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ARCHITECTURAL RECORD

CONCRETE FOR NEW DESIGNS

By ANTONIN RAYMOND, Architect

ARE not lightness and precision among the most sought-for qualities in modern building? The ideal of beauty nowadays undoubtedly is simplicity and the particular elegance obtainable only through these two attributes—lightness and precision.

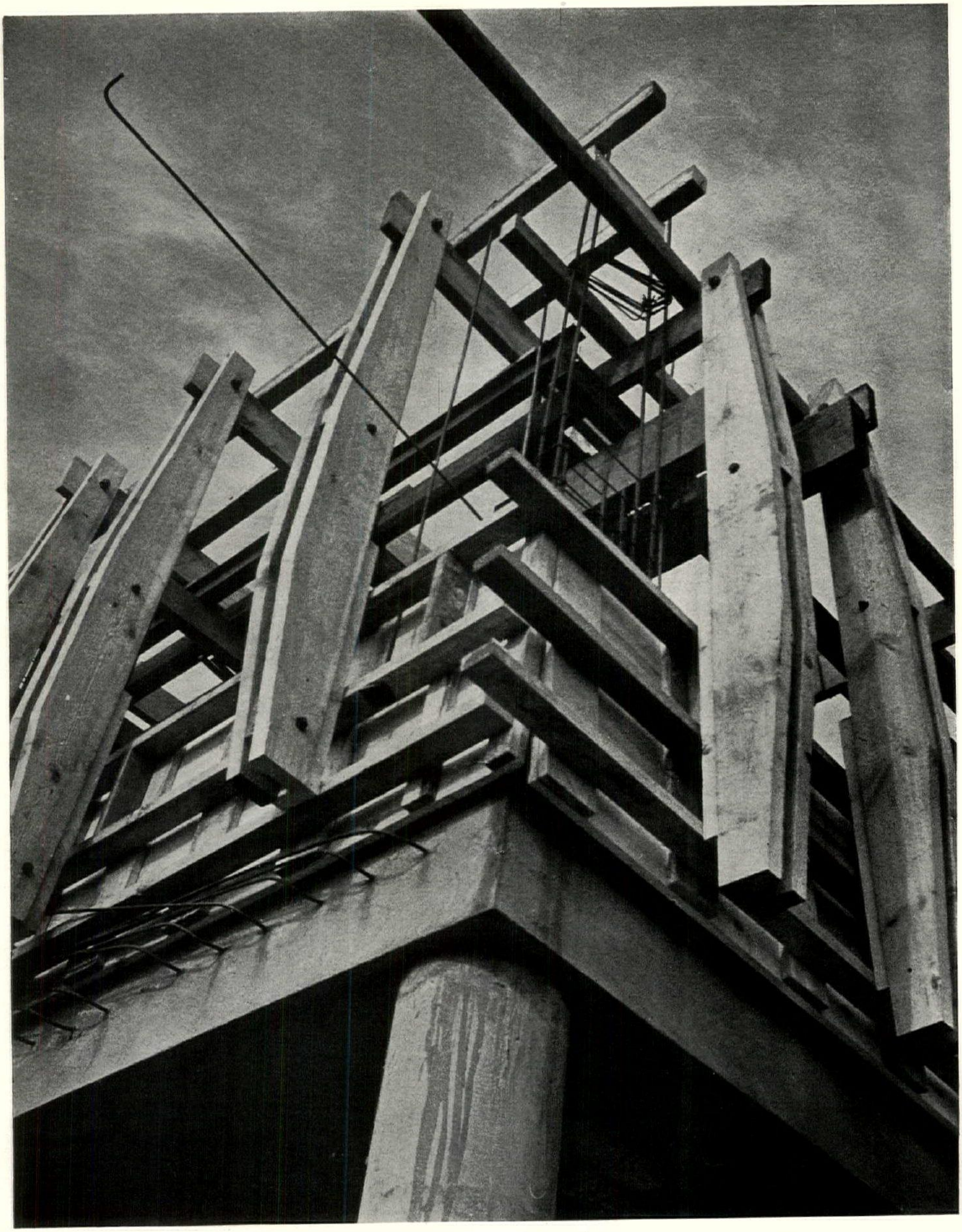
Concrete as a building material is ideal for precision, for lightness and for economy of space. It is therefore a truly modern material and its use should be more general than it has been so far. It is fireproof, and its mass—the thickness of walls and floors and the sizes of columns and beams—can be calculated to a nicety. It is especially suited to earthquake-proof buildings, for it is very strong under compression, and the rigid method of antiseismic construction is generally accepted as the only practical method.

