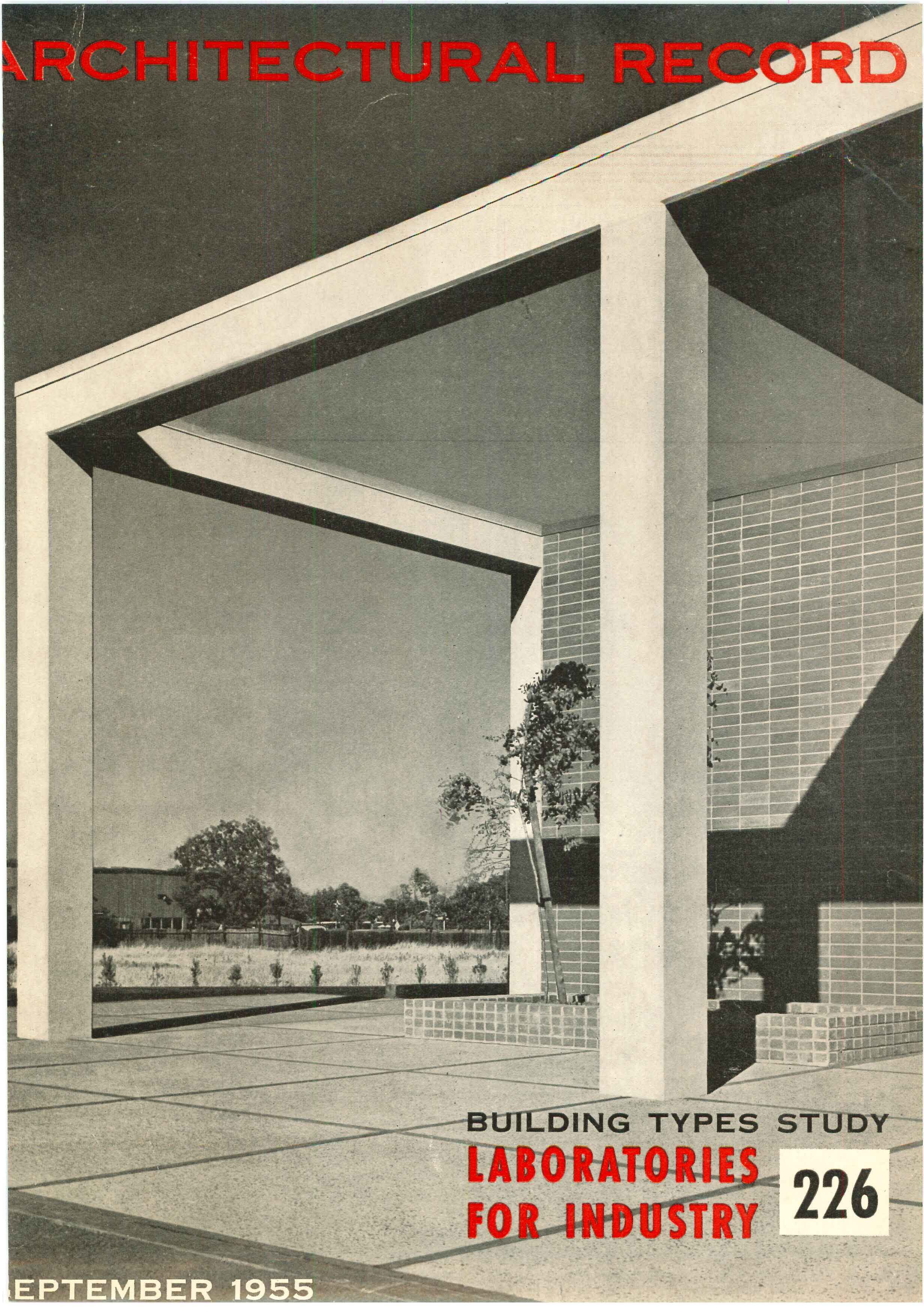
ARCHITECTURAL RECORD



BUILDING TYPES STUDY

LABORATORIES FOR INDUSTRY

226

SEPTEMBER 1955

Schlitz Brewing Company, Van Nuys, California
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Consltg. Struct. Engrs.—Brandow & Johnston, Los Angeles
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* For a given set of materials and water-cement ratio, unit water content (water required per cubic yard of concrete) is the most important basic factor affecting the quality of concrete. A.C.I., Committee 613, 1944 Report, Page 655. Bureau of Reclamation Concrete Manual, 5th edition, Page 130.

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September 1955 Vol. 118 No. 3

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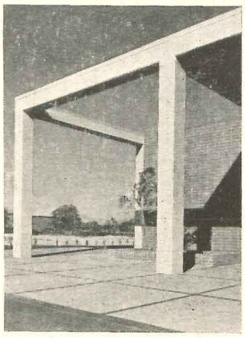

COVER: Microwave Laboratory for G. E., Palo Alto, Calif.; John Carl Warnecke, Architect; Rondal Partridge, Photographer

Continued on next page

Continued from page 5

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PERSPECTIVES

Architectural intelligence: The Quadronial House, "a split-level Colonial," is among the latest builders' offerings in Darien, Conn.

Our readers write: What one engineer likes best about the Record — "It is a dynamic synopsis of the synoptic situation in the architectural field taken in logical sequence." (You-never-know-your-strength dept.)

Trend: "The most important thing to keep in mind about interior design today is comfort," the July issue of *Interior Design* advised its readers.

Public relations note: "Simply beautiful, beautifully simple . . . Chevrolet's *modern beauty*, like that of modern architecture, springs from clean, uncluttered design" ran the heading for a full-page advertisement that ran in newspapers across the country a while back. The illustration featured a sketch of a Chevrolet radiator grille whose pattern bore an unmistakable resemblance to the fenestration of a tall building slab in the background.

It must have been the heat," *Engineering News-Record* suggested. "The House Appropriations Committee last week denied funds for construction of the new Air Force Academy on the ground that the design was too modernistic, and that Frank Lloyd Wright thought so too! The next obvious step is to commission Mr. Wright to make a 'conservative' design. At least that would be one sure way for the committee to come to the conclusion that its foray into architectural criticism was a mistake — attributable perhaps to the heat."

Late in July Mr. Wright sent the Record a second statement commenting on the Air Force Academy design. In the main, it repeated the views of the first (AR, August 1955, page 18), but it began as follows: "Concerning the extreme use of glass in designs for the Air Force Academy, I am reminded of the housewife up before the judge for beating her husband. She pleaded, 'Oh, judge, it wasn't so much *wot* 'e said as *the nawsty way 'e said it*.' Not so much the extreme use of glass. No, I feel the entire design has no sense whatever of the beautiful virtue of the site nor granted a thing to the nature of the occasion. The design was of the sort to be expected," etc.

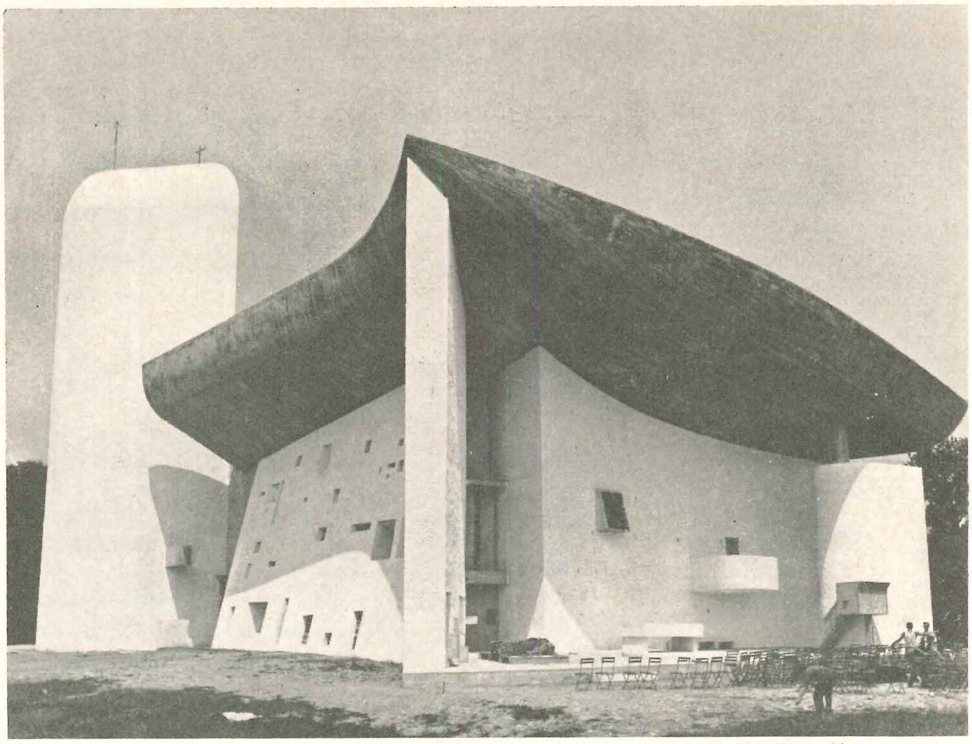
There was never any doubt that most Congressmen felt that if there is a time for extensive use of glass and metal in buildings, the Air Force Academy does not provide such an occasion; but, perhaps to reassure themselves about the validity of their esthetic instincts, a Senate subcommittee considering the Academy appropriation had the masonry industry in to testify. Witnesses included Harry C. Plummer, director of engineering, Allied Masonry Council; John J. Murphy, secretary, Bricklayers, Masons and Plasterers International Union of America (AFL); Neil Boldrick, vice president and general sales manager, Acme Brick Company; Gilbert E. West, Washington representative, Carthage Marble Corp. and Candoro Marble Co.; Charles Penn, vice president, Indiana Limestone Corp.; Robert C. Cradock, president, Stone Center Inc.; and John Taheny, president, Mason Contractors Association of America. Their views are reflected in these excerpts from their testimony: "In my 20 years' experience in this field, I have never met one responsible person, designer or engineer, who ever claimed that metal or glass could compete with masonry cost" (Plummer). "For our government to go into a situation of this kind and to give any thought or consideration to putting up the monstrosities which have been demonstrated to us . . . seems impossible. We may find ourselves in the same position as you find the steel companies and the aluminum companies who have gone into that field in continually repairing and trying to make watertight these buildings" (Murphy). "Marble is also used widely today as a skin facing on buildings. An inch and one quarter marble facing can be installed for as little as $3.50 per sq ft. This is cheaper than metal, though I dislike the comparison. One does not compare the ridiculous with the sublime" (West). "Give us the plans for the Air Academy and we will give you a specific estimate on the cost of stone. It will be less than metal, far more desirable, and the first cost will be the last" (Penn). "This is not a modern design but a crude neglect of decades of progress by the architect and mechanic. . . . I strongly urge that this Air Force Academy be planned and built as a national shrine which will endure forever. Stone symbolizes the beauty of the ages" (Cradock). "I just want to assure this committee that if masonry materials are used in any way, shape or form, we have available in this country at least 2000 contractors with the tools, the staff, the know-how, that are ready and willing to build this Air Academy in masonry" (Taheny).

Before a conference committee in the last days of the Congressional session restored $20 million of the $79 million which had been requested by the Air Force to start construction of the Academy, architects Skidmore, Owings & Merrill had presented before both House and Senate subcommittees revised (though not final) plans which Mr. Owings testified represented a reduction of "80 to 90 per cent" in glass areas.

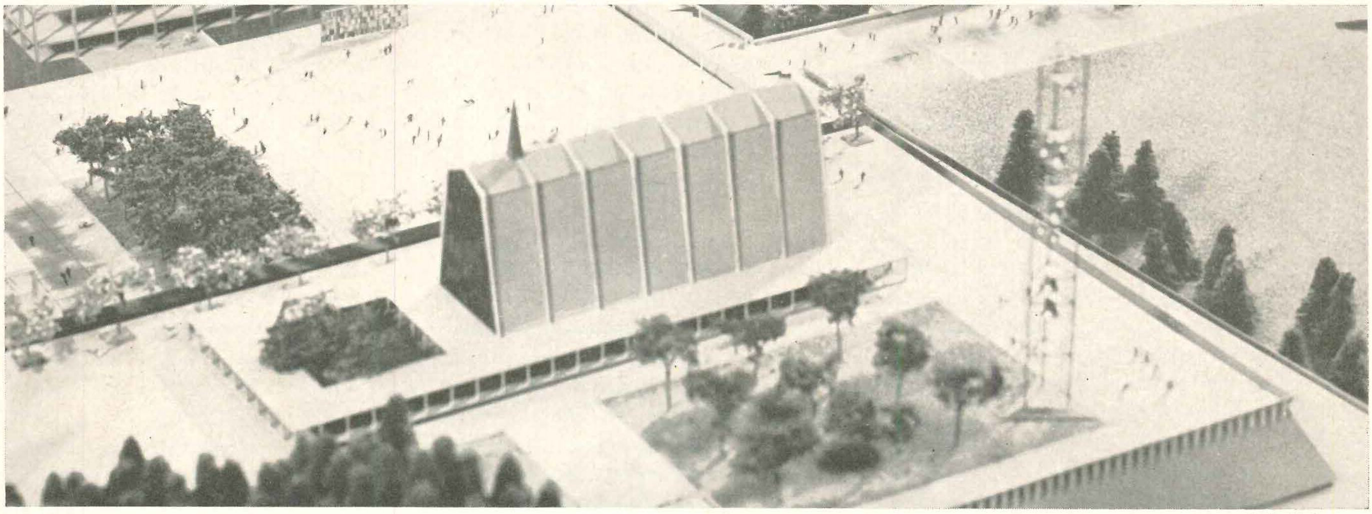
THE RECORD REPORTS

BUILDINGS IN THE NEWS

LE CORBUSIER'S FIRST CHURCH was dedicated in June at Ronchamp, a tiny village in the foothills of the French Vosges long known to devout pilgrims for its miraculous Madonna. The old church of Notre Dame du Haut having been destroyed in the Liberation battles of 1944, it was decided, for reasons of economy, to construct the new church of reinforced concrete, and Le Corbusier was asked to design it. He gave it a great roof made of two bent concrete bowls to dominate the "outdoor church" required for occasions when as many as 15,000 pilgrims may congregate; within, a muted light from the three towers, which serve as light wells, and the openings in the sloping concrete walls, filled with variously angled different colored glass panes

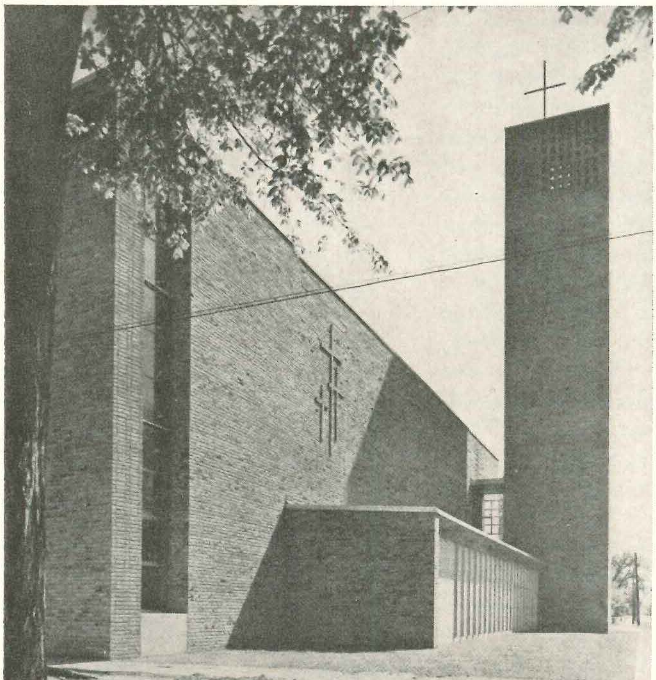


Rene Burri—Magnum

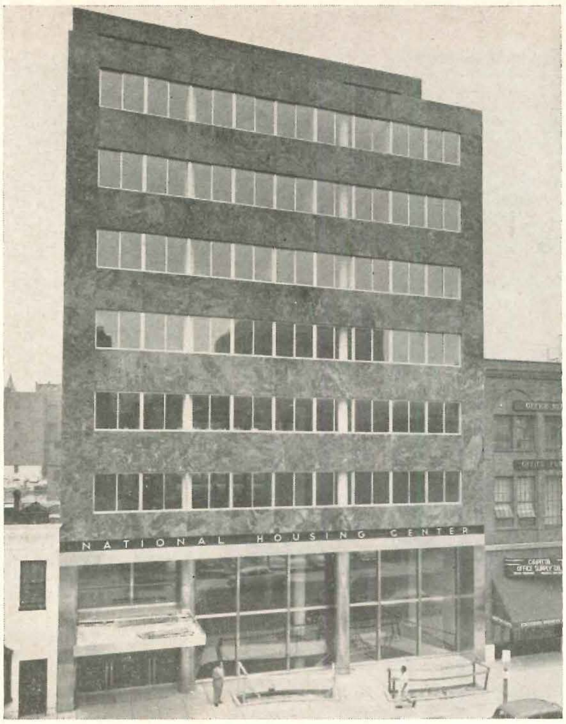


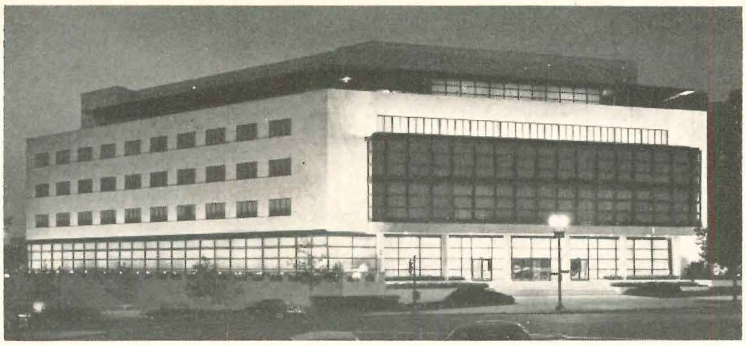
U. S. Air Force

CARDBOARD UNPLEATED — What might be called an "interim model" of the cadet chapel (photo above) turned up to replace the controversial design shown in the initial presentation last May of the basic architectural concept of the U. S. Air Force Academy by architect-engineers Skidmore, Owings & Merrill. Air Force representatives kept assuring irate Congressmen the original chapel model (AR, June 1955, facing page 172) was "nothing but pleated cardboard" — after it had been replaced Mr. Owings himself told Congressmen "this area is what you might call the real estate that has been reserved for a religious edifice." Chapel design will be left to the last

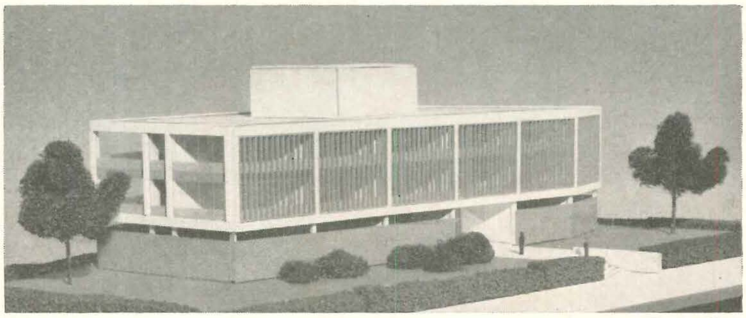


ELIEL SAARINEN'S LAST CHURCH (left) was in the news again this summer as architects in Minneapolis for the A.I.A. annual convention made the five-year-old Christ Lutheran Church a major stop on their private architectural tours. Its pastor, who liked to talk with all his visitors, estimated that nearly 400 architects visited his church during convention week





Ramsdell



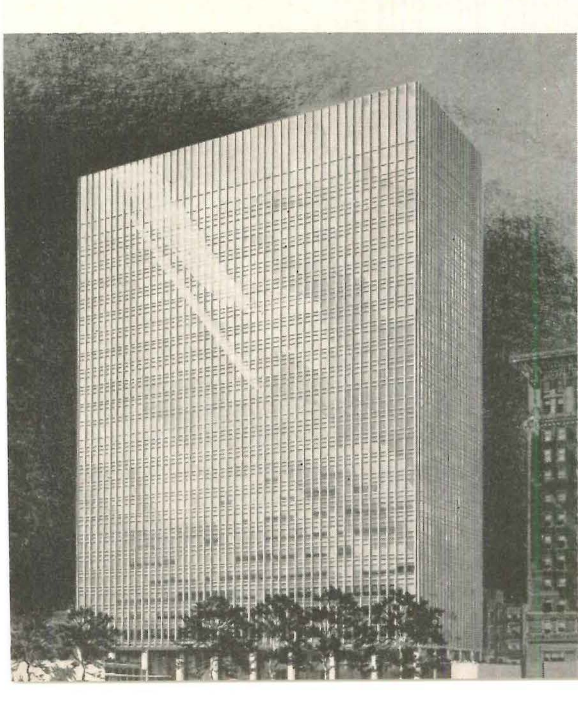
Fremont Davis

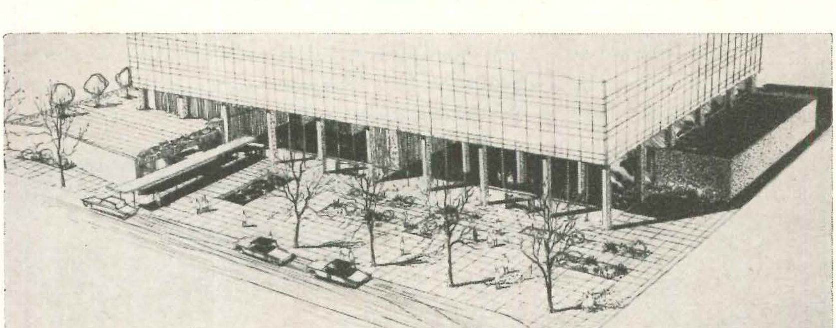
IN WASHINGTON, two more headquarters buildings opened, and another recently under way. Above left: National Housing Center, new eight-story home of the National Association of Home Builders planned as an exhibit and information center for the whole homebuilding industry; Aubinoe, Edwards and Berry, architects. Top right: $5 million white marble headquarters of the International Brotherhood of Teamsters; Holabird & Root & Burgee, architects. Above right: American Association for the Advancement of Science has $700,000 headquarters under construction; Faulkner, Kingsbury & Stenhouse, architects

Gordon Somers

IN LOS ANGELES, the $4 million 13-story office building under way at 3325 Wilshire Boulevard is being built by Tishman Realty & Construction Company as an extension of its new three-building insurance center. Architect: Victor Gruen

Union Oil Company plans a $20 million center comprising a 13-story home office building and three auxiliary office and service units on a five-acre site west of Harbor Freeway overlooking downtown Los Angeles. Architects: Pereira & Luckman

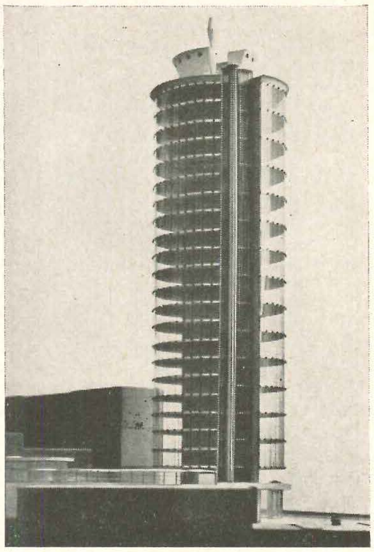




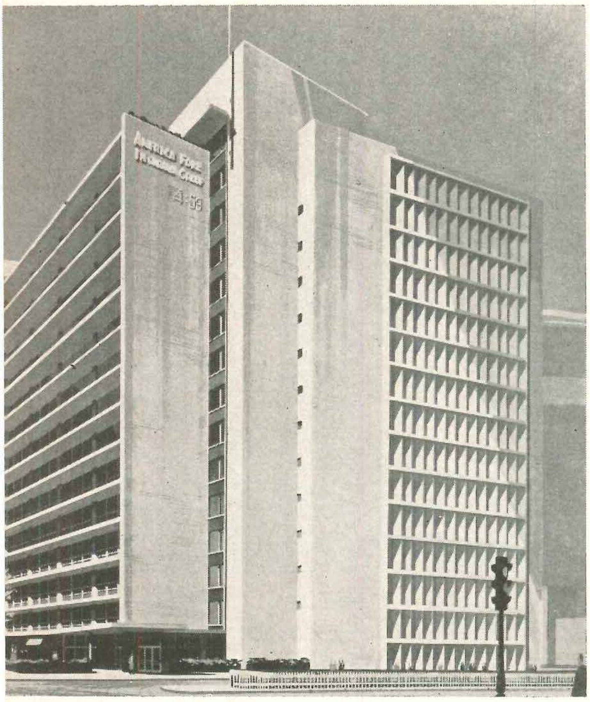
IN CLEVELAND, plans for the first major downtown office building since 1930 were announced by Cleveland Electric Illuminating Company, which will erect a $17 million 22-story glass and aluminum tower on Public Square. Facing the Square will be a paved plaza 200 ft long and 65 ft deep with planting areas and reflecting pools. Architects: Carson & Lundin *(Continued on page 12)*

THE RECORD REPORTS
BUILDINGS IN THE NEWS

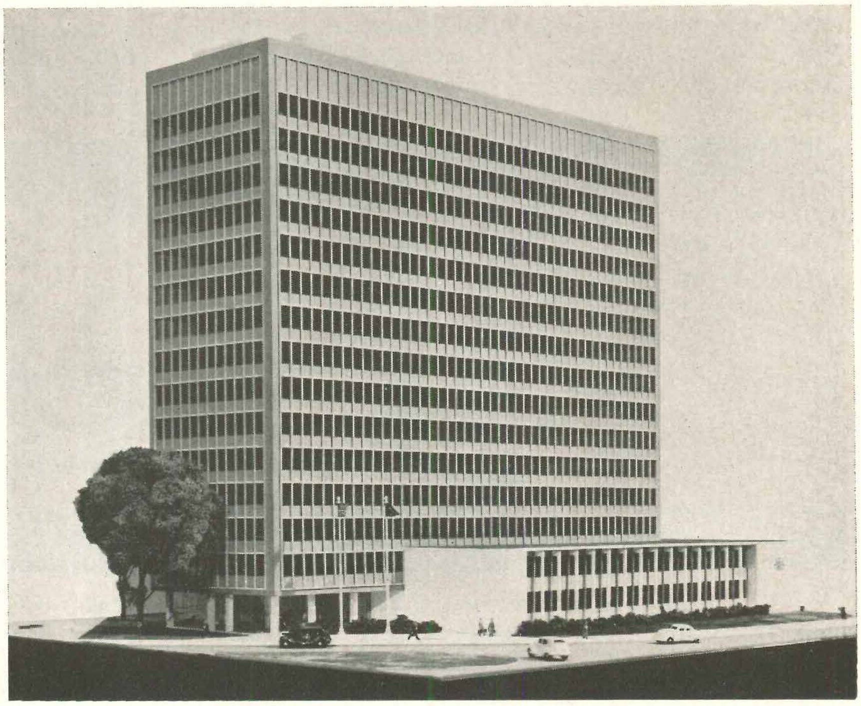
Herbert Bruce Cross



CIRCULAR OFFICE BUILDING for Capitol Records in Hollywood, Cal., to be completed late this year. Rising 12 stories above a rectangular ground floor, the $2 million structure will provide 78,000 sq ft of net usable area out of a total gross area of 92,000 sq ft. Architect: Welton Becket. Model photo at right above is shown in the August issue of the Italian Domus, *which reports "first prestressed concrete skyscraper will be built on the Italian coast." Floors would be cantilevered from a central core containing elevators. The architects are Angelo Mangiarotti and Bruno Morassutti*

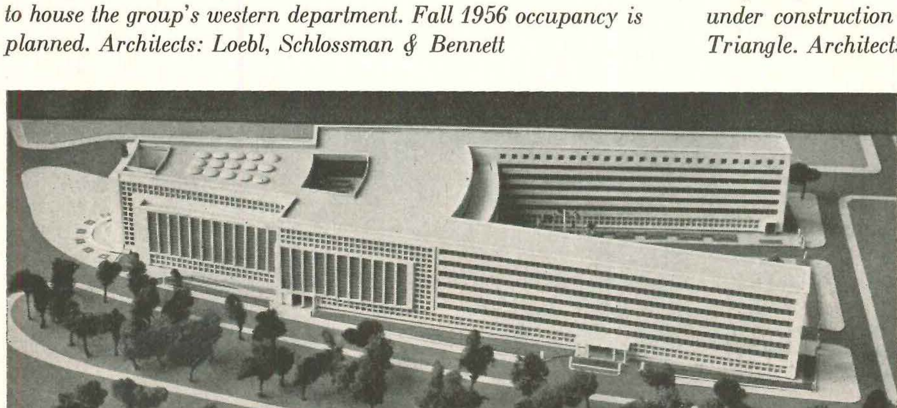


Hedrich-Blessing



IN CHICAGO, the America Fore Insurance Group is building a 14-story office building at Jackson Boulevard and Wacker Drive to house the group's western department. Fall 1956 occupancy is planned. Architects: Loebl, Schlossman & Bennett

IN PITTSBURGH, the first multi-storied office building to be completely sheathed in colored anodized aluminum sheets is under construction — a new state office building in the Golden Triangle. Architects: Altenhof & Bown



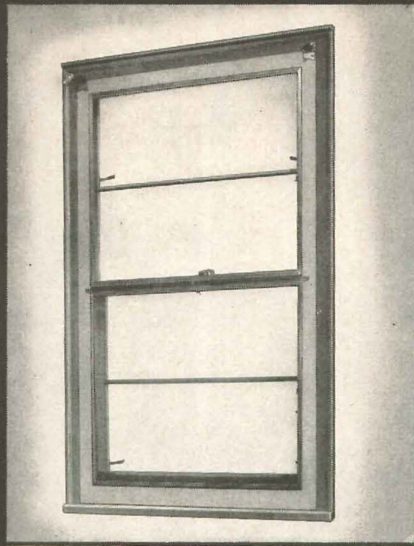
NATO'S PERMANENT HEADQUARTERS in Paris (model photo at left) will be built on a site provided by the French government at Place de la Porte Dauphine. The French government also selected the architect, Jacques Carlu, Inspector General of Civil Monuments in France. The plans, approved by Paris authorities, provide some 900 offices in addition to NATO's main Council Chamber, a number of smaller committee rooms, restaurants, press facilities and library

(More news on page 15)

new client appeal

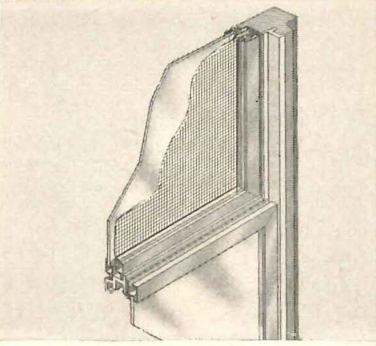
Big improvement in Pressure Seals

3

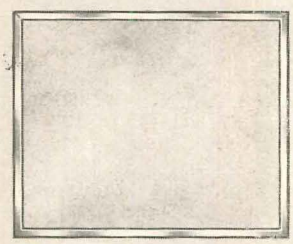


Fits Pressure Seals exactly! The new combination window is made to go with Andersen Pressure Seals. They team up to offer the best looking, most weathertight, most convenient double hung unit on the market.

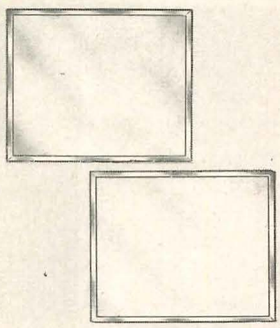
Easy sash removability of all Andersen Pressure Seal Units makes the new Self-Storing Unit a doubly easy-to-use combination window. All panels can be removed, all cleaning can be done from inside the home.



Sturdy 1½″ treated frame with aluminum center bar. Nylon strikes for screen and top storm panel installed. Plastic guide for bottom storm panel installed. Hangers and locks for applying to frame.



One screen panel. Panel has all-weather aluminum frame. Fasteners already applied at factory. Panels are wired with rugged Alclad aluminum screen cloth. Will withstand year 'round exposure.



Two storm panels. Each panel made of quality window glass set in narrow aluminum frame. Designed to be good looking, strong, yet light in weight to assure ease of handling whenever necessary.

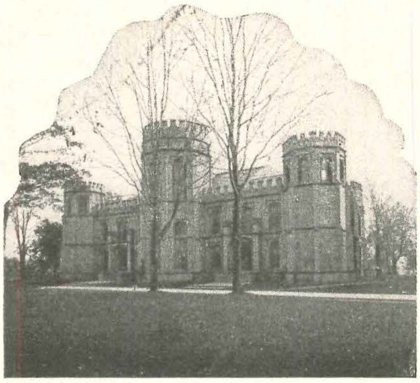
HEIGHT ↓ / WIDTH →	1'-8"	2'-0"	2'-4"	2'-8"	3'-0"	3'-4"
3'-2"		X	X	X	X	X
3'-6"		O	O	O	O	O
3'-10"		X	X	X	X	X
4'-2"	X	X	X	X	X	X
4'-6"	X	X	X	X	X	X
4'-10"		O	O	O	O	O
5'-2"	X	X	X	X	X	X

There's a wide selection of sizes offered by the Andersen Self-Storing Combination Window. Just look over the size table. You'll find 28 sizes (*marked x*) designed to fit perfectly with Andersen Pressure Seal Units. What's more, you'll find 10 extra sizes (*marked o*) have been added to the line to make it adaptable to most modular stock size windows.

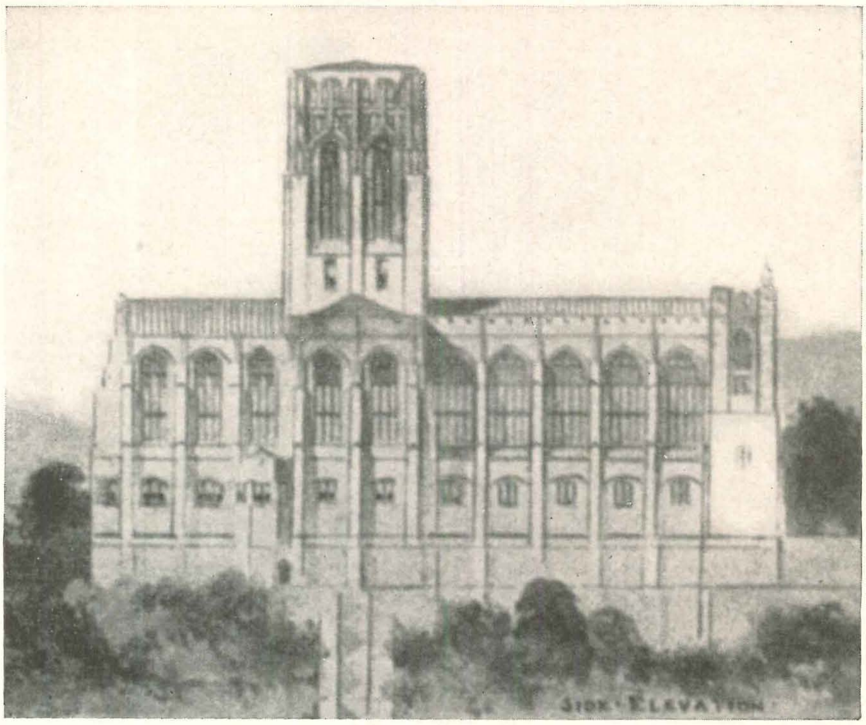
Andersen

THE U. S. MILITARY ACADEMY: "A CISATLANTIC MONT ST. MICHEL"

Architectural Record, December 1903

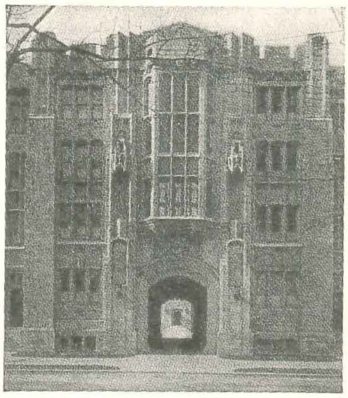


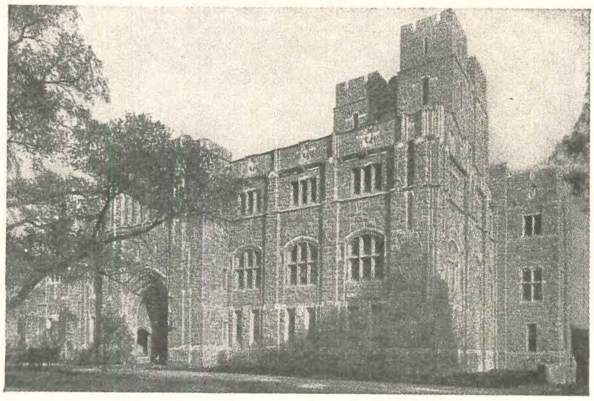
Architectural Record, December 1903



Above: Cram, Goodhue and Ferguson's rendering of the accepted chapel design, which Schuyler said would be "recognized as one of the most notable achievements of 'early twentieth century' Churchbuilding in America, or for that matter in Europe"

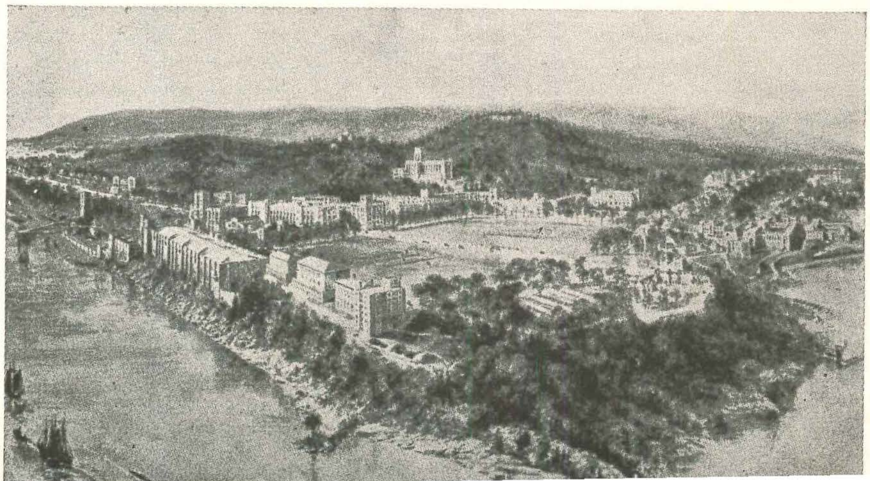
Architectural Record, January 1911





Schuyler found the face of the cadet barracks (above, left) suitable, but thought the yellow-brick back lamentable, and commended the heraldic display of States' shields ("wretchedly unheraldic material") on the post headquarters building (above, right). Below: the architects' 1903 "bird's-eye view" rendering of the campus

Architectural Record, January 1911



Prompted by the controversy over the proposed design for the Air Force Academy near Colorado Springs and by the oft-expressed wish for an architecture that would measure up to that of the United States Military Academy, the RECORD turned back to its pages commenting on the 1903 competition for the expansion of West Point for the articles in which Montgomery Schuyler, the magazine's leading critic at the time, reviewed the winning design of Cram, Goodhue and Ferguson on two occasions: in December 1903 after the selection had been announced, and in January of 1911, when comments on the finished buildings formed a major part of a review of the firm's work.

Schuyler found himself, on the whole, well pleased with the design, commenting in the 1903 article: "The future voyager up or along the Hudson, if he be of a sensitive constitution, will not fail to feel, as he glides or whirls to the northward, from the first vista that is closed by the hotel, past the second that is closed by the higher and remoter chapel, and so past Trophy Point, that all this work is of a piece, that it is the appropriate architectural expression of the United States Military Academy, with its tradition of a hundred years, and that it gives the sense of an indigenous growth and not of an exotic transplantation." But at the same time, Schuyler added, "If he be of a reflective as well as of a sensitive turn, it may occur to him to inquire why the architectural style in which these results have been attained is not capable of a very wide extension, why it might not be developed into some much more vernacular and vivid and vital expression of American life in the twentieth century than can be attained in the 'modern Latin' of an architectural language, which has the advantage

(Continued on page 394)

SURCO TERRAZZO type flooring is here tastefully blended with modern furniture to provide a cheerful and congenial atmosphere to this office lobby.

Although most of our floors are waxed this one has remained unwaxed since its installation nine months ago, yet it still retains a glossy finish.

SURCO TERRAZZO was applied ¼"-⅜" thick after the concrete slab was completely cured. In this particular installation no expansion joints were used. Drilling through the floors for telephone or electrical wiring presents no problem since SURCO TERRAZZO will not crack or craze from ordinary drilling operations.

For beautiful economical floors with resilience comparable to quality hardwood floors, use SURCO terrazzo-type material.

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See Sweets Architectural File for further information on SURCO products for home and industry.

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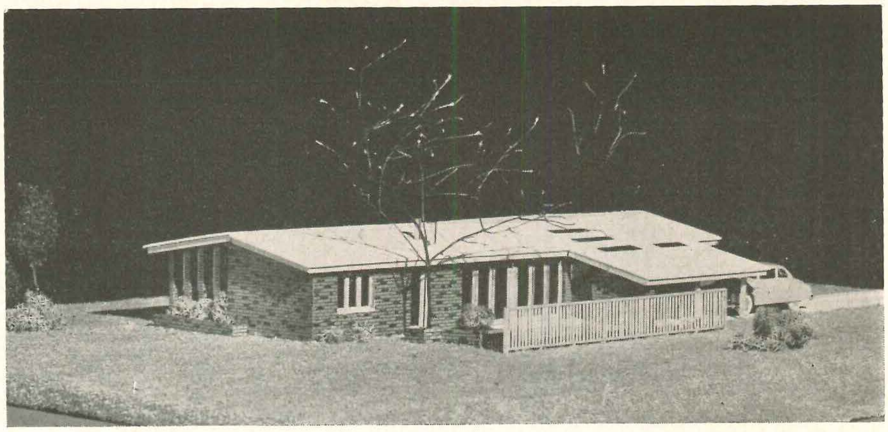
NEWS FROM CANADA

(*Continued from page 28*)

"HOME '55" COMPETITION AWARD WINNERS ANNOUNCED

This year's only cross-Canada competition in the field of residential design — the *Canadian Home Journal's* "Home '55" project — was recently concluded. First prize winner is Kenneth Henry Foster of Toronto, a young architect who took his architectural training on a veteran's educational grant following active war service. Money value of the first award is $1100, with extra fee of $750 for preparation of working drawings and specifications which the magazine will later make available to the Canadian public at a nominal charge.



Top winner in "Home '55" competition

Second prize of $650 went to Hunter J. White and Ralph Cole, of Vancouver, B. C.; and this team also won an honorable mention of $100 for a second entry. Third prize, $250, was awarded to George S. Abram, Toronto, who last year took first place.

The competition is open to registered architects only. This year's program called for a house "of outstanding architectural character," designed for a family with three children, and offering quiet areas for each member and a measure of privacy from street and neighboring buildings. Maximum floor area was set at 1525 sq ft.

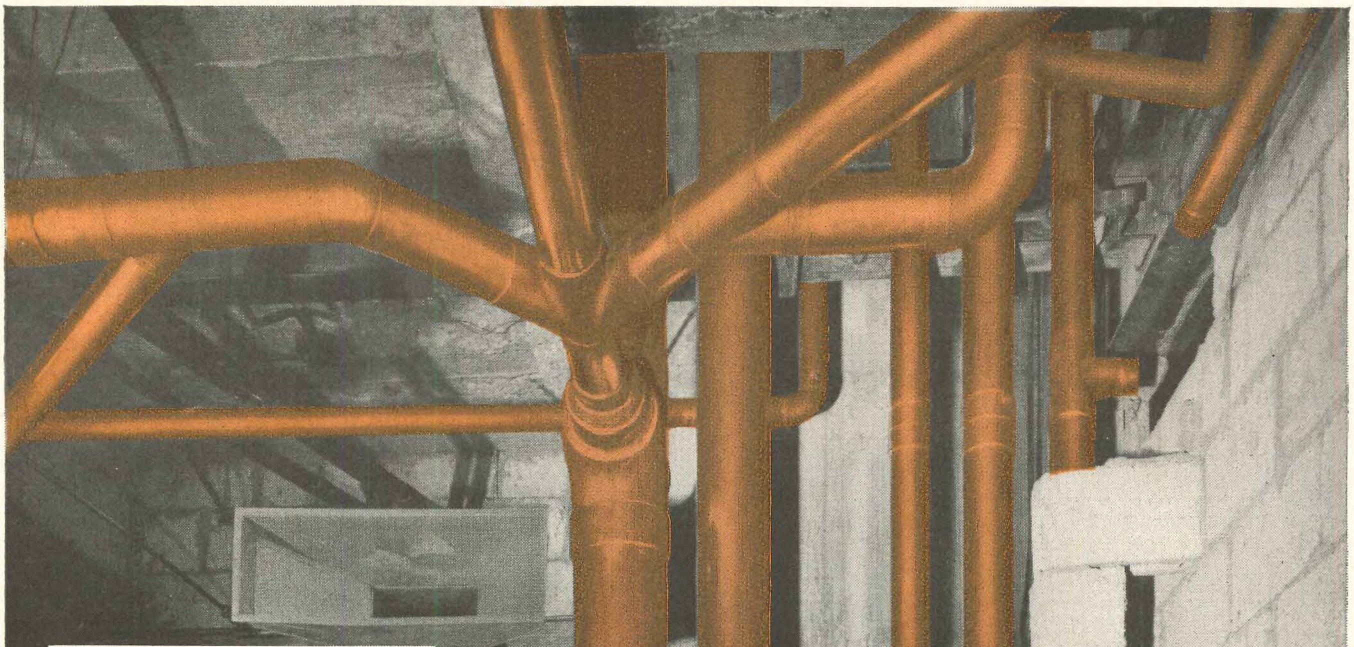
Judges were George D. Gibson, president of the Ontario Association of Architects; Charles R. Worsley, design master, School of Architectural Technology, Ryerson Institute, Toronto; and Mary-Etta Macpherson, editor of *Canadian Home Journal.*

AIR TERMINAL FOR CALGARY TO DOUBLE AS CIVIC CENTER

One of the few air terminals in Canada financed and administered by the community rather than the Federal Department of Transport is Calgary's projected building, to cost an estimated $1,250,000.

Clayton & Bond of Calgary are architects for the terminal, which is planned to provide the city with a civic center as well. Space is provided for concessions and commercial displays, and the building is designed to permit later expansion in two directions.

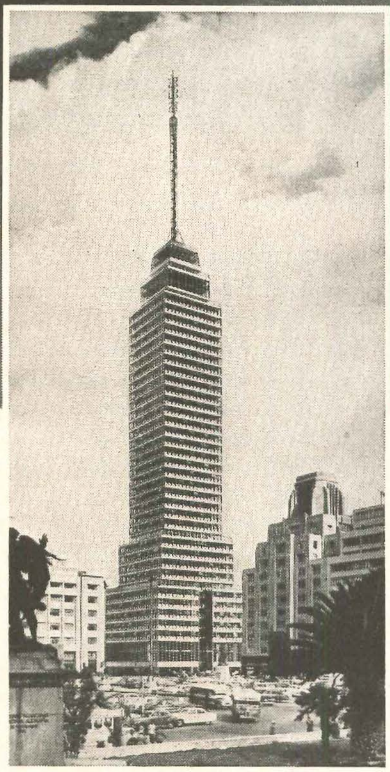
(*Continued on page 32*)



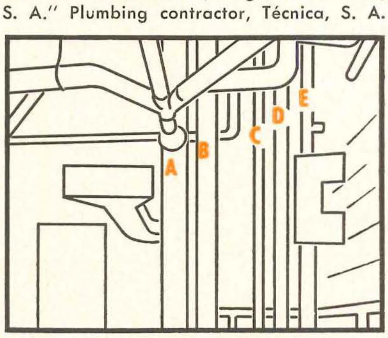
Main pipe shaft. Note compact assembly made possible by the trim, space-saving copper tube and fittings. See pipe sizing diagram below, left.

43-Story all-copper plumbing . . . in Mexico's tallest building

COPPER | hot and cold water lines
sanitary drainage system
roof drainage lines



Mexico's newest and tallest skyscraper. General Director: Adolfo Zeevaert, C. E. Constructed by the Engineering Department of "La Latino Americana, Seguros de Vida, S. A." Plumbing contractor, Técnica, S. A.



A. 8" soil stack. B. 6" vent. C. 3" hot water. D. 4" cold water. E. 3" waste for future use. Laterals to soil stack are 4". All sanitary drainage lines are Type M.

100,000 pounds of copper tube, Types K, L and M, provide lasting protection against rust in the plumbing system of this beautiful, ultra-modern office building of the Latino Americana Insurance Company, Mexico City. Tube sizes ranged from ½" to 12" incl. Anaconda tube was used throughout, with Nacional de Cobre of Mexico furnishing the smaller sizes.

For a skyscraper or a small home, copper tube plumbing saves installation time and effort . . . often the over-all cost is less. Its light weight makes it easy to handle. Standard 20' lengths eliminate many joints. Assembly work with solder-type fittings is quickly and easily accomplished.

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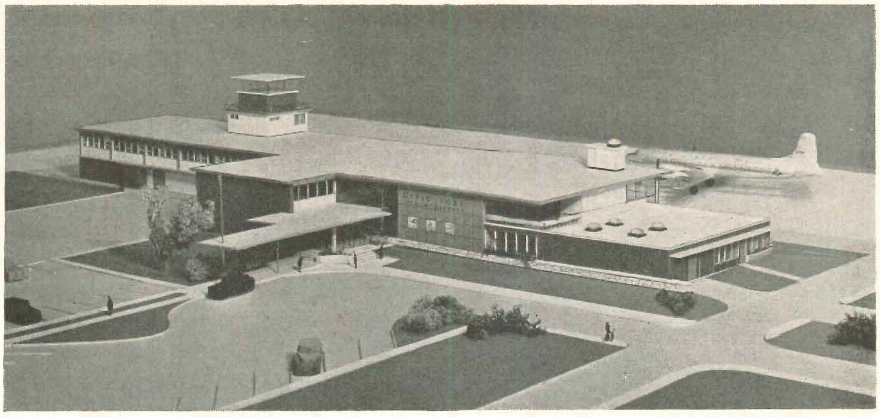
for copper tubes see your
ANACONDA®
distributor

THE RECORD REPORTS

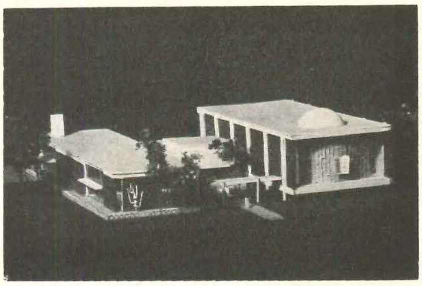
NEWS FROM CANADA

(*Continued from page 30*)

Site of the terminal is as close to the center of the runway pattern as possible, and an access road separates hangar areas from passenger- and cargo-handling areas. The hangars are located so they will not interfere with passenger station expansion, but to keep aircraft taxiing distances to a minimum.



Model of Calgary's new air terminal



SYNAGOGUE FOR TORONTO DESIGNED AROUND COURT

The new Shaarei Tefillah Synagogue to be built in Toronto will be composed of three elements enclosing an entrance court. The *sanctuary* is designed to seat 500 people and includes such auxiliary facilities as meeting rooms, library and offices. A *social unit* will provide dining space for four hundred and kitchen facilities to service it as well as a stage. There will also be a separate *chapel*, with the entrance, cloakroom and washroom areas. The sanctuary and social unit will be on two sides of the entrance court, linked by the entrance and lobby section; the chapel will be above the entry.

Of his design, architect Irving Grossman says: "The sanctuary with its east wall of glass, through which may be seen a solid curved wall, is supported off the ground by slender exterior columns. Opposing is the social unit, placed on a low stone pedestal. Its east wall is a rich brown brick, with a free-standing sculpture of the menorah. The tie between the age-old traditions of the religion and the contemporary form of the synagogue will be expressed in the symbolism of the tablets on the east wall of the sanctuary, the menorah and the form of the dome."

NEWS NOTES

John C. Parkin of Toronto has been elected president of the **Canadian Arts**

(*Continued on page 36*)

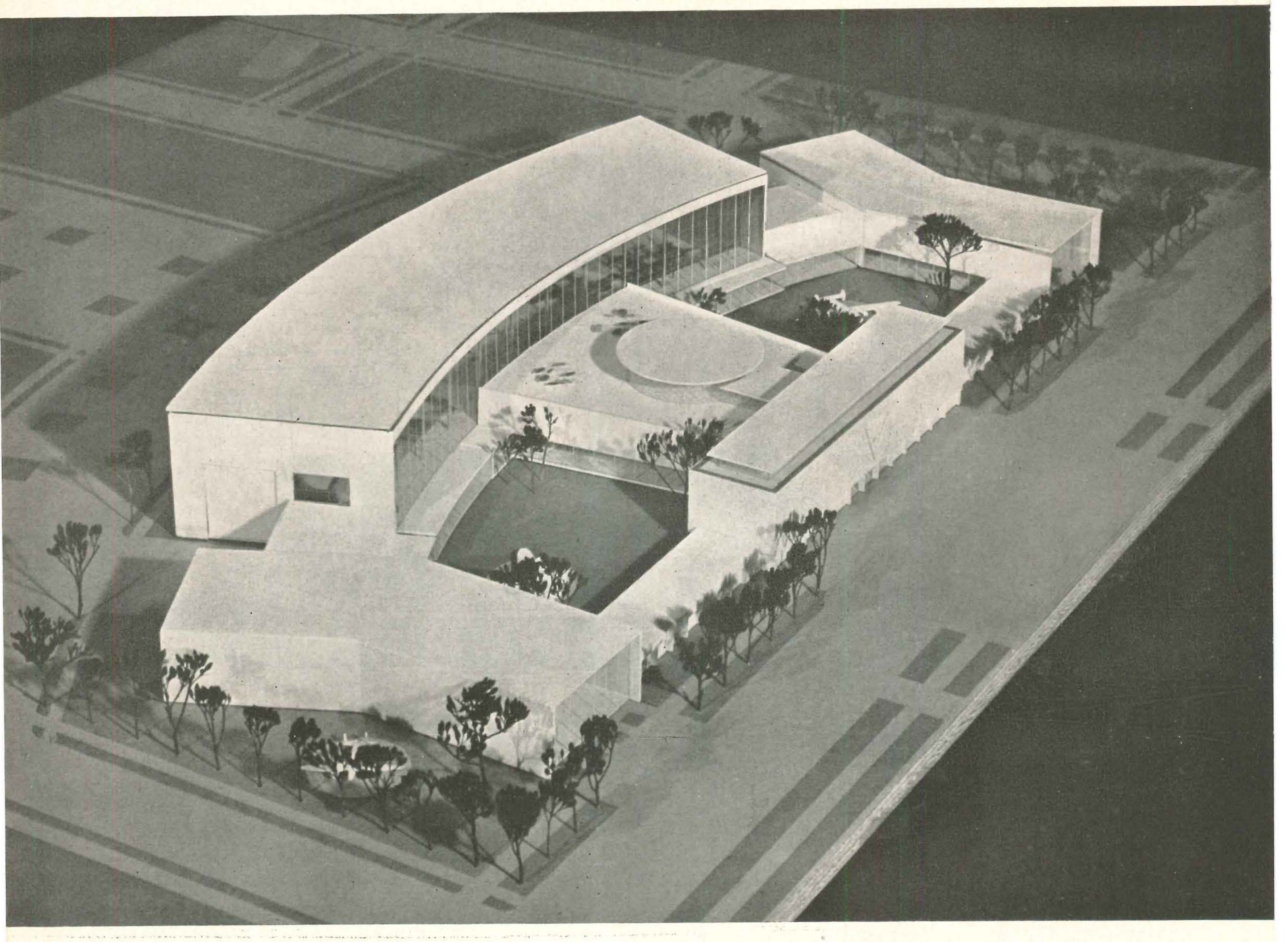
Sketches and Plans by Walker O. Cain

FOR THE AIR AGE

A NATIONAL MUSEUM

The Smithsonian Institution McKim Mead & White, Architects James Kellum Smith, partner in charge Walker O. Cain, Associate Edwin A. Olsen, project Administrator

The Smithsonian Institution

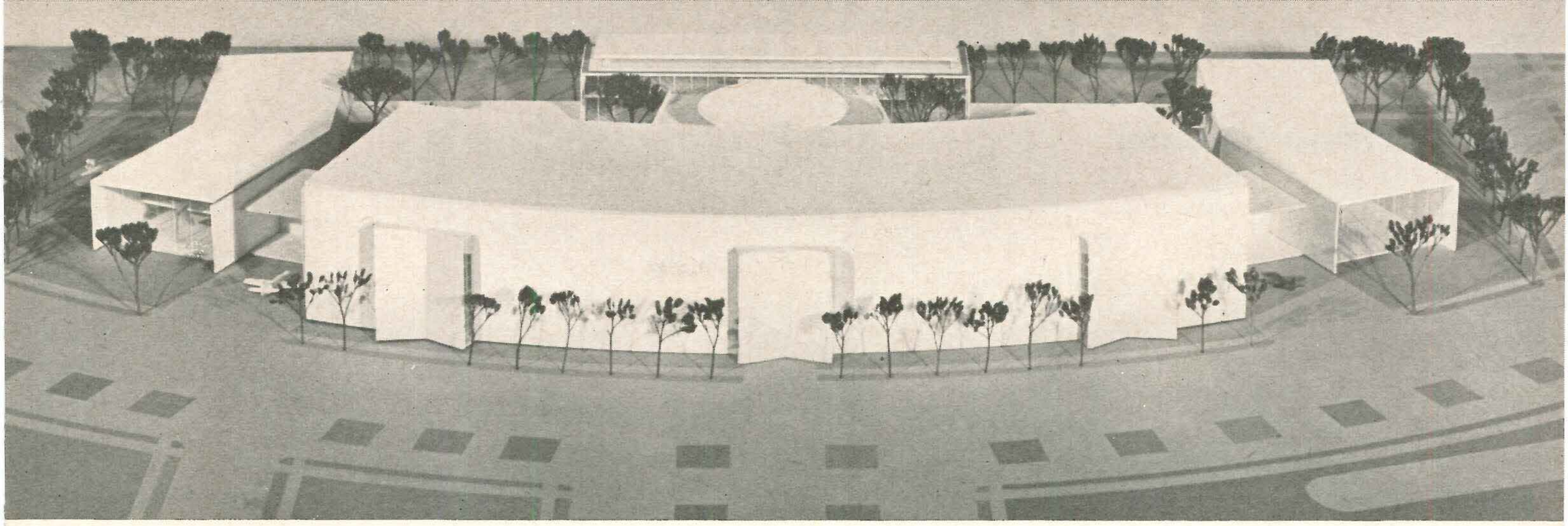


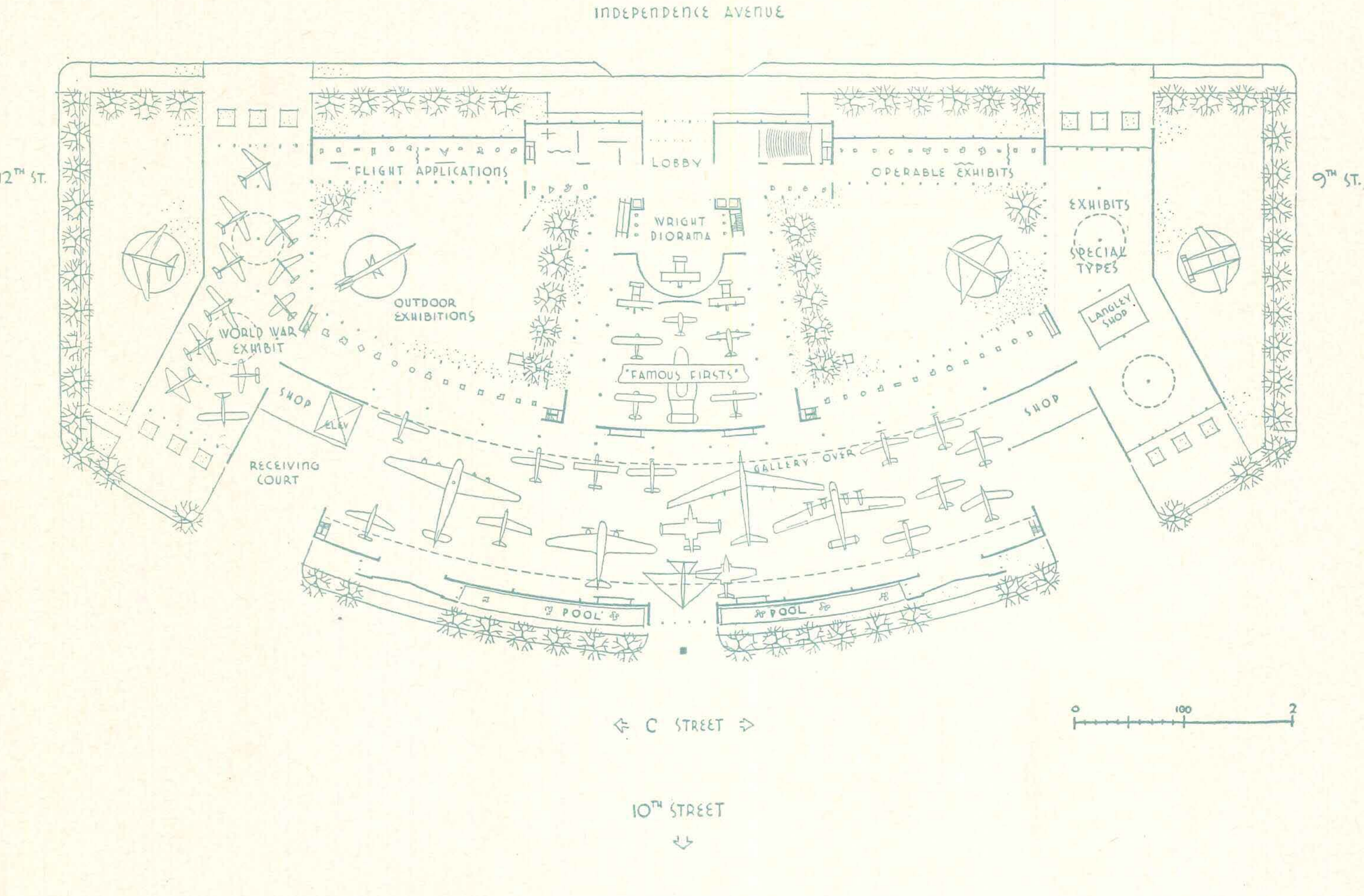
How does one house an exhibit airplane? Anne Lindbergh's "as little housing as possible" appealed to the architects of McKim Mead and White and their proposal for the National Air Museum attempts through varying the degrees of enclosure to avoid excessive confinement while affording adequate protection.

The building has been conceived as a relatively neutral setting rather than an exhibit in itself. New and short-term exhibit planes may be shown outdoors with zoo-like moat protection.

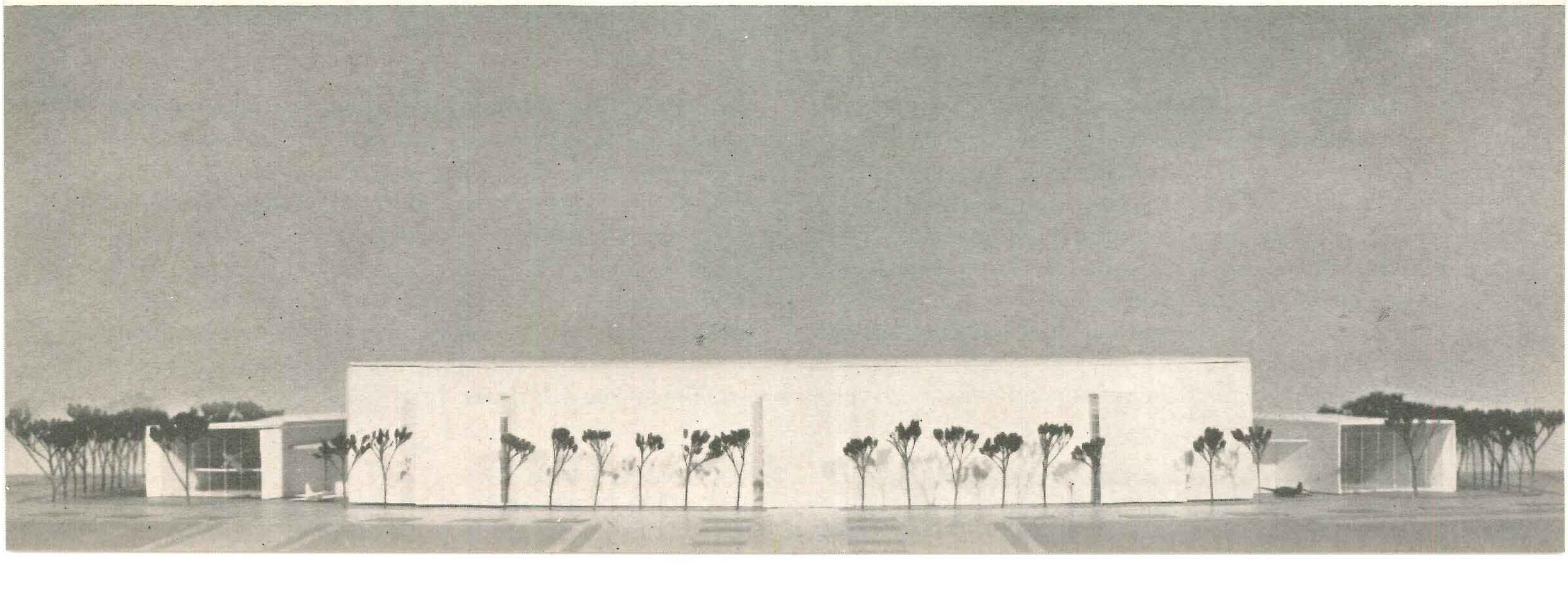
The size of the spaces created problems in scale which have been resolved through locating the smaller elements along the approach from Independence Avenue where existing buildings are relatively small and larger elements to the south in harmony with the larger buildings proposed for that area's eventual development.

The several levels of the entrance unit will house: offices and aeronautical library in the penthouse fourth floor; industrial displays opening onto the third floor

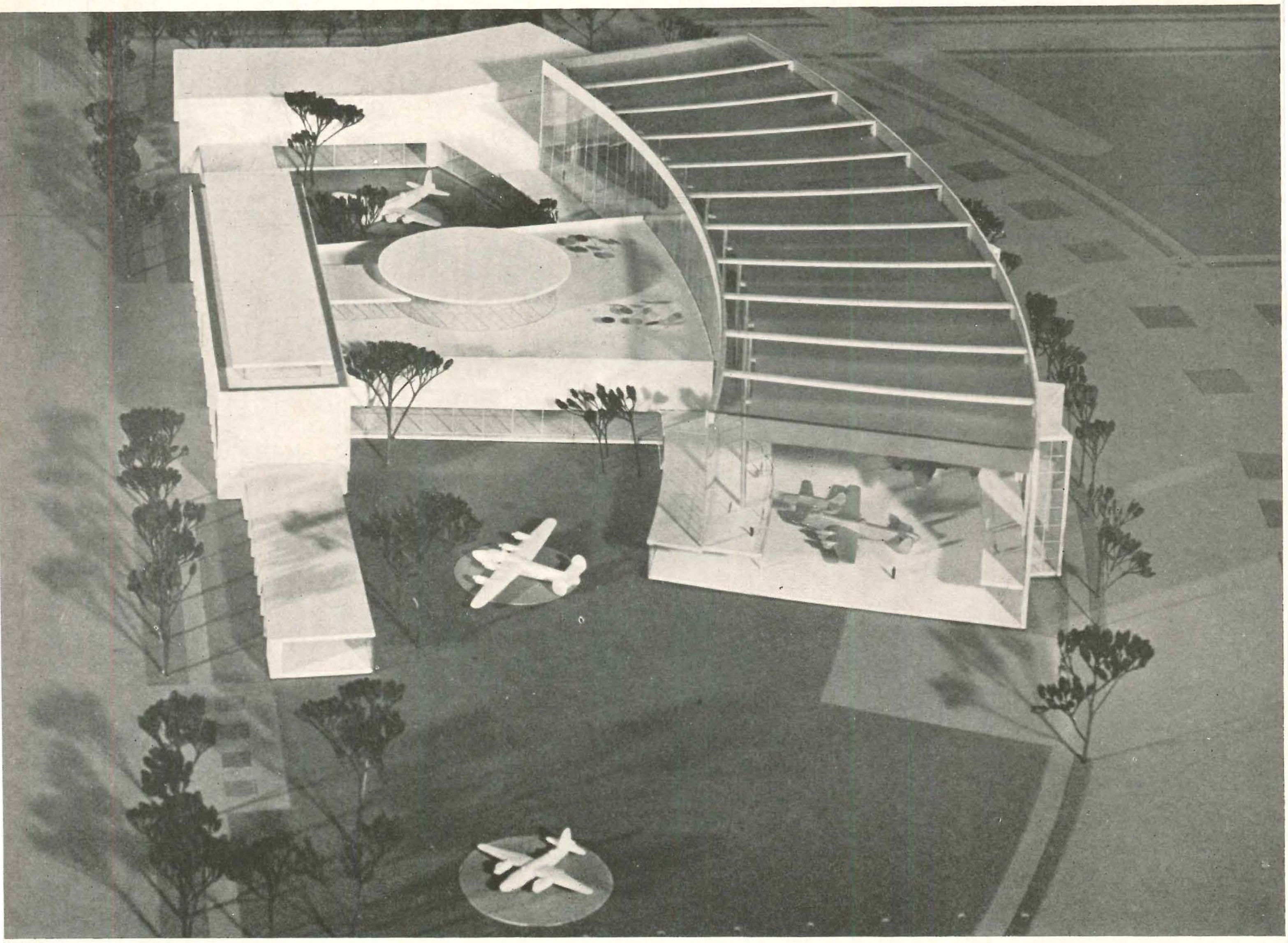




INDEPENDENCE AVENUE
12TH ST.
9TH ST.
FLIGHT APPLICATIONS
LOBBY
OPERABLE EXHIBITS
WRIGHT DIORAMA
EXHIBITS
SPECIAL TYPES
OUTDOOR EXHIBITIONS
WORLD WAR EXHIBIT
LANGLEY SHOP
"FAMOUS FIRSTS"
SHOP
ELEV
SHOP
RECEIVING COURT
GALLERY OVER
POOL
POOL
C STREET
0
100
10TH STREET

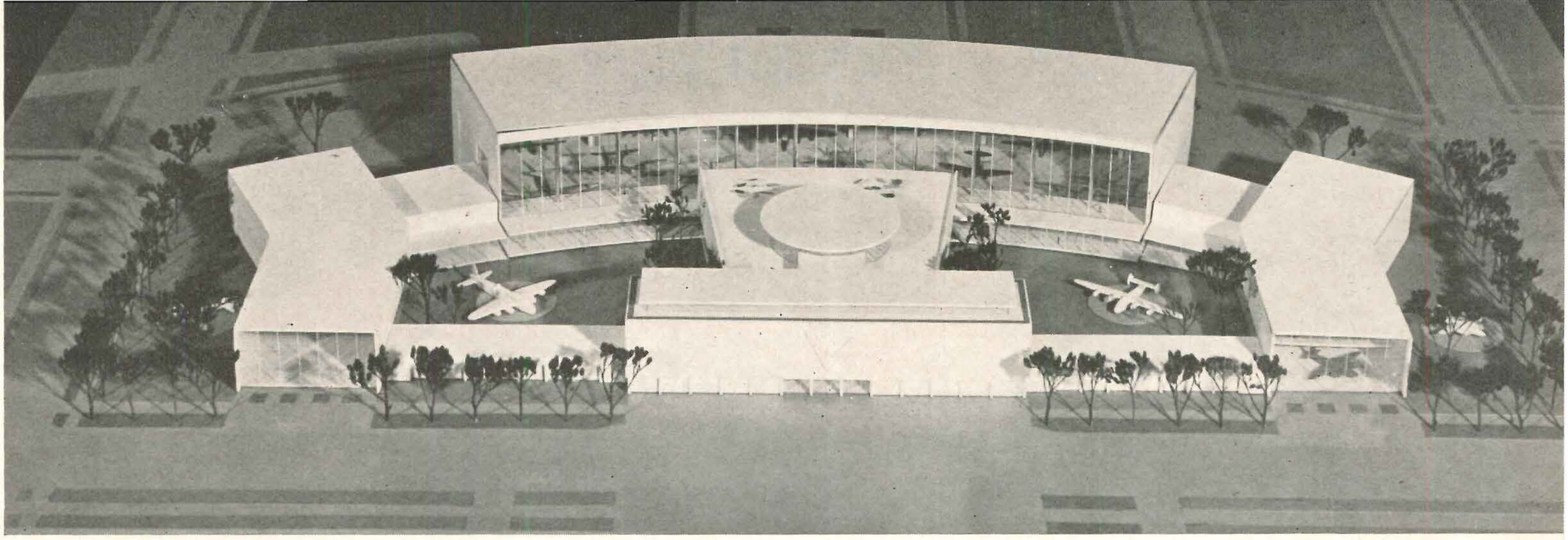


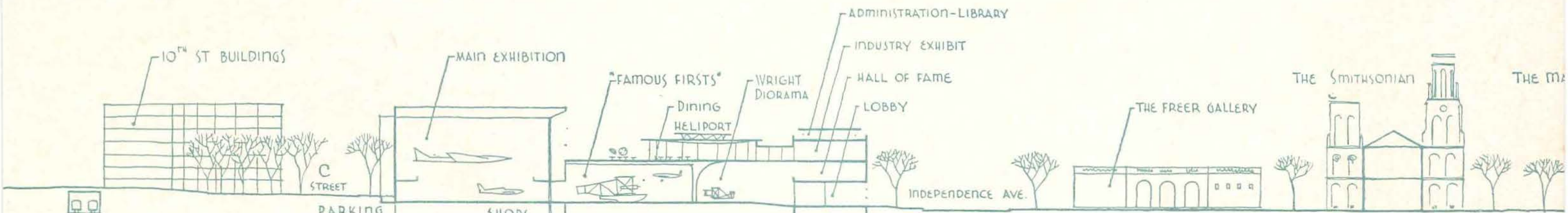
The Smithsonian Institution



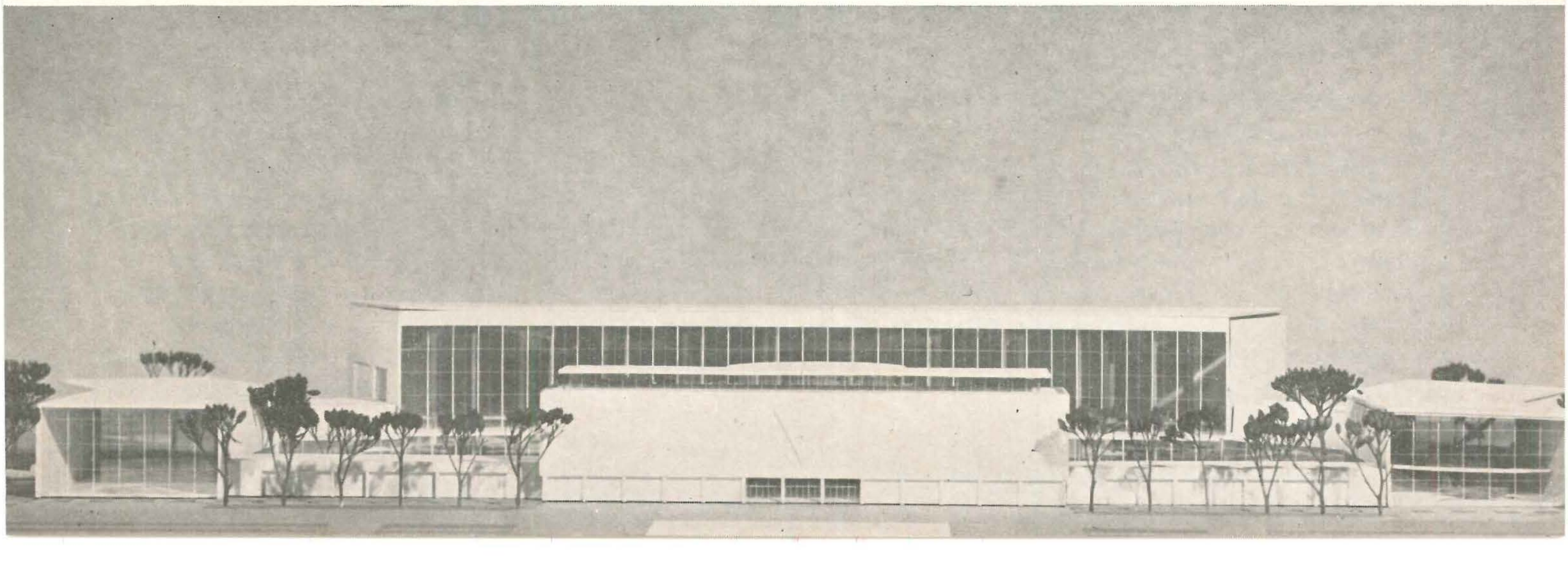
roof terrace and restaurant; a second floor exhibit hall; and a ground floor organized for briefing visitors on what they may expect to find and do in the museum. Those with limited time can see in models and pictures the story of the air's conquest and films and video facilities will assist in making of this a visual card catalog of the museum collection.

Straight ahead of the entrance and visible to passers-by Wright's "Kitty Hawk" will be exhibited as it was in the moment of first flight. Beyond this the Hall of Famous Firsts will be flanked with garden exhibition spaces, and will terminate in the main exhibition room where the bulk of the aircraft collection will be displayed in a space 600 by 160 by 80 ft high. From the floor or elevated moving sidewalk galleries, the suspended planes will be seen against the background of walls curved to invite the sensation of extension. Daylighting from the north will be augmented by a luminous ceiling screening the plane-handling and servicing equipment located in the truss space.

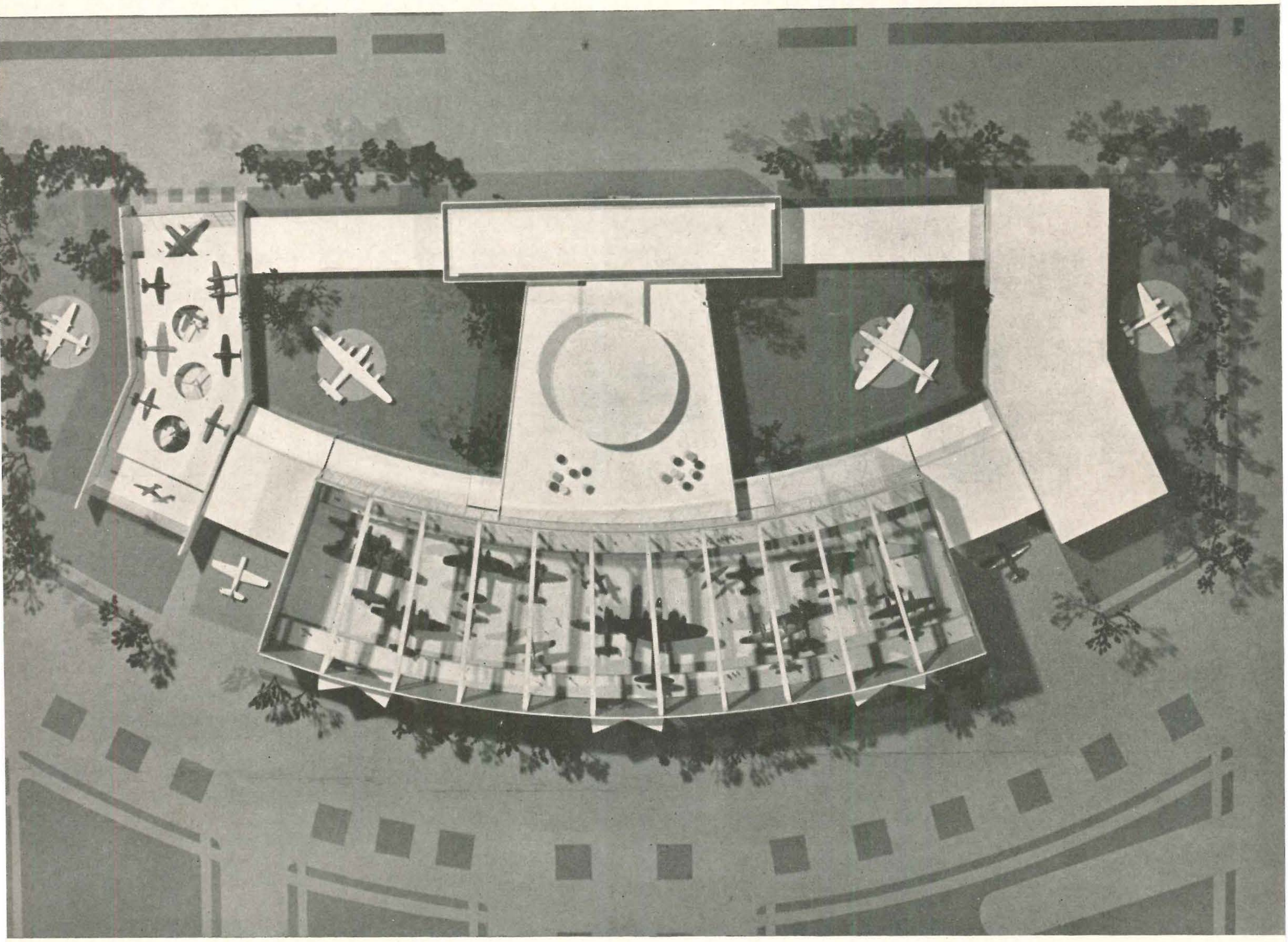




SECTION LOOKING WEST



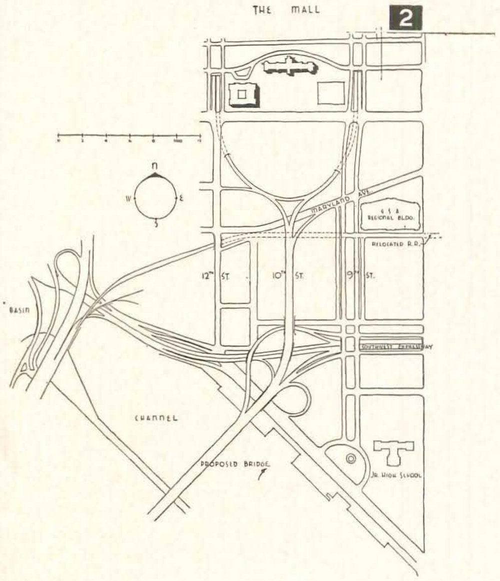
The Smithsonian Institution



The site proposed for the National Air Museum (No. 1 opposite) is a plot that has for some time been tentatively assigned for the use of the Smithsonian. This location facing the Smithsonian with the flanking Freer Gallery and Arts and Industries Building is highly desirable for the proposed museum in terms of its administrative convenience and the convenience of visitors to the various collections. Interestingly the court which the museum would complete is the site of early experiments of Langley, the third Secretary of the Smithsonian. The proposed plot is the only one in the near vicinity large enough to accommodate the building.

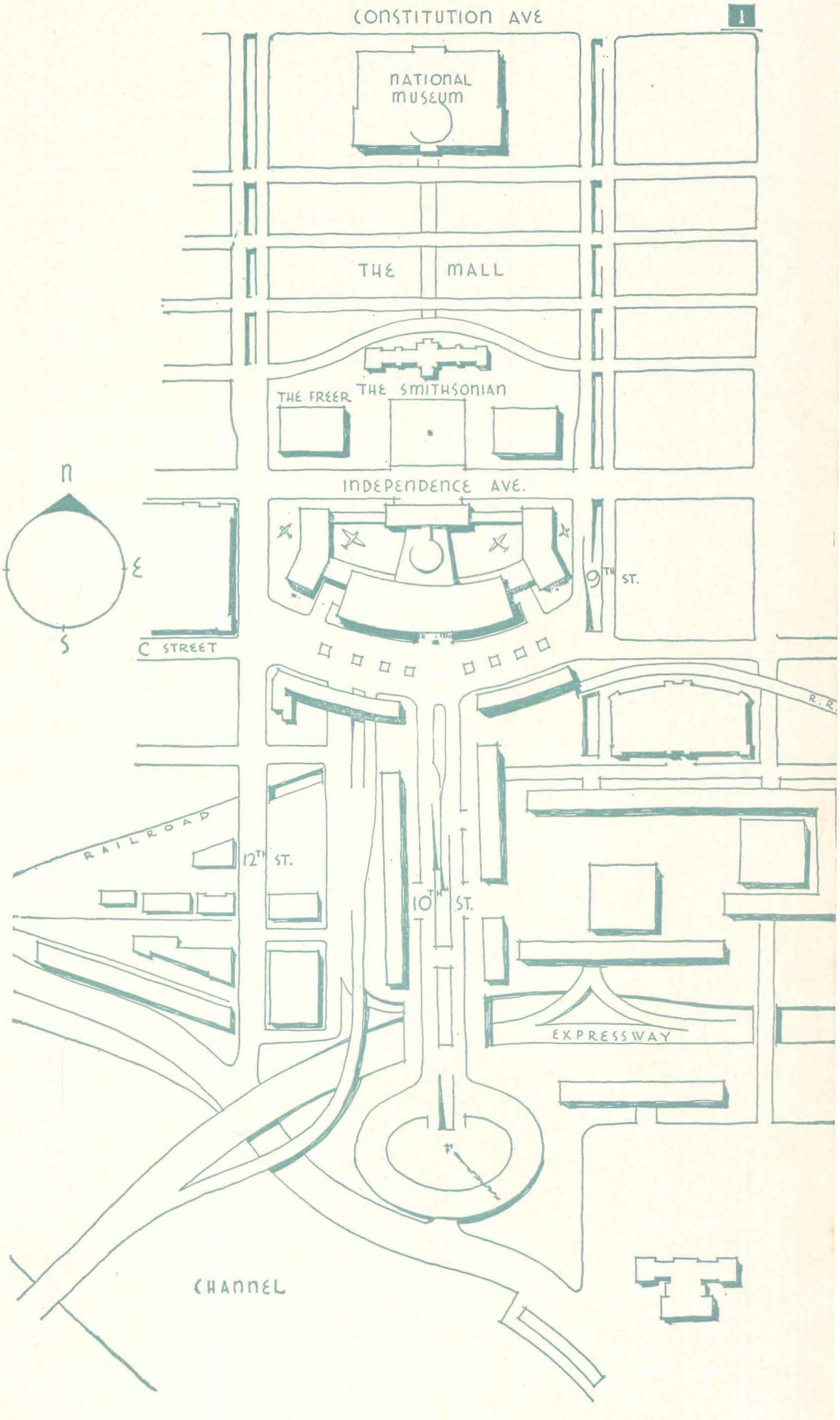
Erection of the museum here would be in keeping both practically and esthetically with existing buildings and with longstanding plans for this area and its traffic handling. In the "wineglass" pattern (No. 2 opposite) which has characterized many of the traffic studies made by the National Capitol Planning Commission, the Air Museum would be located in the cup of the glass between 9th and 12th Streets with its curving south

2



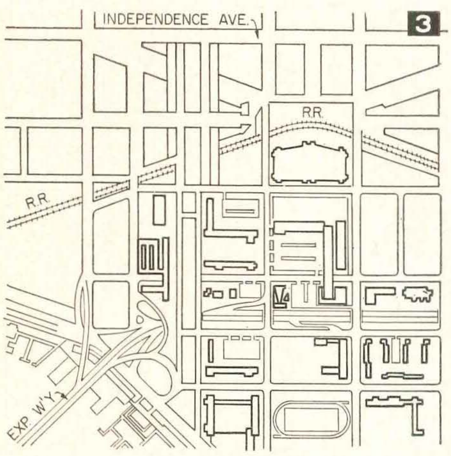
THE MALL
MARYLAND AVE.
G S A REGIONAL BLDG.
RELOCATED R.R.
12TH ST.
10TH ST.
9TH ST.
BASIN
SOUTHWEST EXPRESSWAY
CHANNEL
PROPOSED BRIDGE
JR. HIGH SCHOOL
N
W
E
S

1



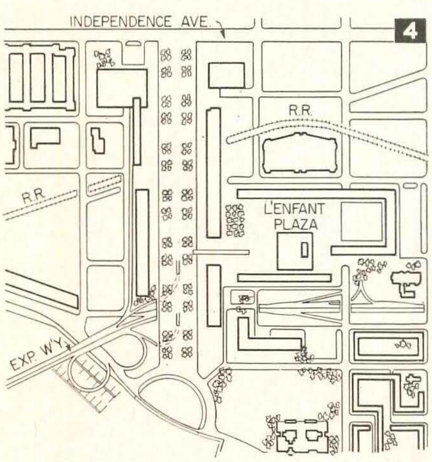
CONSTITUTION AVE
NATIONAL MUSEUM
THE MALL
THE FREER
THE SMITHSONIAN
INDEPENDENCE AVE.
9TH ST.
C STREET
R.R.
RAILROAD
12TH ST.
10TH ST.
EXPRESSWAY
CHANNEL
N
W
E
S

3



INDEPENDENCE AVE.
RR.
R.R.
EXP. W'Y.

4



INDEPENDENCE AVE.
R.R.
R.R.
L'ENFANT PLAZA
EXP. W'Y.

wall paralleling the arc of C Street. The stem of the glass is 10th Street extending from C Street to the proposed Potomac River crossing.

A current proposal for the development and use of 10th Street threatens the construction of the Museum. Mr. William Zeckendorf of Webb and Knapp, Inc., has made the development of a 10th Street "Mall" opening uninterrupted into the L'Enfant Mall a condition of his firm's participation in the redevelopment of Southwest Washington.

Drawing considerably on the "Justement-Smith" Study (No. 3) for the redevelopment of this area the Zeckendorf scheme (No. 4) hopefully emphasizes its "South Mall" as a means of attracting the quantity of traffic and occupancy necessary for the kind of profit sought here.

Since it is inevitable that Southwest Washington will be adequately developed whether by Webb and Knapp or others, it is hoped that Congressional officials will not be unduly swayed by the Zeckendorf Mall contingency if it precludes erection of the National Air Museum.

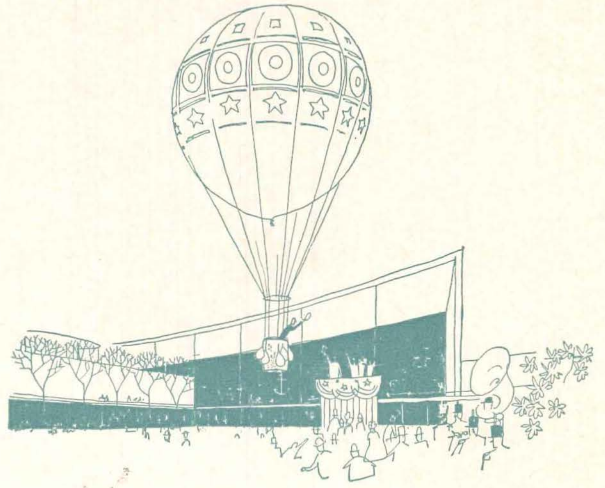
Dr. Leonard Carmichael, Secretary of the Smithsonian, and Mr. Paul E. Garber, head curator of the National Air Museum, the thoughtful and dedicated custodians of the collection, feel the proposals are not mutually exclusive. These men recognize Southwest Washington's need for redevelopment and believe that the museum will provide the kind of attraction that will support Mr. Zeckendorf's undertaking.

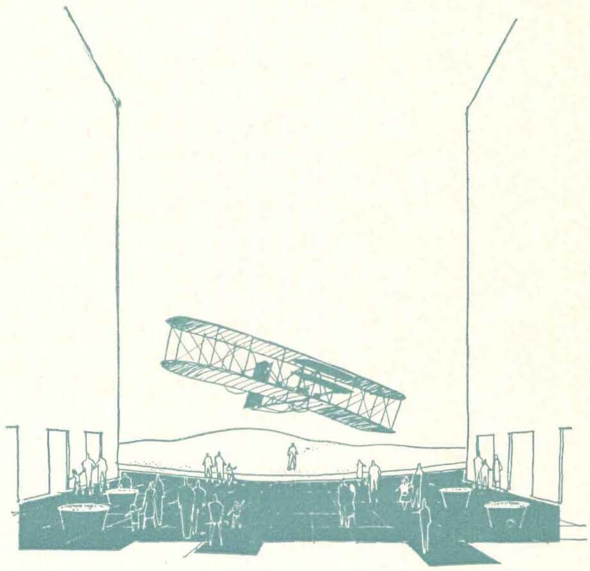
Certainly it cannot be successfully argued that with the humpbacked profile of 10th Street the open end Mall is the only satisfactory spatial solution. The quality of scale and the sense of containment which the Museum could provide seem highly desirable. Openness of itself does not guarantee spatial effectiveness.

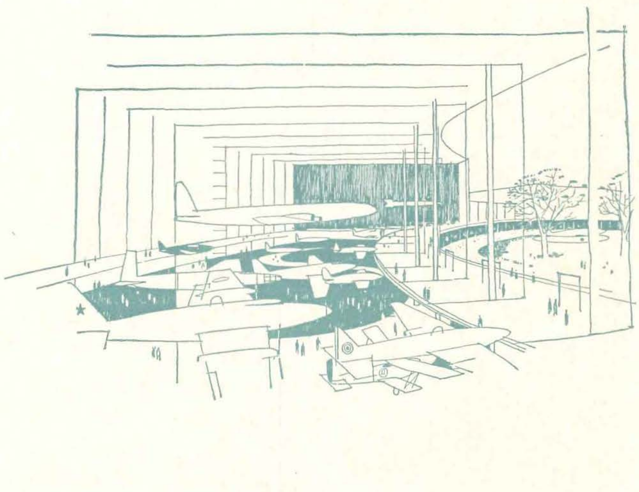
Southwest Washington sorely needs redevelopment and the nation needs a Museum of the Air. There is no good reason why we cannot have both and in the place and manner in which both will be most effective.

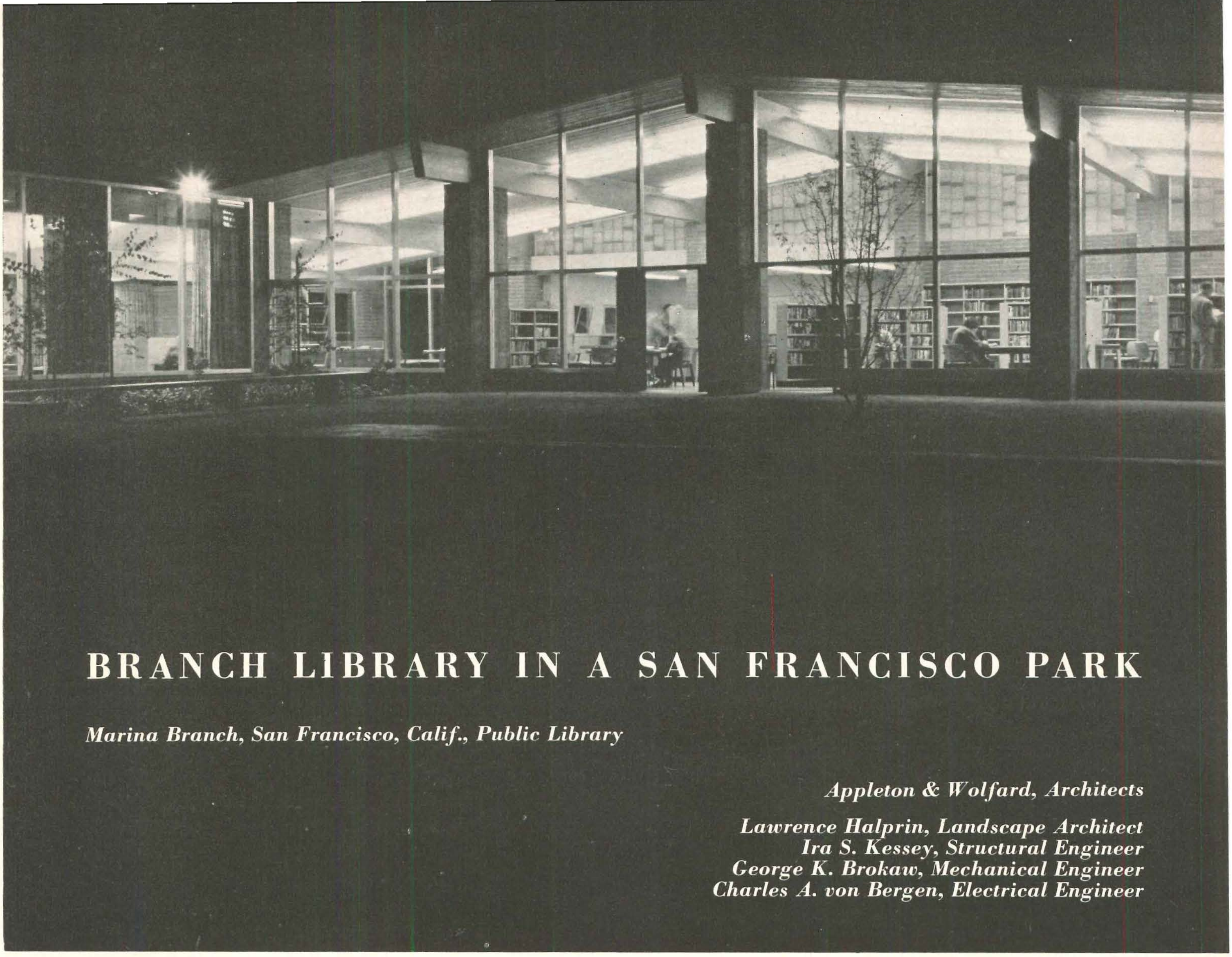
For the country that has pioneered the air age and has with the help of many friends collected hundreds of significant exhibits, a National Air Museum is imperative. For years the Smithsonian has exhibited a few important items but since 1946 when Congress created the National Air Museum the expanding collection has never appeared under one roof.

It is simply obvious that our best interests will be served if the collection can be exhibited in a central location readily available to the inpouring of travelers from all over America and abroad. It is earnestly hoped that the educational and national significance of a skillfully housed and centrally located collection will be apparent to Congress as it has been to the officers of the Smithsonian Institution.









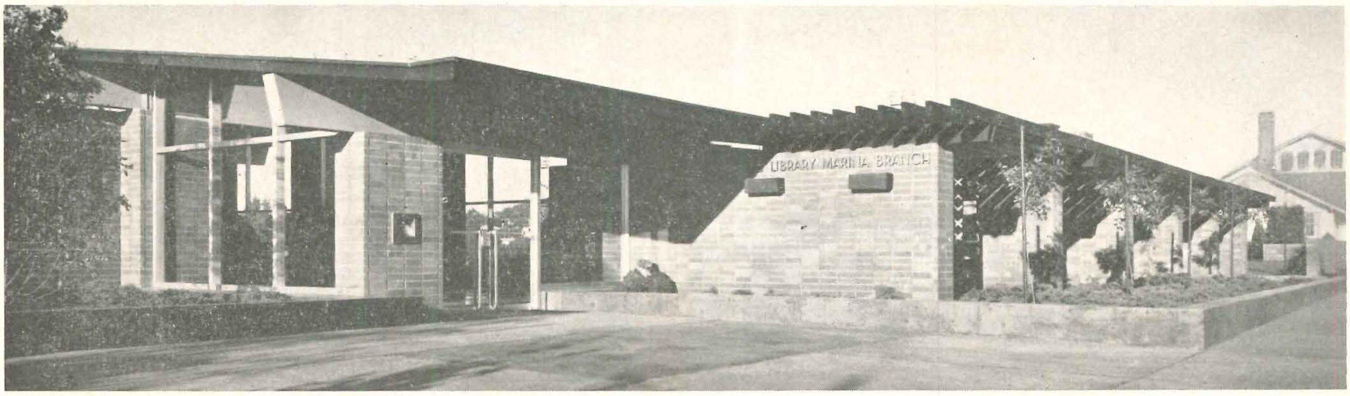
BRANCH LIBRARY IN A SAN FRANCISCO PARK

Marina Branch, San Francisco, Calif., Public Library

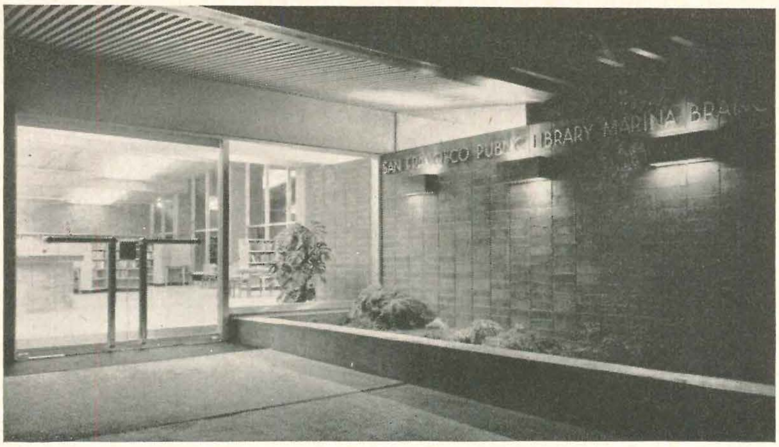
Appleton & Wolfard, Architects

Lawrence Halprin, Landscape Architect
Ira S. Kessey, Structural Engineer
George K. Brokaw, Mechanical Engineer
Charles A. von Bergen, Electrical Engineer

THE NEW Marina Branch of the San Francisco Public Library is built in the southeast portion of a park and recreation area, Funston Playground, half a block from a shopping center, at an intersection of a cross-park pedestrian walk. The least desirable view is to the north and west; this and the direction of prevailing winds caused the designers to open the building toward the south and east. The glass wall of the main reading room (photograph above) fronts on a paved reading terrace and beyond, a pleasant expanse of playfield. Also abutting on the reading terrace is the glass wall of the browsing room; this wing is screened by an arbor and "see-through" planting, the intent being to invite the passerby to the warmth of a fireplace and upholstered furniture within, yet not to create a commercial show window. In plan, the interior public spaces open generously into one another, and at the same time, they are set apart by the structure. Offices, etc. are small cubicles; the public rooms are divided only by book shelving.