There are all kinds of concretes at the disposal of the architect: concrete made with standard portland cement, high early-strength concrete, concrete of high compressive strength, aerated concrete, low-strength concrete, and the lava or cinder concrete. Concrete can be precast and used in slabs; it can also be used in blocks.

BEFORE designing *reinforced concrete* one should always get samples of the aggregate, the sand, and the cement which will actually be used on the job. Using the water-cement ratio theory, the most economical mix should be designed for the particular use to which the concrete is to be applied. Laboratory tests would determine the exact mixture necessary to obtain a specific compressional strength. At the start of a job the engineer should be consulted as to this desired strength, so that it will at least conform to the local building code and safety regulations.

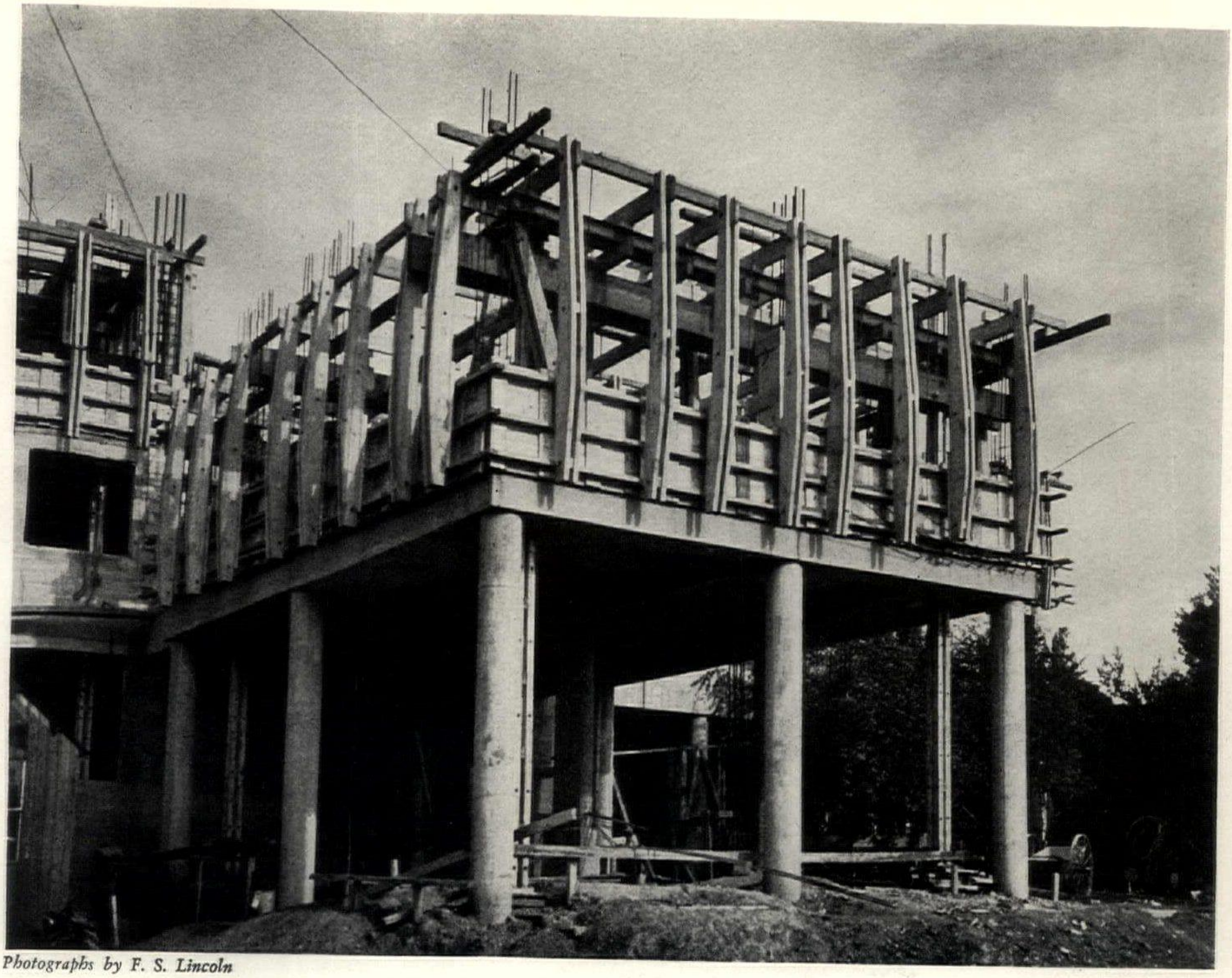
In my own experience with concrete construction in Japan, I have used concrete made of material found in the excavations where the building was to be erected. It was washed and cleaned of all but the mineral matter, test blocks and cylinders were made and from the results the thickness of the walls and the sizes of the columns were obtained. An example of this method of construction is the church in Karuizawa, Japan, photographs of which appear on pages 29-36 of this issue.