Phil Fein



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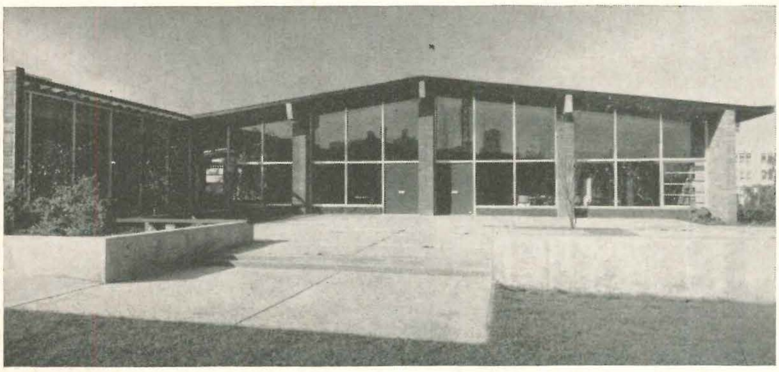

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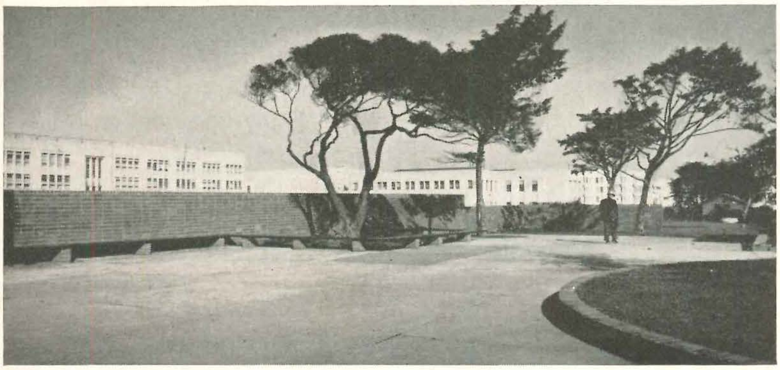

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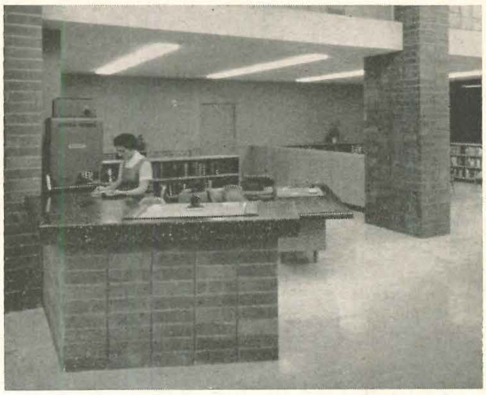


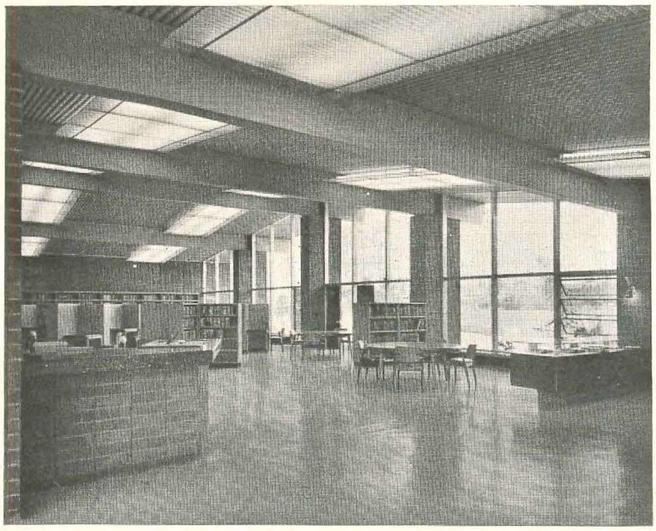
4

Phil Fein

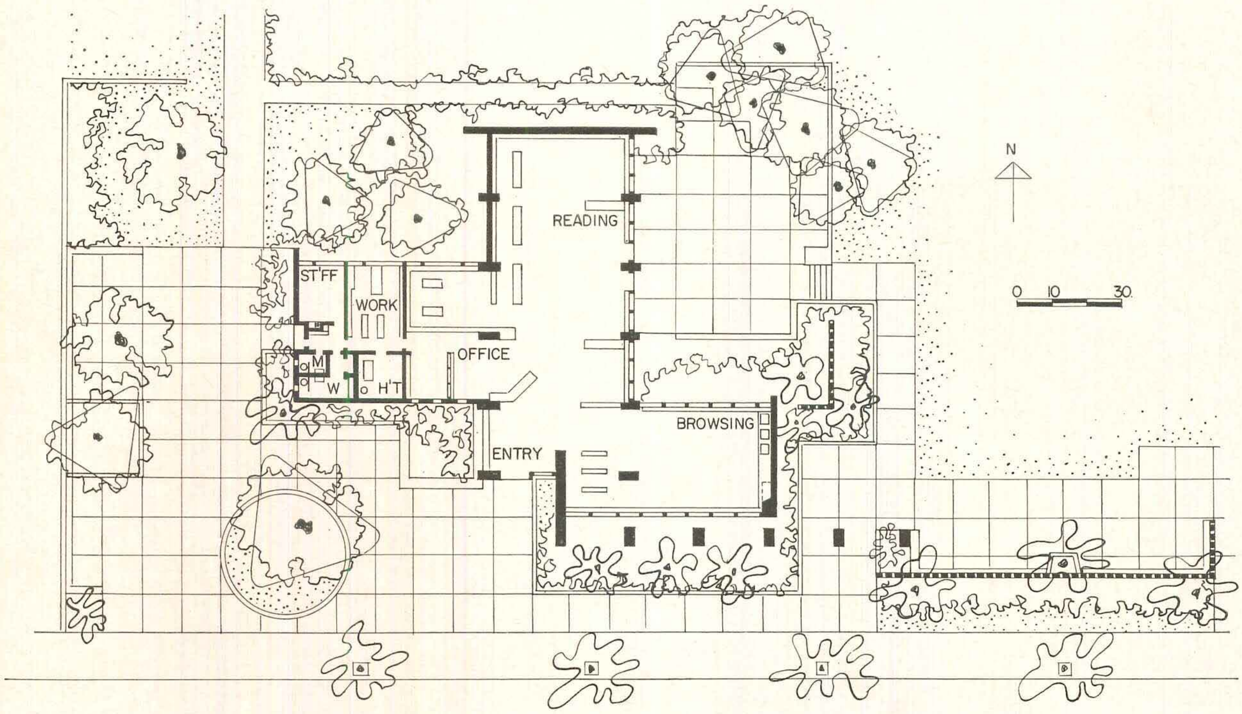
1, Entry. 2, Glass walls of reading and browsing rooms overlook paved terrace and, through a screen of trees, acres of lawn and playfield. 3, Brick wall screens less desirable view to west. 4, Charge desk. 5, Translucent plastic panels diffuse fluorescent light, reading room. 6, Browsing room fireplace, seen through floor-to-ceiling glass wall, invites passers-by. The simple structure is exposed inside and out: roof of laminated 2 by 4 and 2 by 6 planks, alternated, on laminated wood beams; masonry walls of reinforced brick; concrete floor slab on grade, with rubber tile finish. Children's area, adjoining the charge desk, has acoustical tile ceiling; so do office areas. Radiant heating is installed in the floor slab. Supplemental convectors are placed at the bottom of all glass wall areas. Service entrance is on the west side, where the view is unimportant

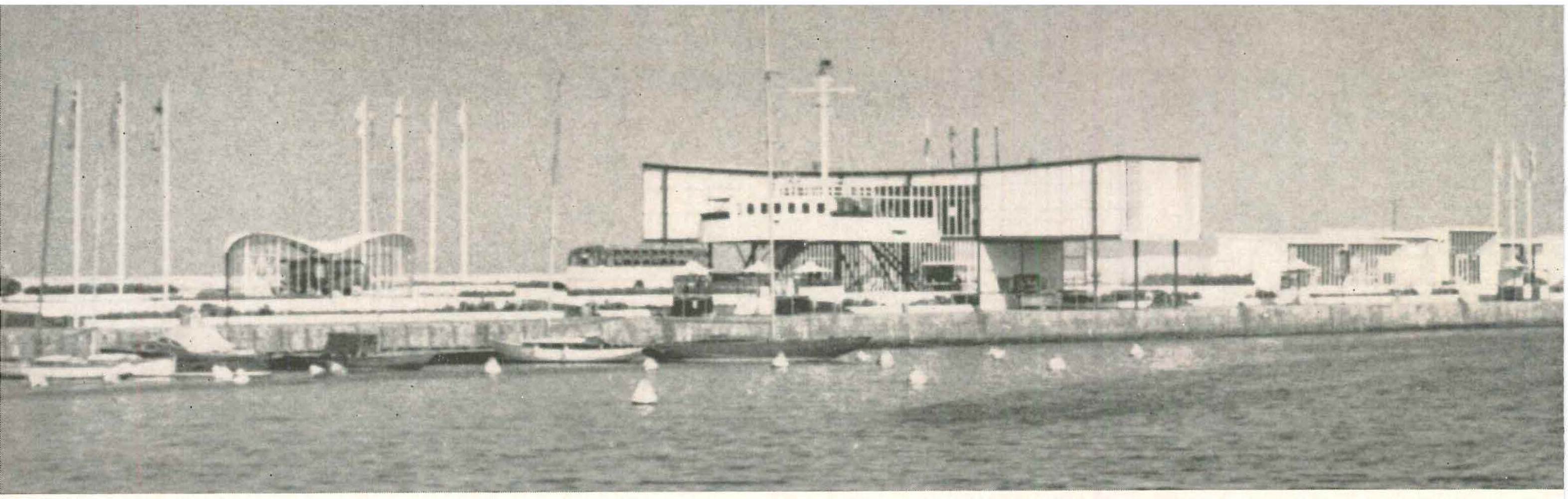
SAN FRANCISCO BRANCH LIBRARY

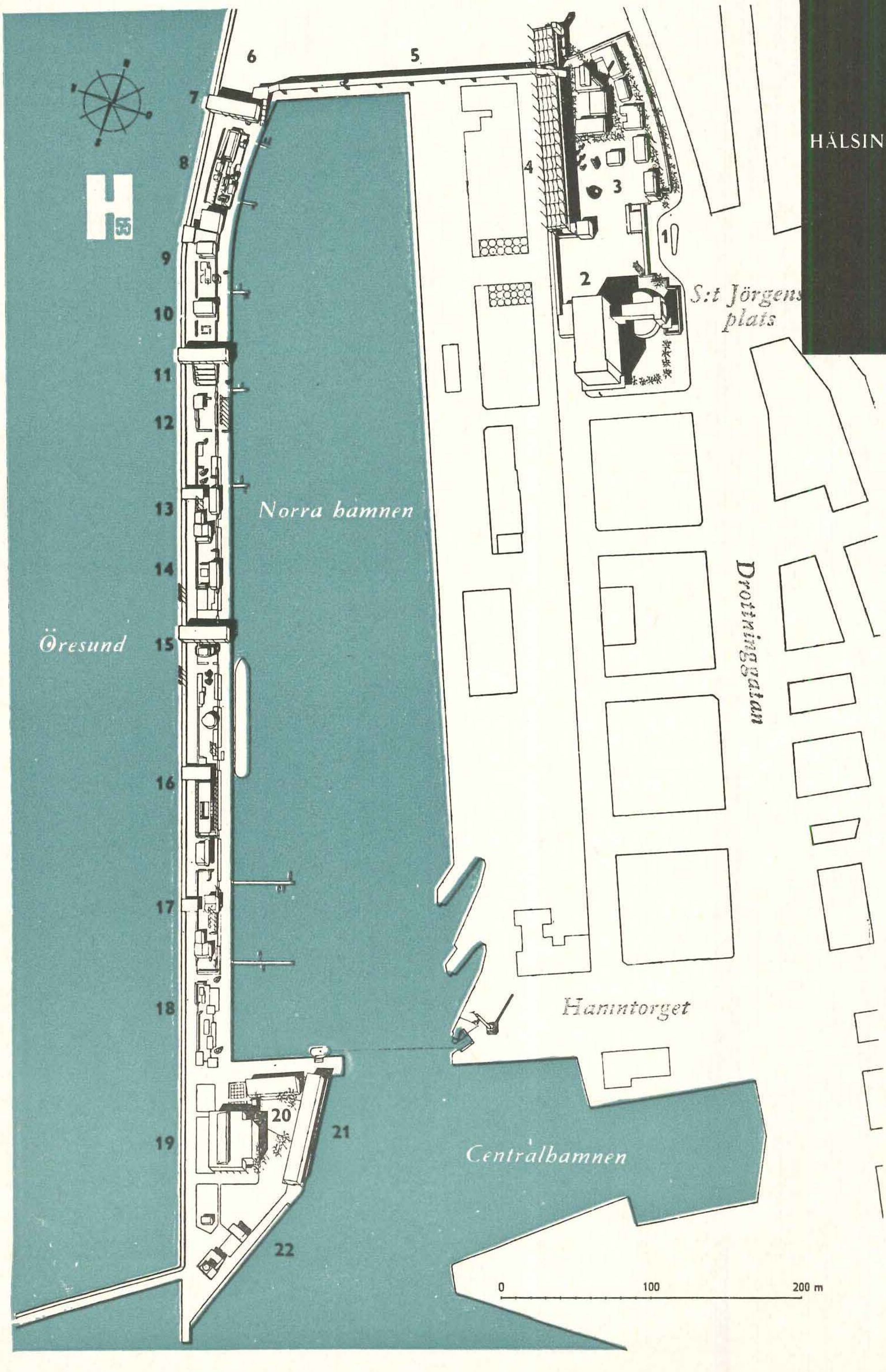
5 6



Reading room is divided by cases. Note light-controlling glass block clerestory above charge desk



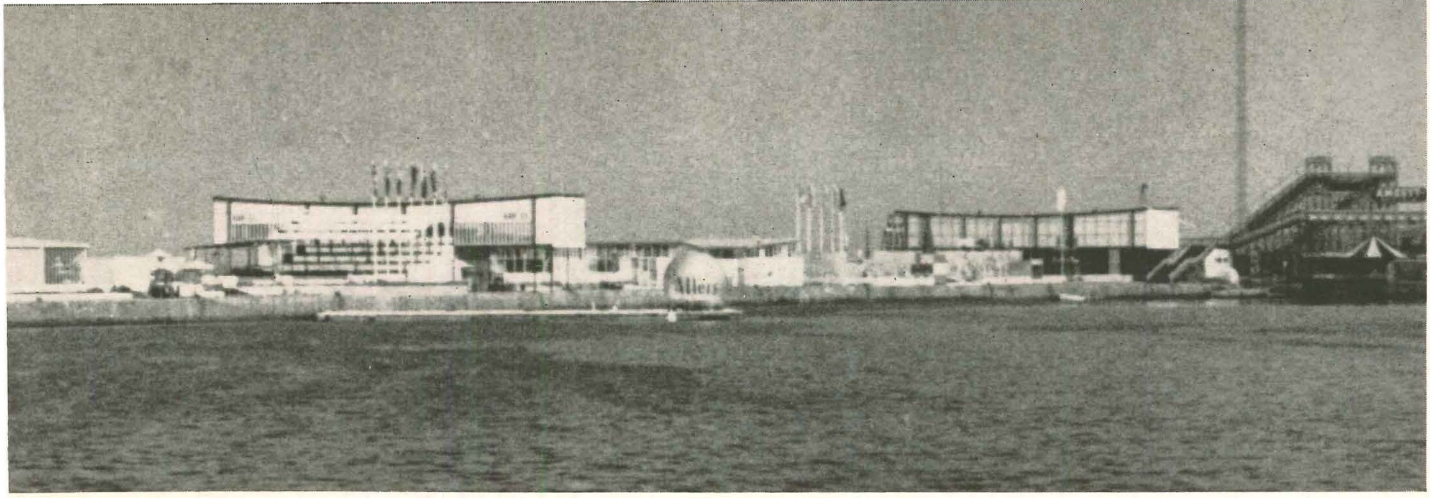




HÄLSINGBORG SWEDEN

H 55

1. MAIN ENTRANCE
2. CONCERT HALL
3. HOUSING SECTION
4. INTERNATIONAL FURNISHED APTS.
5. BRIDGE
6. FUN-FAIR
7. ELECTRICAL BUILDING
8-10. CHILDREN'S AND EDUCATIONAL SECTION
11. CAFE
12. DANCE FLOOR
13-14. BANK, POST OFFICE, ETC.
15. SHIPPING BUILDING
16. PERGOLA GARDEN
17. COLOR EXHIBIT
18. ROSE GARDEN
19. RESTAURANT
20. SCANDINAVIAN INDUSTRIAL DESIGN
21. SWEDISH INDUSTRIAL DESIGN
22. CHURCH ART



SWEDEN: FORMULA FOR A SUCCESSFUL EXHIBITION

Helsingborg Fair

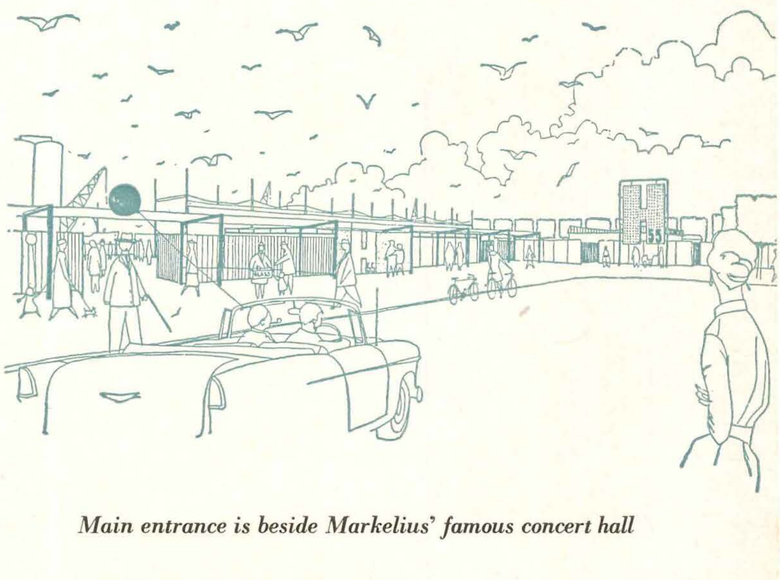
Carl Axel Acking, Bengt Gate, Torbjörn Olsson, Sven Silow, Architects, general layout and design

by Frederick Gutheim

THIS SUMMER'S DESIGN EVENT in Europe was the Helsingborg exhibition, unquestionably the most important fair produced by the modern movement, and the postwar exhibition of the greatest design significance. Produced under the direction of the Swedish Industrial Arts Society, which contributed the unique services of its director, Ake A. Huldt, to manage the exhibition, a broader-than-national fair has resulted. All the Scandinavian nations are represented in the international section which opens the fair, and all are represented in the arts and design section which closes it. The international section itself takes the form of a series of completely furnished exhibition houses, with small housing and planning exhibitions included, and by itself is the first opportunity to compare postwar design trends not merely in architecture but in housing and interior design. The exhibition self-consciously measures itself against the Stockholm 1930 Fair, and it provides a summing up of the decade of postwar architecture which in European countries has been dominated by reconstruction activities. H55, as the Helsingborg exhibition styles itself, opened with capacity weekend crowds in mid-June and continued through August 28.

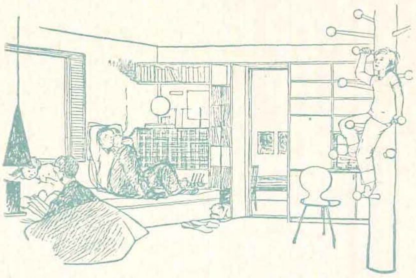
Any appreciation of this exhibition must begin with a description of its unique site on a breakwater a half mile long, 100 feet wide, high over the Öresund and looking across the three miles to the green baroque towers of Hamlet's castle at Helsinore. Visitors enter the exhibition in the center of the town from the main street immediately adjoining Sven Markelius' concert hall (1931) in which many of the exhibition events take place. This is a fair about modern living, and the first exhibit area contains the model houses forming the international section, and a series of five Swedish prefabricated houses. The standards of selection are very high in both cases, and there are in addition exhibits showing an atrium house (organized around a patio), a full sized demonstration on how to modernize 1919 workers' coöperative housing (more baths, better kitchens, more storage), and an exhibit on what to do with basement space in your house. This section is done with the greatest skill and the most rigorous selection of materials. Postwar trends in evidence are the demand for family rooms, for informal living, hobbies, music, sewing and other pursuits; the impact of the automobile and of suburban living habits; and the warmer, more colorful, more individualistic approach to housing than the formalism or dogmas of prewar architecture allowed.

The influence of American ideas in housing is pronounced, but our failure to participate in this exhibition should not be regretted. Had we sent the best of our architect-designed prefabs as our Department of Commerce proposed, it would have been confused with the commercial prefab exhibit, and would not have been likely to win favorable recognition among the displays of other nations.* As the exhibition stands, it is clearer

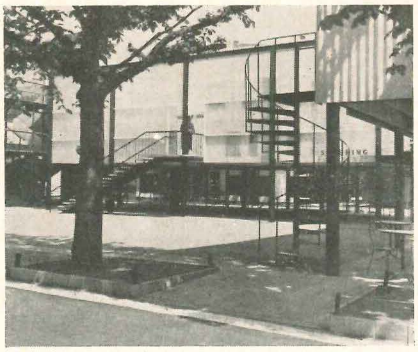


Main entrance is beside Markelius' famous concert hall

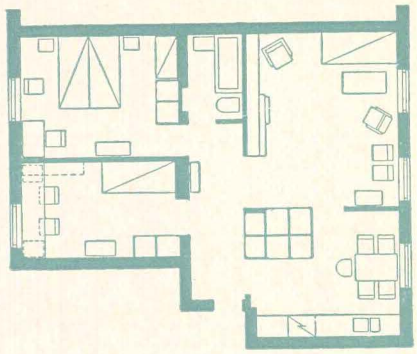
* *Buckminster Fuller's plastic dome, constructed by students at Washington U., St. Louis, was not completed in time for the exhibition.*



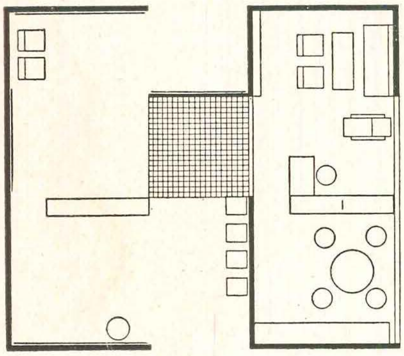
Among housing trends, the family room



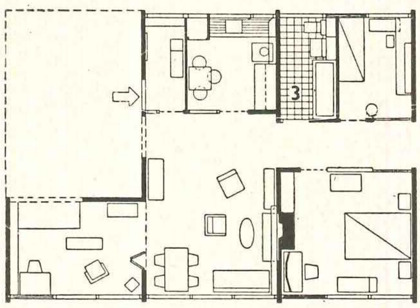
Housing Section



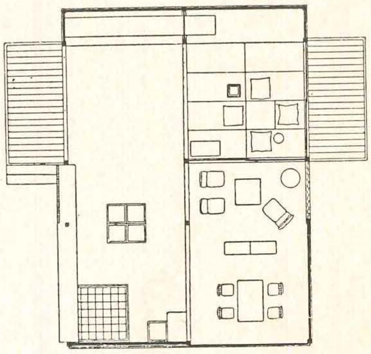
Apartment, Swedish



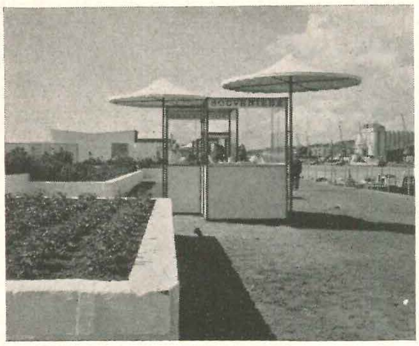
Apartment, Swiss



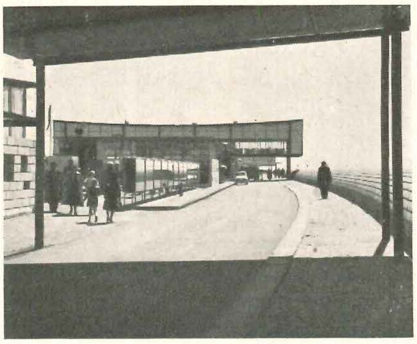
Apartment, British



Apartment, Japanese

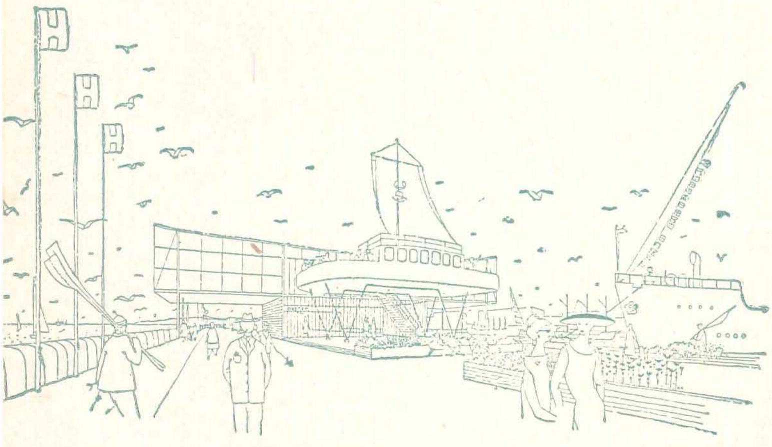


Booths with gay umbrella roofs



Three principal buildings are on stilts

Interior, Bar 55 *cafeteria*

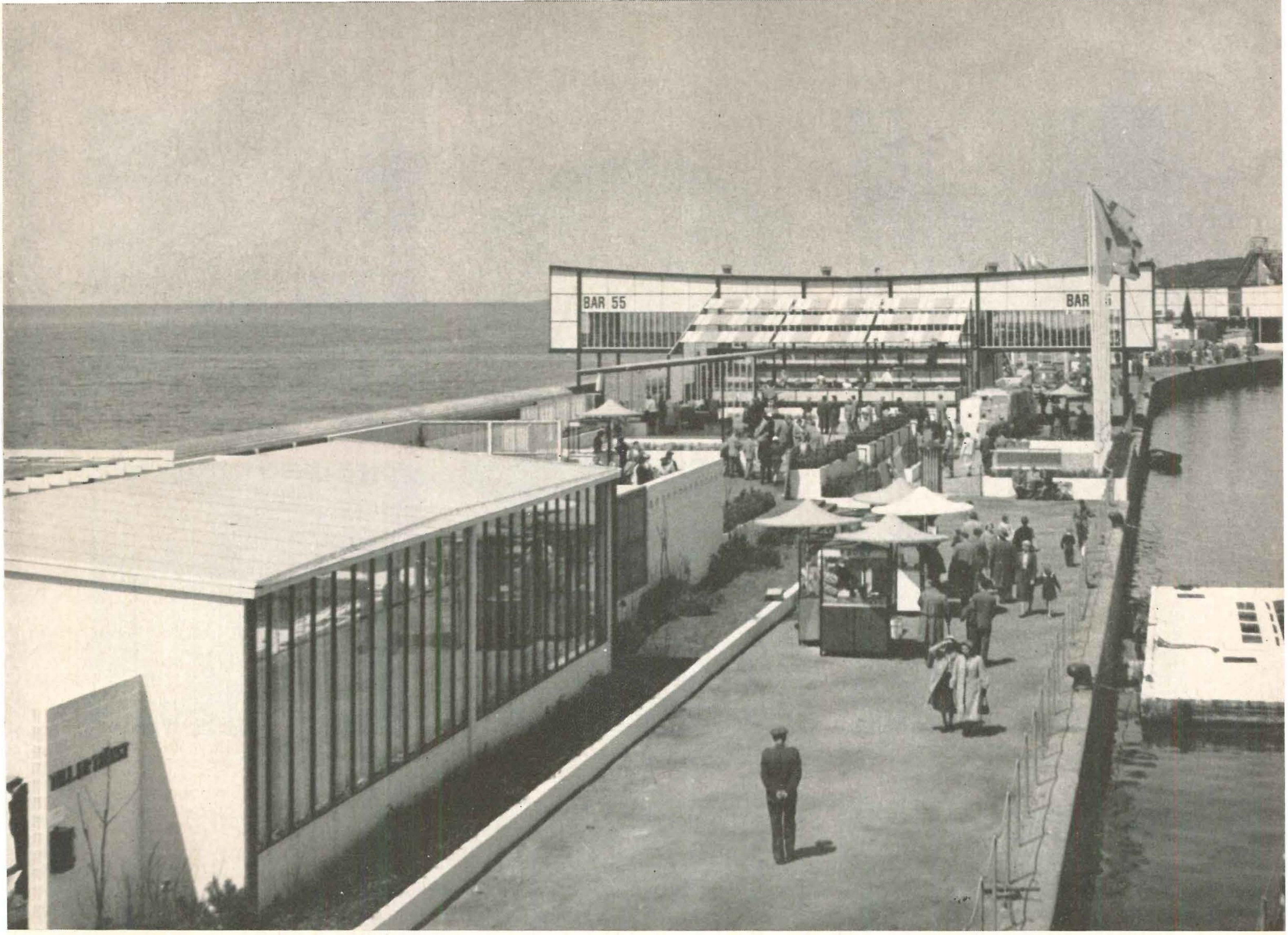


Shipping Building

that there is in Europe a generally accepted standard for middle class housing, and that the predominant influence is the American conception of family life, the open plan, more informal servantless living, mechanization of all household services, abundantly equipped and efficiently planned kitchens, and an entire catalog of similar characteristics.

These national housing displays are arranged in a long row under a white canvas roof. Some are walk-through; others are designed to be seen from glass exterior walls or through windows and one — the Japanese contemporary house, hit of the exhibition — from a porch. In the end it is not the individual house that matters but the comparison, and the group as a whole.

From the housing and planning section, visitors cross the harbor on a high foot-bridge from which there are fine views of the exhibition. The major part of the fair

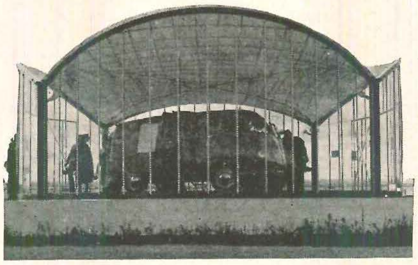


All three principal buildings span the whole width of the pier; between them are smaller pavilions through which the crowd flows. Above, Bar 55, *popular priced cafeteria*

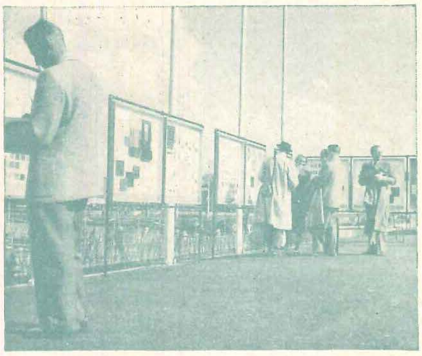
on the breakwater is dominated by three principal exhibit halls, stretching from one side to the other, and punctuating its length. Under their identically formed concave roofs are exhibitions on electrification, shipbuilding and an excellent popularly priced cafeteria, the Bar 55. Between there are smaller pavilions and outdoor exhibits dealing with children's playgrounds and schools, the expanding use of color, travel and outdoor living. This section of the fair is also peppered with small gardens of different types and sizes, souvenir and refreshment stands of uniform design, dance floors and bandstands, and small restaurants. These have been realized almost uniformly with concrete block walls painted white; concrete, asphalt, plank or sand floors; corrugated transite, plastic or lightly built-up roofs on wirework joists, and the simplest electrical installations. The slope of the breakwater is exploited to get changes in level, and there are few places from which one can see the exhibition as a whole. Black and white buildings and walls are relieved occasionally with colored awnings, streaming flags, or brilliant masses of flowers.

The great restraint in form and color allows the most to be made of sparkling sun, blue waters, the lively passing marine parade on sound and in port, and the constantly changing sky and light of the Öresund. The exhibition constantly reminds you of these, whether you are outside or in the exhibition halls that seem actually to overhang the water. These are the characteristics that etch themselves in imagination and memory, and they are embodied in the single permanent building of the exhibition — the Parapeten restaurant designed by Bengt Gate, probably the most important Swedish architect of today.

The restaurant is on the second floor of the building



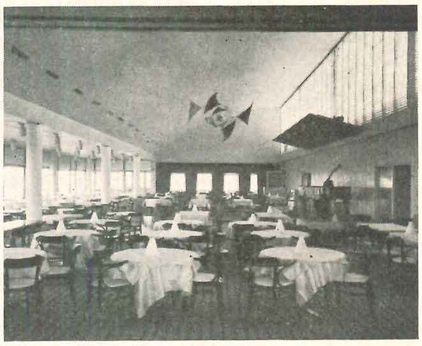
Volkswagen pavilion: vaulted canvas roof supported by intersecting wires



Exhibition, color principles and use

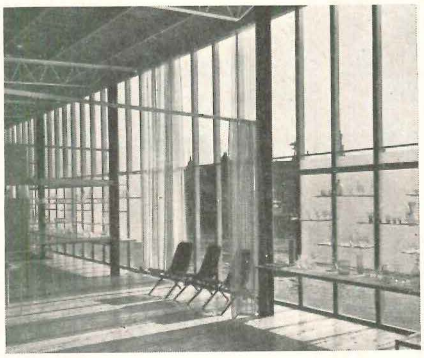
Interior, Shipping Building

Parapeten Restaurant



Interior, Parapeten Restaurant

Swedish industrial arts . . .



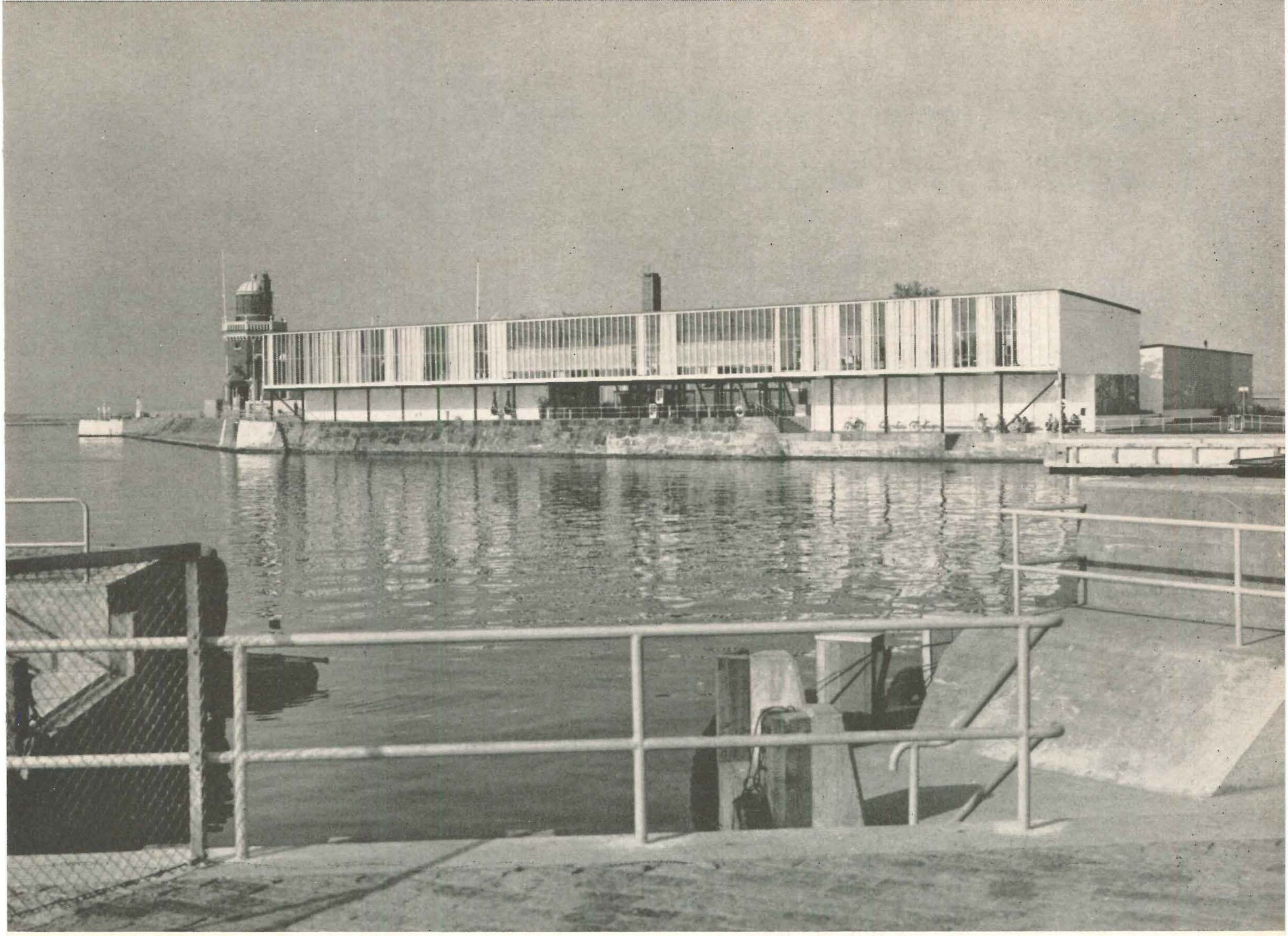
. . . freely exhibited

Swedish glassware, Kalmar Glasbruk

whose lower levels are occupied by coat checking, bars, a small shop and the usual food reception and storage facilities of a restaurant. The restaurant itself is wrapped around the kitchen and achieves views on four sides. Its 450 seats are divided into such varied accommodations as the main salon with its dance floor, an enclosed veranda overlooking the Öresund, open balconies, or three rooms which can be separately enclosed for private parties. The second floor contains another bar as well as the kitchens.

The main room ceiling is a half-arch terminating in a louvered wall of birch strips which has light filtering and acoustical functions. There is an appropriately gay and colorful mobile. In every direction at eye level, but with the greatest care to control the glare from sky and water, you see the sourd and the port. This half-million dollar building in white Swedish marble is a relief from the "fisherman's wharf" type of place where an accretion of synthetic marine effects and properties (fish nets, dried or varnished fish trophies, life preservers, lines, etc.) smother the very atmosphere of the sea. In San Francisco, Washington, or along the New England coast, one longs to scrape these places to the natural cleanliness once characteristic of the best waterfront restaurants. But even more, one should long to create even a few places of the standard of the Parapeten, where architecture enhances the site and improves the food.

At the end of the New York and San Francisco World's Fairs, it was pretty clear that the "universal and international exposition" as it had been formulated in the 19th century was through. The Belgians are trying to do it once more in Brussels in 1957, but the dice



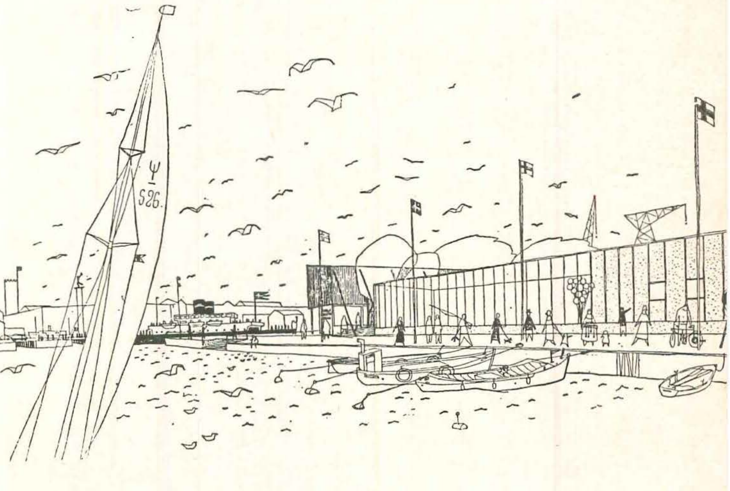
Electrical Building, above, is one of the three main structures; this and the Shipping Building emphasize subjects of great importance in Sweden

H55

are loaded against success. What can be realized successfully today seems to me best illustrated in H55 as earlier in the Zurich exhibition of 1940: a small, specialized exhibition with a tourist accent.

The recipe for such a fair is to keep it small enough to maintain design control and clarity, to keep it fresh and to counteract tedium. It ought to exploit some local urge, some anniversary. And it needs all the executive talents and resourcefulness of a symphony conductor, an opera director, or a festival manager, who can conceive, plan, direct and control the total enterprise.

The Helsingborg Fair is a success because these conditions are present. Its unique site, its brilliant and natural circulation scheme, its reasonable scale allow it to be realized with the simplest materials and methods and still reach levels of distinction that are rarely attained.

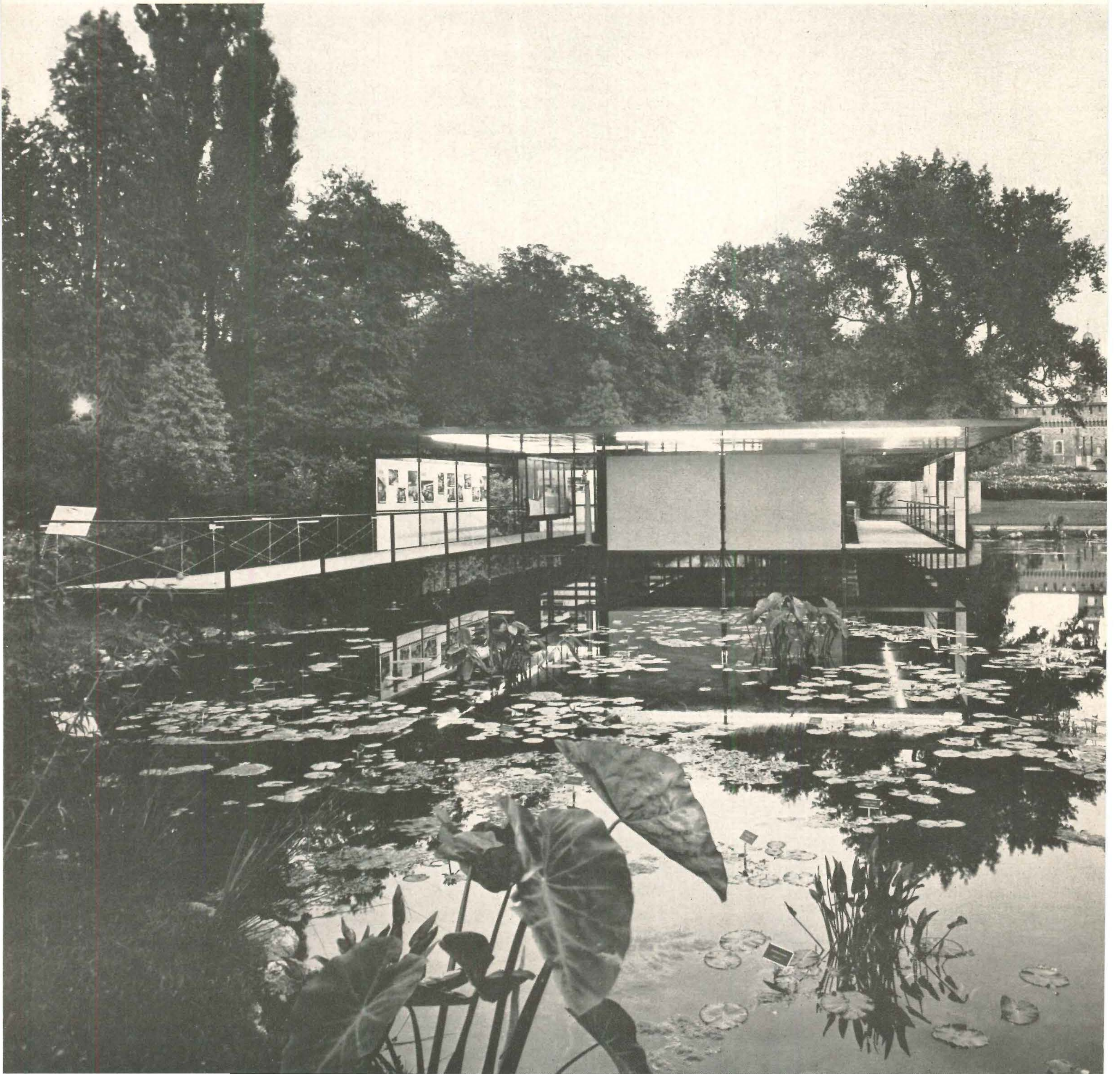


MILAN TRIENALE PRODUCES IDEAL SHOWCASE

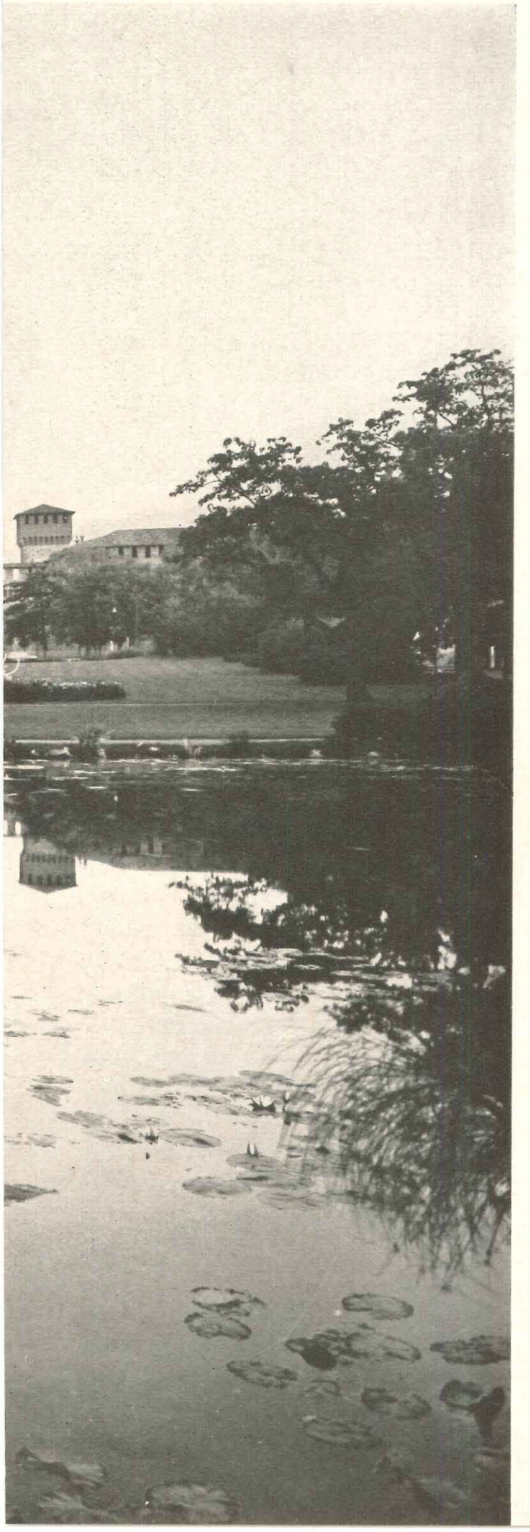
G. Minoletti, M. Tevarotto, R. Zavanella, Architects

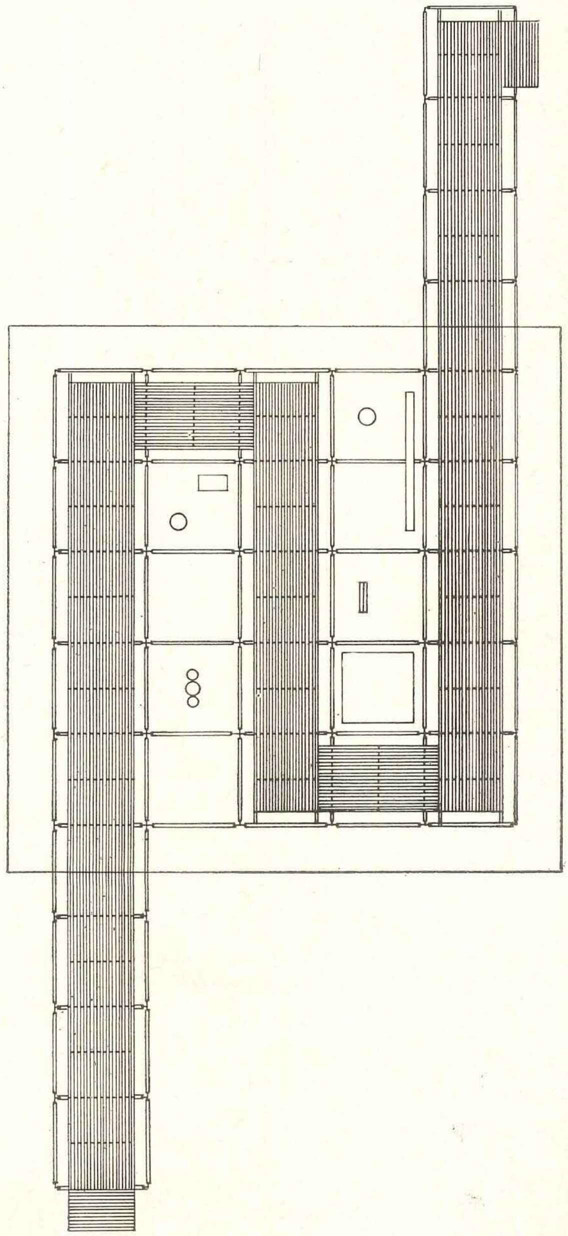
THE TENTH TRIENALE OF MILAN included a number of unusually interesting structures, among them this small pavilion which won the first prize in international architecture.

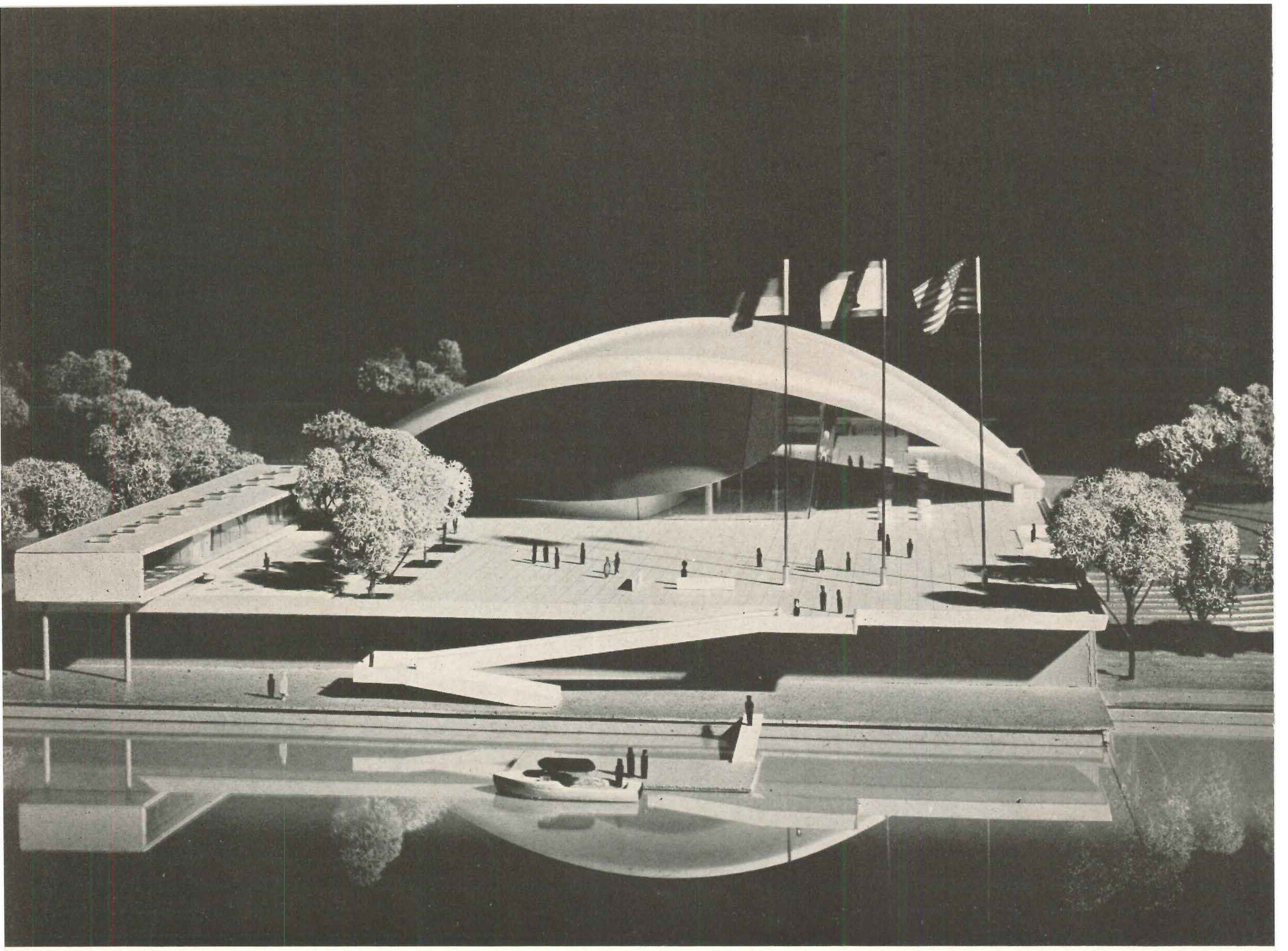
The pavilion, designed for an Italian shipping company (the Finmare e della Finmeccanica), is virtually a "showcase" passage from one side of the lake to the other. Steps at each end connect via a long gangway with a central roofed portion (corrugated iron roofing) with wall panels of wood which serve both as stiffening agents for the central structure and as display areas. The "double-U" walkway makes it all but impossible for pedestrians to by-pass the exhibits — a happy situation indeed for the exhibitors.



Vertical iron stanchions are joined by iron cross-pieces along the entire walkway; wood panels are demountable. The organizing module is a square, 2.80 by 2.80 meters. Wide overhang of roof protects exhibits in bad weather







U. S. PROPOSES AN INTERNATIONAL CONFERENCE

Hugh Stubbins & Associates
Architects

Severud-Elstad-Kruger
Structural Engineers

Bolt, Beranek & Newman, Inc.
Consultants in Acoustics

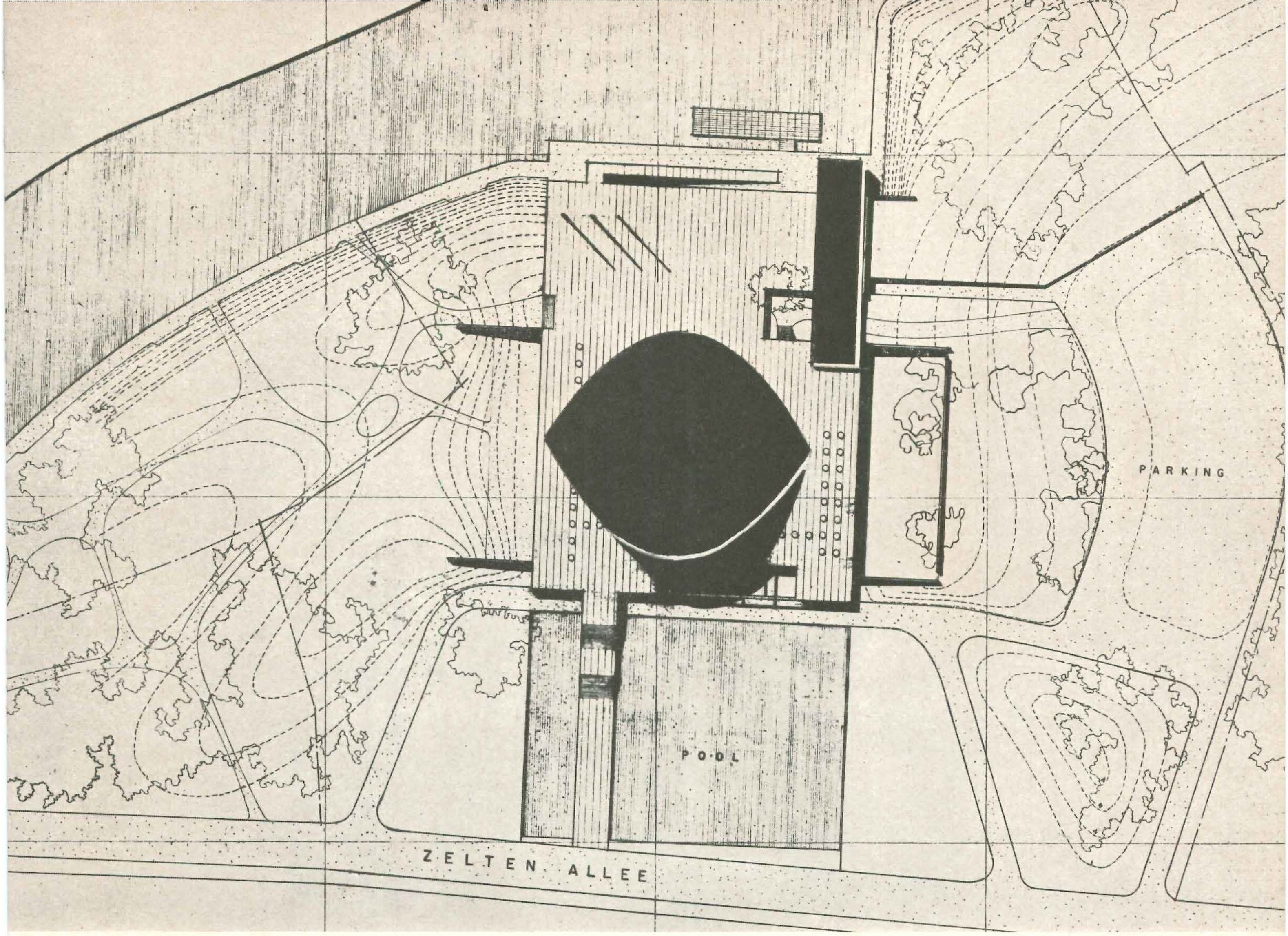
Lawrence Halprin
Landscape Architect

THIS LATEST ADDITION to the growing number of curved roof buildings by American architects has little else in common with them save imaginative daring.

Site, function and structural system are widely different and in the hands of the architect for this conference and exposition center, the design is uniquely and appropriately expressive of its own program.

This program, as well as the selection of the architect, was made for the United States Government by a special advisory committee of The American Institute of Architects at the request of the Department of State. As tangible expression of its support of West Berlin, our government proposed participation in that city's international building exposition which is to open in 1957.

After visiting Berlin with State Department officers and after discussion with German officials, the advisory committee, under the chairmanship of Ralph Walker,



AND EXPOSITION BUILDING FOR BERLIN

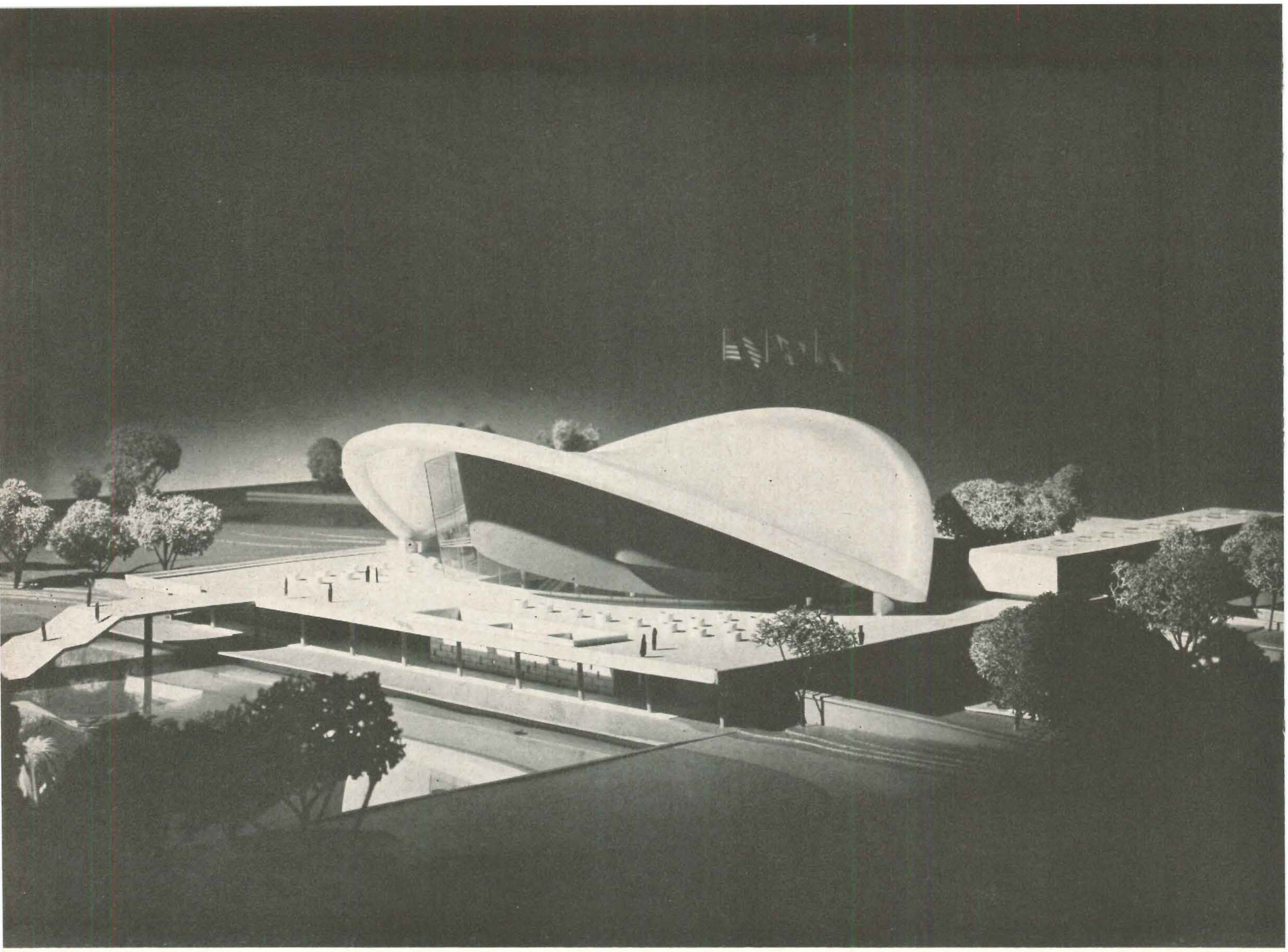
agreed that a conference and exposition building might constitute the most effective symbol of our belief in free communication and discussion of ideas. Thus a building was needed which could at one time both function effectively as a gathering place and clearly express the invitation to gather. In siting and in design the building gives every evidence of satisfying this demanding program. All parties to this experiment in socio-architectural relations deserve congratulations.

At what is very nearly the geographic center of the city, the 11-acre site lies on the bank of the Spree River at the edge of the great Tiergarten. Strategically the location is important, for though it is within the Western sector, it is both accessible and visible from the Soviet zone. In the immediate vicinity are the old Reichstag, site of the proposed new German capitol group, the Brandenburg Tor, and the 1945 militaristic Soviet Memorial.

Financing of the project, in which the building proper is estimated at $3,000,000, will be accomplished in part by the Berlin government through the new dollar aid program.

In the flat Tiergarten area the building will be given more prominent elevation through mounding up rubble already on the site. Approaches will be made easily from a depressed parking area, from the river, and from the park. Automobile entrance will be made under shelter directly into the ground floor which is organized for reception, exhibition, small conference rooms and conference administration facilities. Here, too, is planned a memorial room to Benjamin Franklin, whose 250th anniversary is being happily commemorated with this building.

The plaza level is sheltered by the 22,500 sq ft roof whose 2½ in. thickness of concrete is supported by cables hung between the two great arches and a con-



INTERNATIONAL CONFERENCE AND EXPOSITION BUILDING

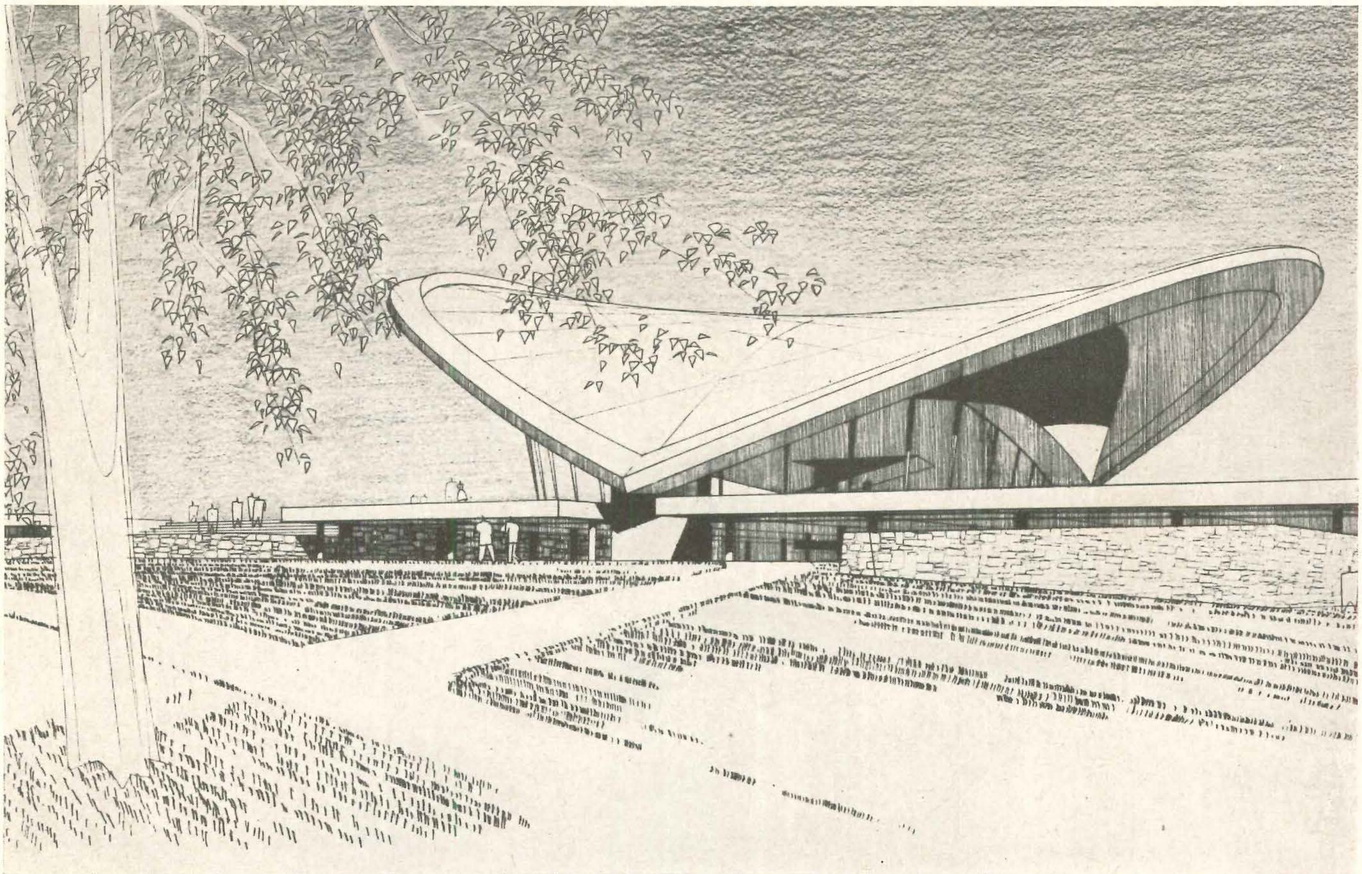
crete compression ring surrounding the auditorium. The arches are 280 ft long and at the tops are 60 ft above the plaza and 220 ft apart. Set back well within the shelter of the roof to allow the deep extension of welcoming and protecting canopies, the auditorium is placed above the plaza level. Within its 14,300 sq ft area, seating is arranged for 1200 in rows spaced 42 in. back to back to accommodate the frequent circulation typical of conferences. Multi-lingual translation, radio and television facilities are located above the floor and outside the auditorium proper in booths set far enough forward to remain operative even when the rear portion of the auditorium is closed off on the occasion of smaller conferences.

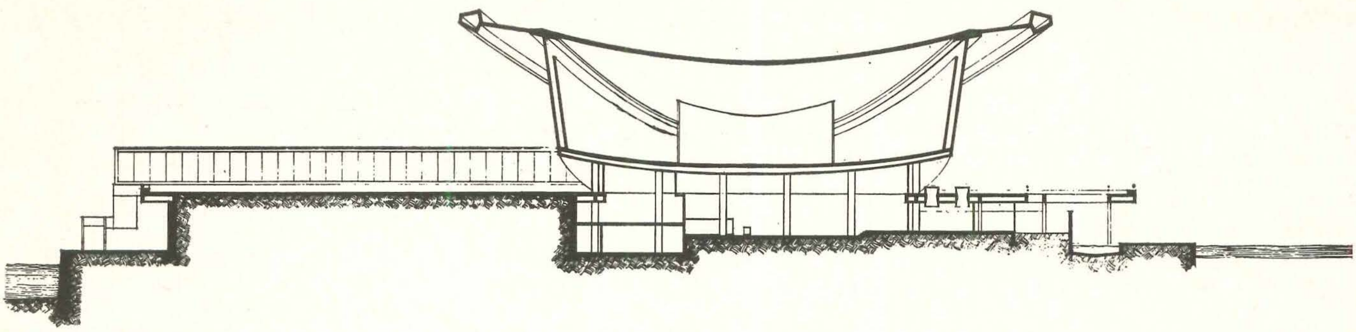
The curvature of the roof produced in this system of construction is naturally favorable to good acoustics through its distributive rather than concentrative form, and will presumably avoid expensive doctoring. State Department officers with long experience in conference problems find in the acoustics, seating, and careful handling of circulation, promise of an efficient and effective building.

Exterior walls of the auditorium may be finished in wood. Their red-based color with the white of the roof and the blue of the artificial pool opposite the river should be a relatively subtle symbol.

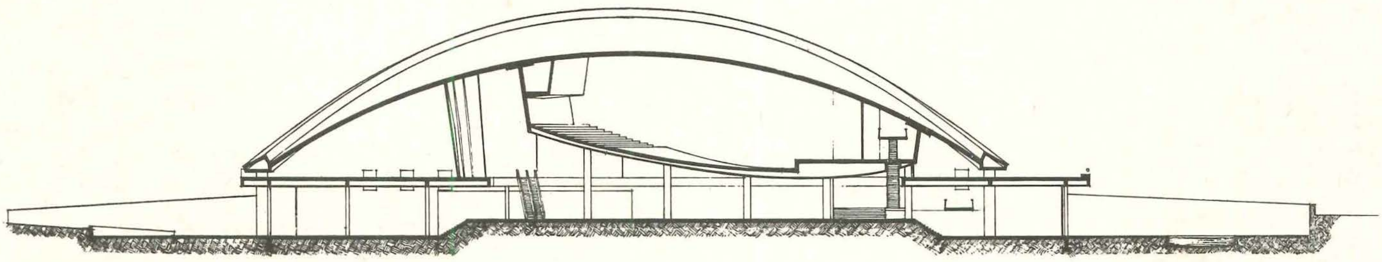
Three masts will carry the flags of the U. S., the city and West Germany. The low rectangular wing extending north from the auditorium contains permanent administrative and maintenance offices and terminates in an indoor-outdoor cafe.

This cafe along with easy access and the great sheltering canopy suggest that aside from its purpose as a place of official congress, this building will serve the ideal day-to-day function of a pleasant focus for the citizens of Berlin.

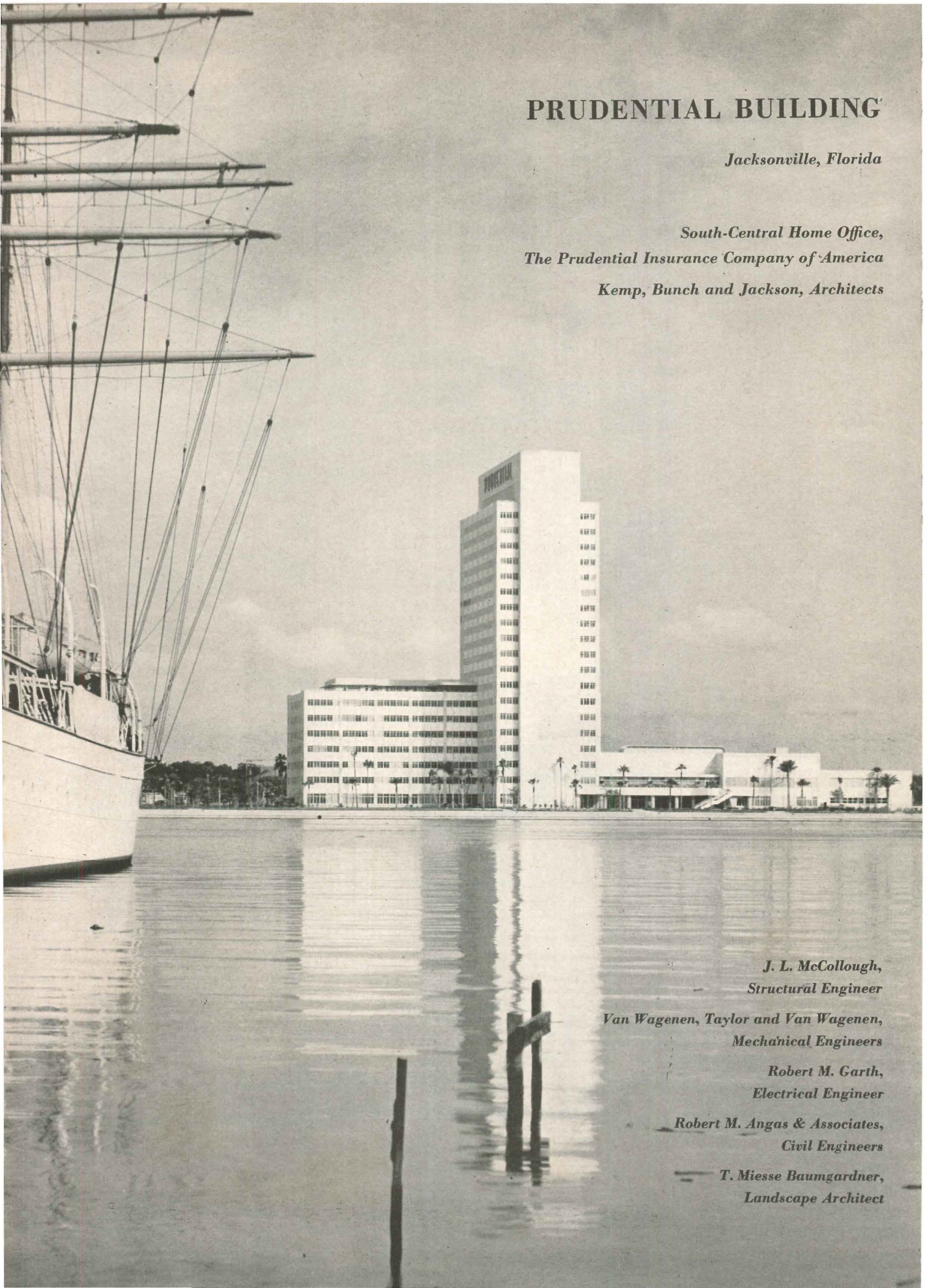




TRANSVERSE SECTION



LONGITUDINAL SECTION



PRUDENTIAL BUILDING

Jacksonville, Florida

South-Central Home Office,
The Prudential Insurance Company of America

Kemp, Bunch and Jackson, Architects

J. L. McCollough,
Structural Engineer

Van Wagenen, Taylor and Van Wagenen,
Mechanical Engineers

Robert M. Garth,
Electrical Engineer

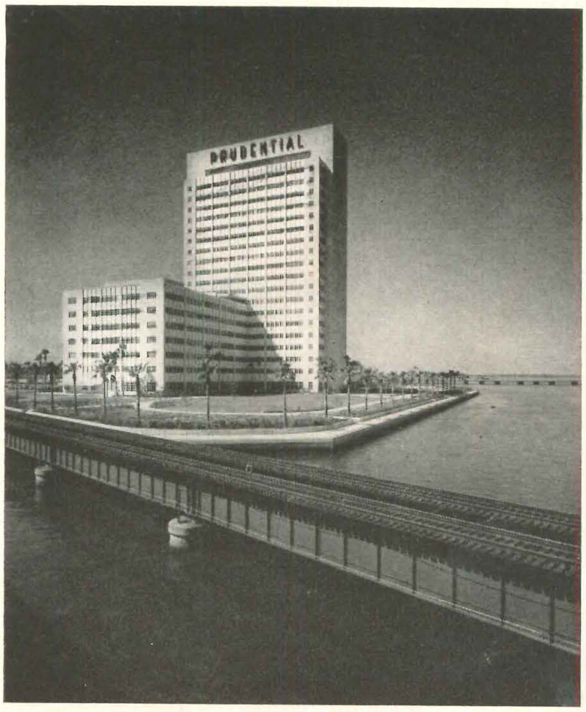
Robert M. Angas & Associates,
Civil Engineers

T. Miesse Baumgardner,
Landscape Architect

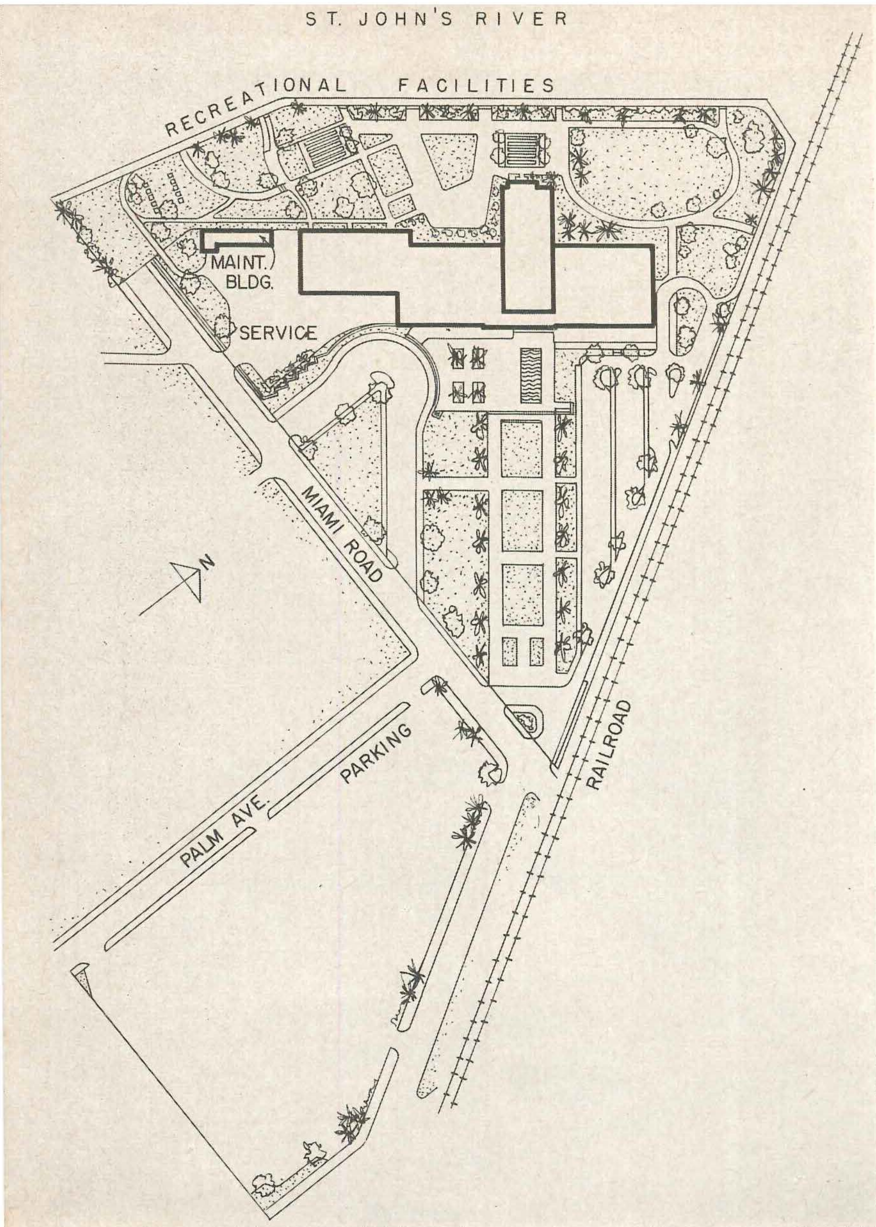
Aero-Pic

As THESE PHOTOGRAPHS suggest, this building represents an interesting concept of an office building for an age of mobility. Here is space — breathing space, parking space, recreation space, planting space, not to mention working space — within reach of city services and advantages. This is Prudential's answer to the current problem of decentralization: a compromise between the congestion of downtown and the isolation of suburban or country locations. Carol Shanks, Prudential president, explains that if traffic and parking problems can be worked out, big business belongs in the city; it will even pay high city taxes for the services the city supplies. Prudential is currently decentralizing its national organization in five regional home office buildings, but the buildings are only semi-decentralized.

Design-wise, the building makes much of the space freedom it enjoys, inside as well as out. Spaciousness is noteworthy in lobby, employes' lounges, dining rooms, and office areas. The nineteen-acre site has been (or is being) expensively landscaped, from formal garden on the entrance side to all manner of lawn recreational facilities on the river side, and for parking.



Alexandre Georges (also opposite page)

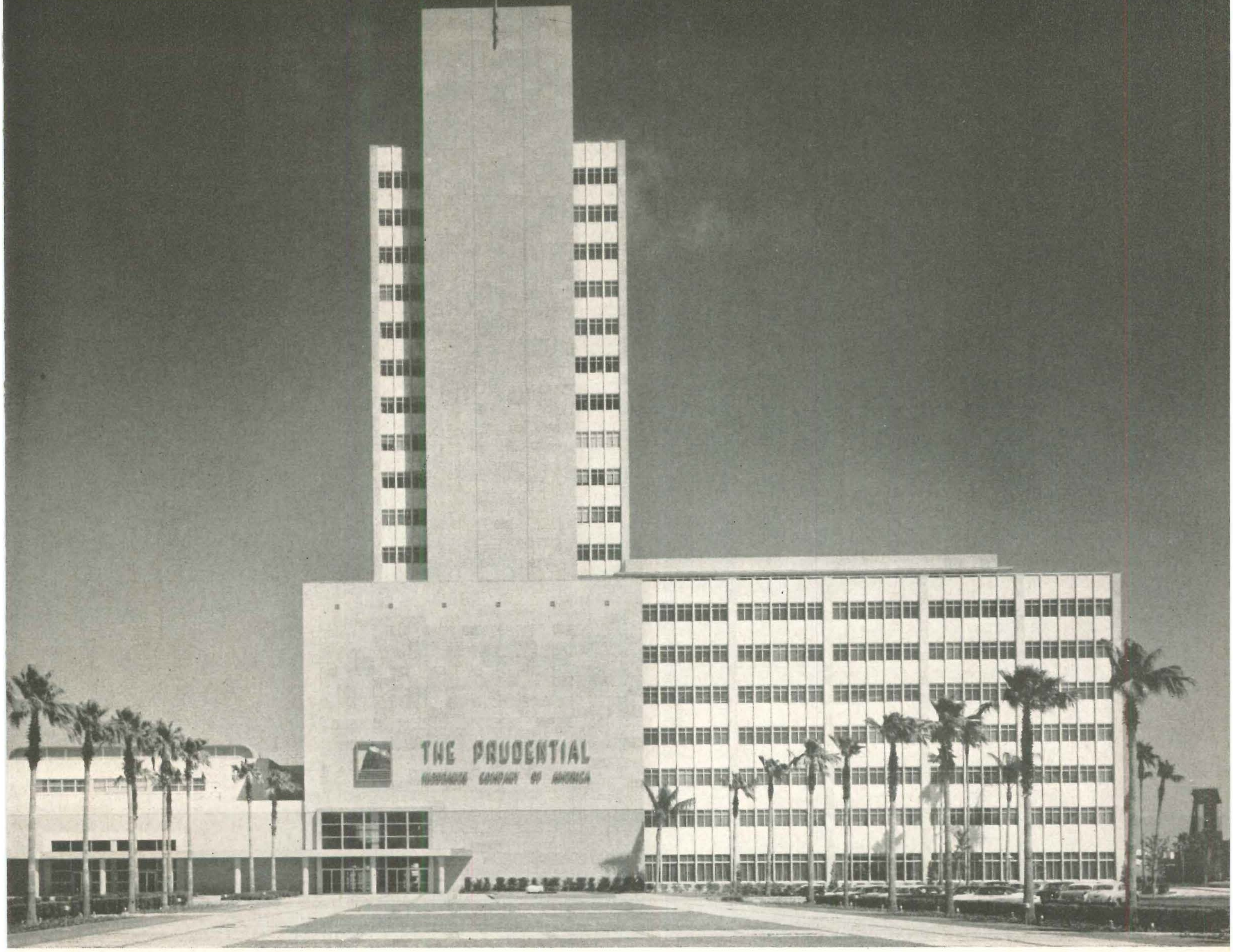


PRUDENTIAL BUILDING

The architects developed several different schemes for building on the site — low, high, combinations. There was a definite desire for a tower, largely for its advertising potential; the site is central with respect to three main highways and a main railroad line, and a tower would be a monumental signboard on the river scene. The solution then is a high tower section (its space largely for rental), a lower section of larger area for Prudential's own offices, and a wing for cafeteria, lounges, auditorium and service facilities. The tower is oriented to present its broad side to the highways, and this decision had a bearing on the architects' study of sun control.

Alexandre Georges

One of the broad sides of the tower faces almost due south. So why not some kind of exterior sunshades? Some study answered that question in the negative. A wide variety of shading devices was considered, but all would be expensive; all would introduce maintenance expense. One factor in all this was high winds; another was the sea gull population. Nice strong concrete eyebrows, for example, would withstand the winds, but would prove a strong attraction for our feathered friends(?). Incidentally, this bird consideration was one of the strong reasons for keeping all exterior projections to a minimum; it even vetoed a suggestion to stock the reflecting pool with goldfish. In any case, the entire



building is air conditioned, and a little study soon indicated that increasing the air conditioning on the sunny side would be much cheaper, in both first cost and upkeep, than exterior sunshades.

Further, the tower itself could be made useful as a sunshade; notice (in the air view, page 187) that the tower is so placed as to shade the seven-story office wing during the working hours of the day and thus save substantially on air conditioning load.

It was clear, moreover, that no exterior sunshades would be of much help against the glare from the sky and the water (remembering that sky glare introduces solar heat even on the shady side). The glare factor dictated the use of sun-resisting glass on all windows, also textured finishes on the light aluminum vertical fins and sand finish for marble and stone, to minimize reflections.

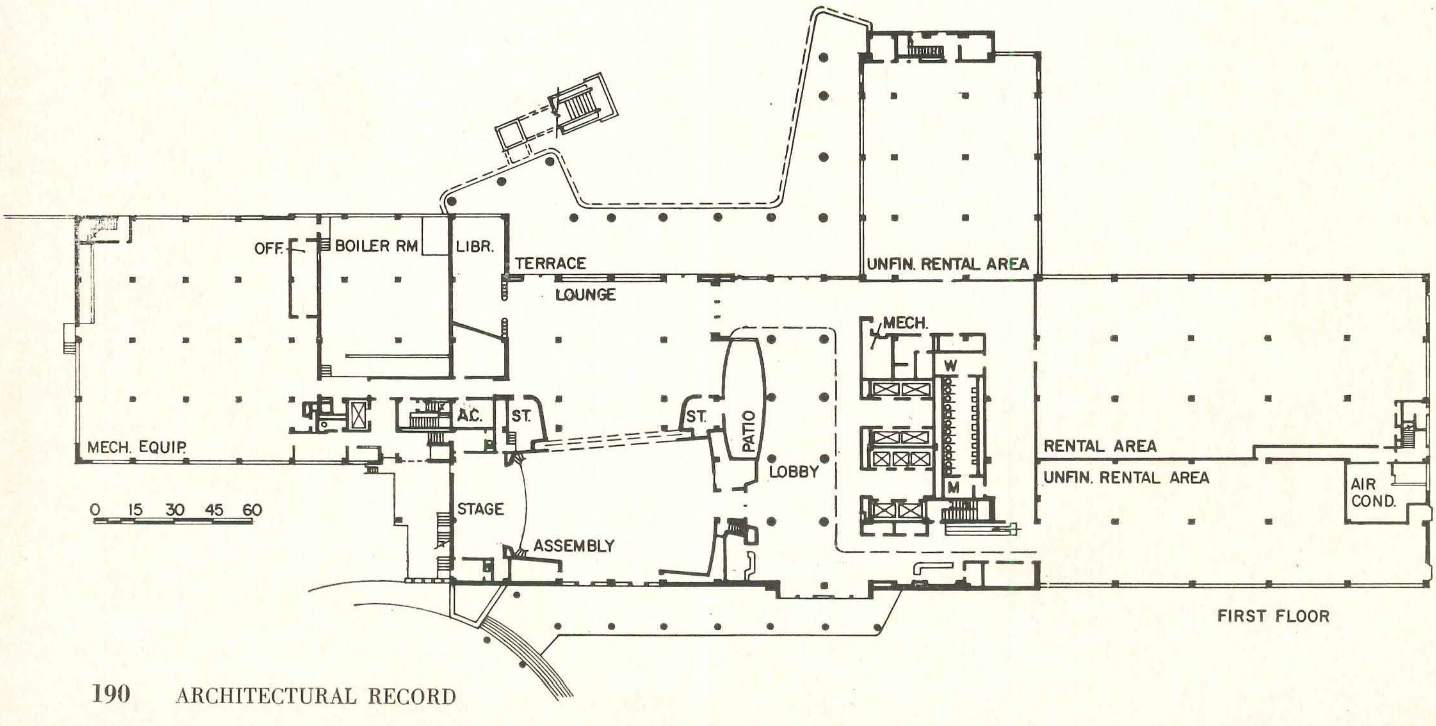
Office areas were planned on a system of 5-ft modules (25-ft bay), so that subdividing can be arranged or rearranged with the least changes. A cellular steel floor system, topped with light-weight concrete, contributes much to this flexibility, the cells serving as electrical raceways. Lighting fixtures were designed to be easily movable; movable steel partitions are extensively used; and air conditioning outlets sized so that partitioning changes will not require air conditioning changes.

The steel frame was erected with high-tension bolts, nuts and washers. This method of construction was used to save erection time, also because of a local shortage of riveting or welding labor.

One final comment on design: in developing the tower the architects were conscious of the Prudential symbolism of rock-like stability, hence, for example, the limestone exterior and also the closed end and west ends of the tower section. Besides the sun-control feature these closed ends are quite functional in another way: they provide good space for necessary air conditioning equipment on each floor. Main air conditioning plant with cooling towers and compressors is at the top of the tower nicely hidden behind high solid walls of stone facing which tie the solid ends together in a rock-like aspect.

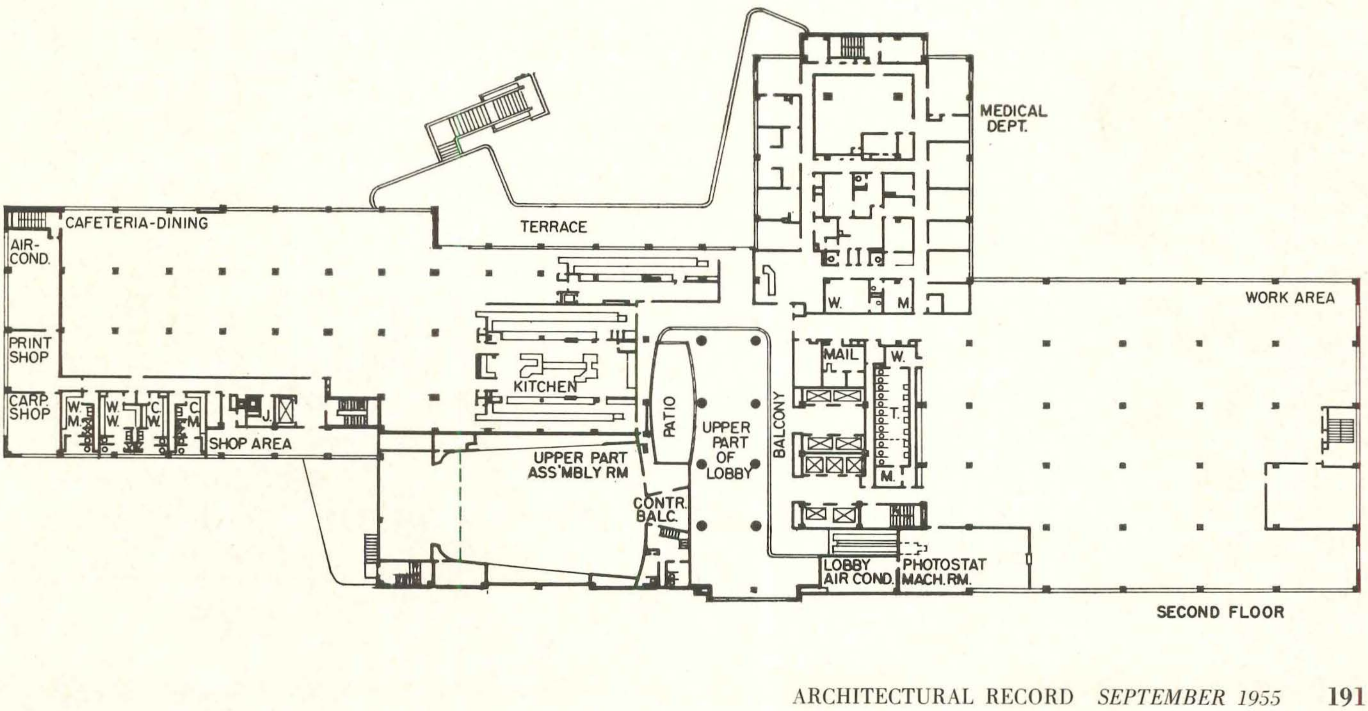
Deane's Studio

Main floor lobby runs clear through long dimensions of tower portion of building, looking out at one end to formal entrance garden, at other to employes' lounge terrace and the river. Unusual feature is a 30-ft high glass enclosed patio, planted with palms and tropical flowers, which can be enjoyed either from the lobby or from the cantilevered balcony at mezzanine

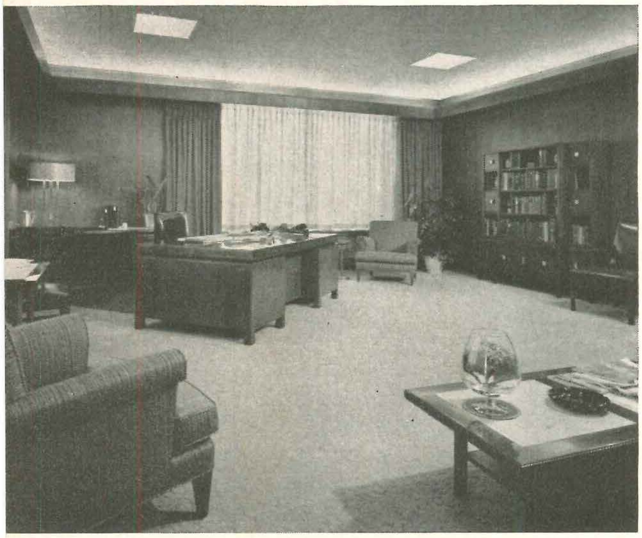


FIRST FLOOR

Alexandre Georges (also extreme left)



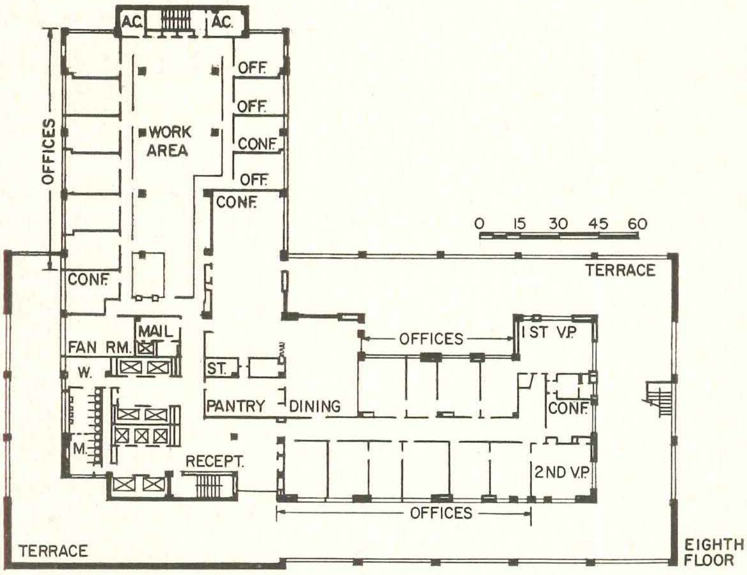
SECOND FLOOR

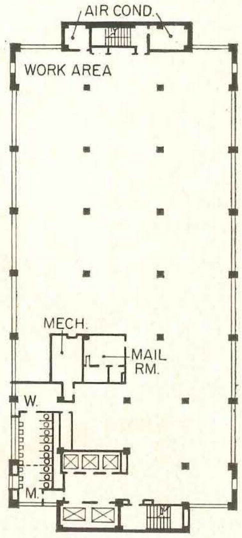


Alexandre Georges

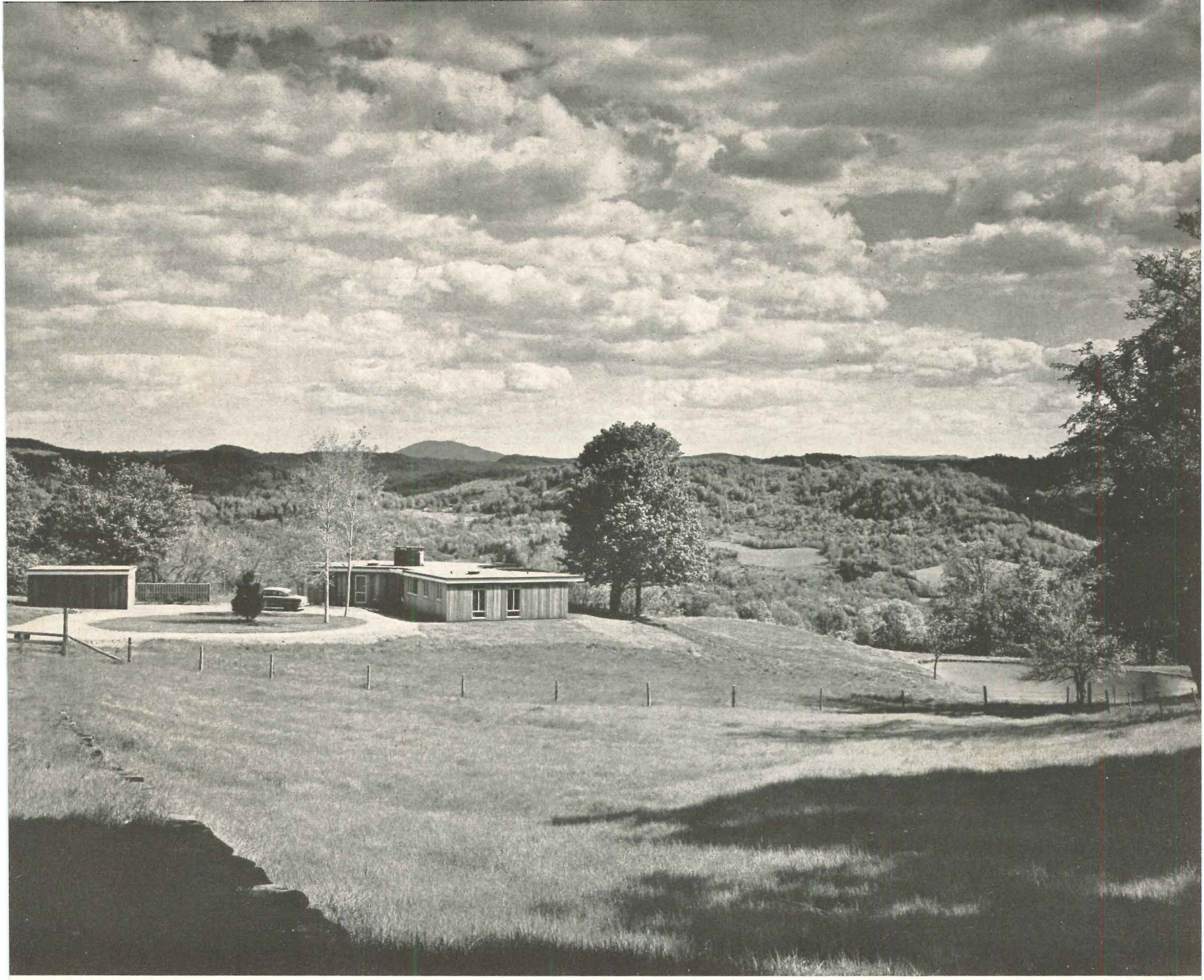
Most Prudential space is in open office areas, though module is planned to permit partitioning without utility changes. Below, regional vice-president's office and conference room

PRUDENTIAL BUILDING





11 TH THRU 19 TH FLOOR



Joseph W. Molitor

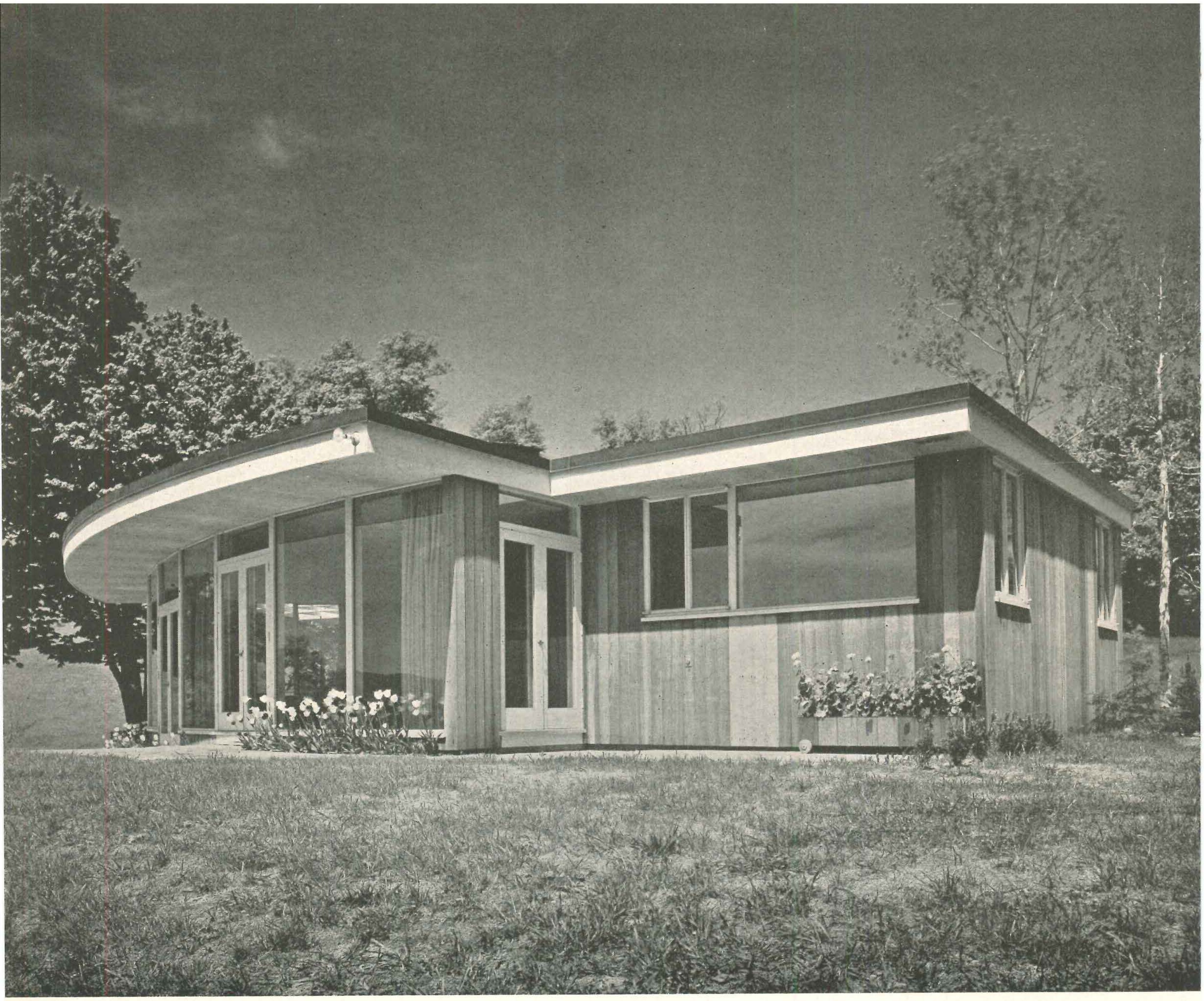
YEAR 'ROUND VACATION HOUSE IN NEW ENGLAND

Woodstock, Vermont

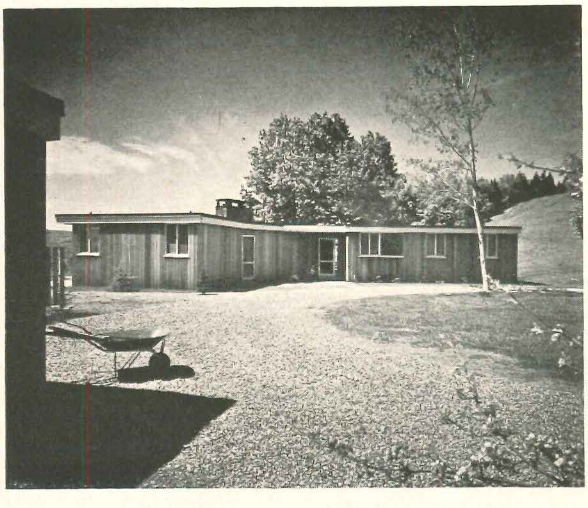
Mr. and Mrs. John French, Owners
E. H. and M. K. Hunter, Architects

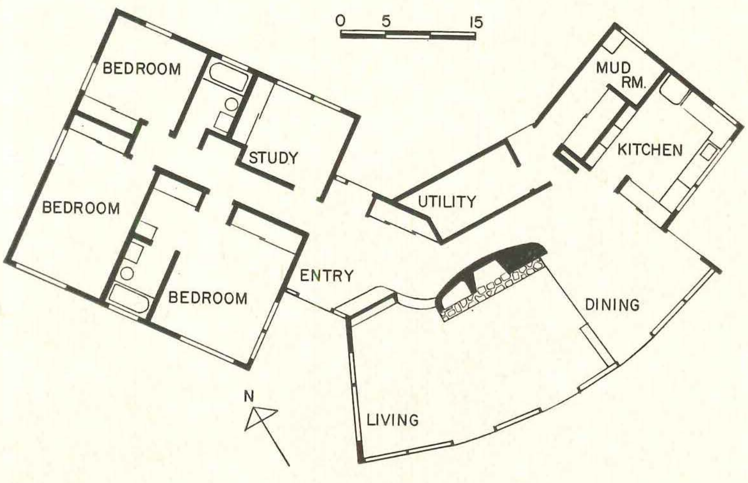
VERMONT'S COLD WINTERS presented something of a problem in the planning of this vacation house, since the owners insisted first of all on quick and easy opening or closing at any season of the year. Sturdy construction (concrete foundation, steel frame, rock wool insulation) was part of the answer. More unusual was the installation of anti-freeze in the radiant floor coils for protection in case of burner stoppage. A constant temperature of 45 F is maintained by thermostatic control when the house is not occupied, eliminating the long "warm-up" period which otherwise would be required for winter comfort.