High-strength concrete will permit small sec-



CONCRETE HOUSES UNDER CONSTRUCTION AT GENESTA ROAD, PLUMSTEAD, ENGLAND

The concrete walls are fabricated by means of wood forms which extend a full story in height and can be used repetitively for successive pourings of concrete as the building goes up from the foundations.



Photographs by F. S. Lincoln

PILICHOWSKI AND LUBETKIN
ARCHITECTS

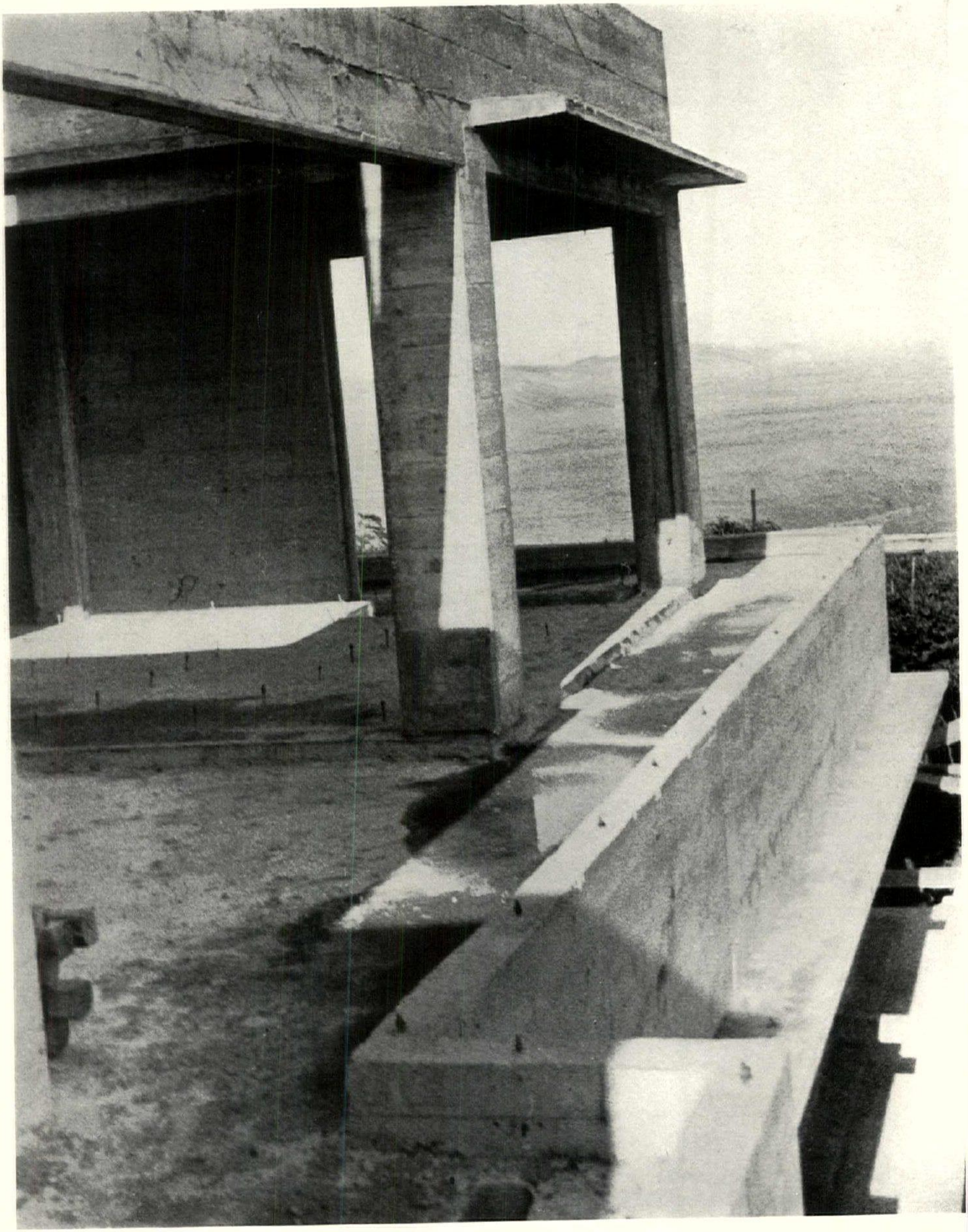
The house construction is ferro-concrete cast in place. Columns were formed by asbestos pipes. Exterior walls are 4 inches thick with 1 inch of bituminous cork insulation, and finished with a light buff waterproof concrete paint.