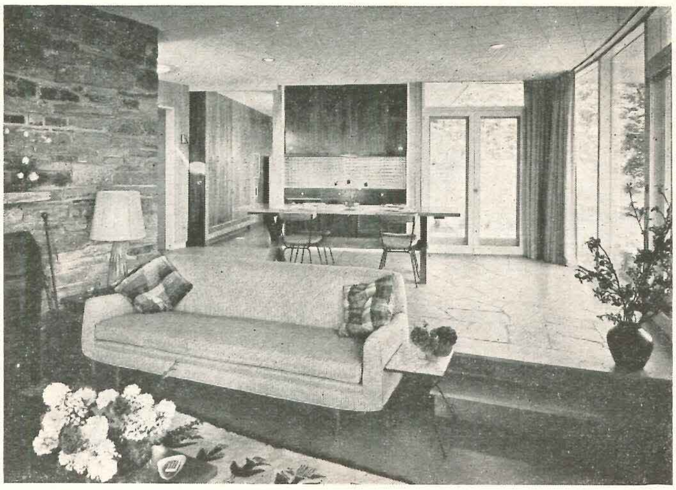
The site is an exceptionally beautiful one — a wide plateau part way up the side of Mt. Tom, overlooking the town of Woodstock. To the north rise open slopes and heavily wooded areas of larch and spruce; to the south is Mt. Ascutney. The house was so placed that it has a 180 deg view, and the living room was curved outward toward the view. This resulted in an irregular but still compact plan (see next page).



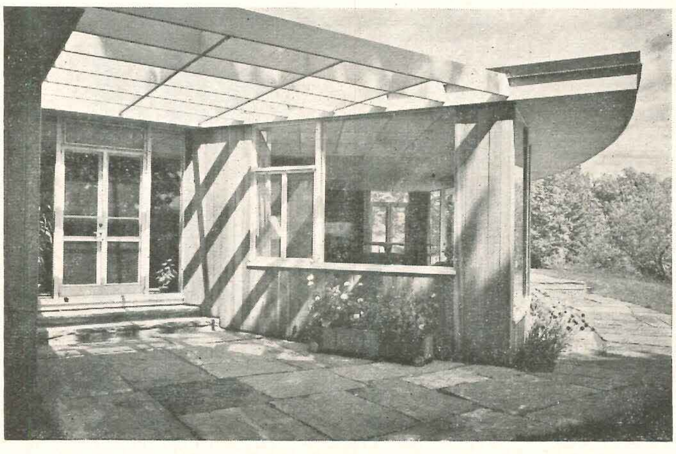
HOUSE IN NEW ENGLAND (*continued*)



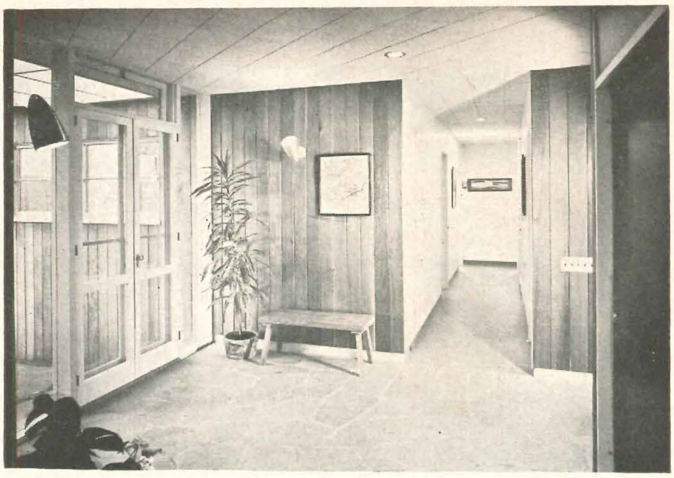


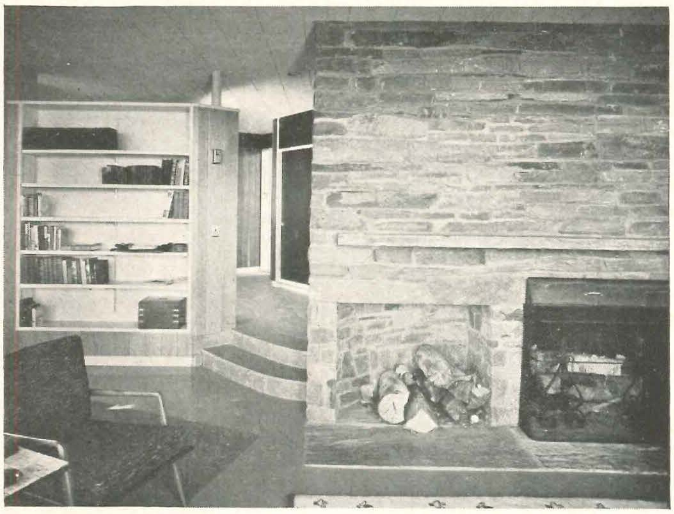


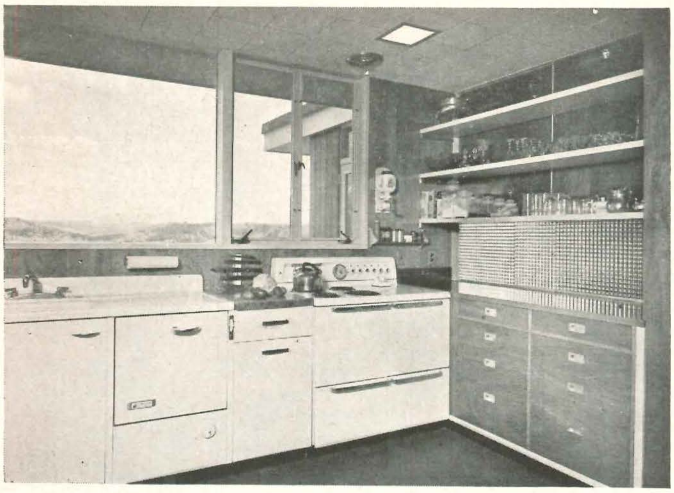
Living-dining area was curved to focus on wide view; three walls are predominantly glass, protected on south side by wide roof overhang. Kitchen and two bedrooms also are oriented toward main view. Entrance hall (photo, next page) gives direct access to every room from both sides of house and serves as buffer zone between bedrooms. Exterior is cypress siding, stained; interior walls are waxed butternut in living and entrance areas, sheetrock in bedrooms. Ceilings are acoustic tile, sash are steel. Wall between bedrooms is acoustically insulated and whole house is equipped for comfortable living throughout the year

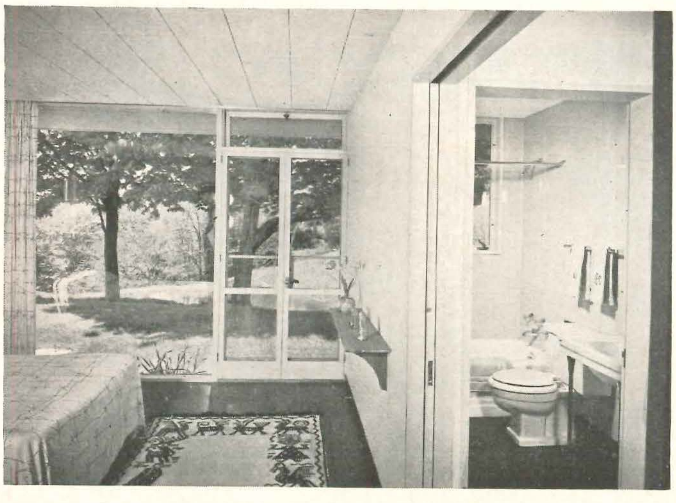


Joseph W. Molitor







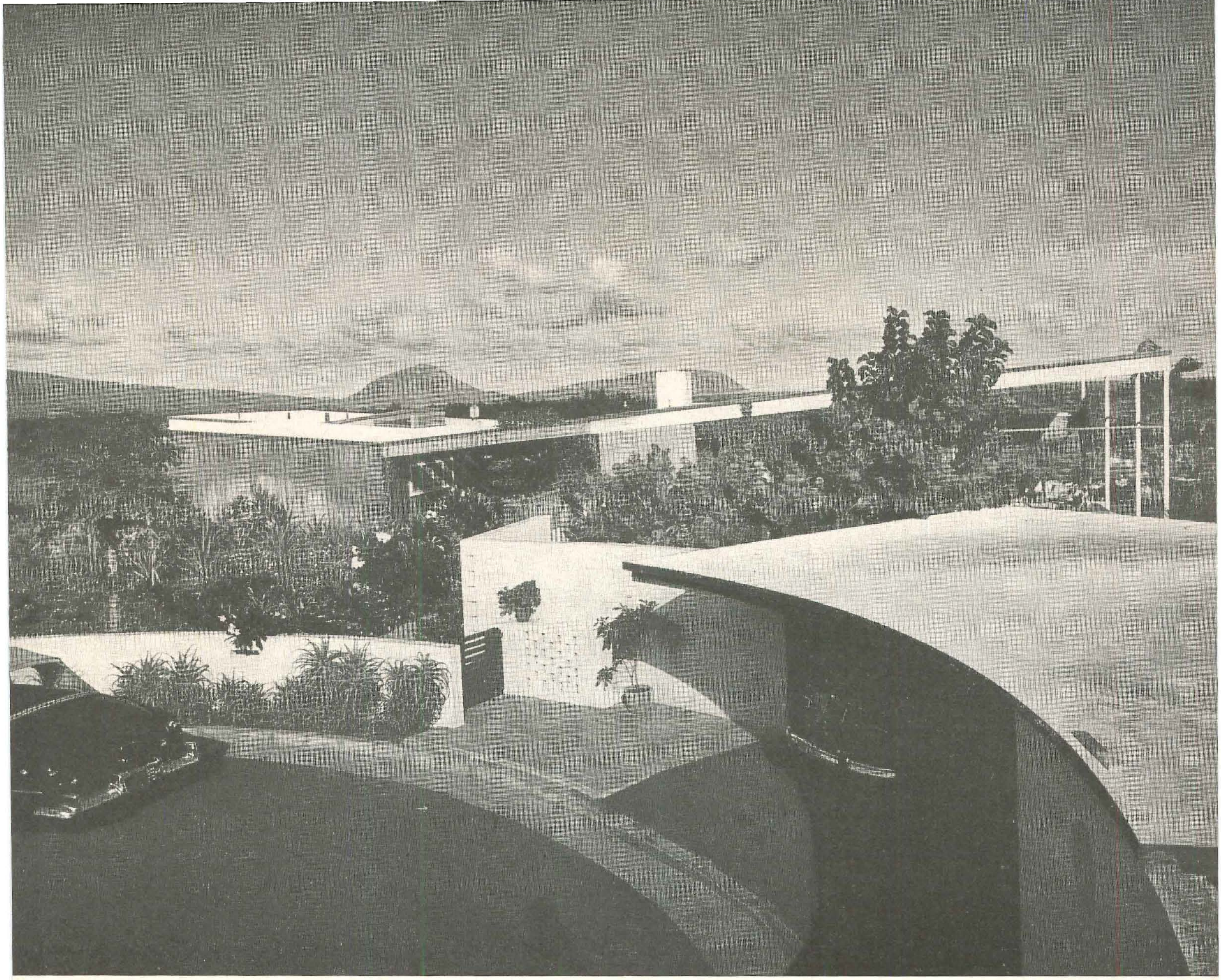


Joseph W. Molitor

HOUSE IN NEW ENGLAND

(continued)

Angled wings and central entrance hall provide maximum privacy for every part of house without loss of openness or ventilation. Living room, on slightly lower level, is open to hall only in one corner and further protected by book shelves just under ceiling height. Kitchen, at far end of living room wing, shares magnificent view to south, has pass-through to dining room. All three bedrooms have 90 deg cross ventilation, master bedroom has own bath



R. Wenkam

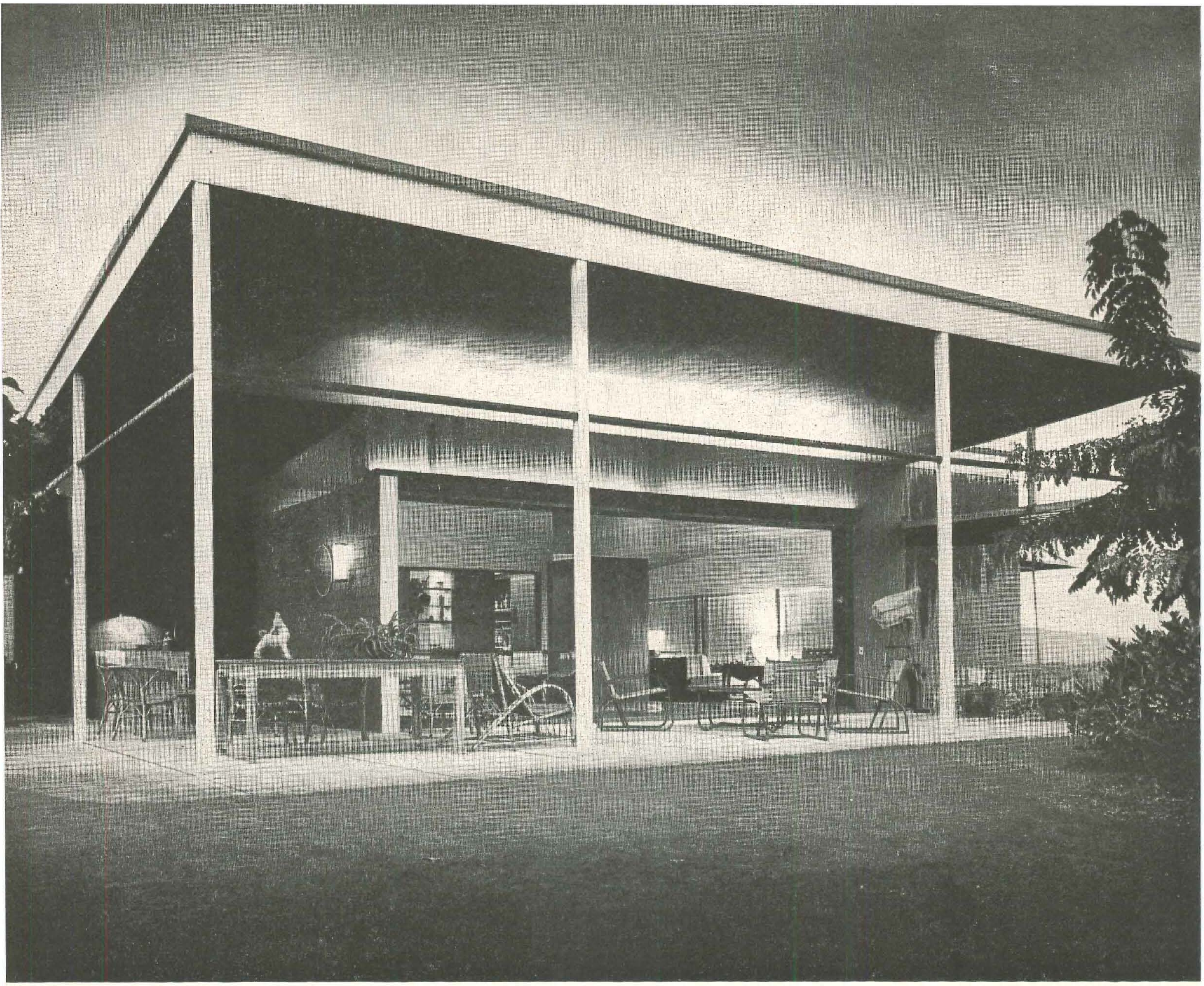
RESIDENCE ON A WINDY HILLTOP IN HAWAII

Honolulu, Hawaii

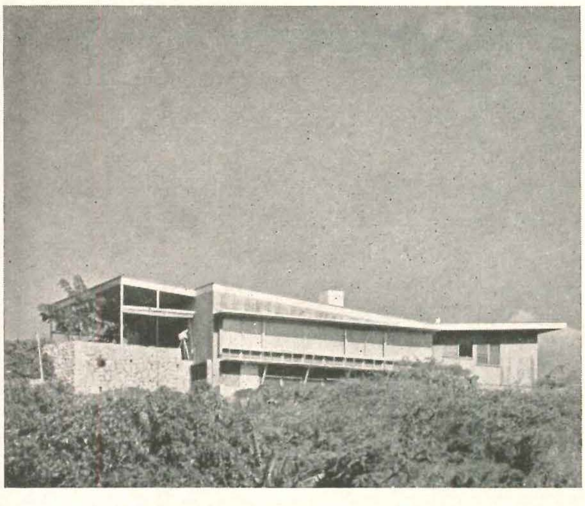
Mr. and Mrs. Vladimir Ossipoff, Owners
Vladimir Ossipoff, Architect

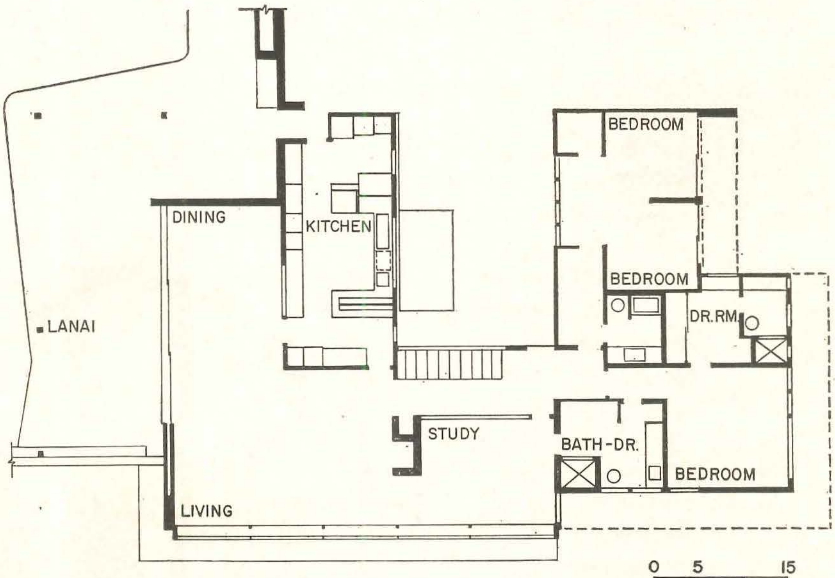
THE TOP OF A WINDSWEPT HILL sounds like the ideal location for a house in a climate such as Hawaii's, but in this case it presented several problems: in such an exposed location the strong and persistent wind (a godsend in warm weather) made some sort of protection from it mandatory for comfortable outdoor living; the underlying rock of the hill would make excavation both difficult and expensive; the "back yard" which the architect-owner considers a vital part of every small house, would, perforce, have to be on the same side as the entrance, and the kitchen, to be centrally located (another firm requirement) and adjacent to the back yard, would have to overlook the entrance.

An L-shaped lanai with one leg in the lee (see plan, next page) solved the first problem. The second was solved by perching the house at the high point and filling with soil (about 600 yards were brought in), which kept the cost of the house down to between \$10 and \$11 a square foot. And finally: two distinct gardens were created, one for the entrance, one for the family.



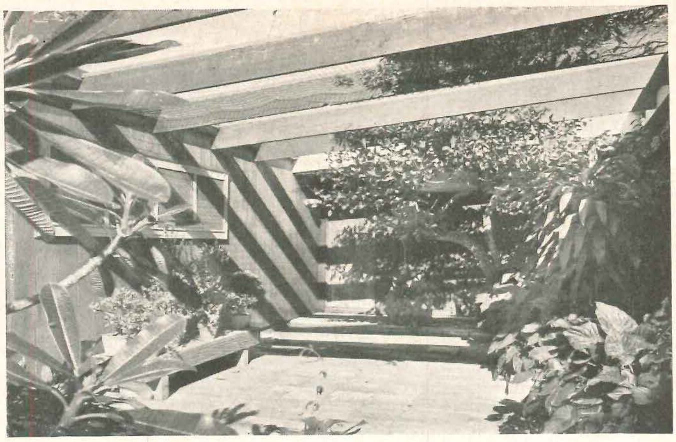
HOUSE IN HAWAII *(continued)*





Eyebrow on east side of house (*far left*) is flutter-proof double thickness of corrugated aluminum supported from above by light steel brackets; catwalk below plate glass windows provides for manual washing to supplement periodic spraying from built-in perforated water line at window head. Living room ceiling panels of Koa ply, a local hardwood, "were fitted with great care around the unevenness of the fireplace masonry," the architect-owner says; "there was no special detailing except for an almost complete absence of door and window trim and cornice." Bar-pantry serves living-dining areas, kitchen outdoor grill (see next page)

R. Wenkam

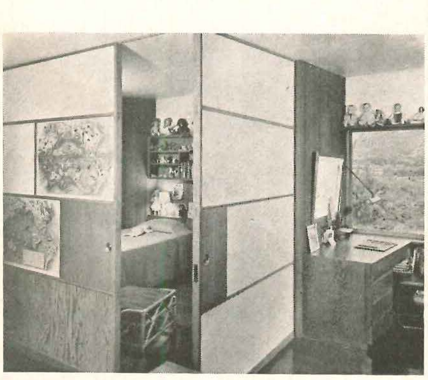


R. Wenkam

HOUSE IN HAWAII

(continued)

Entrance to house is through trellised garden between children's wing and kitchen. "I recognize the questionable advisability of having the kitchen overlook the entrance garden," the architect-owner comments, "but it is there nevertheless to be as centrally located as possible." Outdoor grill is on short leg of L-shaped lanai, in lee of house for protection from wind. On credit side, wind is persistent enough to provide adequate ventilation through jalousies under fixed plate glass extending entire length of east wall of living room and den. Children's bedrooms can be opened into one large play area or separated by tracked partitions (below)



LABORATORIES FOR INDUSTRY

WHAT ARE THE PROSPECTS?

By ***George Cline Smith,*** *Assistant Vice President and Economist, F. W. Dodge Corporation*

IN ITS NEW EDITION of *America's Needs and Resources,* the Twentieth Century Fund calls technology "*the primary resource.*" Research and development are the father and mother of technology.

The age of research has sneaked up on us so fast that practically no research has been done on research itself. Little is known of the extent of research as a whole; there are practically no statistics on the number of persons engaged, or the amount of money being spent. In fact, the term is only hazily defined.

In one of its recent reports, the Second Hoover Commission calculates that during the current year, government agencies are spending some $2,400,000,000 on research. The Commission hazards the guess that about $2,100,000,000 more is being spent by industry and non-profit private organizations, for a grand total of about $4.5 billion.

While these figures may be subject to a margin of error, one thing is certain: outlays for research and development have been skyrocketing for several years.

This is clearly indicated by the Dodge Reports totals of contract awards for new construction of laboratory and science buildings. These figures which are among the few verified statistics relating to research, show annual outlays for new buildings in the past few years running seven or eight times as high as they did in the years just before World War II.

The peak year for laboratory construction was 1952, according to these Dodge figures, which cover the 37 eastern states. With an adjustment for the eleven western states added, the national total in 1952 is estimated at about $175,000,000. While 1953 and 1954 were at somewhat lower levels, a decided pick-up in the first half of 1955 indicates that this year may well be close to the 1952 record.

Because we are in another era of expansion, and because of growing recognition that we must do far more research — particularly of the basic variety — than now, it seems clear that the trend of laboratory building will be sharply upward during the next few years.

AND THE ARCHITECTS' PART?

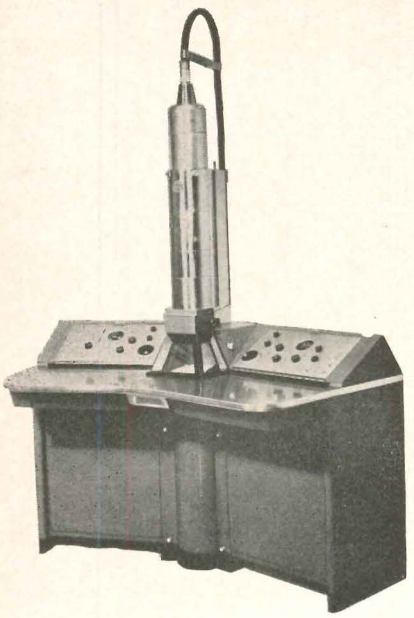
By ***James S. Hornbeck, A.I.A.,*** *Senior Associate Editor*

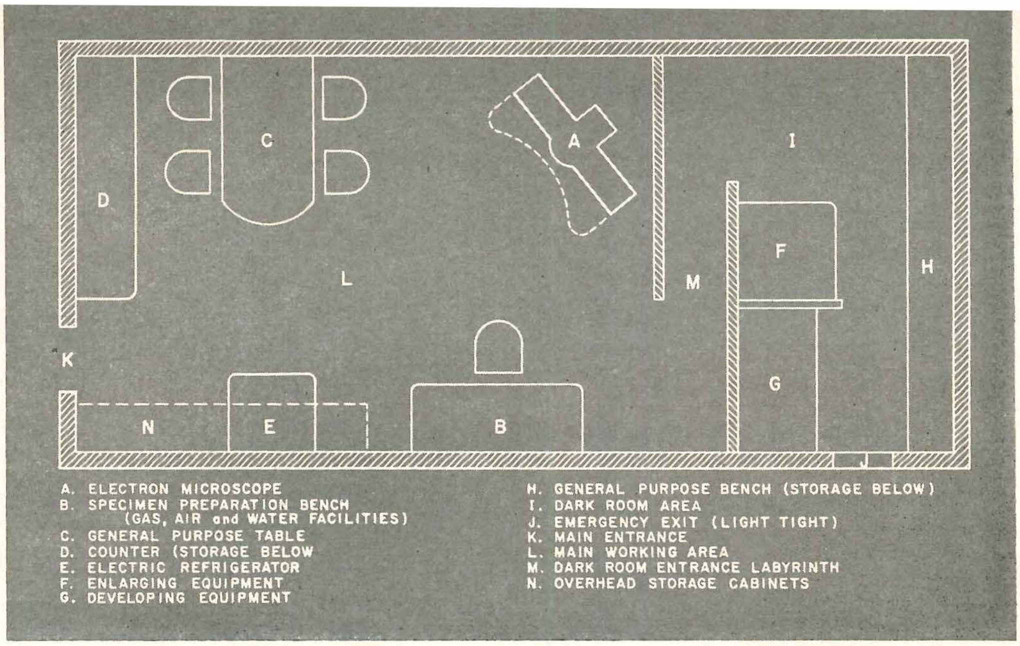
LABORATORY BUILDINGS — only in recent times architect designed — are more efficient, flexible and better looking than formerly. The unique quality an architect brings to a laboratory project is good design — good design in the broad sense. No technician is by training and experience as skilled in this specialty.

To the laboratory owner, this quality may appear intangible during the planning process, but quickly becomes the project's most tangible aspect after the job is done — when people can see and use the building. Design's value is real — so real it spurred a citizens' group to present a token of appreciation to the owner and architect of the attractive GE laboratory in their neighborhood, p. 206; of such value that a Johns-Manville executive tells how their research center design has built high morale and low technical personnel turnover, as well as favorable customer and community reaction, p. 224. These things are worth money and are good for the spirit. There are countless examples.

Architects explain to owners that competent laboratory design in the broad sense means much more than mere good looks. The specific needs must be searched out, analyzed, programmed. This task, which architects regularly undertake to start any job — often with expert technical advice — is discussed by such a consultant, p. 202. These requirements — now transformed into design elements — are then fitted together or pulled apart or piled up into an arrangement that works with grace and efficiency; fits easily into the setting. The materials and equipment selected must be attractive and easy to care for; the specialized knowledge of numerous technical consultants must be utilized and coordinated with intelligent understanding; the architect's specifications and supervision must result in good workmanship; the entire undertaking must meet the budget and be administered and coordinated by one who can get along with human beings and who can act as a fair judge when the occasional inevitable disputes arise.

Increasingly, architects are measuring up to such a performance, either with competence or brilliance. This augurs well for those who will be building laboratories and availing themselves of architectural service.





Plan and photo courtesy of RCA

PURPOSES, OBJECTIVES, PRINCIPLES, COMMON

*By Edwin Frederic Pike, Ph.D.**

INDUSTRIAL LABORATORIES are today a fad and a necessity, as power steering — everybody wants the newest kind. This desire often is the sole contribution the client brings to the architect about to design one of the most complex of buildings, yet the productive laboratory must fulfill a specific set of purposes and objectives. It must meet today's needs and anticipate tomorrow's. There can be no standard model.

THE PROGRAM. Determining precisely what is required is one of the difficult problems. A typical scene unfolds at the initial meeting. The architect's question, "What do you want this lab to do?" evokes strange answers. The technicians ask for labs and equipment without end; the "top brass" want a monument to their administration; the sales and public relations department request a country club for customer entertainment; the treasurer demands a building that will pay for itself in five years and cost $9 per sq ft to build. If all these were incorporated, you would have a building with the "beauty and utility of a medieval castle, a battleship, and a greenhouse — all in one."

Another provoking situation arises when someone says, "We want a building like X's" when X makes baby food and your client extracts rare metals from ores. One hardly expects a screwdriver to jackplane a board, and the initial problem becomes one of deciding exactly what the building must do, and how. Experience suggests a procedure and some principles that are often helpful in tying down the problem.

Call a meeting and invite the production heads, a couple of men from sales, an advertising man, the entire technical staff, and any other persons expected to use the laboratory in any way. Ask each of these people for written answers to a few simple questions and give them a week to turn in their papers. Ask:

A. What would *you* like a laboratory for your company to do? Describe its purposes and functions from *your* viewpoint and interests.

B. In *your* opinion what would it take in terms of facilities, people, equipment, apparatus, etc. to accomplish these?

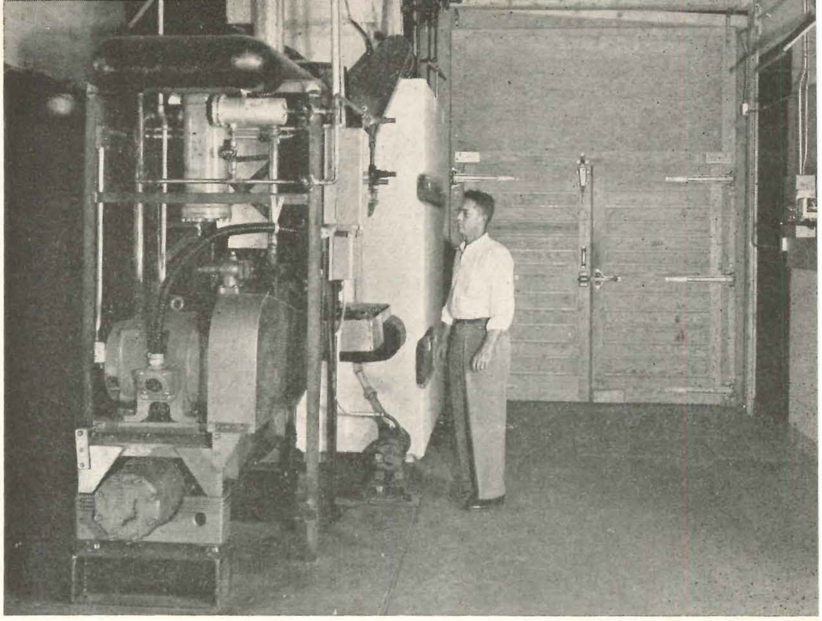
C. Looking to the future (as well as the present) what would *you* like to see included in the new laboratory?

It is often a pleasant surprise to learn how seriously and constructively most persons will answer, for here is the opportunity to influence the design of a facility they have needed and wanted and will use for a long time. Frequently an "angle" is uncovered that the director of research had missed entirely; or a new way to accomplish something important to the company is suggested. Technically trained people usually have definite and often creative ideas.

After the architect and client have reviewed the answers (and followed up some of them with further discussion) the purposes and objectives can be listed. If the executive judgment of the company is then superimposed on the list — since plans or facts not generally known to others may exist — a still better list can be made. The purposes and objectives can be rated in the order of their importance to the company.

Now the architect can (if necessary) guide the client in classifying the laboratory. This may be in accordance with (A) the principal science, as chemistry, physics, pathology, engineering, etc., or (B) the activity, as

* *Dr. Pike, Director of Chemical Engineering for Giffels & Vallet, Inc., L. Rossetti, engineers and architects, has had wide experience in organizing and directing research for several industrial corporations.*



U. S. Forest Service, Forest Products Laboratory Photo

At far left is shown an electron microscope, and at next right, a typical plan and fixture layout for a laboratory devoted to electronic microscopy. Photo at right shows the interior of the newest controlled humidity room at the Forest Products Laboratory in Madison, for testing wood under controlled conditions of temperature and humidity

DENOMINATORS

When The Client-Owner Says, "I Want a Laboratory"

fundamental research, applied research, development, control, etc., or (C) the field of investigation, as fuels, paints, high polymers, solvents, etc.

The laboratory may ultimately be a mixture of these kinds or a simple example of one, depending upon the size, research experience, plant distribution, and special requirements of the company. However, it is important at the outset that a classification be made.

Ideas schemes, and details for incorporating special requirements into the scheme are derived from the technical personnel, from equipment manufacturers, from other installations, or best of all from the designers ingenuity. Special needs are usually many, and may include areas, rooms, or whole wings devoted to high pressures, microanalysis, chromatography, etc. There may be a few dormitories for technical personnel — not at all an unusual need today.

There is a large background of work from which an architect may draw, but a still larger future to which he may contribute; this is the challenge. Research requires imagination — and nothing less than imagination can produce an outstanding laboratory design.

The electron microscope is dependent upon its environment for proper functioning. The two illustrations above show the machine itself and a recommended layout. The area must be free of vibration — preferably by means of structural independence — and the machine kept out of electrostatic or magnetic fields which might be created by motors, generators, or other electrical equipment. Two supplies of cleansed and cooled water are required, as is air conditioning to draw off the heat generated by the machine and to eliminate dust and dirt particles. Darkening the room is also necessary.

A constant humidity or constant temperature room is often required for research in order to reproduce experimental procedures or test materials under similar conditions. This is especially true in the pulp, paper, paint, and wood industries. Such a room is in operation at the Forest Products Laboratory in Madison, which is shown above. This room is 20 by 20 by 12 ft. Outside air must be dehumidified and reconditioned by means of steam coils and water spray nozzles. Temperature can here be maintained at from 40 to 100 degrees F. and relative humidities from 20 to 85 percent.

COMMON DENOMINATORS. Facilities common to laboratories of all kinds are listed below. Many are already familiar; so we discuss further those not regularly encountered in architectural practice.

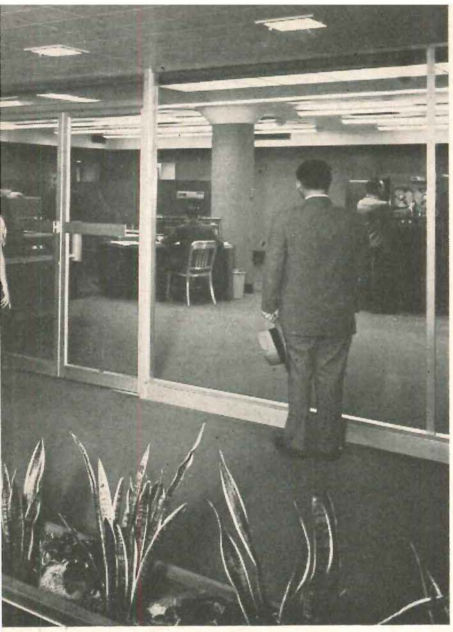
Offices
Reception
Conference rooms
Auditorium
Food facilities
Shipping, receiving
Microscopy
Constant temperature room
Constant humidity rooms
Chromatography
Glass washing
Storage:
- equipment
- glassware
- supplies
- samples
- files
- exterior

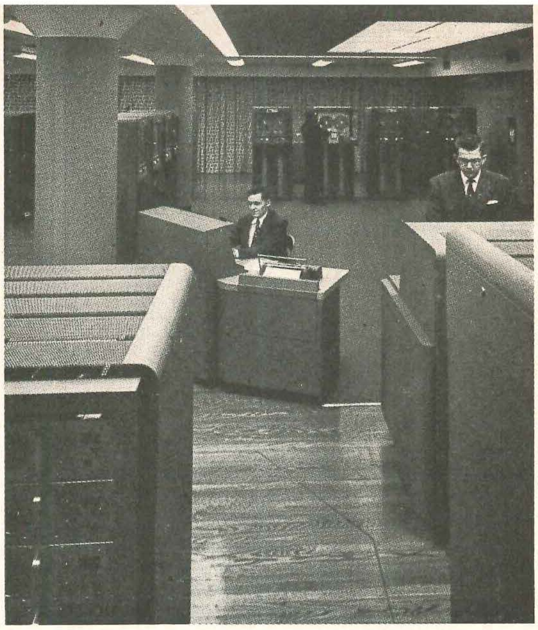
Computer room
Spectroscopy
Photography
Water distillation
Balance room
Protective devices:
- fire, chemicals, explosion

Distribution systems:
- water
- fuel gas
- vacuum
- compressed air
- electricity
- steam
- various gases
- various liquids

Waste disposal systems
Animal quarters
Refrigeration
Communication
Engineering, drafting
Shops:
- apparatus making
- apparatus repair
- models, glass
- carpenter shop

Library
First aid
Maintenance, janitor facilities
Rest rooms, toilets, lockers, etc.





Photos courtesy of Monsanto Chemical Co.

At left are shown two views of the 40 by 60 ft computer room of the Monsanto Chemical Co. in St. Louis, containing equipment installed by IBM. Next right, a view of the spectrophotometric laboratory, American Cyanamid Co. laboratory, Bound Brook, N. J. At far right, an animal treatment room at the Hoffman-LaRoche pharmaceutical laboratory located in Nutley, N. J.

Chromatography is a technique used to separate mixtures of compounds and is especially helpful in the study of complex organic substances, the identification of compounds, and in concentrating materials contaminated by large amounts of foreign substances, as well as in analysis. The recent use of scaled up chromatographic techniques has posed construction problems for proper installation of equipment. Headroom, supports and drainage for equipment must be correctly designed. Most difficult to deal with is static electricity, for its charges must be drawn off and grounded.

Increasing civilian use of **radioactive materials** may require special washrooms, locker-rooms, and processing stations, much like those in our atomic energy installations. Removal of clothing and its safe disposal may be required upon leaving "hot" areas; also equipment for reading and recording amount of exposure. In some cases decontamination will be necessary, and various kinds of detergents, abrasives, soap, and protective creams must be available. Shielded lockers may be required for clothing, as well as provision for transporting contaminated articles to disposal or laundry. The degree of attention to such measures will depend, of course, upon the activity present. Laboratories using such materials for analytical, biological and similar processes use relatively small amounts of radioactivity.

To indicate the special attention to details necessary in laboratory areas using radioactive materials, consider two of prime importance: hoods and table tops. A positive and constant air flow must ventilate hoods and recirculation is generally prohibited. Also, filters are usually provided. For table tops, modern thinking prefers a strippable surface which can be replaced at regular intervals, or removed when an accident occurs. A lip or curb prevents spillage of material.

Not many years ago, laboratory technicians washed their own glassware when the sink became full. Today, such a procedure is expensive and in many cases inadequate since regular procedure calls for a common **glass-washing room,** with regular personnel, for all apparatus in the building. In cases where hazardous biological or bacteriological materials are used, or toxic or radioactive materials are involved, special equipment, materials, and techniques are employed in order that the glassware be sterile for the next user. Mechanical washing equipment is often installed.

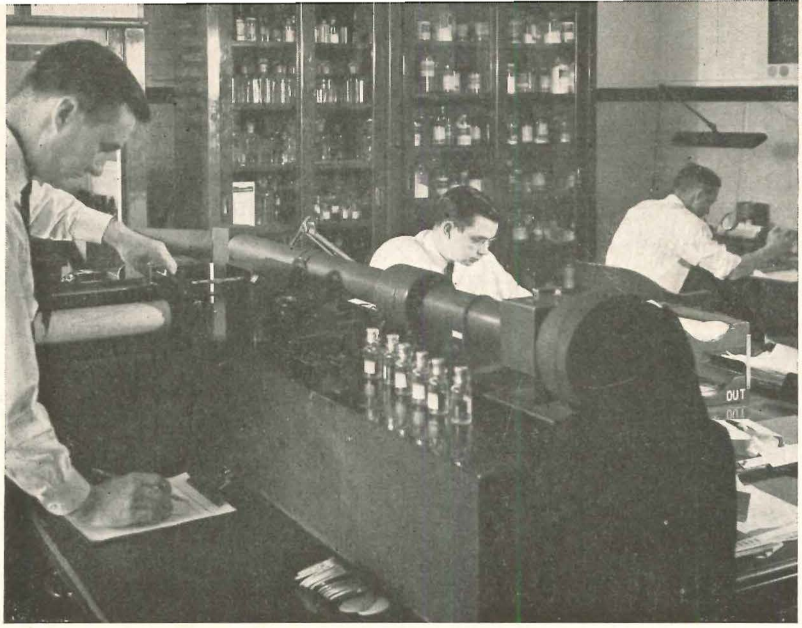
Storage is an important factor in over-all efficiency. Haphazard location results in lost time for highly paid laboratory personnel seeking material or equipment. The lessons learned by mail order houses in "picking orders" might well be applied in planning storage for accessibility. Storage should provide proper protection, arrangements for inventory control, and necessary systems for fire protection.

Some laboratories serve as a distribution point for samples. In this event, there should be complete facilities for cataloging, weighing, packaging, shipping.

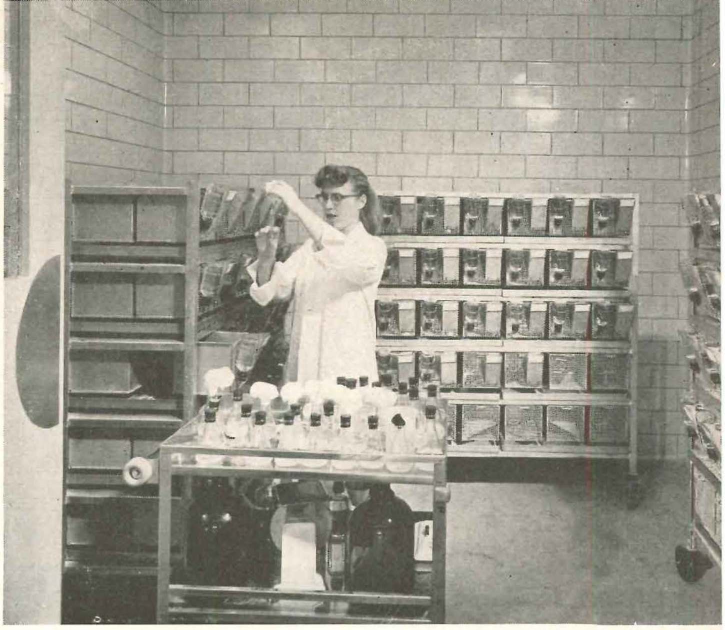
In some cases exterior storage will be required for solvents, hazardous or toxic chemicals, etc. If the volume of use requires extensive interior use of these items, they may be distributed by piping or conveyor belts, sometimes located in a tunnel. Building codes may require that such a tunnel be ventilated, lighted, and equipped with fire and explosion controls.

Micro techniques are being increasingly used today, as opposed to the older practice of working with relatively larger quantities of material. Often only a drop of a given substance is prepared and minute quantities are the subject for work. As a result, special arrangements are required even for a simple weighing operation. The microanalytical balance must usually rest on a series of shock absorbing layers between thick lead plates, on a pedestal supported separately from the building's structure and penetrating to bedrock.

Computers, or electronic "brains" can today be used not only to solve mathematical problems, but also in carrying out certain kinds of experiments. Data representing variables and their changes are fed into



Research Division, American Cyanamid Co



J. Alex Langley

such a machine rather than setting up a whole series of actual experiments to study the effect of changes upon a reaction or process. See illustrations above.

Accurate control of temperature and humidity within small ranges is necessary for reliable functioning of the machines. Relative humidity must be maintained at 40 to 60 percent at 80 degrees, even when the machine is at rest. The air in the computer room must be as dust-free as possible, and lighting should be balanced against the computer's panel and signal lights.

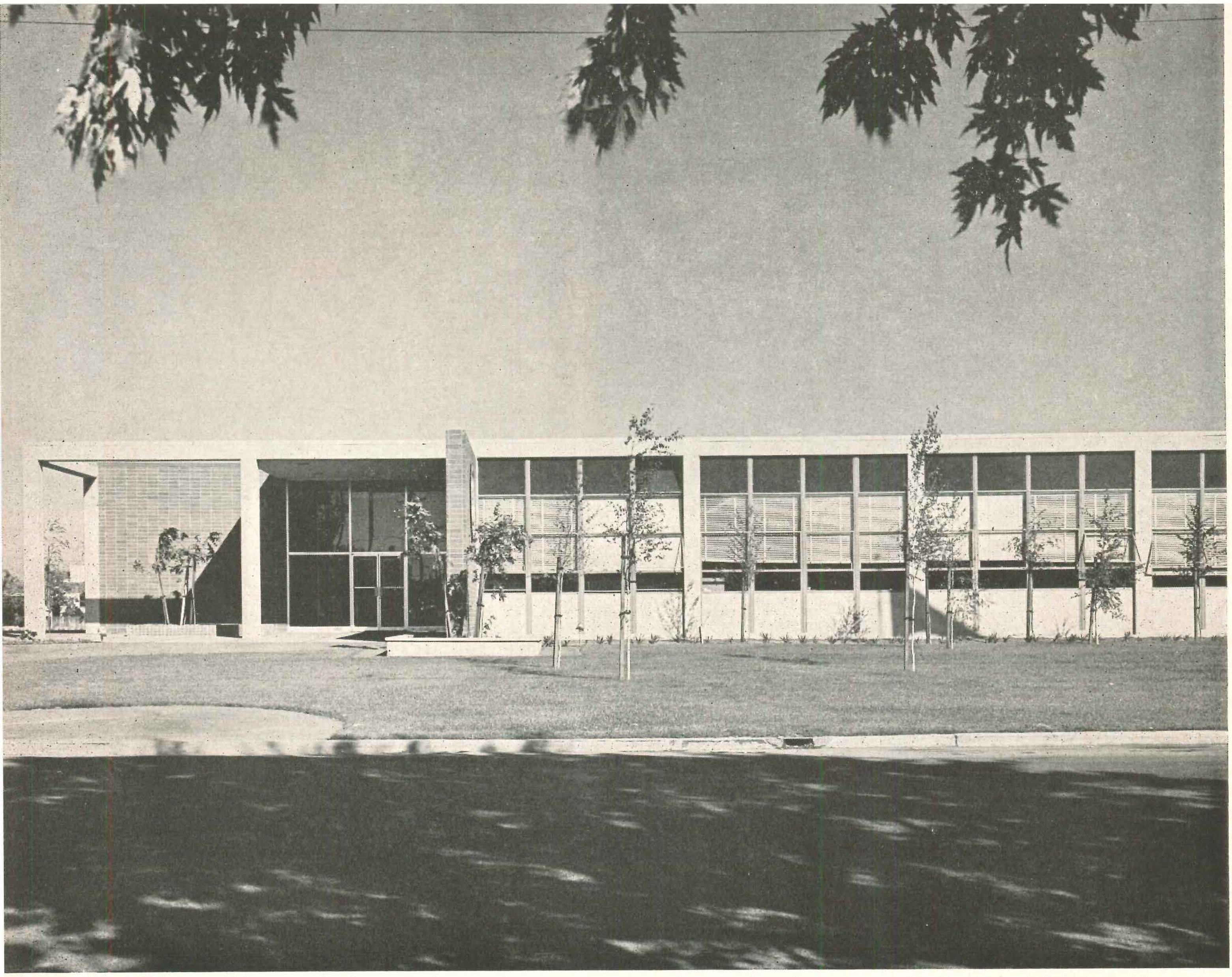
Spectrophotometry, X-ray, and photography are being increasingly used in modern research for identification, purity determination, and analysis of various materials. All of these require the preparation of negatives, prints, and reproductions of various kinds. A typical layout for such an area would house X-ray diffraction apparatus, an electron microscope, a negative dark room, a photographic print room and some laboratory space. Vibration can often be more easily controlled if such a section is located in a basement area. It should also be air-conditioned for dust and temperature control, have light seals of the sliding type, and a crash door for emergency exit from dark rooms. The picture above shows a spectrophotometry.

Water, fuel gas, electricity and steam distribution systems are a familiar consideration and pose no particular problems, but in the case of lines for nitrogen, argon, helium, ether, or various solvents and other chemicals it is frequently necessary to maintain specific temperature ranges. This means that such systems must be either heated or refrigerated and lines must be insulated and often protected by automatic fire fighting equipment as well.

Fire and explosion protection is necessary when high pressure experiments are to be conducted. Shock absorbing walls consisting either of a layer of sand between insulating board or of thin panels of soft wood are commonly used to enclose the high pressure cells. Since reactions are unpredictable, observation can be arranged through telescopic vision apparatus. Mechanical and electrical devices are used to start or stop processes, draw off samples, or add chemicals. Several types of fire quenching materials should be installed to work either in sequence or under manual control, depending upon the type of explosion anticipated. It is customary to place high pressure cells within areas built with explosion panels and non-fixed roofs. Such structures require shielded electrical fixtures and switches and pressure or temperature actuated fire fighting systems.

Animals play an important part in biological, pharmaceutical and medical research, so provision for their rearing, holding and treatment is necessary. In such quarters it is required that light, temperature and humidity be closely controlled; a high degree of cleanliness is imperative, and degrees of sterility and asepticity must often be achieved. Pictured above is a typical example of a well constructed animal treatment room. For animal surgery, the same requirements must be met as in a regular hospital operating room.

The psychological effect of the surroundings upon the employees is of great importance. The product of a laboratory is ideas, and the environment should be pleasing and free from distraction if maximum productivity and high morale is to be achieved. The building must be accessible to others in the company — but not too accessible to those who do not regularly work there. It must provide good communication on the one hand and make possible nearly monastic seclusion on the other. The tasks are such that regular hours cannot always be observed and long periods of concentrated effort are sometimes required, so the environment then becomes doubly important in sustaining the workers' spirit. Pleasant spaces well ordered, attractive colors, good lighting, air conditioning, convenience, good food and a place to relax at lunch time, a quiet setting nicely landscaped — these are only some of the amenities an architect is best equipped to provide. They are of great value to the company-owner and well worth their cost.



WEST COAST MICROWAVE LABORATORY FOR

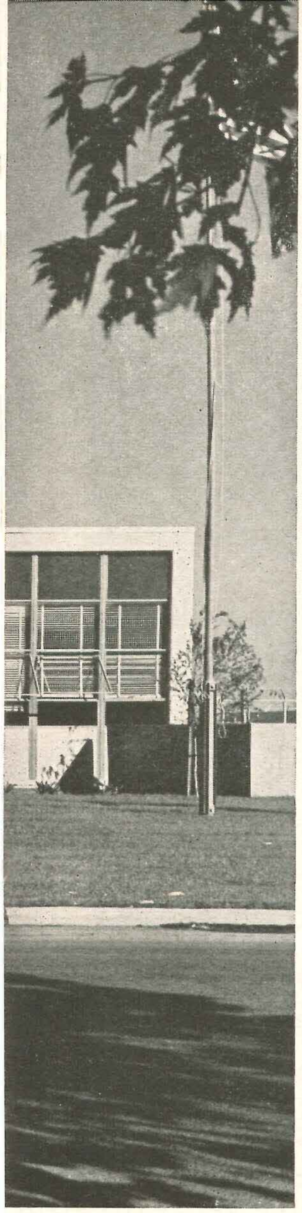
THIS HANDSOME laboratory was so well received by neighboring residents that their Community Association presented the owner with a resolution of congratulation. Completion of the landscaping plan — now under way — should further enhance the over-all attractiveness. There will be two "outdoor conference rooms" available to workers at lunch time for lounges; also a patio.

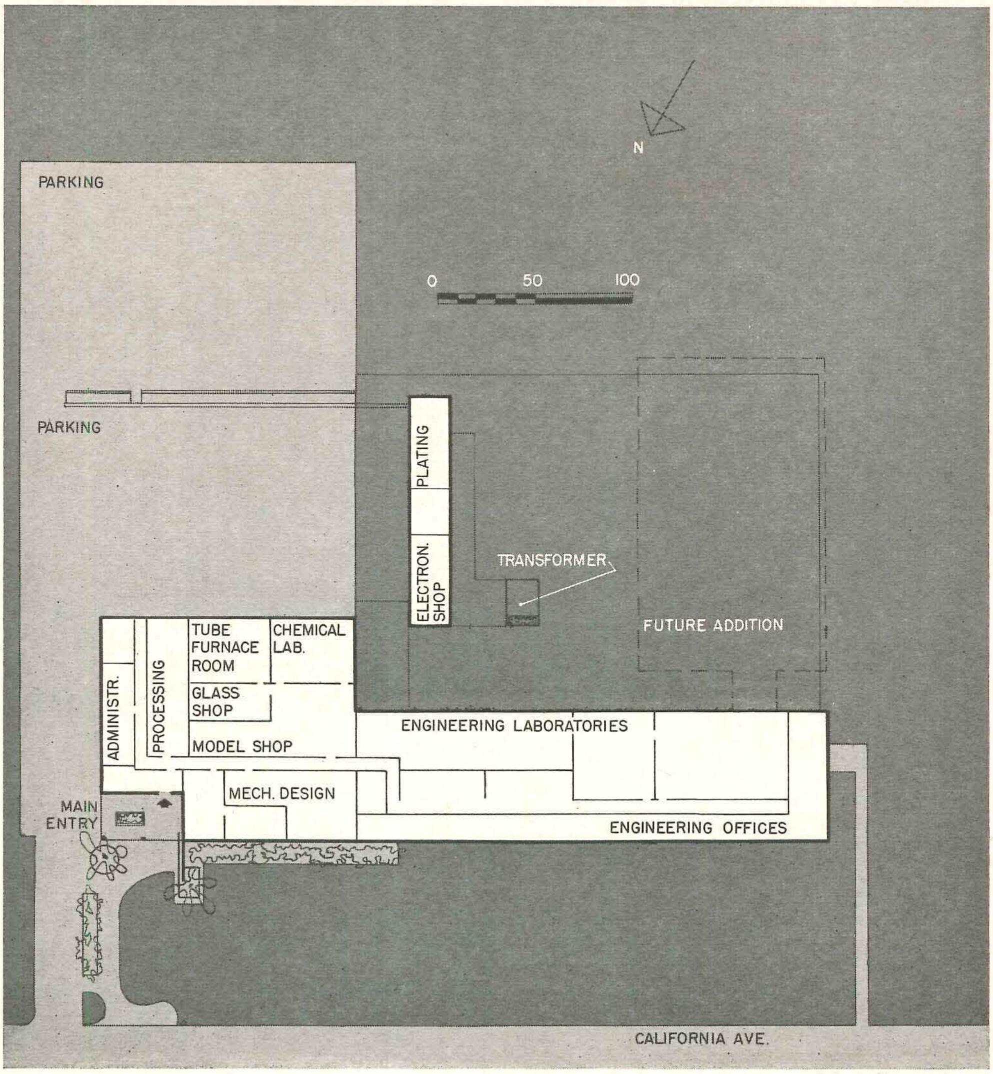
The location, in Stanford Industrial Park, enables employees to study part time for advanced degrees and provides also the mutual advantage of informal cooperation and pooling of skills with the university staff.

The scheme is a three part one, with part two now under construction. The diagrammatic plan as shown will change as the building grows, so that offices toward the street in the present block, now used by scientists, will become administrative quarters.

The exterior wall panels are of concrete, poured on the ground and tilted-up into place to fill the voids in the steel frame, which is arranged on a bay pattern 18 ft on centers both ways. The 21,000 sq ft structure was quickly and economically built, the owner moving into the first unit only 4 months and 8 days after the first meeting with the architect.

Exterior concrete was painted; sash are steel, painted; floors are asphalt tile on slab; interior walls are birch or fir plywood on studs; ceilings are of exposed concrete slab, painted; interior doors are of wood, flush type.

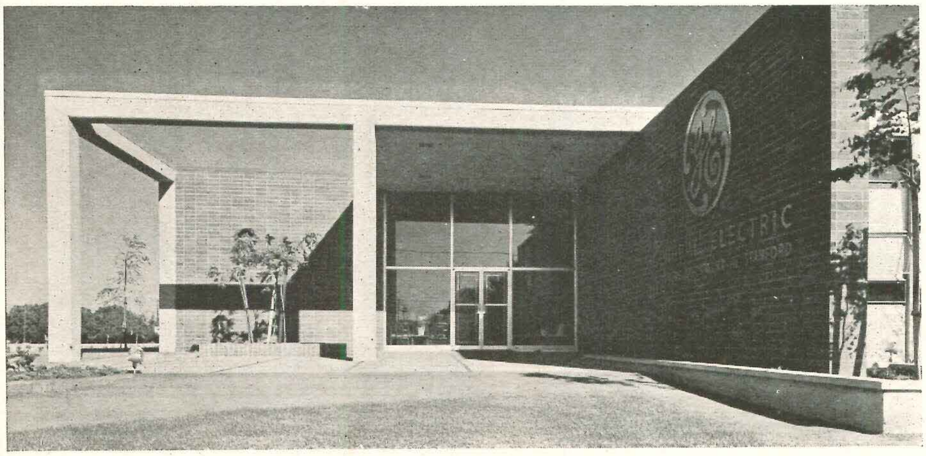


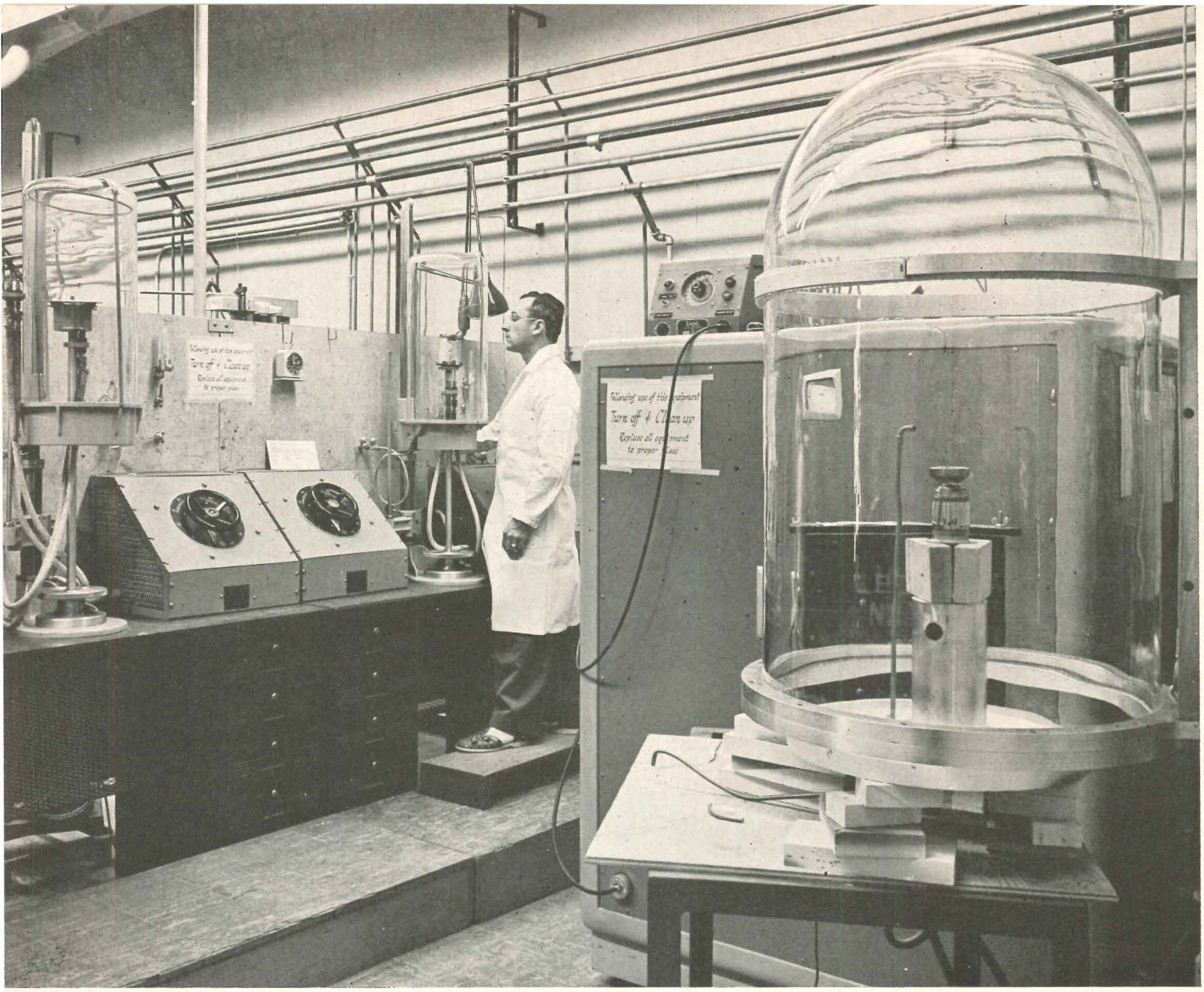


Rondal Partridge

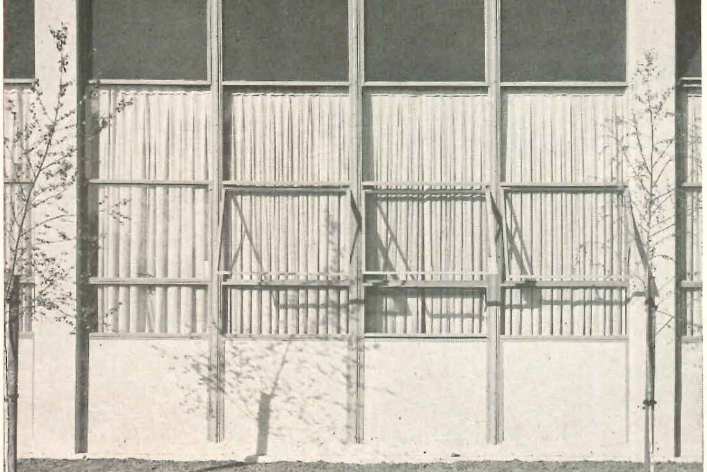
GENERAL ELECTRIC

Location: Palo Alto, Calif.
Architect: John Carl Warnecke
Structural Engineer: John A. Blume
Consulting Engineers: Coddington Co.
Landscape Architect: Thomas D. Church

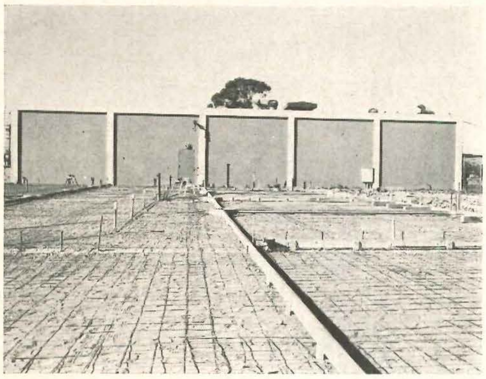


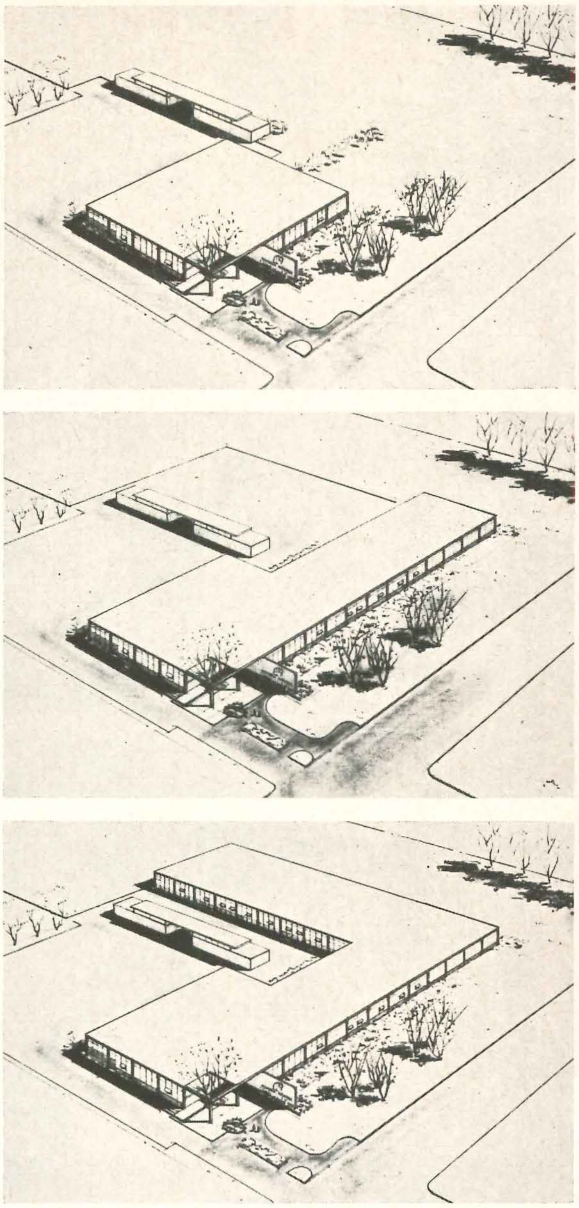


GE AT STANFORD



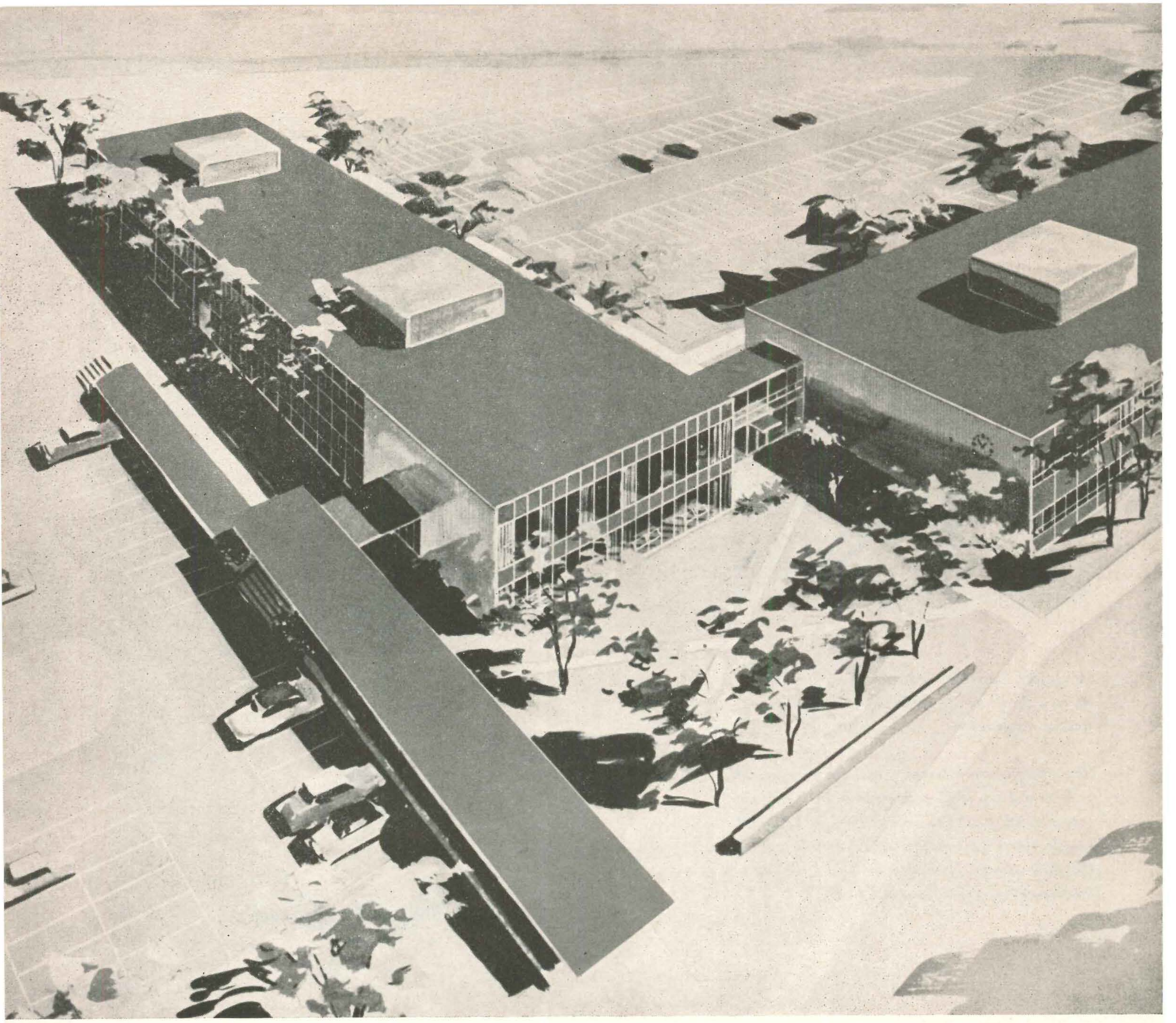
Randal Partridge





A typical laboratory interior is shown at left, as is a detail of the modular sash arrangement and its application

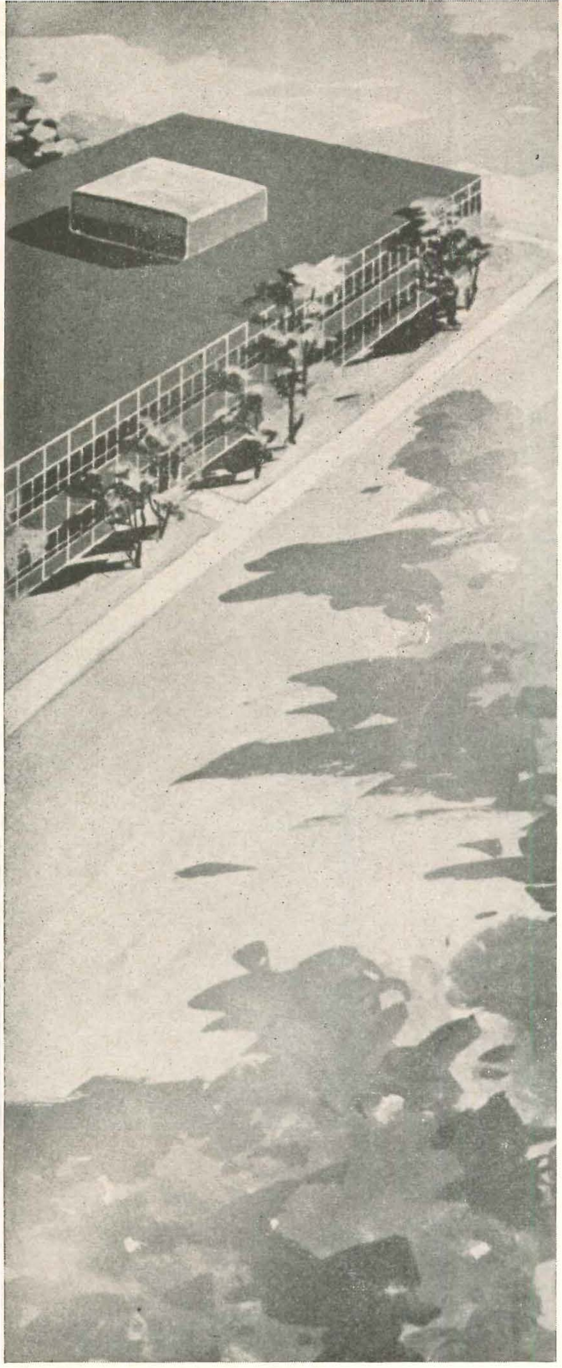
The photo above pictures actual construction of part two of the three-part scheme, in which the concrete wall panels will simply be lifted out and reused. At right are the architect's sketches to show the three phases of development and, below, a rendering of the completed building

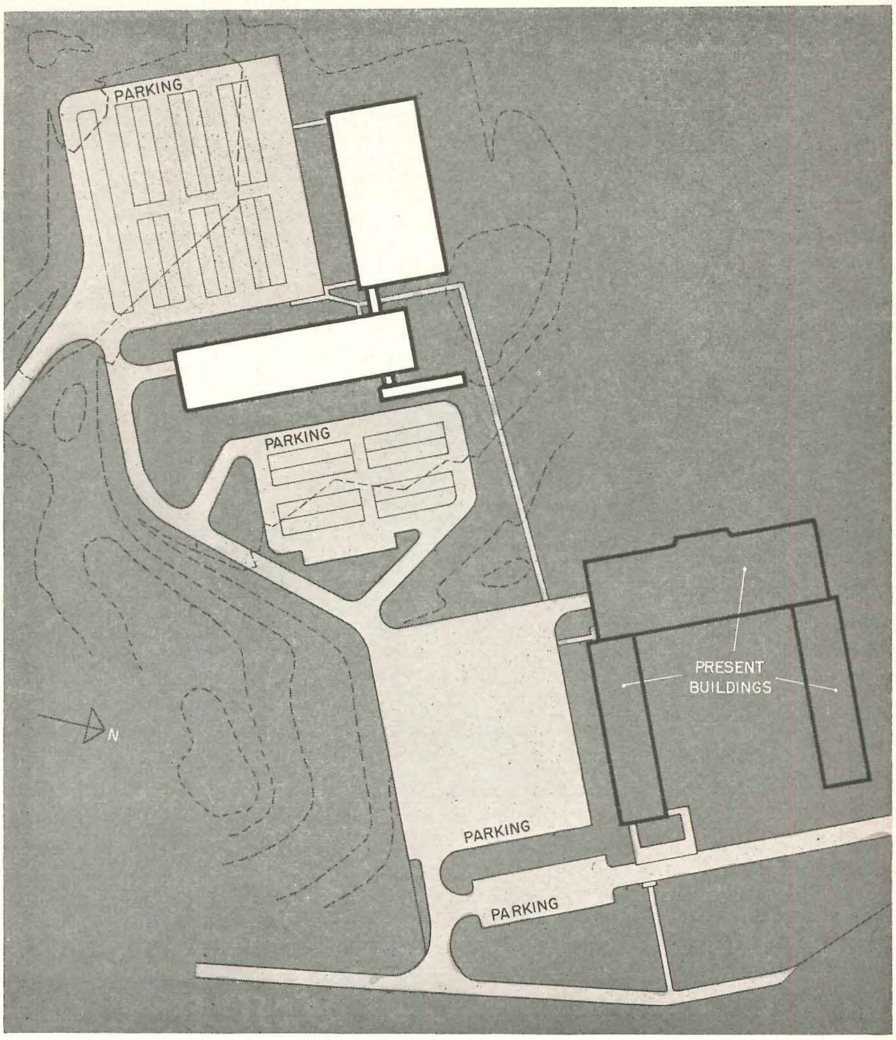


IBM ENGINEERING & DEVELOPMENT LABORATORY

Adjacent to the company's existing research group and in a wooded valley two miles from the factory, these two interconnected buildings for engineering and development — now under construction — will contain 96,000 sq ft and house approximately 500 of the engineering staff. Those in the new buildings will use the auditorium, cafeteria, and library of the nearby research laboratories, only recently dedicated.

Architect Noyes says, "The basic concept of these buildings is that they are to provide large space totally undivided at the beginning, but so organized that it can readily be subdivided into an assortment of useful sizes for various purposes. The partitions will not extend to the ceilings. All service lines will run above an acoustical ceiling of modular pattern so that panels may be removed as required to provide for a given space. There will be no services in the floor. The vertical ribbed walls will be of extruded aluminum and the exterior wall panels in two shades of gray. The buildings will be completed late in 1955."





IN THE NORTHEAST

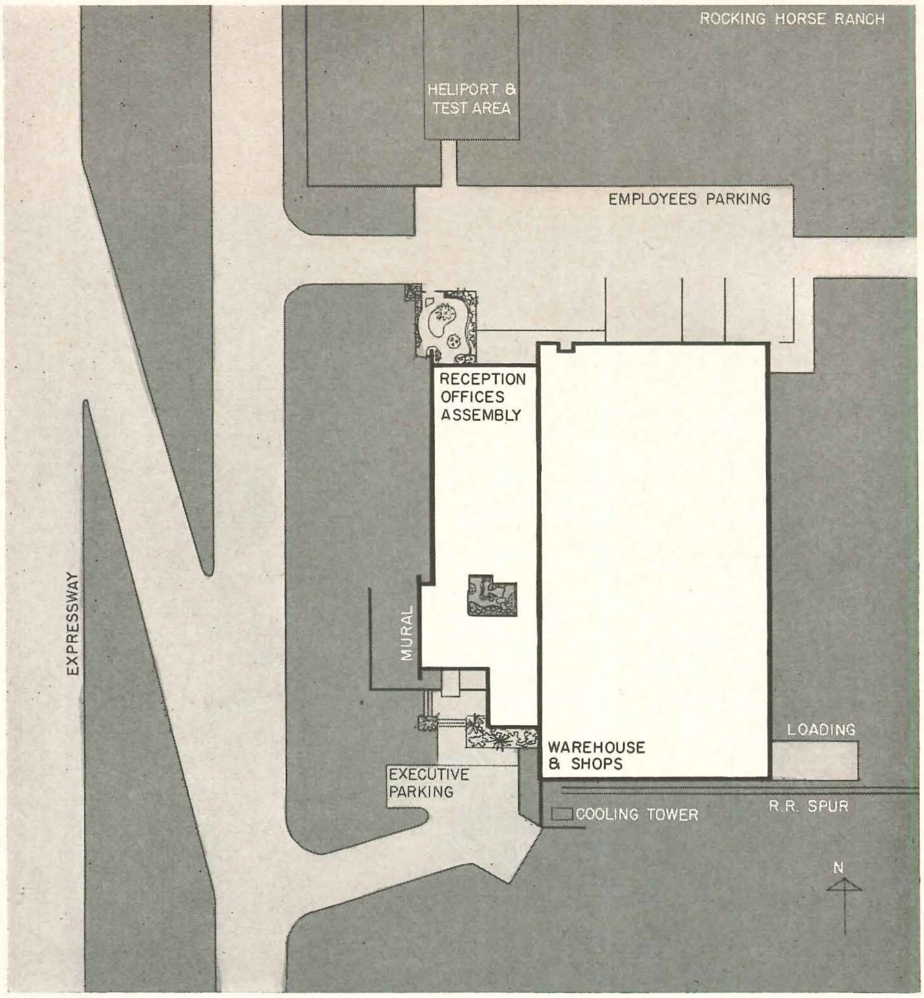
Location:
Poughkeepsie, N. Y.

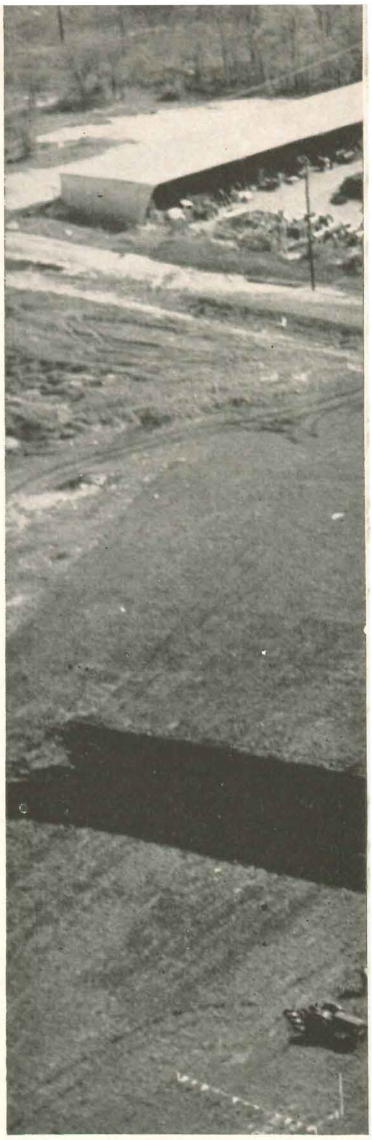
Architect:
Eliot Noyes and Associates

Engineers:
Seelye, Stevenson, Value, and Knecht

Landscape Architect:
Dan Kiley

Associated Contractors:
Turner Construction Co., and
G. D. Campbell Building Co.





Location: Dallas, Texas
Architects: Harwood K. Smith & Joseph M. Mills
Structural Engineers: Mullen & Powell
Mechanical Engineers: Blum & Guerrero
Landscape Architect: Alex Bul
Contractor: Burgher Construction Co.

FARM EQUIPMENT

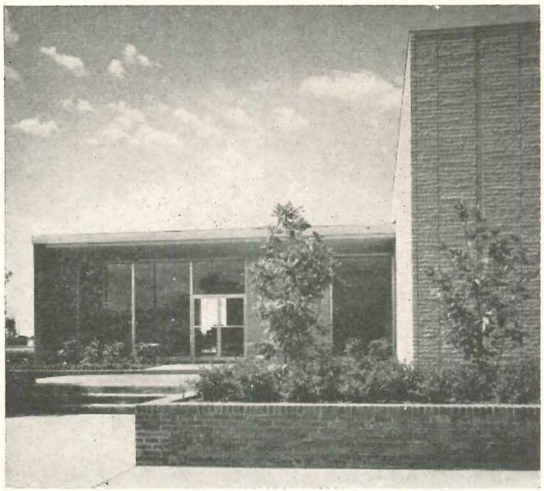
Ulric Meisel

TESTING AND SALES CENTER IN THE SOUTHWEST

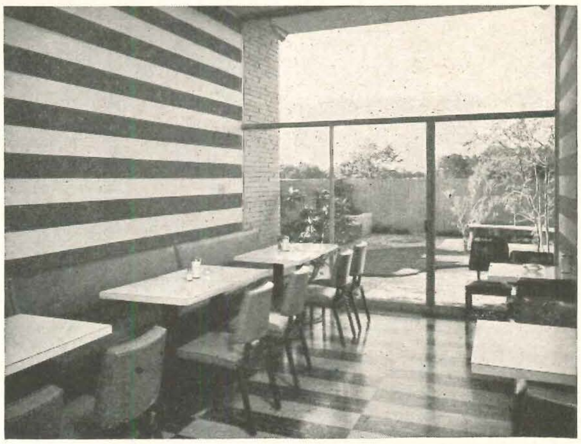
THIS BUILDING, owned by the Stewart Company, is located near Dallas and at one corner of Rocking Horse Ranch — an area developed by the company and devoted to research, experimentation and demonstration of farm equipment. The ranch boasts a heliport — the first in Dallas; and the company uses a helicopter for trouble shooting and personnel transportation. The building serves as a center of operation for research and as the company's home office and warehouse. Their former location was in an industrial section where expansion was impossible. Their recent rapid growth is a manifestation of the general increase in farm equipment sales accompanying the feeling that the recent drought has ended.

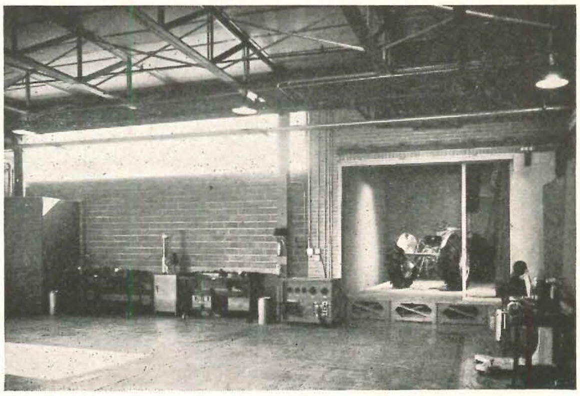
The building contains 10,000 sq ft of office and display space and 28,000 sq ft of warehouse area; cost $236,000 to build. The diagrammatic plan shows the general disposition of the elements in relation to the site. There is a reception and public display area, a small auditorium with adjacent projection booth, executive offices opening to an interior patio which is skylighted and landscaped, general offices, employes' dining room and dining terrace, a mail center, and a large warehouse and work space.

Construction: brick or stone exterior walls on a steel frame, with interior walls of brick or of fabric over gypsum board. Interior partitions are typically either vinyl plastic wall covering or fabric over gypsum board; for executive offices ash or walnut wood panels natural finish. Floors are terrazzo, vinyl tile, asphalt tile, and carpeting. Lighting is recessed into acoustic tile ceilings; entire structure is sprinklered and air conditioned.



Ulric Meisel

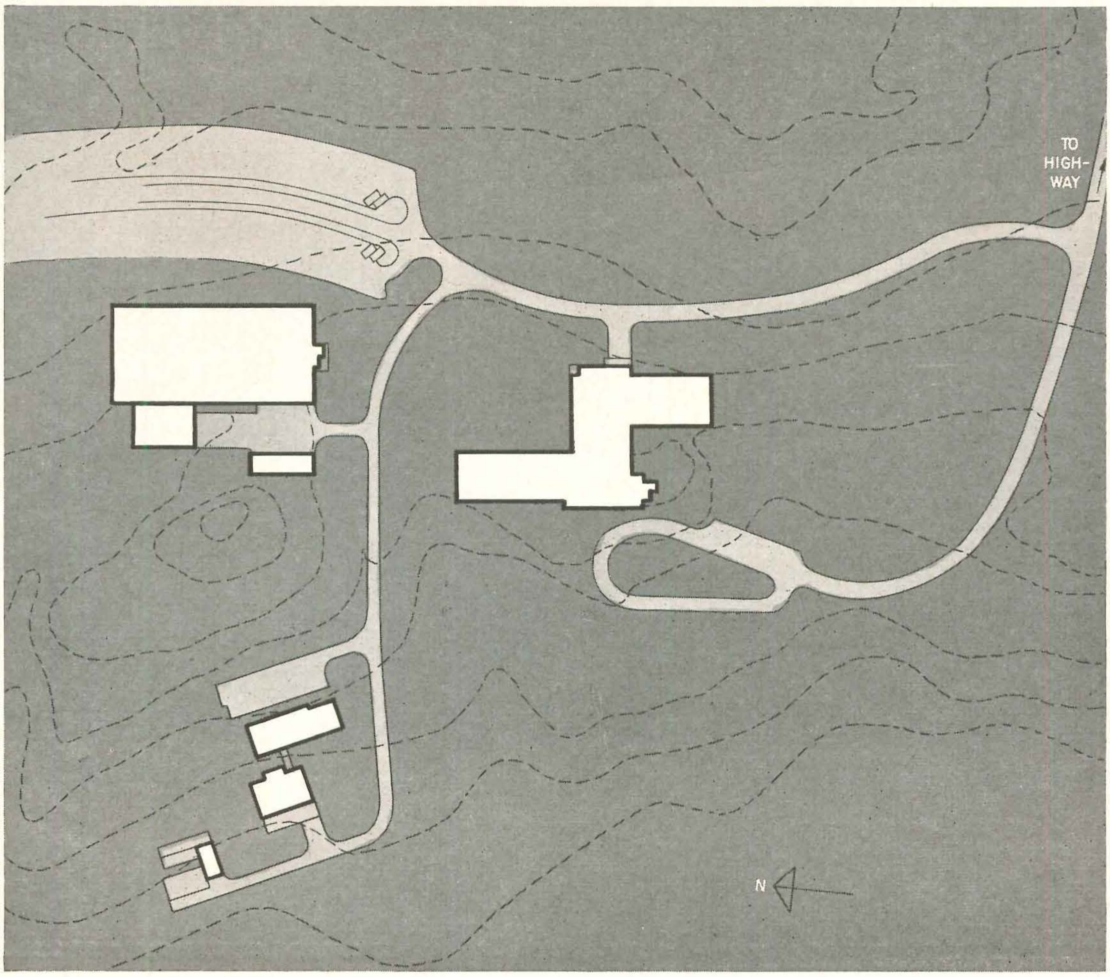




STEWART COMPANY

Above is a photo of the entrance and at right are three interiors. Reading from top to bottom they show: an executive office viewed from the patio; the employes' dining area and its garden; a work area for the testing and repair of equipment.

The 67 by 13 ft mural of glass mosaic, shown below, was designed by Miguel Covarrubias and is the principal exterior feature. Its stylized forms, in vivid colors, portray the Indian concept of the four elements — earth, water, fire, sky — in dramatizing agriculture and the forces affecting it



U. S. Rubber Co. Research Center, Wayne Twp., N. J.

THE ANALYSIS OF SEVERAL LABORATORY PLOT PLANS

As designed by Shreve, Lamb & Harmon Associates

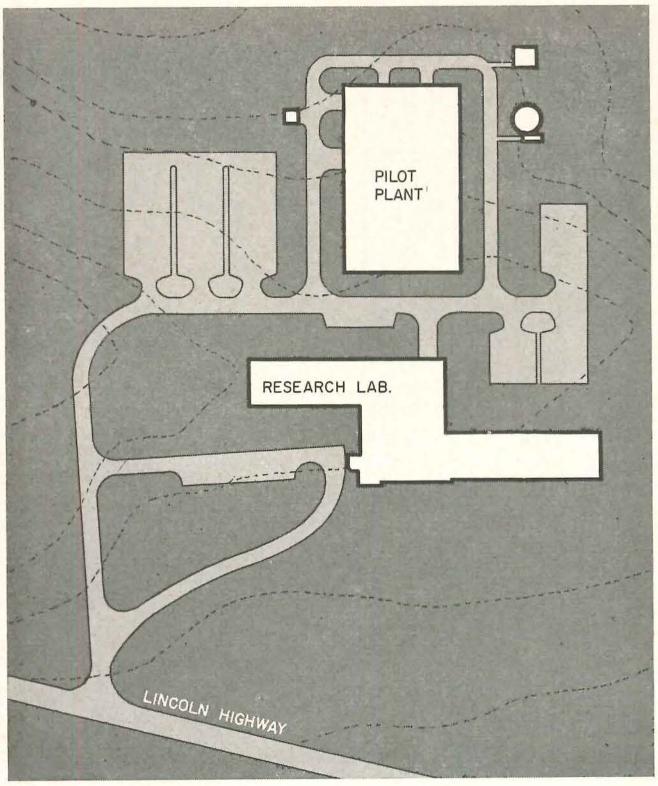
by Harold C. Bernhard, A.I.A.*

THE RECENT TREND that locates laboratories away from the industrial plant atmosphere has made the selection of a suitable site a matter of major importance. In order to provide ideal working conditions for research scientists, to attract younger engineers and technicians to the company, and to stimulate the creative thinking that leads to new product development, a favorable situation is necessary. The site should be physically attractive and remain so when buildings, roads, parking, and possible recreation areas are constructed. Practical matters such as room for future growth, proximity to public transportation for those not driving, and availability of utilities — water, gas, electricity, sewer — must of course be taken into account.

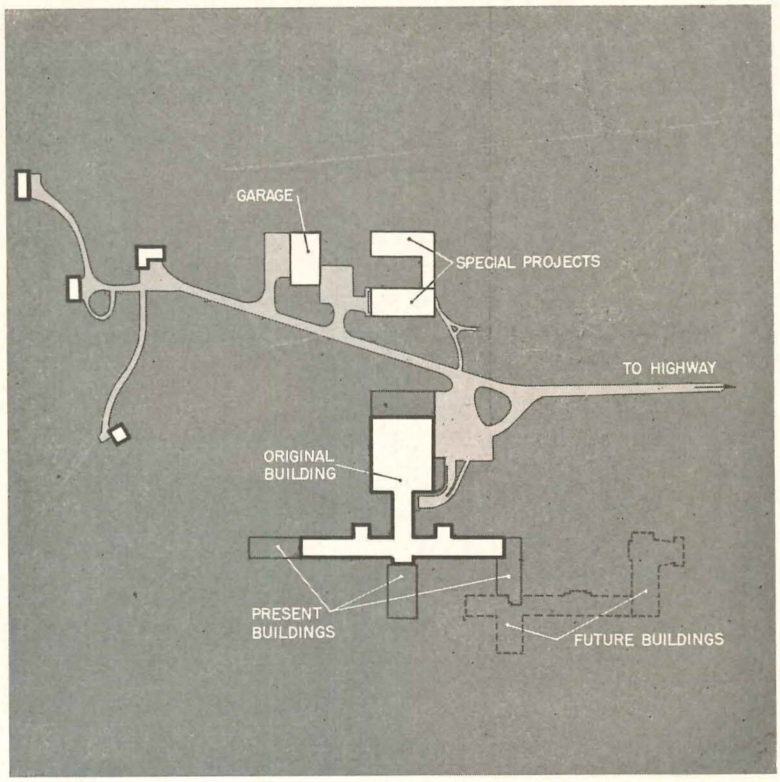
After a site is selected, many factors in addition to the owner's research program must be dealt with, and the problem becomes increasingly complex as it develops. Basically, however, the plan should always consider the unknown needs of the future as well as satisfying those of the present.

When laboratories are planned for rural or suburban residential areas the zoning laws in these sections must be met or variations obtained by appeal. Usually, little

* *Mr. Bernhard is a senior partner in the New York architectural firm of Shreve, Lamb & Harmon Associates, and is in charge of much of that organization's laboratory work.*



Armstrong Cork Co., Lancaster, Pa.



RCA Laboratories, Princeton, N. J.

difficulty need be experienced if the local authorities can be shown that the particular development will actually be an asset to the neighborhood, not unlike a park or college campus in character. Other restrictions often imposed locally are concerned with building height, ground coverage, building distances from property lines, and smoke or odor nuisance; factors the competent architect commonly deals with in his stride.

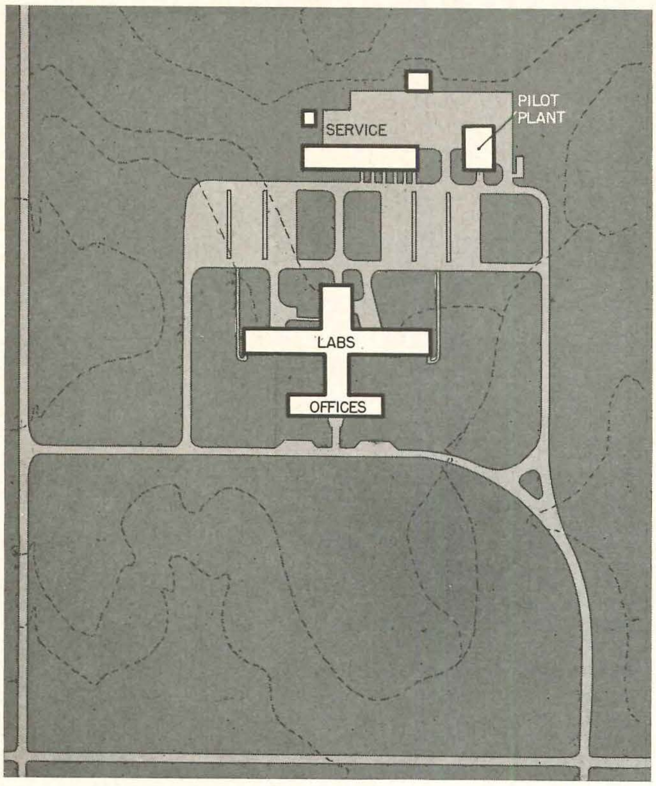
CASES IN POINT:

The United States Rubber Co. research center now under construction in Wayne Township, N. J., is an example located in a residential district. (See preceding page.) The site is hilly and densely wooded with a drop in level to the west that affords a fine view of the Packanack Lake valley and beyond. The topography influenced the informal arrangement of buildings. The asymmetric form of the main laboratory building is designed to permit future additions at the ends without destroying apparent balance. Note the complete seclusion of the buildings from the public highway. In this case the owner preferred privacy for his operations to the possible advertising value of a building prominently located on the highway. The ample plot, approximately 100 acres, allows generous space for growth. In its quite unusual sylvan setting, this center should compare favorably in character with a college campus.

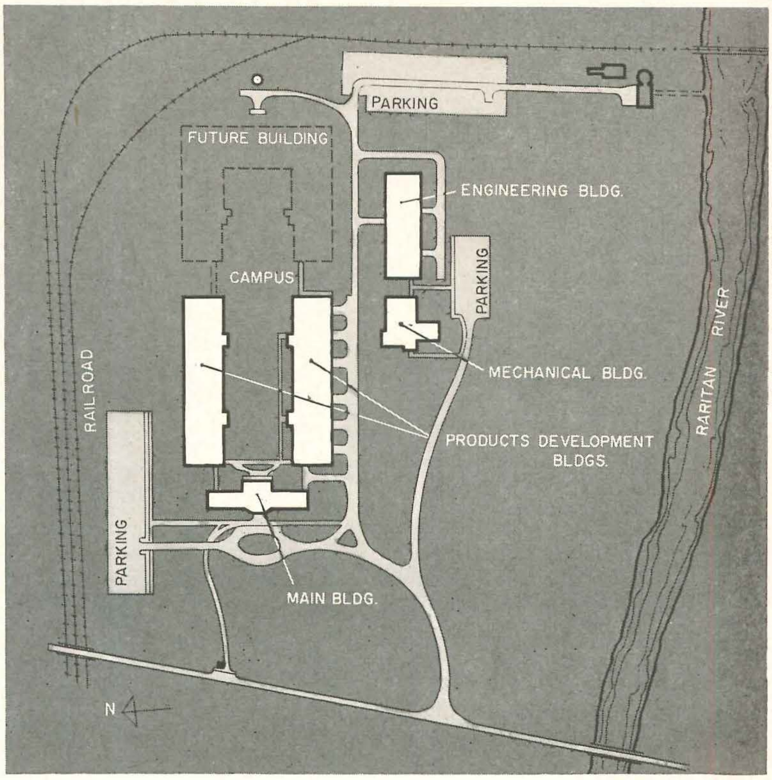
Following a different line of thought, several research centers have been located on highways or railroads. The resulting publicity to passersby informs them that the company is progressive; interested in new developments.

On the Lincoln highway near Lancaster, Pa., the placing of the building for the Armstrong Cork Co. laboratory allows only the main building to be seen from the highway, and has as a result attracted favorable notice. The service and pilot plant structures, less pretentious in appearance, are kept to the rear, removed from the sight of the passerby. (See illustration.)

The development of the plot for the RCA research laboratories at Princeton began when the architects prepared plans and models for probable expansion from the original block built at the beginning of World War II. (See illustration.) Since then, growth has generally followed the master plan. In addition to the main connected group, several separate structures have been built to house research work for special governmental assignments, and the plot is large enough to accommo-



Stanolind Gas & Oil Co., Tulsa, Okla.



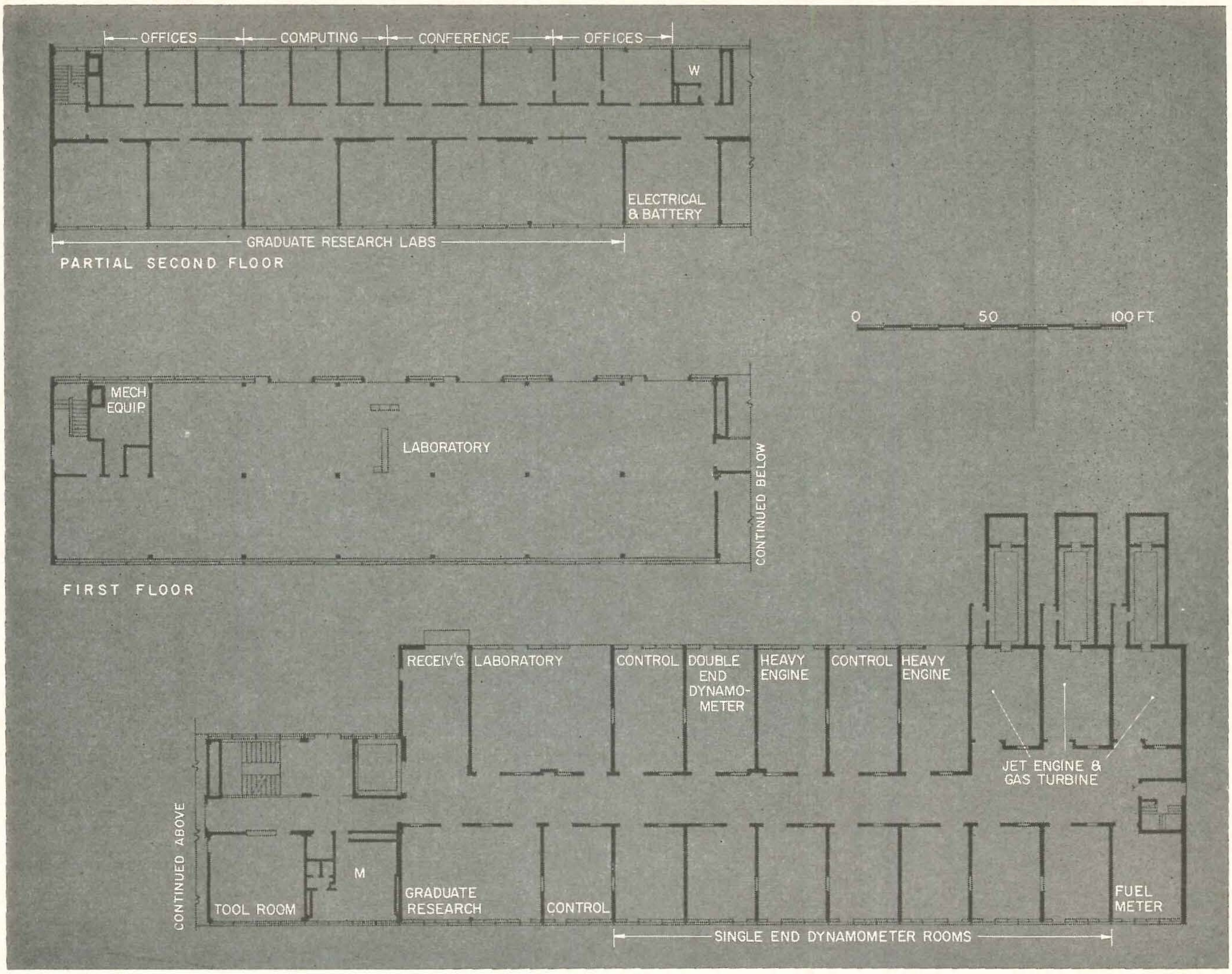
Johns-Manville, Manville, N. J.

Plot Plans by Shreve, Lamb & Harmon Associates

date these buildings comfortably. For accessibility, it was deemed advantageous to group all laboratory facilities under one cover, except for the special projects. The director of research and other officials who must contact all laboratory functions thus need not leave the shelter of the one structure in bad weather. Since the research program involves electronics, the scheme is practical. If a chemical or other hazardous operation were involved, a less concentrated arrangement would be preferable. As it is, fire walls and doors for the additions and wings minimize possible fire hazards.

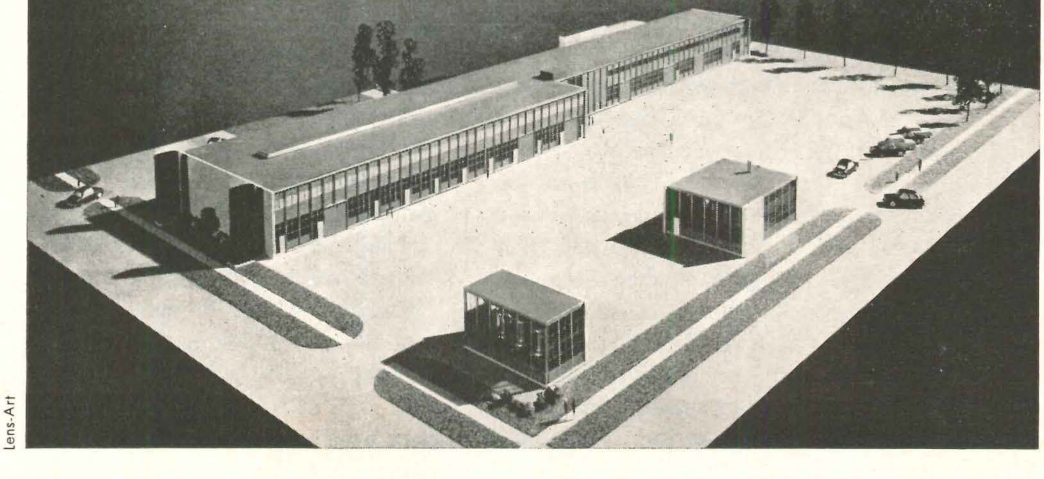
At Stanolind Oil & Gas Co. in Tulsa, the plot arrangement is such that the main bench laboratories are housed in one three-story block, 410 ft long. The extensive office areas typical of an oil laboratory are placed in a contiguous T-shaped structure in front of the laboratory block. Thus, plan modules and story heights for office and laboratory units could be planned separately with the specific requirement governing. The office module is 9 ft with window mullions 4 ft 6 in. on centers; while the laboratory module is 11 ft. (See illustration.) The concentration in one block of the necessary mechanical and electrical connections for the laboratory effected a decided economy. Accessory buildings for service and pilot plant operations are grouped to the rear of the main building, separated from it by a parking lot.