tions to be designed for every part of the building, thus saving weight and reducing the cost of construction.

By using *high early-strength concrete,* construction can proceed even in winter. Certain construction features requiring quick time in execution are likewise made possible.

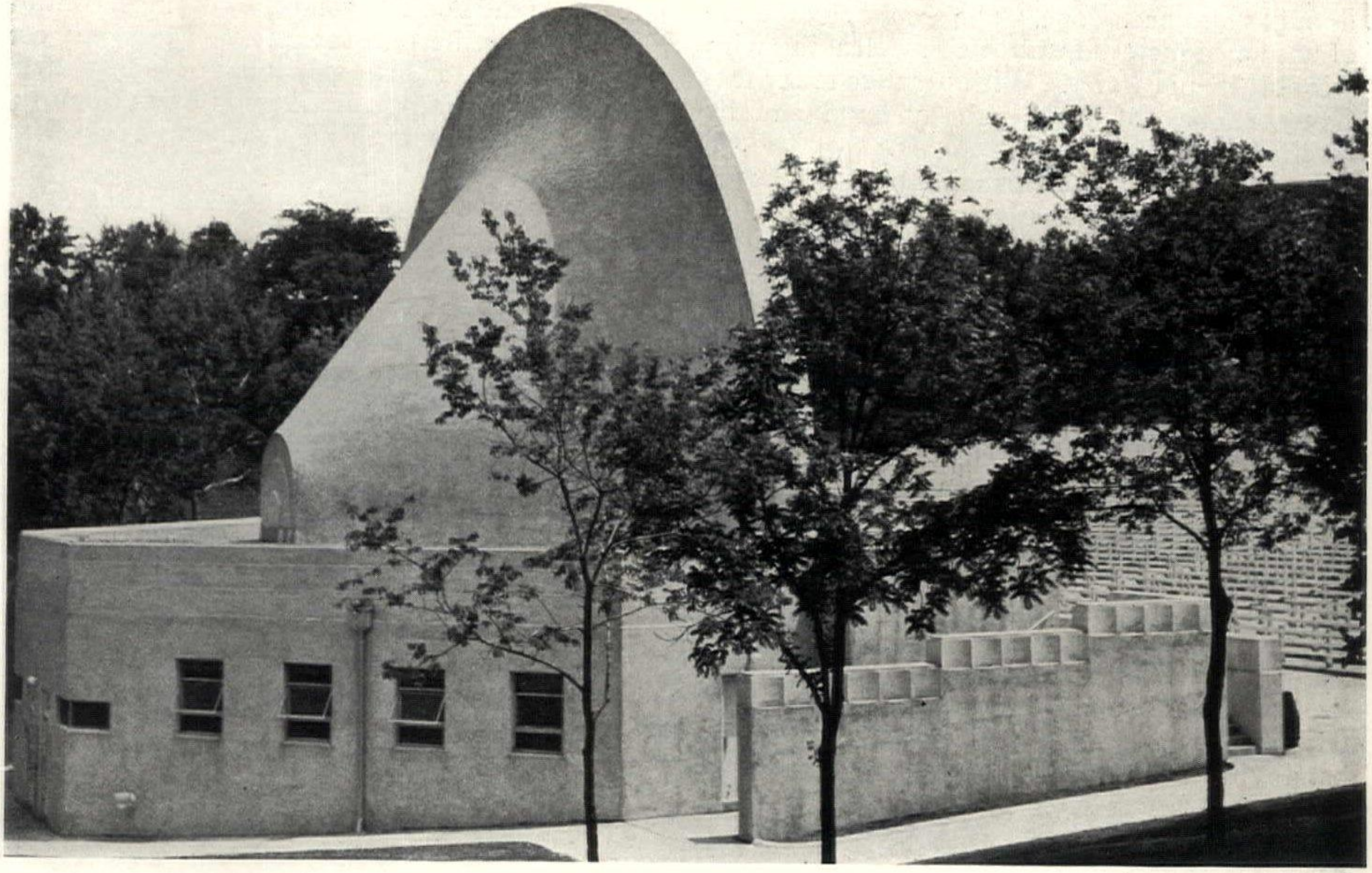
Aerated concrete is a good sound and heat insulator, and because of its light weight, it is a good material for use in grading or for grooves in floors.