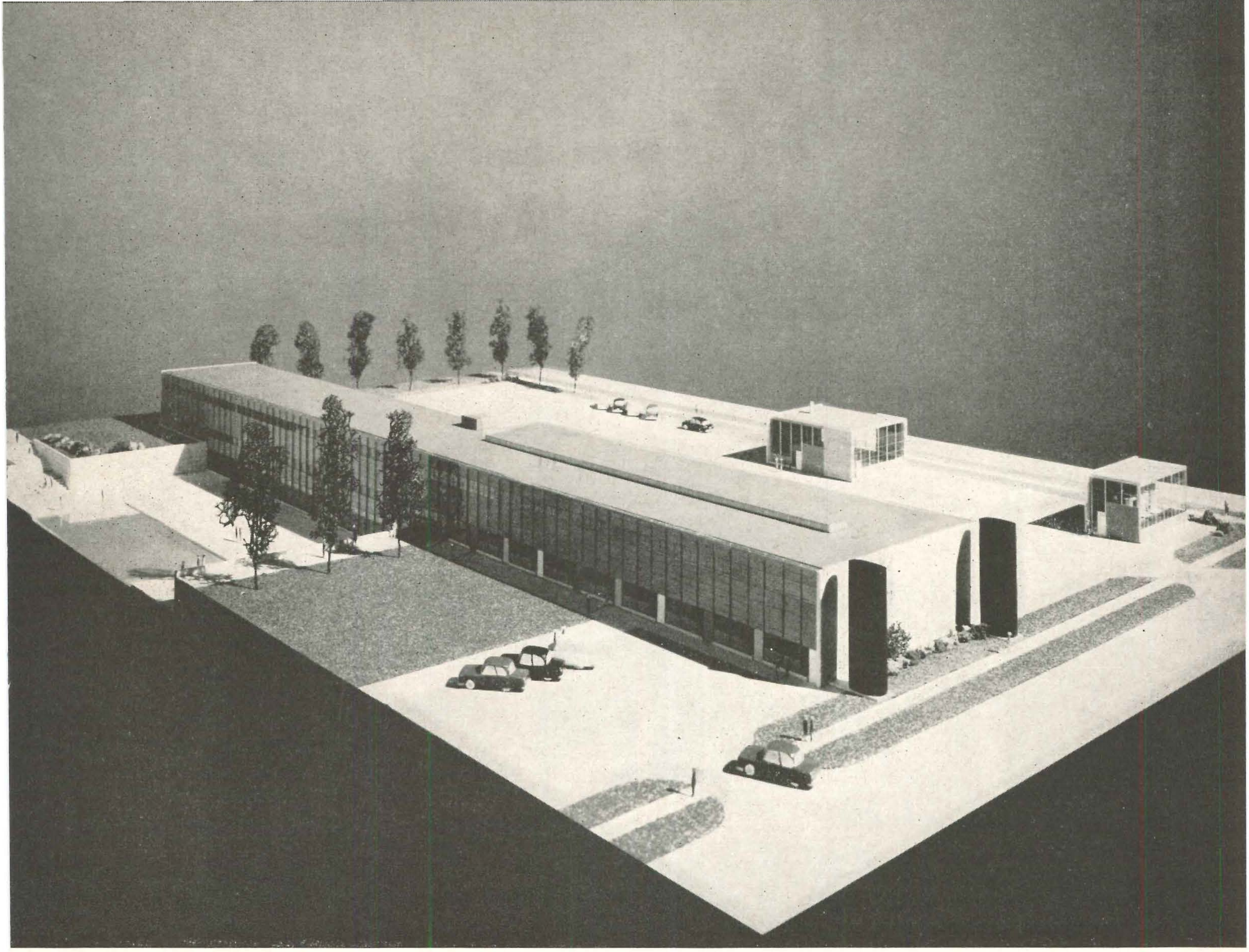
The quadrangle arrangement of the main buildings at the Johns-Manville Research Center, Manville, N. J., was designed before any construction began. The symmetrical plan was not an arbitrary one, but developed naturally from the owner's program. It consists of a central unit for fundamental research, administration, library, cafeteria, and other facilities commonly used by all. This building is linked by enclosed passages to two product development or semi-works buildings which are served by their own office blocks. (See illustration and also p. 223.) Accessory buildings for the engineering department and for mechanical development work are placed outside the main quadrangle. Steam and power for this center are received directly from one of the company's manufacturing plants, which is located nearby. There is an immediate economy advantage in such a scheme, but in a more general sense, recent thinking has led to serious consideration of the idea that the esthetic and long term economic advantages of a laboratory ideally situated in its own surroundings may well outweigh the less permanent gain of the location near a factory.



Location: University of Michigan, Ann Arbor
Architects & Engineers: Giffels & Vallet, Inc., L. Rossetti
Supervising Architect, University of Michigan: Lynn W. Fry

A BUILDING IN



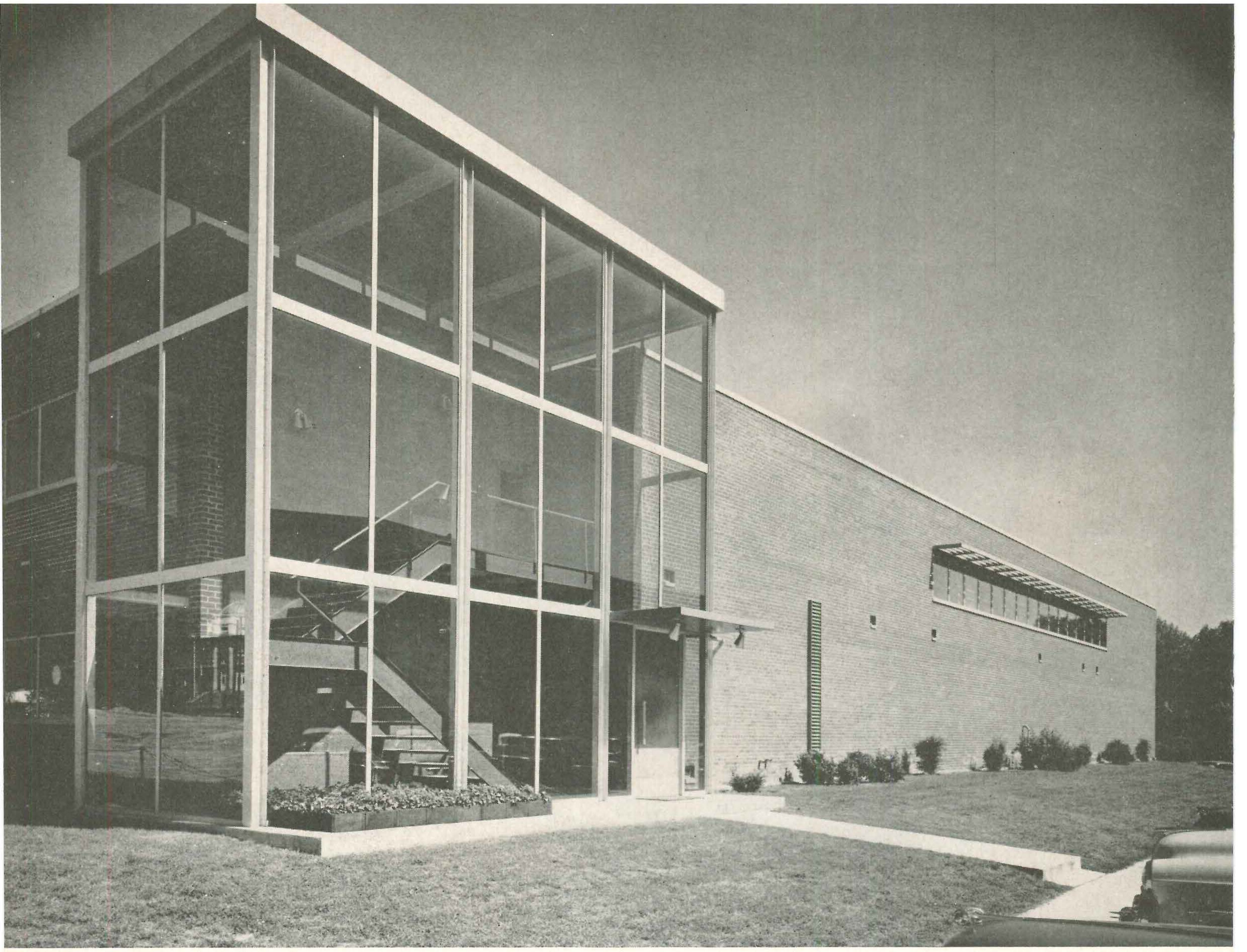


THE MIDWEST FOR AUTOMOTIVE ENGINEERING STUDY

THIS PROJECT is among the first of the new buildings in the expansion of the university campus to the north of the Huron River and is near two other engineering research buildings now under construction. The group of three units and their equipment for research and testing will be financed largely by the State and in part by gifts and grants from private sources.

The three buildings will house a small heating plant, a fuel blending house and the engineering laboratory itself. The two-story laboratory will be of unusual construction and will contain specialized equipment essential to its intended use. About one half of the principal building will be occupied by dynamometer laboratories and the testing machinery required for them; the other half will contain a large shop and garage area on the first floor and small computing rooms, offices, conference rooms, equipment rooms, and an area for graduate research on the second floor.

The $1,600,000 structure will be built upon a reinforced concrete frame, will have an aluminum window wall for exterior facing, a built-up roof, floors of quarry tile in the laboratory section and of asphalt tile in the office section, with interior partitions of cinder block. Plumbing will be of conventional type and ventilation both natural and mechanical. Lighting will be a combination of fluorescent and incandescent.



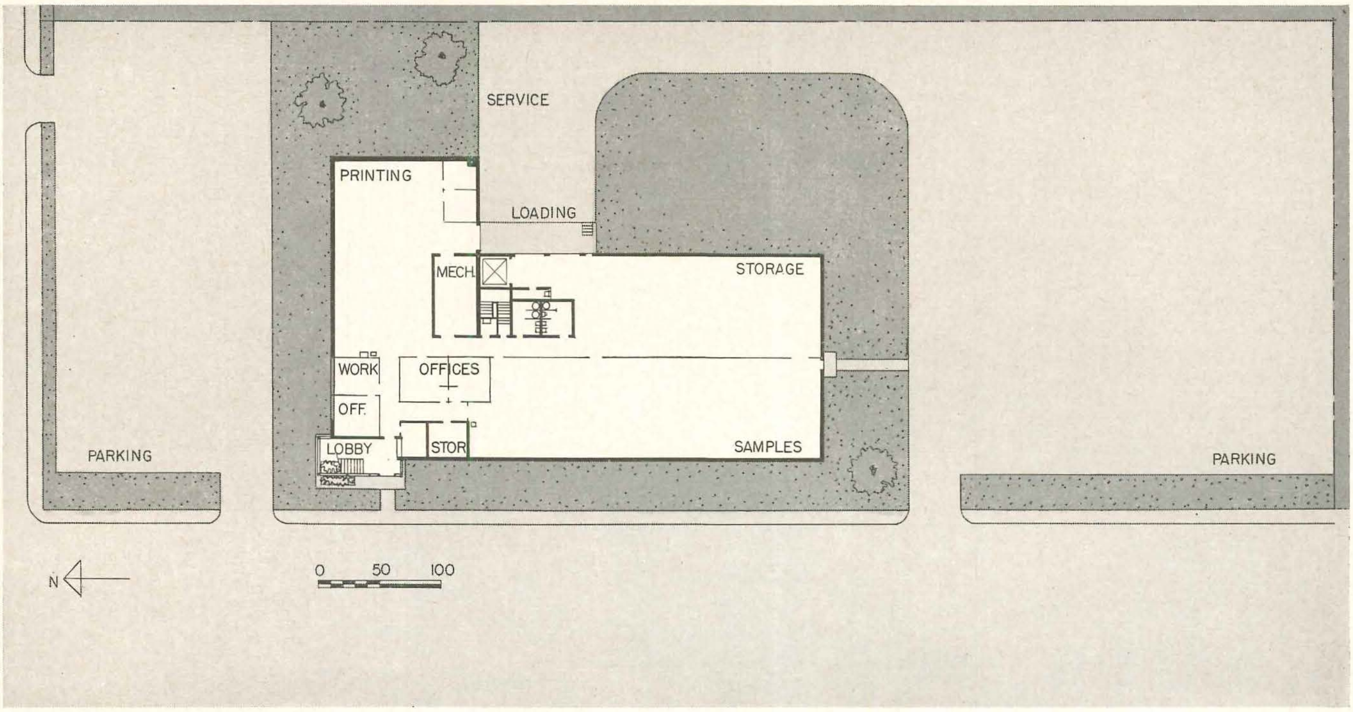
TEXTILE LABORATORY AND PRINTING PLANT IN

Adjacent to existing mill buildings and designed to replace crowded quarters in antiquated surroundings, this new structure for Cone Mills Corporation houses textile laboratories as well as printing facilities for the company's publication.

The two-story building contains 25,200 sq ft and was designed to be as flexible as possible, since it was difficult to foresee future requirements. Movable partitions and portable heating and cooling units were provided for that reason. The architect recommended a windowless building, but a number of fixed glass panels were installed at the owner's insistence.

The first floor contains the print shop, fabric sample department, and space for shipping and storage. The second floor contains an office area, library, large laboratories for physical and chemical testing and research, a reinspection area, and smaller auxiliary laboratories for special work in fabric shrinkage, microscopy, electronics and cotton fiber analysis.

The walls are of brick outside and painted concrete block inside with fixed panels of heat absorbing glass; the frame is steel; partitions are movable office type; floors are plastic tile or cement finish; ceilings are acoustic tile or exposed framing; heating and cooling units are movable for flexibility; the building is sprinklered and lighted by fluorescent fixtures.

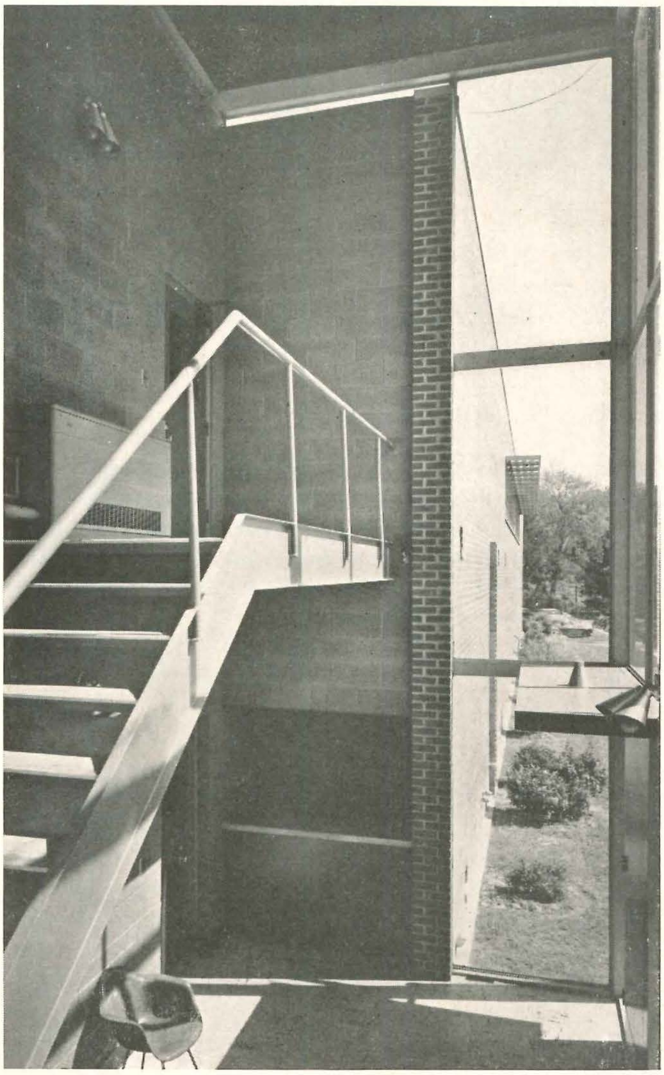


THE SOUTHEAST

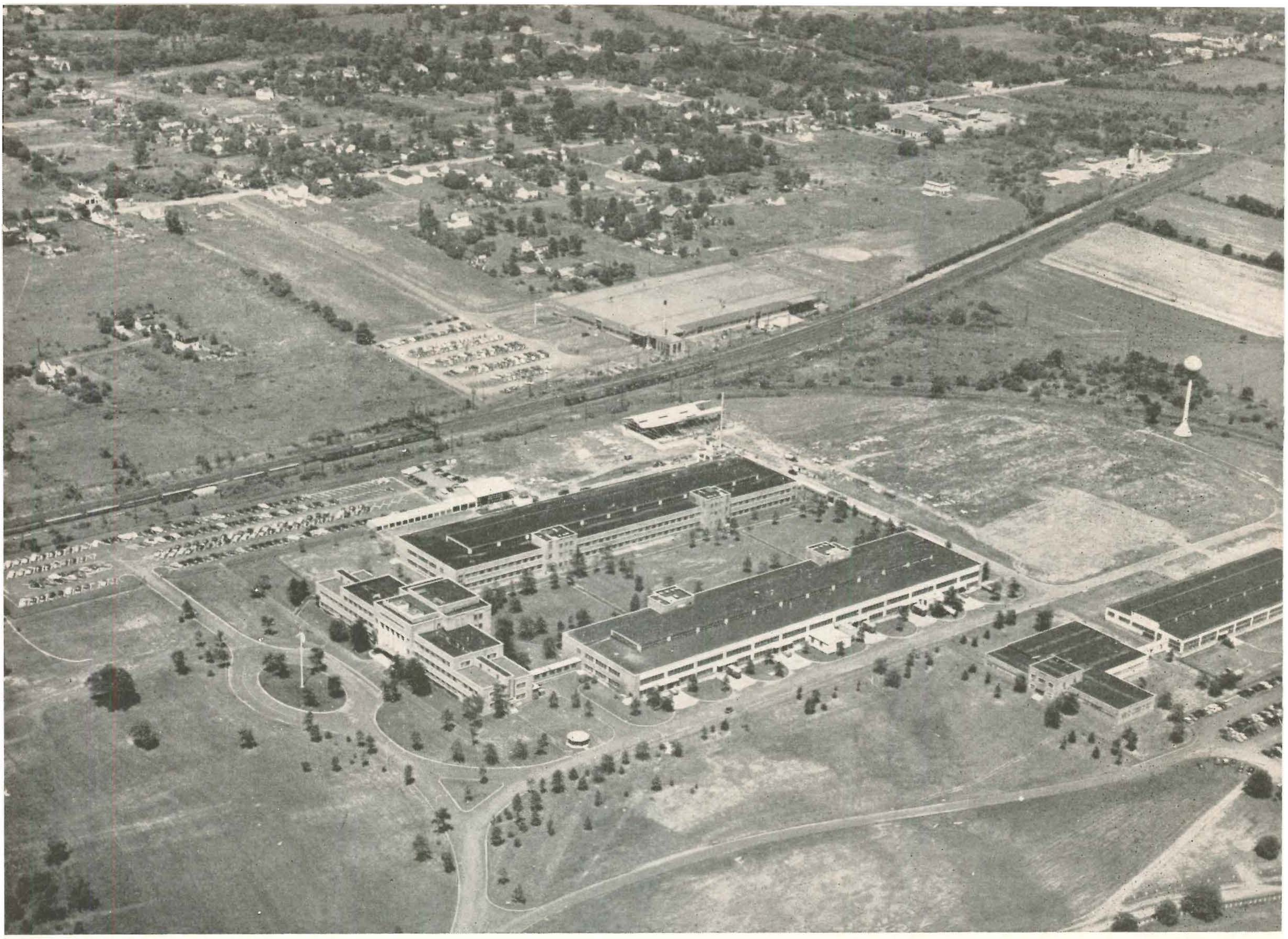
Location:
Greensboro, N. C.

Architects:
Lowenstein-Atkinson Associates

Contractor:
English Construction Co.



Joseph W. Molitor



THE JOHNS-MANVILLE RESEARCH CENTER SIX YEARS LATER

*by Clifford F. Rassweiler, Ph.D.**

Note: This is the story of how one of the earliest of the "campus-type" industrial research centers has actually performed during the six-year period since it was dedicated. The experience is told (from the owner's viewpoint) by the J-M official most closely identified with the center's inception, policy and future development.

For the full architectural presentation of this group of buildings, refer to ARCHITECTURAL RECORD of October, 1949.
— J. S. H.

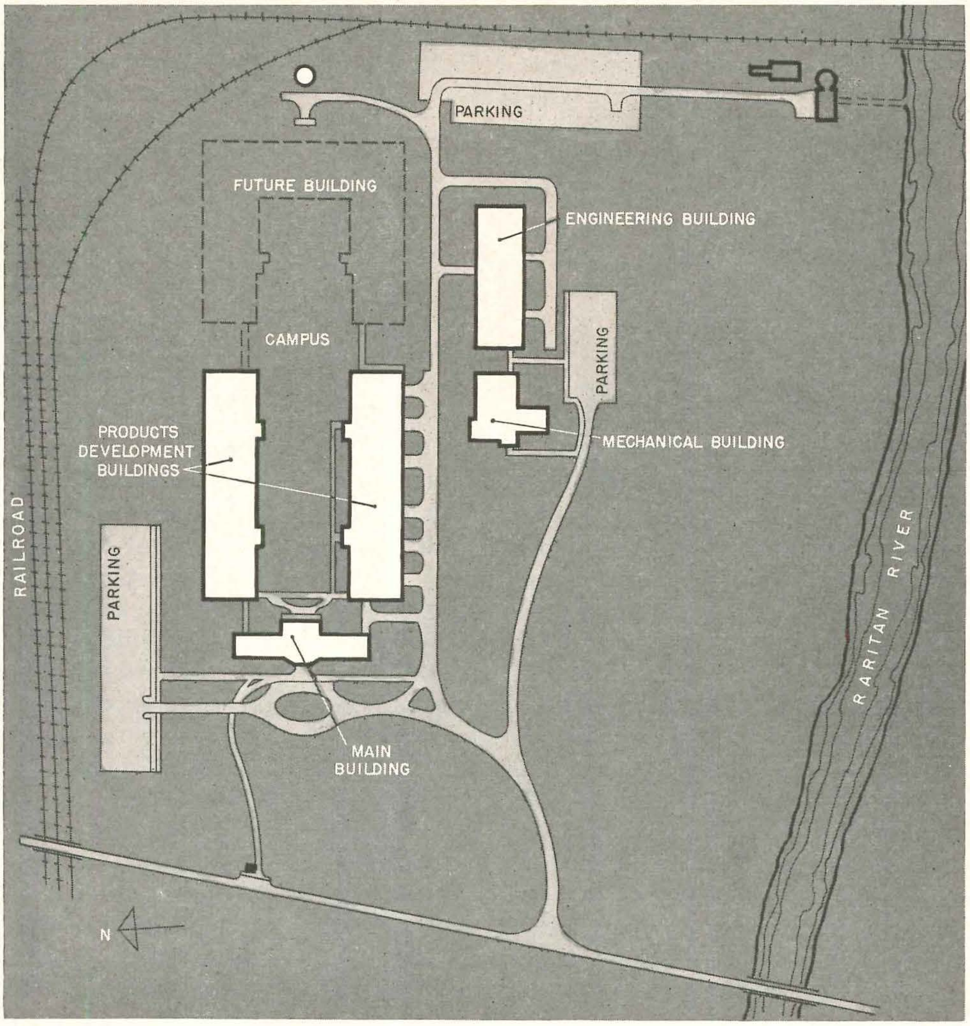
IN 1945 ground was broken for the new Johns-Manville research center on a 93-acre tract adjacent the company's Manville, N. J. plant. Before that time, research and development had been carried on in the factory buildings and these facilities were outgrown; did not lend themselves to expansion.

The design was influenced by two considerations. First, the research and development organization for J-M is responsible for all experimental work affecting product quality. Involved are basic research, product development and design, construction and operation of experimental machinery for eventual factory operation. Next, the business is diversified, our company manufacturing more than 400 different lines of products distributed among 22 major businesses. Each of these requires, in effect, its own research and development organization.

Before the architects were named, preliminary study of the design was given direction when a staff architect worked out with each section head a layout for the space he wanted. These areas varied widely in size and shape, but each head was eventually convinced that his needs could be met in a uniform group of work centers. The laboratory module became 11 ft by 26 ft with a window at one end, a door at the other, and work benches or equipment along the sides. Movable walls

** Dr. Rassweiler is vice-chairman of the board and vice-president for research and development, Johns-Manville Corporation.*

Photo for Johns-Manville by Ted Czarda



Location: Manville, N. J.
Architects: Shreve, Lamb & Harmon Associates
Structural Engineers: Purdy & Henderson Associates
Mechanical Engineers: Syska & Hennessy
Landscape Architects: Clarke, Rapuano & Holleran
Supervision: J-M's Department of Engineering
Builder: Turner Construction Co.

made it possible to include one or several modules in a given area. This idea was a departure from pre-war concepts, which usually consisted of individually planned work areas of assorted sizes and shapes, difficult to change due to fixed partitions, furniture and service plumbing. Since completion in 1949, operating experience has demonstrated that the standard module can be used for practically all work. Out of a total of 124 module laboratories, only a few special size rooms have been required, and these were gained by breaking up nine multiple-module laboratories.

At the time our center was planned there was a trend toward movable partitions, sectionalized furniture, and easily removable or replaceable plumbing. As a manufacturer of movable walls, J-M of course made maximum use of this concept. All the walls in the center are relocatable, particularly those separating work spaces. All laboratory furniture is constructed in two- or four-foot sections with desk top slabs in corresponding sizes. Individual units are easily moved or replaced. Since 1949, 28 walls have been installed, removed or relocated. These moves were caused by changes in executive responsibility, minor relocation of research sections, and the addition of new equipment, such as an electron microscope and spectograph apparatus. Also, 300 pieces of furniture were installed or relocated and about 700 individual services (pipe or electrical) were moved. All of these were minor operations performed by service personnel as routine maintenance chores.

Precedent had generally called for pilot plant experimental space in separate buildings. Thus it was another innovation when large pilot plant bays, adjoined by two stories of modular laboratories, were provided in each of the two product development buildings. These bays extend the complete length of the two buildings and provide an area 572 by 100 ft in each for pilot plant equipment. This design has led to close collaboration between pilot plant and laboratory personnel working on the same product or process. Supervision has been simplified and personnel requirements reduced, since research workers can divide their time between laboratory and pilot plant without undue loss of time.

In addition, the large pilot plant areas have permitted carrying on nearly all the company's experimental processes on equipment large enough for duplication in the company's numerous plants. Products can be tested either on small-scale or full-scale equipment. This enables development engineers to experiment with products or processes before introducing them to commercial production. In many cases equipment built at the research center is transferred directly to a plant production line. Another advantage of the pilot plant arrangement is its occasional use for actual small-scale production of new products to permit an interim trial marketing period before sales warrant full commercial manufacture.

While the modular laboratory arrangement and pilot plant development were major contributions to industrial research design, there was another objective achieved in the building of the center that has proved both successful and worthwhile. Before the war ended, it had become apparent that technical personnel of outstanding caliber would be difficult to find and keep in competition with other companies. Therefore the architects were instructed to pay special attention to making the center as attractive as possible, both inside and out. The site chosen offered good landscaping opportunities and the buildings themselves were designed to be of a character such that the ensemble would resemble a modern college campus.

There was emphasis on adequate natural light and all the laboratories were air-conditioned. Attractive interior color combinations were chosen for the movable walls of asbestos cement, which have proven resistant to marring and economical to maintain.

The company has been amply rewarded for its concern in making the center attractive. In the past two years, turnover of technical personnel has been less than four per cent per year from all causes — an unusually low figure which is a source of pride. Research heads firmly believe that the low turnover is due to making the center attractive to the people the company wanted to have in its research organization. There have been, in addition, public relations and promotional values with both customers and visitors, who see here a building materials firm practicing what it preaches.

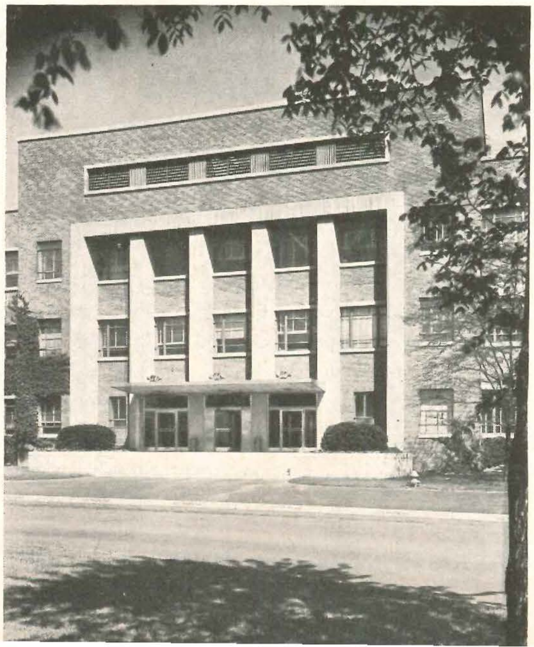
Also important is the effect of the center on its community. First, employees of both the nearby plant and the center itself are proud of its appearance, and this spirit carries over into the town. Next, the facilities of the center are made available to a wide variety of community groups, who also find the employed personnel invaluable in a surprising number of civic, youth, educational and cultural activities. This, of course, redounds to the credit of the company.

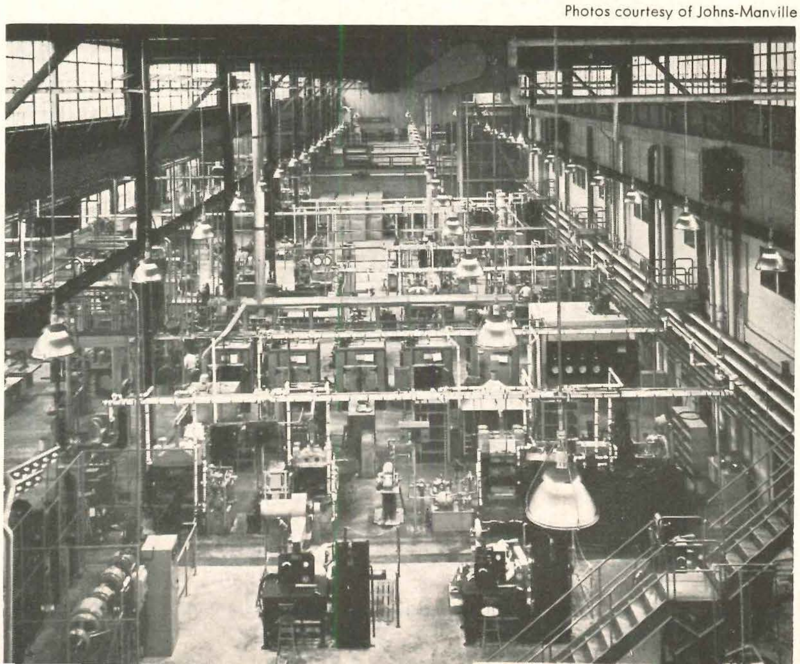
In reviewing the original design for the center and planning for the future, the Johns-Manville research organization would recommend two major changes. First, the pilot plant bays would be enlarged in length from 100 to 120 ft, since experience has shown that more length is needed for certain operations. The cafeteria serves both research and engineering personnel and its facilities are overtaxed. The company is convinced that attractive luncheon facilities promote the interchange of ideas between scientific workers whose tasks seldom bring them into contact otherwise and would favor a larger cafeteria with adjoining kitchen.

Other minor improvements might include such items as: recessed doorways to prevent the hazard of doors opening into corridors; additional access panels in suspended ceilings to eliminate carpenter work when repairs are made; stronger trench gratings in pilot plant areas for greater carrying capacity; fewer loading doors in pilot plant areas to protect against outside temperatures; fixed sash to maintain air-conditioning standards and decrease drafts and rain leakage; additional storage for flammable liquids; fluorescent lighting troffers with hinged lenses for easier lamp changing.

Such changes will, of course, be considered when future buildings are added to the center. Nonetheless, the center as built can honestly be termed a great success, both financially and esthetically.

Photos courtesy of Johns-Manville





UNPREDICTABILITY—MARGIN FOR INSPIRATION

By Joseph Brown
Associate Professor of Sculpture
Princeton University, School of Architecture

THE QUICK WAY to dispose of a social problem without solving it is to blame it on the Industrial Revolution. Responsibility is then so watered-down that *personal* responsibility fades to the point of invisibility, and we can contentedly suffer without blaming ourselves. Naturally, we want material and spiritual security; unnaturally, we want it nicely wrapped and delivered direct from a factory, and guaranteed forever.

We're all involved; sculptors and architects, shoemakers and bakers; but don't go away mad — we're not choosing sides in preparation for a fight: we're trying to understand a common problem which will not solve itself.

The sculptor — the case of the architect is basically the same — has tried to escape his responsibilities by juggling forms, in one way or another. On one hand

Harriet Arnold

UNPREDICTABILITY

there is the "self-expressionist" who cannot see that self-consciousness and self-expression are not the same — that, actually, one stifles the other.

On the other hand we have the worshipper of the familiar, and each hand is so preoccupied with its own brand of sterility that we "drop the baby," the deep human need for constructive exchange that is the vitalizing spark of every work of art whether it is a building, a statue, or a loaf of bread.

A few years ago one of the classes at the University was given a grade-school as a design problem. In criticizing the playgrounds that were submitted, I pointed out that they erred in two directions. One group took the traditional playground and painted candy-stripes on every pipe above ground, as if perfume could be used as a substitute for soap and water. The other extreme offered "free forms" imitating Swedish and other European developments that had recently been publicized, developments that had contributed, but in an extremely limited way, thanks to the self-conscious approach that perceives each little step as the entire journey.

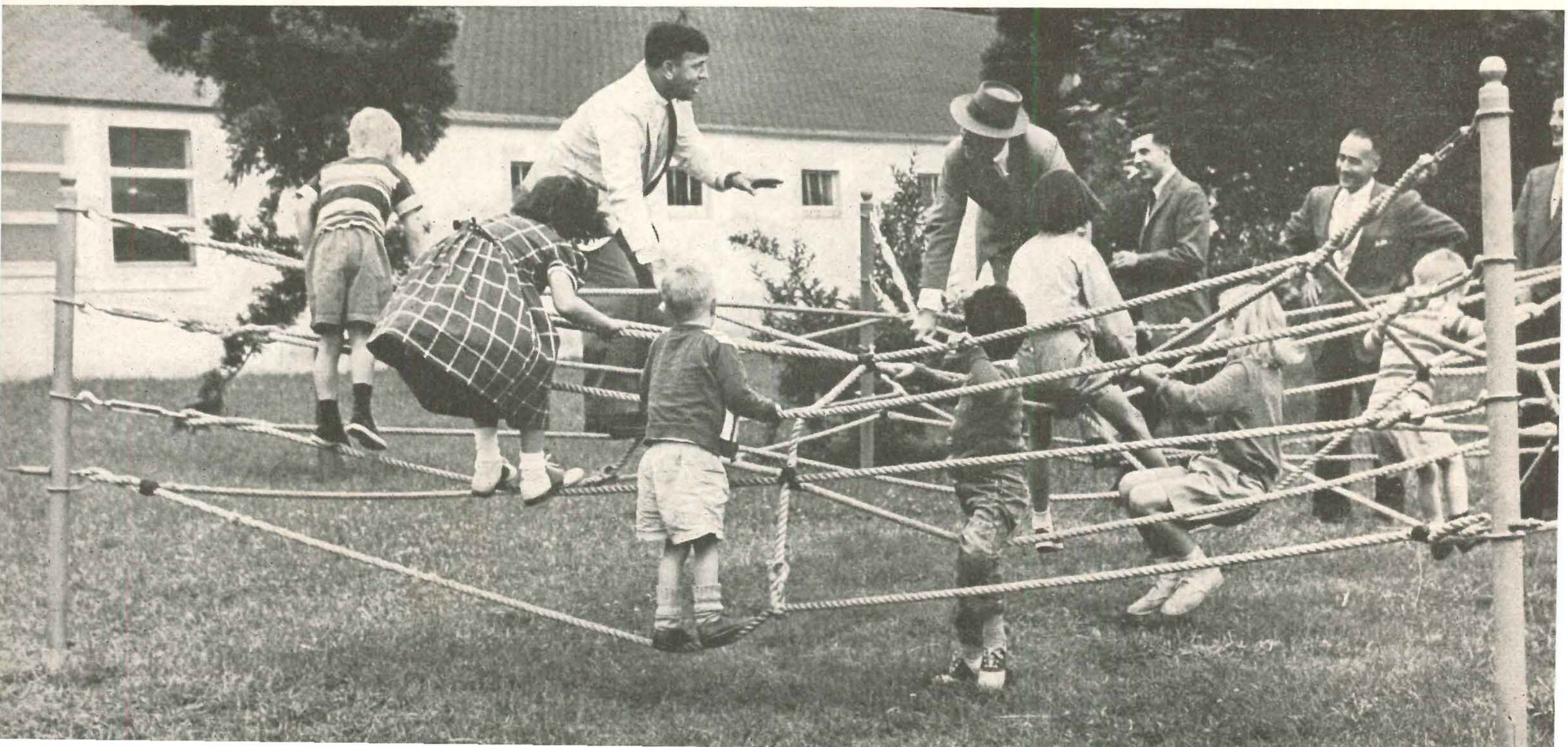
I asked if anyone had given any thought to the meaning of the word "play." No one had. Generally, it was felt to be a good way of getting rid of the children for a while — safely.

The implications of dilettantism are as deadly serious in architecture and sculpture, or teaching generally, as they are in medicine, and in this case they aroused me to an active personal interest in tackling a problem that was being tickled by almost anybody with an idle finger.

Play is nature's way of preparing the child — or any young animal — for the responsibilities of maturity, allowing him to discover his natural rights and his natural limitations, giving him the chance to find that these rights and limitations vary with the frame of reference, and inducing him to recognize that he is the same as other children as well as different from them, that individual interests and group interests are not necessarily antagonistic but that they are basically interdependent. If a supervisor is used as a substitute for good design he becomes to the child what the lawyer and the policeman become, too often, to his father — a substitute for judgment and conscience. A good play design gives the child the chance to recognize the vitality of his surroundings, through experience learning to respect the complexity of each situation even though his personal aims may be simple; and this respect is neither unreasonable fear nor a thoughtless sense of security, but an acceptance of the fact that personal designs and social designs constantly shape and reshape each other. The margin for error is the margin for inspiration; there can be no real guarantee of success. It is a dynamic process that is directed by the individual, but collaborating with his environment. And that's not grim. Unpredictability — within reasonable limits — is the basis of man's creativity.

My first design, a "play community," combined both stable and mobile elements, and spatial and material

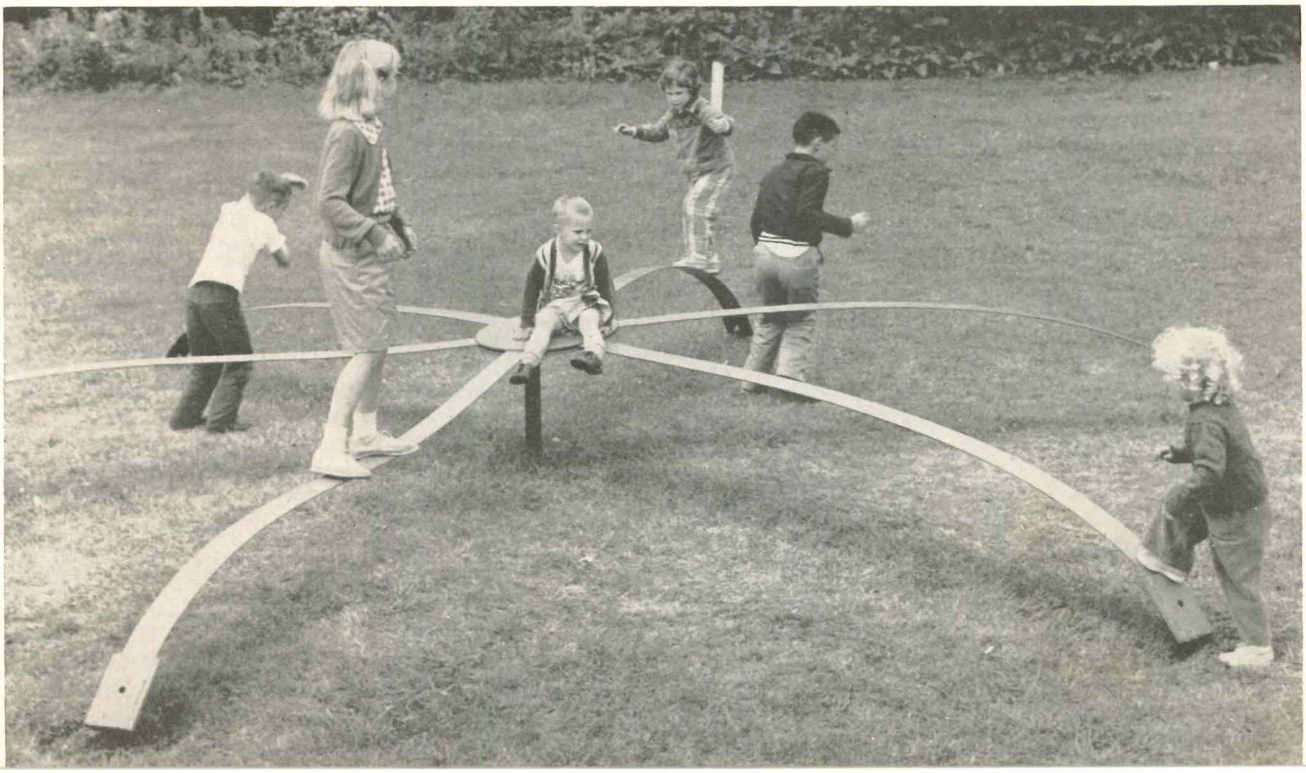
1



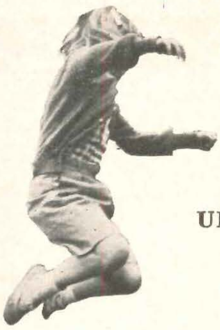
1. The Jiggle-Ring, made of rope with a steel core, can be used simultaneously by adults and children without condescension on the part of either. Height, weight, and age are not advantages when "the joint starts jumping." 2. The Jiggle-Rail, made of spring-steel. Pressure on any part is transmitted in such a way as to demand adjustments that are, simultaneously, mental and physical. The leader in a game of Follow-the-Leader can feel the responsibilities of leadership even if he can't see them. 3. The Swing-Ring, made of rubber, rope, and steel. It can rotate and swing, depending on the efforts of the individuals involved. With the proper respect for gravity, inertia, and his fellow man, a child can learn to keep the ring swinging and going around without the aid of a pusher

3

2



Harriet Arnold



UNPREDICTABILITY

form were considered equally important. The materials utilized included steel-cored rope, spring-steel and fiber glass. The feature of the design was the fact that one child's actions affected everyone on the plot, demanding a balancing adjustment. The designs shown in this article are mobile, and were simpler follow-ups that demonstrate the same principle in different ways. The child is given practice in choosing and executing a course of action, but he is constantly reminded that change is the essence of living, that to adhere to a principle it is necessary to be able to change your mind — with balance.

Mobility alone does not insure security, but stability doesn't either. The person who always stands firmly like a tree by the water is bound sooner or later to be hit by a truck. There is a time to move and a time to stand still or sit down, and judgment is the big factor; but judgment must be nurtured by experience above and below — as well as on — the verbal level. These designs are, in effect, non-verbal — even self-inflicted sermons.

As sculptors or architects, we tend to think of Art in terms of studios and drafting rooms, exhibitions and museums — we even try to define this word — but basically we know that we can never define or adequately explain the ever-changing and inescapable means by which we shape, and are shaped by, the world in which we live — for better or for worse. The important question is not who does what, to whom and how, but how well are we doing it.

Harriet Arnold

ACOUSTICS IN DWELLINGS

By Jack B. C. Purcell
Bolt, Beranek and Newman, Inc., Consultants in Acoustics

Based on a talk by the author at the fourth annual meeting of the Building Research Institute last April

The problem of acoustics in dwellings has grown more acute in the past few years due to several factors: we have more neighbors, more neighbors' children (our own are never a problem), more household appliances and mechanical contrivances, more open planning and more lightweight construction. Add to this the noise from automobiles, trucks, busses and airplanes you can see why the noise levels invading our private domain have jumped. How can we possibly reduce all of these noises to tolerable levels?

Obviously, we can't do it for every noise, nor for every human being, but we can certainly make a statistical stab at the problem. By statistical we mean the significance of the reactions of a community or population to a specified type of noise.

In analyzing the acoustics problems of a proposed dwelling, we should proceed as follows: 1) establish a criterion for tolerable background noise; 2) analyze the noise sources; 3) take necessary measures for control of noise sources to satisfy the criterion.

It should be mentioned, however, that a criterion for background noise level cannot be stated in precise terms due to the many physiological, sociological and psychological variables, or — one man's music can be another man's noise.

When is Noise Annoying?

Temporal and seasonal factors are bound to have some effect on the degree of annoyance caused by noise sources. For example, the source which may determine a certain criterion might operate during the daytime hours of 9 A.M. to 5 P.M. when the occupants may not be at home. On the other hand, there may be residents who will stay in their homes during these hours (housewives, children, etc.) who are engaged in activities which do not necessarily require much noise isolation from external noise sources.

Still further, we must consider the repetitive character of the noise source. For example, an occasional airplane a few times a day may be less annoying than a heavily trafficked highway.

In winter, in northern climates, we spend a good portion of our time in fully enclosed buildings which are well insulated thermally (double glazing, etc.), and thus probably insulated from exterior sound as well. In the summer or in mild climates a good portion of our living is in open areas with sliding glass walls, jalousies, etc., which permit the house to take full advantage of the cool breezes, but admit noise as well.

Additional factors which must be considered in establishing criteria are the peak noise levels which can occur during a given day, and the effect of previous experience with noise. An interesting example of the latter may be shown in the following chart,* describing reactions of three tenant groups to floor constructions with various sound transmission losses.

	Percentage of tenants		
	50 db floors	45 db floors	40 db floors
Very disturbing	12%	23%	11%
Disturbing	14	19	12
A little disturbing	43	37	29
Not at all disturbing	31	21	48

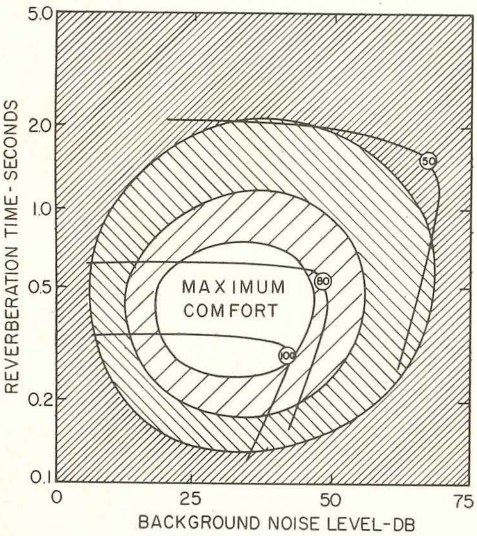
50 db, 45 db and 40 db are sound transmission losses.

Reading horizontally in the "very disturbing" tabulation, it can be seen that the 50 db floor and the 45 db floor gave a 12% and 23% tenant disturbance while the 40 db floor, which would be expected to produce a higher percentage of disturbance, only indicated 11%. This

** This data was compiled and presented in the Noise Control Journal by P. H. Parkin and E. F. Stacy of the Building Research Station in England.*

is a matter of being conditioned to a noisy environment. The 45 db and 50 db floors are in better class dwellings while the 40 db floors are in "slum clearance" dwellings. The people in the latter units had a much better living environment than they had had before and the slight noise intrusion was unimportant. Also, it may be that they like to hear what is going on next door. The first two columns of data were taken in London and the third column (for the 40 db floor) was taken in Glasgow, Scotland. Coincidentally, this is known as the Glasgow effect.

When we consider all of these factors



Acoustical Comfort. *While it is difficult to tie down criteria precisely, this chart at least indicates relative areas of comfort. Best conditions are within the inner circle and lesser degrees of comfort in the next two. Curves with circled numbers represent the percentage of words intelligible for various conditions.*

Chart by R. H. Bolt and R. B. Newman from *Construction and Equipment of the Home*, American Public Health Assoc., 1951

and others not listed, it is evident that establishing a noise criterion in terms of a single number is difficult. However, we cannot expect the architect to concern himself from a practical standpoint with all of the variable factors.

Noise Criterion

If, in the design of housing, we can be assured that we are not located close to railroad lines, under the flight paths of aircraft near airports, and that the spectrum characteristics (frequencies present) of the noise may be one of a typical daily activity, street traffic, children playing, etc., the chart shown above may serve as a useful guide in determining background noise levels which give various degrees of comfort.

The background noise levels are shown on the horizontal scale. The reverberation time of the room in seconds is plotted on the vertical scale. This is important since the reverberation time is affected by the amount of sound absorption in the room. The areas which are hatched in the same manner are qualitative zones of equal comfort. The outer zone would be considered very uncomfortable in a residence. The inner zone represents the maximum comfort region or optimum conditions which can be realized in the home. A room which is very quiet, but very reverberant, for example, is just as uncomfortable as one which is too noisy.

The curves which are marked 50, 80, and 100 represent the percentage of speech sounds which will be intelligible under the specified conditions. This chart is based on the average distances and voice levels normally expected in an average residence. The range from 80 to 100 represents optimum conditions for speech intelligibility.

Admittedly, this chart would ideally consider in some manner the connotation of the disturbing noise. For example, the neighbor's radio program may be very pleasant if it is background music, but on the other hand, a mystery thriller may be bothersome. The importance of the connotation of the intruding sound cannot be overemphasized. If a person knows that a neighbor is aware of his every action, the resulting inhibitive effect on his daily life can, in extreme cases, result in an unhappy family.

In summation, the chart which is presented for the qualitative zones of relative comfort in residential rooms is based on cultural conditions more than psycho-acoustical conditions. Obviously, the data in this chart is not valid in all conditions. For example, the residents in the immediate vicinity of the Bells of St. Peter's Cathedral in Rome (if not already stone deaf) probably enjoy the musical interludes.

Kinds of Noise

The application of acoustical planning to the design of dwellings need not be a hindrance to the architect since many improvements can be realized by attention to small details. Before we consider the basic planning aspects for achieving the pleasant acoustical environment, let us review some characteristics of typical noise sources.

In the first category we have external noises from our immediate neighbors and the community. Some of these have been discussed earlier — automotive traffic, railroads, etc. The hi-fi bug with accentuated bass notes well over 100 db (to reap the full reward of the music and to make it sound "better than natural") can be extremely annoying to the entire community, particularly on a summer evening. The "Build it Yourself" craze has brought with it a bit of noise too. The handyman not only can be driving his family crazy, but can do a superb job of alienating his neighbors. Consider further the fact that while it is loud, it is not music such as the hi-fi bug produces. These are just some of the more recent additions to possible neighborhood sources of sound. It is this group of noisy neighbors which continues to increase the requirements for noise isolation.

Any comprehensive listing of internal noise sources would require far too much space in this article. Obviously, we cannot go into detail on each of these sources, but we can discuss some of the more important ones.

Let's start with the bathroom. Present-day flush valve and tank type water closets, with some exceptions, can be extremely annoying, particularly in the late hours. It is not uncommon in housing of lightweight construction that the parents are reluctant to flush toilets after the children are in bed. This is as unnecessary as it is unsanitary.

To reduce the level of noisy water closets we must consider the airborne and structure-borne paths of noise. Isolating the stack from the floor construction by means of a resilient support, secured, if possible, to a masonry wall will reduce structure-borne vibration. An additional gain can be realized by mounting the WC on a resilient pad. For controlling the airborne sounds, let's eliminate the undercut doors and replace them with solid core doors, completely weather-stripped or at least tightly fitted. If these simple measures can be carried out, the noise from a bathroom will be greatly reduced.

And then there is the problem of back-to-back bathrooms with recessed medicine cabinets, not to mention the

SOME NOISE PROBLEMS AND THEIR PREVENTIVES

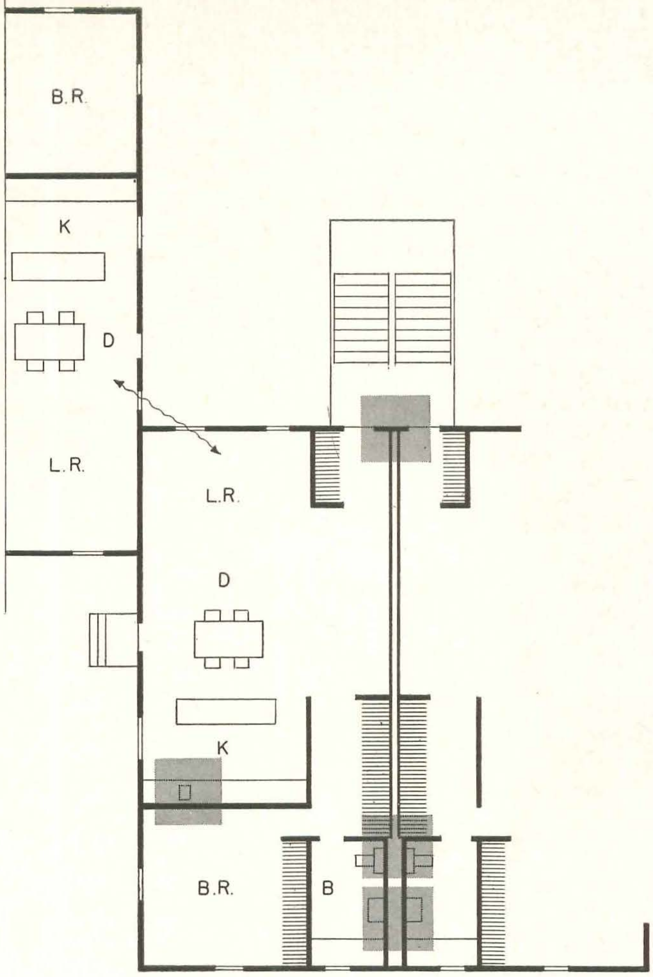
Adjoining apartment doors: *it is desirable to separate the common jamb with a resilient strip, to hang the doors from the masonry rather than the furred section, and also to mount the door stops on the door jamb rather than the interior partition*

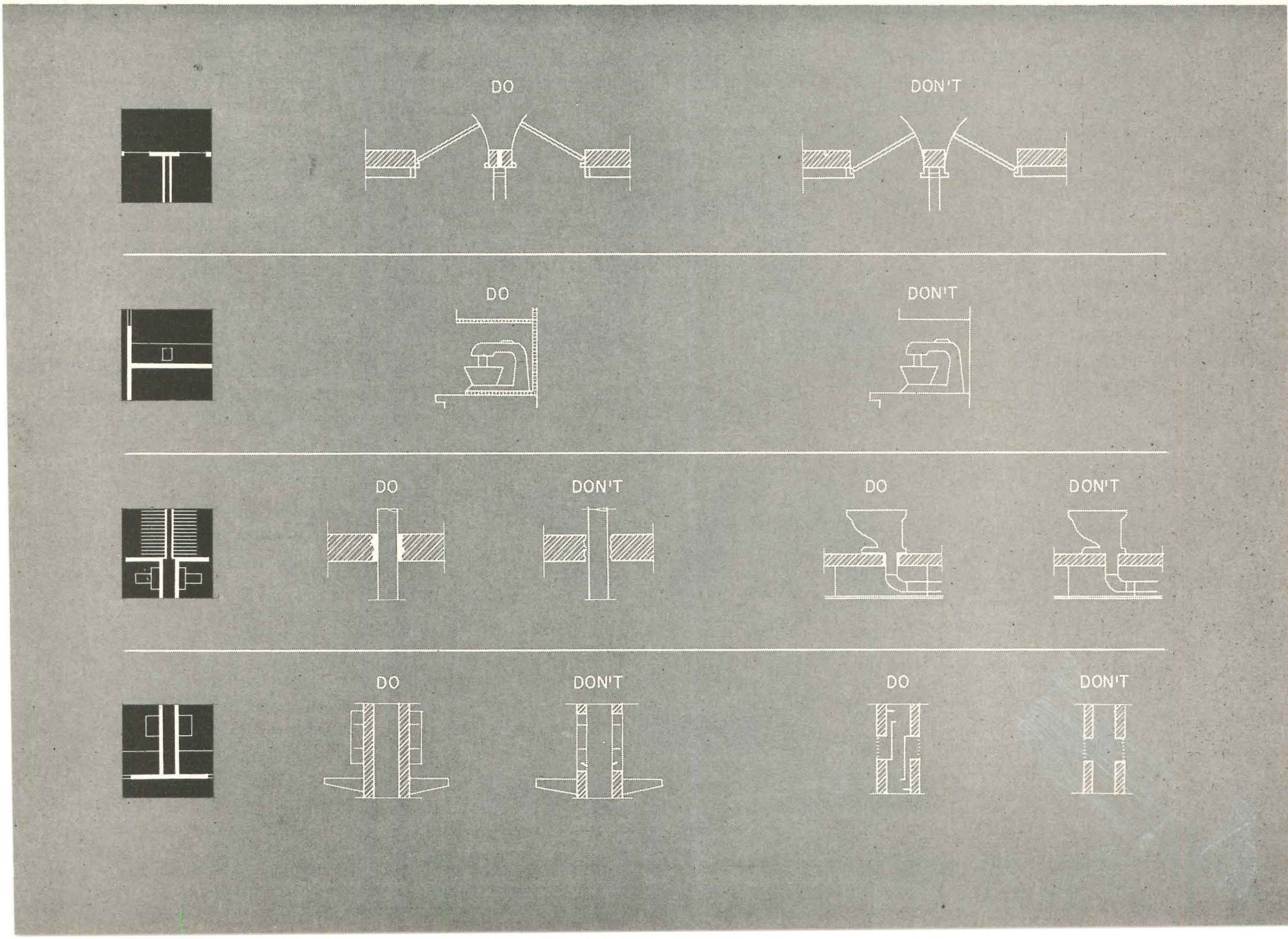
Kitchen appliances: *some quieting of portable units can be achieved by providing a resilient pad on the counter top and by installing sound-absorbing material at the back of the counter and under the cabinets*

Bathroom plumbing: *pipes common to several apartments should have caulking where the pipe passes through the floor to keep sound from traveling. The WC can be less noisy if it is mounted on a resilient pad; caulking should be applied around the waste pipe. A hung ceiling tied to the waste pipe will act as a sounding board*

Medicine cabinets and vent ducts: *if possible, surface mounted medicine cabinets should be used rather than recessed ones, particularly since razor blade slots can transmit a lot of annoying sounds. Common vent ducts should have baffles to cut down on sound transmission*

Note: windows set at 90° which "look" into the neighboring apartment, as used in this plan, should be avoided





back-to-back razor blade slots. Remember that these small openings have a unity transmission coefficient and seriously reduce the sound isolating properties of the wall. Let's surface-mount the medicine cabinets and use the handy disposal containers furnished by the blade manufacturers. Those of us who use electric razors have no problems.

In vertical arrangements of apartment house bathrooms the rigid tie of the plumbing stack to the ceiling below can be a very efficient sounding board for undesirable noises. Let's be straightforward about this and face the problem for what it really is. It is disturbing to the occupant on the lower level when he can distinguish the performance being enacted on the upper level, and conversely, disturbing to the performer when he knows his performance is distinguishable. Enough said!

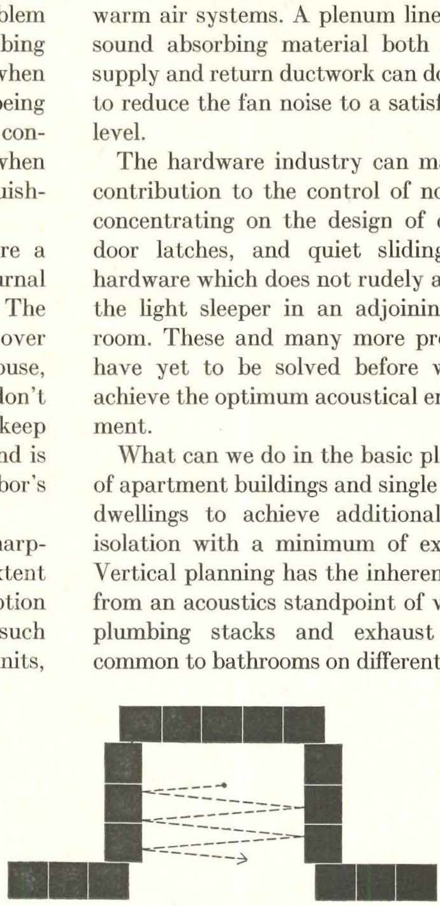
Silent mercury light switches are a very simple solution to the nocturnal clacks caused by noisy switches. The cost difference amounts to a little over $3 for the average three-bedroom house, and it is money well spent. If you don't use the quiet type switch, at least keep the switch off party walls. The sound is actually magnified on the neighbor's side.

Food blenders, automatic knife sharpeners, etc. can be quieted to some extent by the use of close-in sound absorption and a resilient pad. Appliances such as dishwashers, garbage disposal units, automatic washers and driers, vacuum cleaners, etc. actually require research by the respective industries for reducing the noise at its source. The manufacturers are certainly aware of the problem and great strides are being made by research in industry to determine the causes and treatment of the noise source. In the meanwhile, resilient mounts and flexible hoses for dishwashers, rubber connections to disposal units, etc. can reduce the structure-borne vibrations.

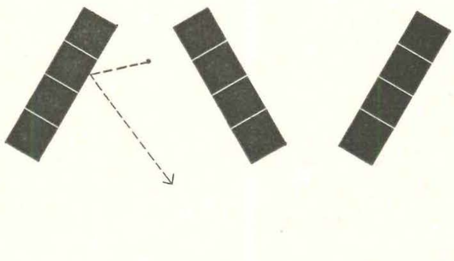
In the heating and ventilating department, we have the problem of the forced warm air systems. A plenum lined with sound absorbing material both in the supply and return ductwork can do much to reduce the fan noise to a satisfactory level.

The hardware industry can make its contribution to the control of noise by concentrating on the design of quieter door latches, and quiet sliding door hardware which does not rudely awaken the light sleeper in an adjoining bedroom. These and many more problems have yet to be solved before we can achieve the optimum acoustical environment.

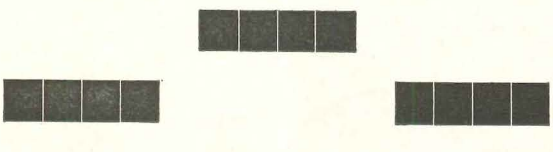
What can we do in the basic planning of apartment buildings and single family dwellings to achieve additional noise isolation with a minimum of expense? Vertical planning has the inherent fault from an acoustics standpoint of vertical plumbing stacks and exhaust ducts common to bathrooms on different levels.



Parallel wall surfaces of apartment buildings set around a courtyard make exterior noise worse by causing flutter echos



One solution would be to angle them as shown here



Or it would be even better to group them in this way

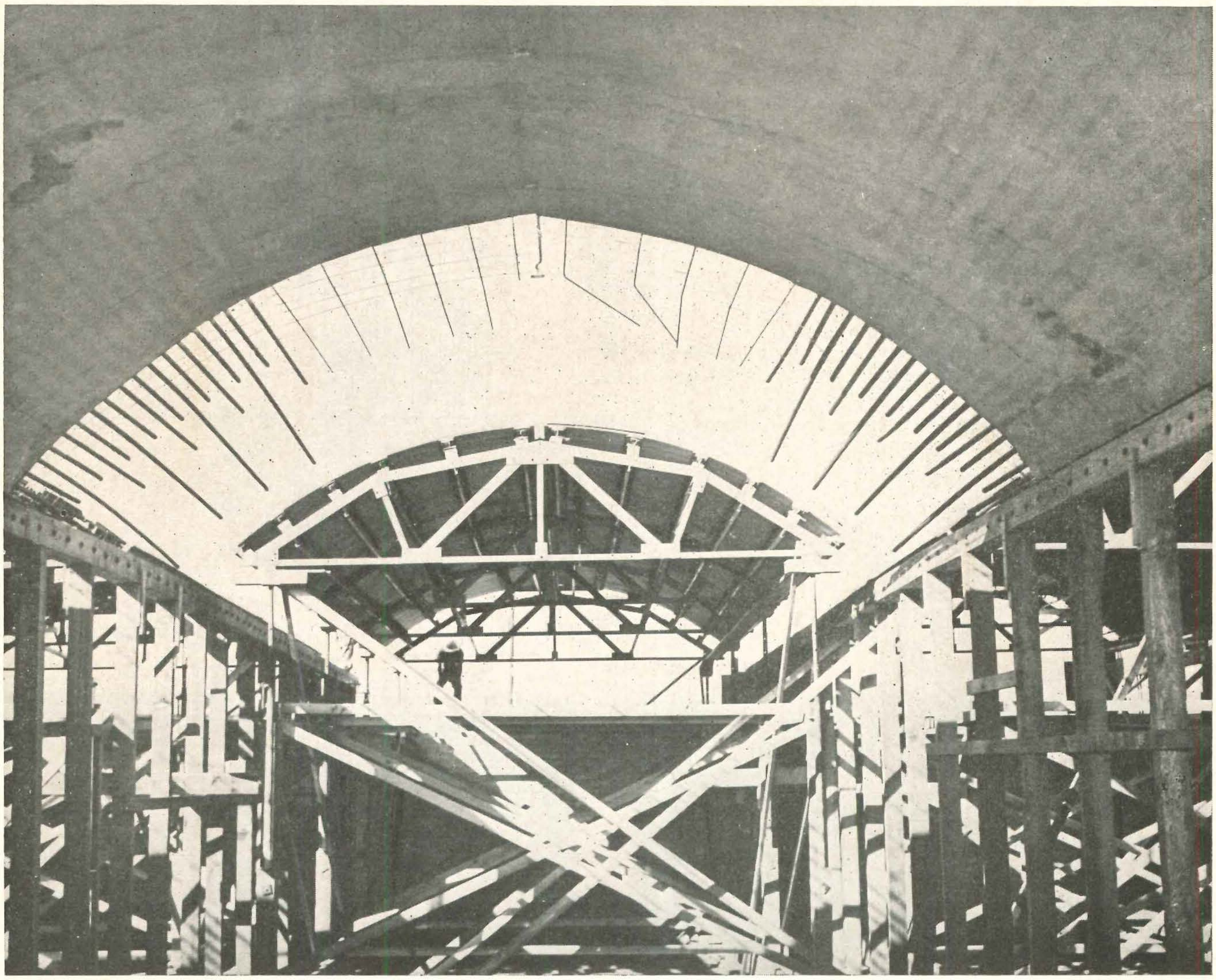
There is also the problem of impact noises (foot-falls, pianos, and radios) being transmitted to the apartment below.

Horizontal planning can eliminate many of these problems at their source. For example, walls between adjoining apartment units can be of heavy construction which is, of course, the ideal method for isolating airborne sounds. Heavy construction in floors is more prohibitive because of the increased cost requirement in steel and concrete. Windows set at 90° which look into the neighboring apartment should be avoided. Casement windows of adjoining apartments when located close together should not open so that sound is reflected from the windows into the adjoining apartment. In other words, the windows should open away from the adjoining apartment. Back-to-back closets of adjoining bedrooms can provide additional sound isolation above the single wall construction.

In horizontal planning of dwelling units, beware of the courtyard! Parallel wall surfaces give rise to extremely-annoying flutter echos which intensify and prolong the noises.

A short note on open planning — here the architect in his desire to give the visual effect of a continuum of space which is certainly desirable, introduces some difficult acoustics problems. The situation is aggravated by the fact that contemporary finishes of exposed stonework, terra cotta and flagstone are excellent sound reflectors and do not provide any sound absorption. In addition, the lack of carpeting and the use of wood, plastics and wrought iron furniture does not provide the sound absorption that is furnished by overstuffed couches, etc. The highly reverberant character of the modern living room magnifies the noises of general activities to a point where it jangles the nerves. Sound absorbing material on the ceiling can do much to improve this condition.

No solution is yet available for achieving a satisfactory degree of noise isolation when lightweight prefabricated partitions and closets are used. The architect contemplating this type of construction should give serious thought to the resulting lack of privacy. There will be times when his client will want peace and quiet and will not have it if any member of the family is in a noise making mood. Perhaps the solution here lies in the master of the house asserting himself!



BARRELS FOR A BOWLING ALLEY

Kelley's Bowl, Honolulu, T. H.

Wimberly and Cook, Architects

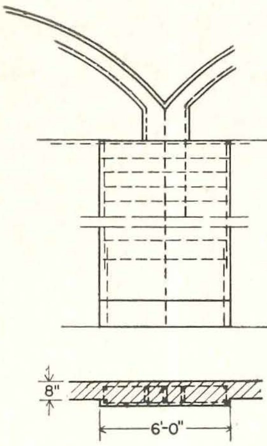
Richard R. Bradshaw, Structural Engineer

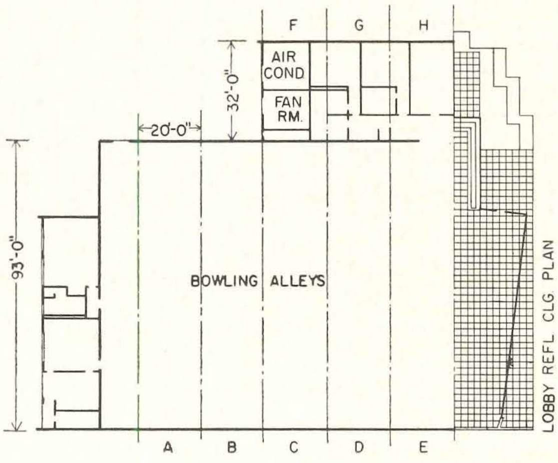
Nordic Construction Co., Builder

The secret to bringing down the cost of thin shell concrete roofs is multiple use of forms. For this structure, a series of rolling forms, raised and lowered by screw jacks, were set in three different positions for concrete pours to make five, 93-ft long, 3-in. thick, barrel shells which cover 16 bowling alleys. Three other 32-ft shells provide the roof over offices and equipment rooms, while a waffle slab is used over the lobby to reduce the number of columns necessary by cutting down on the weight. Under building conditions in Honolulu, it was cheaper to use thin shells than conventional trusses carrying a plaster saw-tooth ceiling. The excellent quality of concrete work available was an added factor in favor of thin shells; good plastering is difficult to procure.

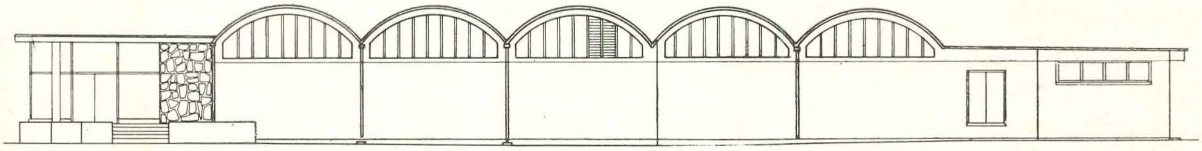
The need for proper spacing of lighting fixtures and acoustical considerations were the main determinants in the spacing of the shells. Low points of the shells made natural shielding points for concealing the lighting. The architects offer a word of caution on the acoustics of such a roof structure for use over a bowling alley: the circular forms of the barrels, even though treated for sound absorption, provide lens shapes in which sound is focused and bounced off the faces of the alleys, causing various sound densities at odd places throughout the building. They recommend a thorough study by acoustical consultants in order to avoid cut and dry "correction" after the building is completed.

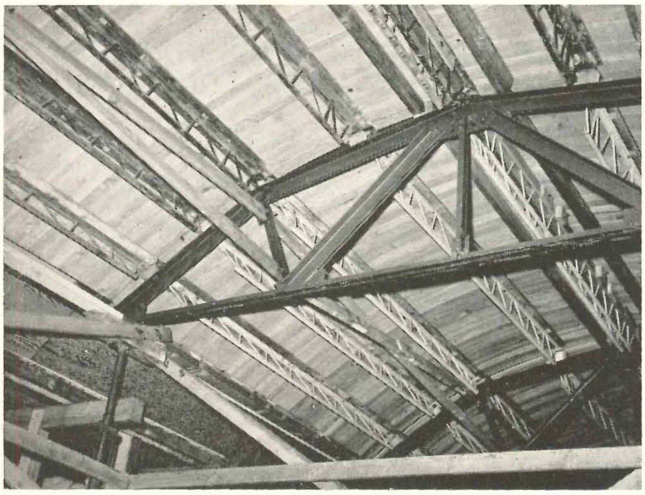
Originally the architects thought that air conditioning ducts could be run on top of the roof, with holes being left for outlets. But after consultation with the structural engineer, they found that best placement of outlets would coincide with high areas of stress in the shell. (Ordinarily barrel shells are ideal for incorporation of cut-out areas — glass, for example; but in this case the barrel is only a small section of a cylinder, giving a different stress picture than, say, with half a cylinder.) Horizontal stresses at the edges of the two outside barrels are taken by flat-roofed areas over the lobby and working areas, respectively.



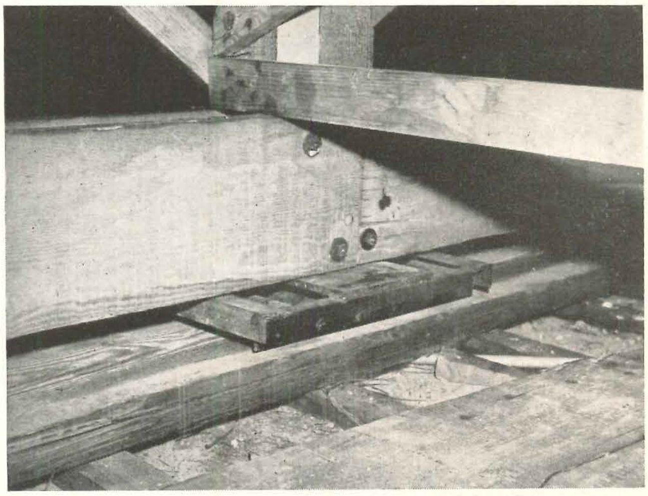


The five 93-ft long shells are suspended like simple beams, the sole support being piers at each end, 6 ft by 12 in. Three 32-ft shells cover the offices, equipment rooms and locker rooms. The lobby roof is a waffled slab to cut down on the columns needed

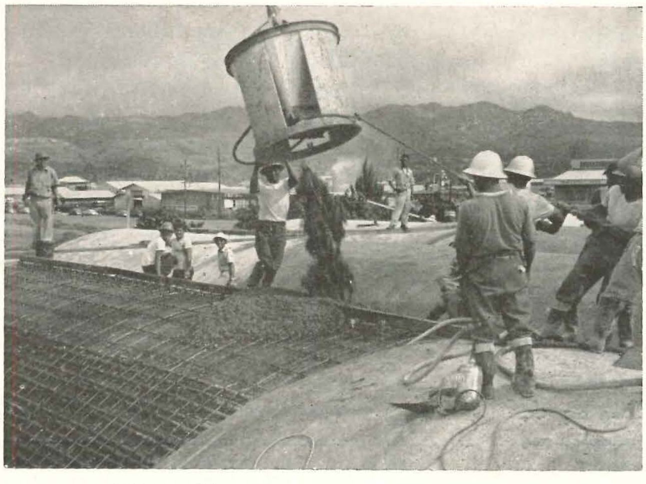




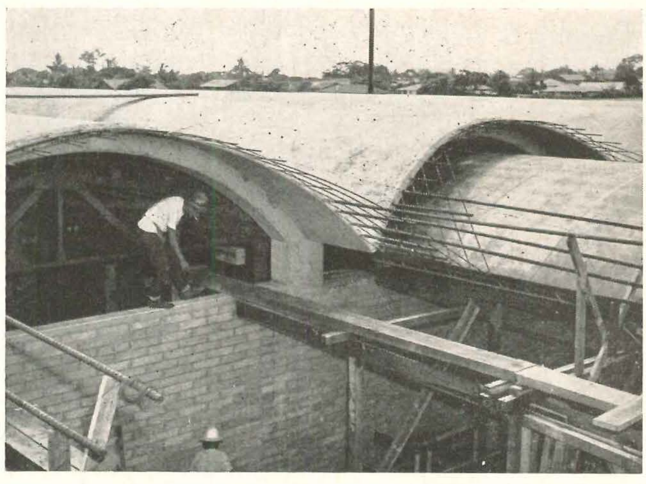
Five forms like this were used for pouring the 93-ft shells in three sections. Forms were built well because of future need



After the first 31-ft section was poured, forms were slid on dollies to the opposite side and finally to the middle section



Here the middle and last section of a large barrel is being poured. The forms have screw jacks for raising and lowering



The form is being positioned for one of the three 32-ft barrels. Reinforcing steel projects to make a tie with the 93-ft shell

ENGINEERED WOOD DESIGN—10: LAPPED JOISTS

By Mel A. Barkan and William J. LeMessurier

The principle of continuity in framing is often employed in large buildings to reduce the required size of members. It is used less in small structures such as houses, but recent tests have shown that when the principle is applied to roof joists, making them continuous over two spans, framing lumber can be reduced as much as 20 per cent. In this case deflection is reduced to the point where shear and bending stresses govern design. Such an approach, however, has the disadvantage that the length of a fully continuous joist must be equal to twice the length of a simple span. Frequently this member is difficult to procure and costs more.

A desirable solution, then, would be a design which combines reduction in deflection resulting from continuous action with the shorter length of the simple span joist. This can be accomplished by lapping and connecting two members over the interior support as shown in Fig. 1. Since the beams are connected at C and E (Fig. 2) the following is true: the deflections at points C and E on Beam 1 must be equal respectively to the deflections at points C and E on Beam 2. Mathematically this leads to the forces shown in Fig. 2. The forces P_1 and P_2 exerted at the connections tend to reduce the maximum deflections which occur in a

Fig. 1

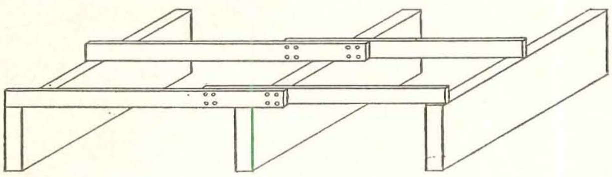
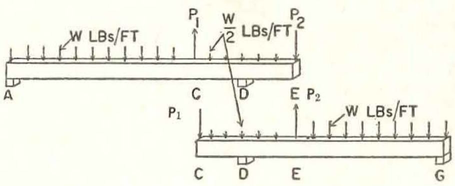


Fig. 2



LAPPED JOIST TABLES: Roofs, 20 lb/sq ft live load

Dead load: 15 lb/sq ft (including plaster ceiling)
Spacing of joists: 24 in. center to center

Key to tables:

$k = \dfrac{\text{short span}}{\text{long span}}$

$a = \dfrac{\text{distance from interior support to center of lap construction}}{\text{long span}}$

P = joint force (lb)
L = length of longer span (ft-in.)

1. Design Conditions
Fiber stress 1200 lb/sq in.
Shear 95 lb/sq in.
Mod. of elasticity 1,200,000

Woods Meeting Design Conditions
Cypress, 1300f grade
Redwood, Heart Structural
Spruce, Eastern, 1200f Structural Grade

	k=0.5 a=0.09		k=0.6 a=0.09		k=0.7 a=0.09		k=0.8 a=0.10		k=0.9 a=0.11		k=1.0 a=0.12	
	P	L	P	L	P	L	P	L	P	L	P	L
2x4	278	6–10	282	6–10	289	6–11	280	7–1	283	7–4	295	7–8
2x6	432	10–7	437	10–7	446	10–8	432	10–11	437	11–4	455	11–10
2x8	575	14–1	582	14–1	596	14–3	578	14–7	585	15–2	609	15–10
2x10	731	17–11	740	17–11	756	18–1	736	18–7	739	19–2	772	20–1
2x12	884	21–8	895	21–8	916	21–11	888	22–5	897	23–3	936	24–4

2. Design Conditions
Fiber stress 1450 lb/sq in.
Shear 120 lb/sq in.
Mod. of elasticity 1,600,000

Woods Meeting Design Conditions
Douglas Fir, Coast Region, 1450f No. 1
Pine Southern, No. 1

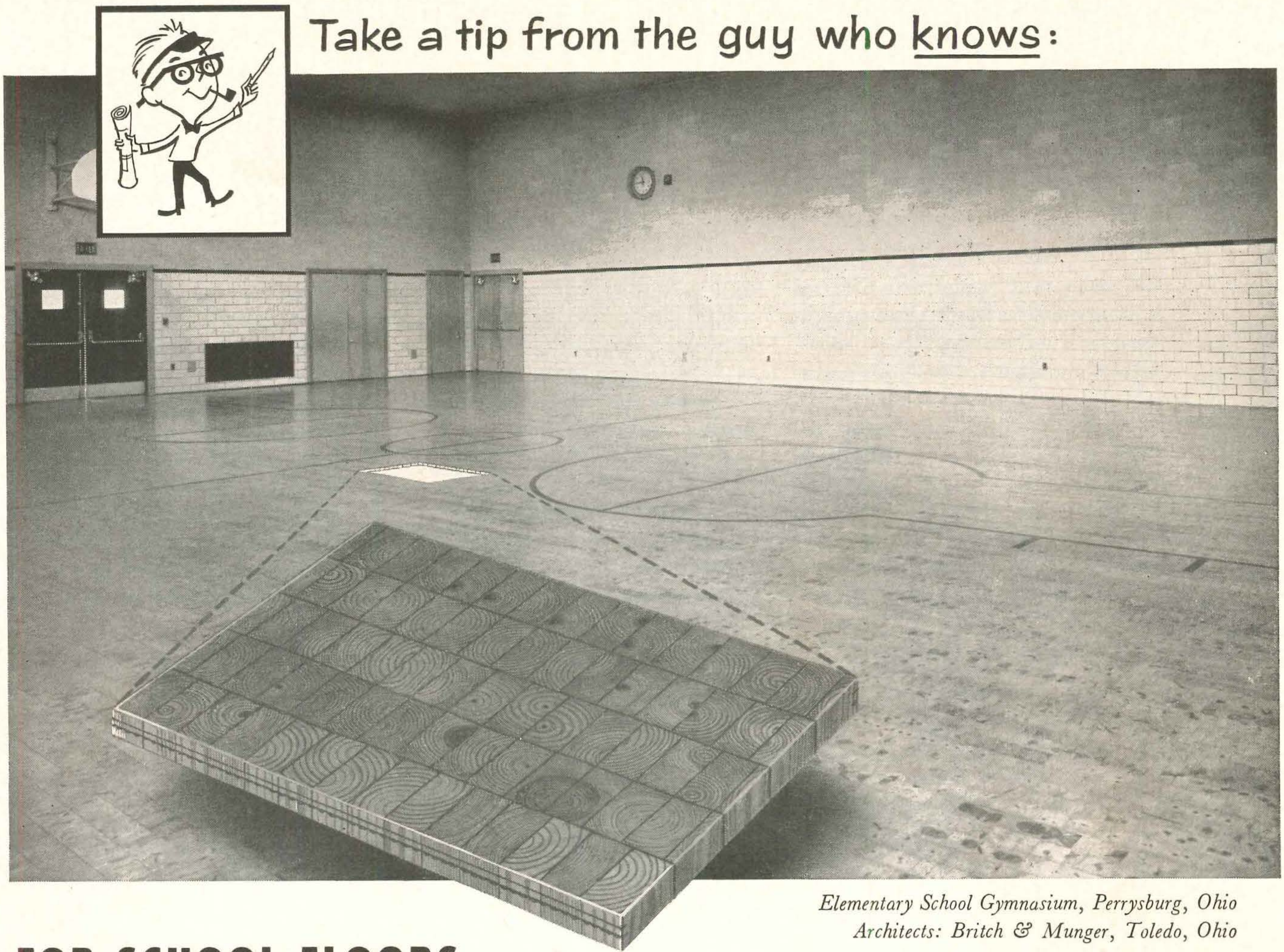
	k=0.5 a=0.08		k=0.6 a=0.08		k=0.7 a=0.08		k=0.8 a=0.08		k=0.9 a=0.09		k=1.0 a=0.09	
2x4	342	7–6	346	7–6	355	7–7	381	7–9	376	8–0	427	8–4
2x6	531	11–8	538	11–8	550	11–9	590	12–0	584	12–5	662	12–11
2x8	706	15–6	715	15–6	733	15–8	787	16–0	776	16–6	884	17–3
2x10	896	19–8	907	19–8	932	19–11	996	20–3	984	20–11	1120	21–10
2x12	1090	23–10	1100	23–10	1130	24–1	1210	24–7	1190	25–4	1350	26–5

3. Design Conditions
Fiber stress 1100 lb/sq in.
Shear 145 lb/sq in.
Mod. of elasticity 1,600,000

Woods Meeting Design Conditions
Douglas Fir, Coast Region, 1100f No. 2

	k=0.5 a=0.07		k=0.6 a=0.07		k=0.7 a=0.07		k=0.8 a=0.08		k=0.9 a=0.09		k=1.0 a=0.12	
2x4	383	7–5	388	7–6	403	7–7	381	7–9	376	8–0	320	8–4
2x6	593	11–6	599	11–7	625	11–9	590	12–0	584	12–5	497	12–11
2x8	791	15–4	802	15–6	833	15–8	788	16–0	776	16–6	663	17–3
2x10	1000	19–5	1020	19–8	1060	19–10	996	20–3	984	20–11	840	21–10
2x12	1210	23–6	1230	23–9	1280	24–0	1210	24–7	1190	25–4	1020	26–5

Take a tip from the guy who knows:



Elementary School Gymnasium, Perrysburg, Ohio
Architects: Britch & Munger, Toledo, Ohio

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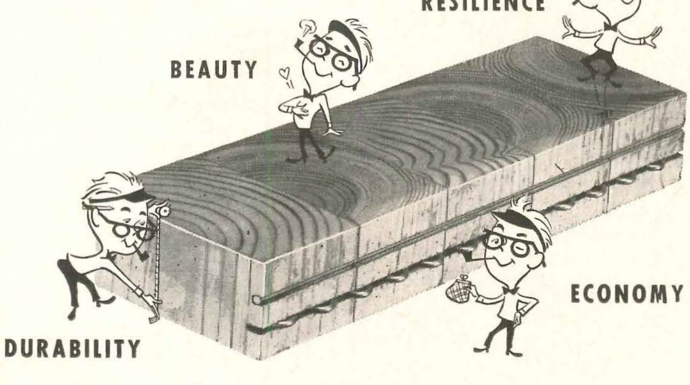

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ENGINEERED WOOD DESIGN—11: LAPPED JOISTS

By Mel A. Barkan and William J. LeMessurier

simple span making possible smaller members.

The saving which may be achieved by lapping and connecting two simple span joists is illustrated below.

Required Span: 16 ft
Load per sq ft: 30 lb
Joist Lumber:
- No. 1 Douglas Fir, Coast Region
- Allowable fiber stress 1450 psi
- Allowable shearing stress 120 psi
- Mod. of elasticity 1,600,000 psi

Spacing between lapped joists: 24 in.
Maximum allowable deflection: L/360
Equal spans: k = 1.0

From the data given in Table 5, the required member is 2 x 8. Using the same depth of joist and quality of lumber, the spacing between joists must be 12 in. for a simple span. The saving which results from lapping the member is therefore in excess of 20 per cent.

Limitations

Although this technique is applicable to floor construction, the design data contained in the tables must be restricted to flat or pitched (in one direction) roof applications since these tables assume both spans are loaded simultaneously.

Example, Using Tables

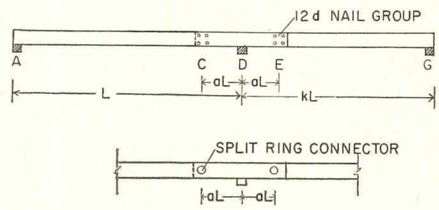
Given:

w = 30 lb/sq ft
f = 1100 lb/sq in.
L = 14 ft
s = 145 lb/sq in.
k = 0.8
E = 1,600,000 lb/sq in.

Find:

Size of member; joist force, P; lap ratio, a.

Fig. 3



LAPPED JOIST TABLES: Roofs, 30 lb/sq ft live load

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Key to tables:

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a = distance from interior support to center of lap construction / long span

P = joint force (lb)
L = length of longer span (ft-in.)

4. Design Conditions
Fiber stress 1200 lb/sq in.
Shear 95 lb/sq in.
Mod. of elasticity 1,200,000

Woods Meeting Design Conditions
Cypress, 1300f grade
Redwood, Heart Structural
Spruce, Eastern, 1200f Structural Grade

	k=0.5		k=0.6		k=0.7		k=0.8		k=0.9		k=1.0	
	a=0.10		a=0.10		a=0.11		a=0.11		a=0.13		a=0.14	
	P	L	P	L	P	L	P	L	P	L	P	L
2x4	301	6–4	304	6–4	284	6–5	301	6–6	283	6–9	299	7–1
2x6	463	9–9	468	9–9	439	9–11	467	10–1	436	10–5	461	10–11
2x8	621	13–1	628	13–1	586	13–3	622	13–5	583	13–11	619	14–8
2x10	787	16–7	796	16–7	745	16–10	788	17–0	740	17–8	781	18–6
2x12	954	20–1	963	20–1	899	20–4	954	20–7	897	21–5	946	22–5

5. Design Conditions
Fiber stress 1450 lb/sq in.
Shear 120 lb/sq in.
Mod. of elasticity 1,600,000

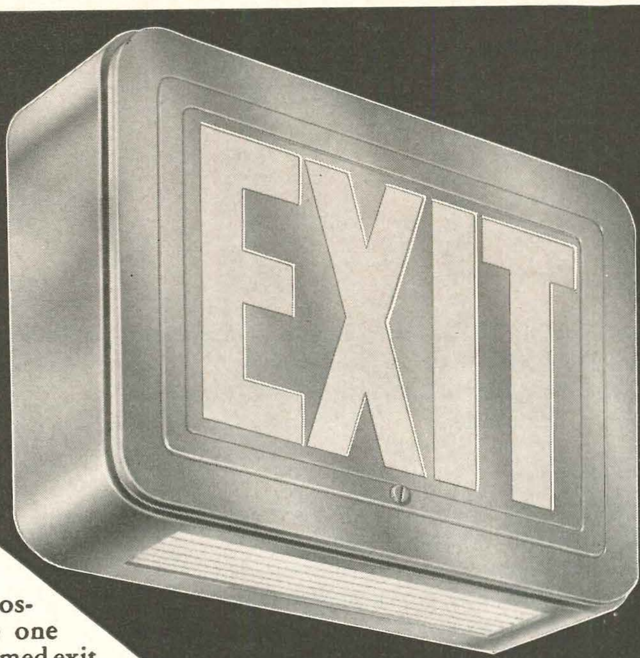
Woods Meeting Design Conditions
Douglas Fir, Coast Region, 1450f No. 1
Pine Southern, No. 1

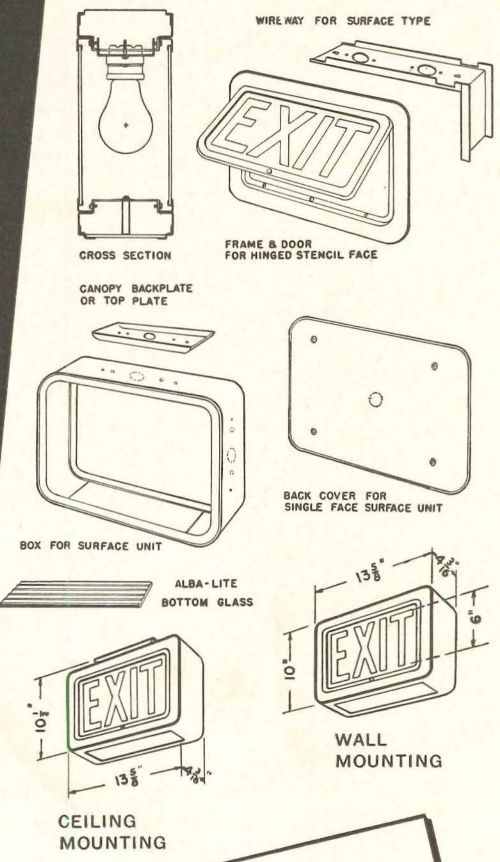
	k=0.5		k=0.6		k=0.7		k=0.8		k=0.9		k=1.0	
	a=0.09		a=0.09		a=0.09		a=0.10		a=0.11		a=0.13	
2x4	363	6–11	367	6–11	372	6–11	365	7–2	368	7–5	357	7–1
2x6	560	10–8	566	10–8	573	10–8	564	11–1	570	11–6	550	12–10
2x8	747	14–3	757	14–3	766	14–3	752	14–9	761	15–4	736	16–2
2x10	944	18–0	956	18–0	967	18–0	951	18–8	963	19–5	926	20–4
2x12	1150	21–10	1159	21–10	1180	21–10	1160	22–8	1170	23–7	1130	24–8

6. Design Conditions
Fiber stress 1100 lb/sq in.
Shear 145 lb/sq in.
Mod. of elasticity 1,600,000

Woods Meeting Design Conditions
Douglas Fir, Coast Region, 1100f No. 2

	k=0.5		k=0.6		k=0.7		k=0.8		k=0.9		k=1.0	
	a=0.10		a=0.10		a=0.11		a=0.11		a=0.13		a=0.14	
2x4	321	6–9	324	6–9	302	6–10	321	6–11	297	7–1	310	7–4
2x6	495	10–5	500	10–5	468	10–7	494	10–8	461	11–0	478	11–4
2x8	661	13–11	668	13–11	623	14–1	661	14–3	615	14–8	640	15–2
2x10	839	17–8	847	17–8	792	17–11	838	18–1	779	18–7	809	19–2
2x12	1020	21–5	1030	21–5	958	21–8	1020	21–11	939	22–5	981	23–3

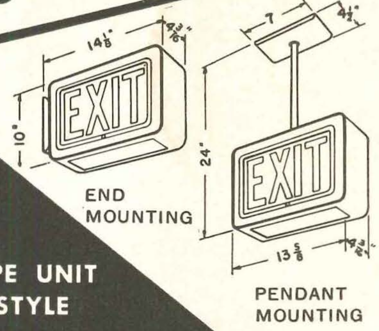




Now it's possible to use one basic die-formed exit sign throughout an entire building. Quickly converted to single or double face use, The Perfeclite Surface Unit, is mounted from top, back, side, or from a pendant, depending on your requirements. Wiring is no problem. The wireway simply disengages through key slots. Two face styles available: hinged metal stencil face, 6″ letters on fired green or red glass backing — or 6″ letters on fired ceramic glass panel — in four color combinations.

SURFACE TYPE UNIT
STENCIL FACE STYLE

ADAPTABLE — is the word for PERFECLITE'S new hinged exit unit



Specify Perfeclite Recessed Mounted Illuminated Exit Signs . . . die-formed, easy-to-install, easy-to-service. Two face styles: hinged metal stencil face, 6″ letters on fired green or red glass backing, or 6″ letters on fired ceramic glass panel — in four color combinations.

RECESSED TYPE UNIT
GLASS FACE STYLE

All signs are fired ceramic colors — unconditionally guaranteed. *Units are Underwriters Laboratories, Inc., approved, and comply with National Electrical Code.*

PERFECLITE PRODUCTS
THE MARK OF LIGHTING SERVICE

THE PERFECLITE COMPANY
1457 East 40th Street
Cleveland 3, Ohio

Please send me The Perfeclite Data Folder EX-55A.

NAME...

ADDRESS...

CITY. ....STATE.....................

ENGINEERED WOOD DESIGN—12: LAPPED JOISTS

By Mel A. Barkan and William J. LeMessusier

Using Table 6 which meets the given conditions enter the column for k = 0.8. Move down this column until the allowable span listed is equal to or greater than the required span. Then move horizontally to the left to find that the required minimum member size is 2 x 8. The joint force of 661 lb may be found immediately to the left of the allowable span (14 ft-3 in.). The value of the lap ratio, a = 0.11, is tabulated directly beneath the value of k.

Joint Design

1. The allowable load per common wire nail is the lateral resistance of the nail when driven in the side grain (perpendicular to fibers) of seasoned wood. (Calculations based upon the *National Design Specification For Stress-Grade Lumber and Its Fastenings, 1953.*)

Table	Nail Size	Allow. Load, lb per nail
1, 4, 7	12d	57.75
2, 5, 8	12d	70.50
3, 6, 9	12d	70.50

To determine the minimum number of nails required, divide the force P listed in the tables by the allowable load in pounds per nail as listed above. For example, using No. 1 Douglas Fir, Coast Region, 1450f joists subjected to a joint load of 295 lb, the number of nails required is 295/70.5 = 4.18. Since the number of nails actually used must be equal to or greater than the number required use 5 nails.

2. The allowable load per split ring connector loaded perpendicular to the grain in seasoned wood. (Calculations also based upon the *National Design Specification.*)

Table	Joist Size	Ring Dia., in.	Allow. Load, lb.
1, 4, 7	2 x 4	2½	1572
	2 x 6	2½	1750
		4	2770
	2 x 8 and larger	2½	1750
		4	3330
2, 3, 5, 6, 8, 9	2 x 4	2½	1880
	2 x 6	2½	2110
		4	3330
	2 x 8 and larger	2½	2110
		4	4000

To allow adequate space for the connection add approximately 6 in. to the length L + aL.

WARNING: Each nail group or ring connector must be centered about a point which lies at least a distance equal to "aL" from the support. Otherwise, joint forces will be higher than those listed. Further, the ring connector should be centered halfway between the edges of the joist.

LAPPED JOIST TABLES: Roofs, 40 lb/sq ft live load

Dead load: 15 lb/sq ft (including plaster ceiling)
Spacing of joists: 24 in. center to center

Key to tables:

$$k = \frac{\text{short span}}{\text{long span}}$$

$$a = \frac{\text{distance from interior support to center of lap construction}}{\text{long span}}$$

P = joint force (lb)
L = length of longer span (ft-in.)

7. Design Conditions
Fiber stress 1200 lb/sq in.
Shear 95 lb/sq in.
Mod. of elasticity 1,200,000

Woods Meeting Design Conditions
Cypress, 1300f grade
Redwood, Heart Structural
Spruce, Eastern, 1200f Structural Grade

	k=0.5, a=0.12		k=0.6, a=0.12		k=0.7, a=0.12		k=0.8, a=0.13		k=0.9, a=0.14		k=1.0, a=0.16	
	P	L	P	L	P	L	P	L	P	L	P	L
2x4	289	5–11	291	5–11	298	6–0	292	6–1	300	6–4	298	6–8
2x6	447	9–2	451	9–2	459	9–3	451	9–5	466	9–10	462	10–4
2x8	597	12–3	602	12–3	616	12–5	603	12–7	621	13–1	615	13–9
2x10	765	15–6	762	15–6	777	15–8	763	15–11	787	16–7	779	17–5
2x12	914	18–9	922	18–9	943	19–0	923	19–3	953	20–1	944	21–1

8. Design Conditions
Fiber stress 1450 lb/sq in.
Shear 120 lb/sq in.
Mod. of elasticity 1,600,000

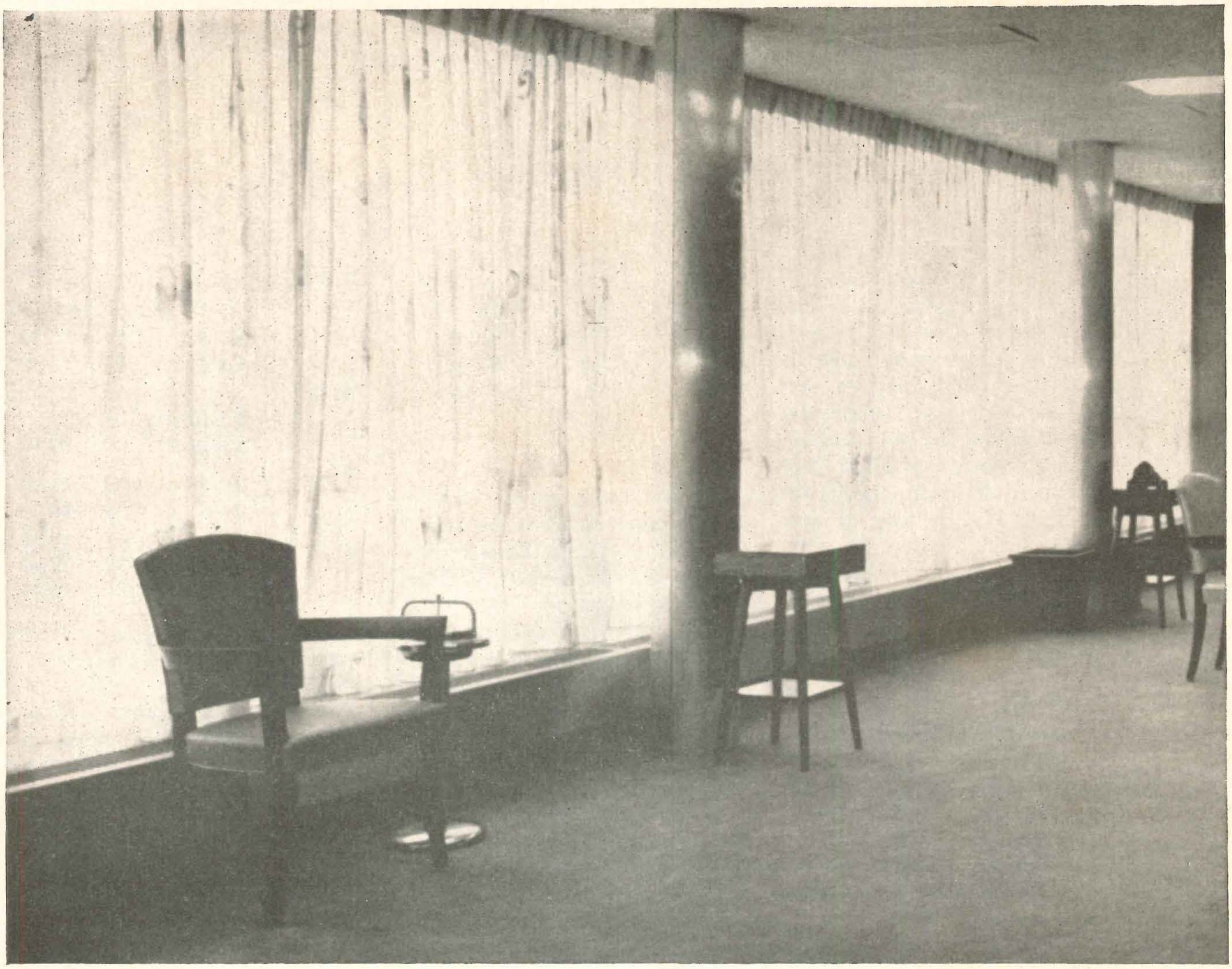
Woods Meeting Design Conditions
Douglas Fir, Coast Region, 1450f No. 1
Pine Southern, No. 1

	k=0.5, a=0.10		k=0.6, a=0.10		k=0.7, a=0.10		k=0.8, a=0.11		k=0.9, a=0.12		k=1.0, a=0.14	
2x4	377	6–6	381	6–6	391	6–7	378	6–8	389	7–0	378	7–4
2x6	585	10–1	591	10–1	603	10–2	585	10–4	602	10–10	585	11–4
2x8	784	13–6	792	13–6	811	13–8	784	13–10	801	14–5	782	15–2
2x10	992	17–1	1000	17–1	1020	17–3	991	17–6	1020	18–3	989	19–2
2x12	1200	20–8	1210	20–8	1240	20–11	1200	21–2	1230	22–1	1200	23–3

9. Design Conditions
Fiber stress 1100 lb/sq in.
Shear 145 lb/sq in.
Mod. of elasticity 1,600,000

Woods Meeting Design Conditions
Douglas Fir, Coast Region, 1100f No. 2

	k=0.5, a=0.09		k=0.6, a=0.09		k=0.7, a=0.10		k=0.8, a=0.10		k=0.9, a=0.11		k=1.0, a=0.13	
2x4	390	6–1	395	6–1	366	6–2	389	6–3	389	6–5	367	6–7
2x6	604	9–5	611	9–5	568	9–7	602	9–8	601	9–11	566	10–2
2x8	807	12–7	817	12–7	756	12–9	804	12–11	803	13–3	756	13–7
2x10	1020	15–11	1030	15–11	959	16–2	1020	16–4	1020	16–10	960	17–3
2x12	1240	19–3	1250	19–3	1160	19–6	1230	19–8	1230	20–4	1160	20–10



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Mr. Lee Schoen, member of the architectural firm of Schoen & Hennessy, New York. The firm has most recently designed the Air France Building in New York; the New York Thruway Restaurants for Union News Co.; the San Juan Hotel in Orlando, Florida; and the new Health Center for the Amalgamated Laundry Workers, New York, shown here.