Low-strength concrete can be used to good advantage in leveling and hardening ground under foundations.



A COUNTRY HOUSE OF CONCRETE IN JAPAN
ANTONIN RAYMOND, ARCHITECT

Formwork has just been removed, showing the monolithic construction. Roofs, columns and walls, window overhangs and floors, all are cast together without joints. Floor bolts, downspouts, piping and ducts are set in the forms before the concrete is poured.



MUSIC PAVILION AT SIOUX CITY, IOWA
HENRY L. KAMPHOEFNER, ARCHITECT
PAUL COOK & BRUCE PACKARD
ENGINEERS

The truncated-cone shape of this concrete-cast music pavilion was determined by acoustical requirements in reflecting sounds to listeners seated in the natural amphitheater. About 60% of the weight of the great arch was eliminated by hollow construction.

Where natural lava is obtainable, *lava concrete* may take the place of aerated concrete.

Cinder and slag concrete also have various uses because of their lightness.

Different cements, as well as different aggregates, will impart different colors to the concrete. In using concrete an architect soon becomes aware of this and will take full advantage of this quality.

CONCRETE is a plastic and readily adaptable material. It is not particularly difficult for concrete to simulate other products. The general practice in the United States has been to use concrete in this manner—either covered over by other materials, like brick and tile and stucco, or tooled or precast to imitate antique forms pleasing the fancy of the owner or the taste of the architect.

The truly modern use of this material points in another direction. There is inherent beauty in concrete and it has its own character if studied and understood. There are structures where hard-polished surfaces with sharp corners and exact levels are desirable; there are others where the unevenness and the texture of the wood forms (and the occasional impressions of the knots in the wood) are suitable. Both can be easily obtained. The first, by the use of dressed lumber or form liners; polishing with carborundum has also been done. The second, by the use of unplaned material, followed by cleaning with wire brush and water. With practice many textures can be obtained, both by hand and by machine.

Undoubtedly, a concrete finish is more durable and more handsome than almost any applied finish.

Concrete is readily painted, either by flat colors (what the manufacturers call "cement paint") or by any colors in oil or turpentine. The alkali in concrete will turn the colors to a certain degree, often softening any hardness and monotony. Oil color in turpentine will stain concrete and I usually apply it by air brush, producing rather soft effects. (Instead of oil paint alone being used, the oil is diluted with turpentine and sprayed on by air brush, so that the natural surface is not destroyed but stained similarly to wood.)

An interesting effect on an uneven wall has been obtained by chipping the surface like stone with a pea-hammer and then polishing it by hand with carborundum.

GOOD design leads one to research in the minimum of material for given uses. So with concrete. Columns and beams should be just large enough to do the work safely, and no more; likewise with all other sections and walls.

Concrete is particularly applicable for long spans and cantilevers and domes. It can be molded into any shape, therefore curved walls or beams are quite feasible and a continuous research in this direction should lead to new and unexpected forms very different from anything done in past ages but doubtless equally effective. These forms may be even more beautiful because of the scientific exactitude of the ways and means by which they will be attained.

In concrete a flat roof acquires real significance. In concrete the window overhangs can be executed in a permanent fashion. In concrete wide sills are made possible. By cantilevering the floors beyond the columns, continuous windows become feasible, and it is only concrete which made it possible for me to make whole walls disappear. A good example of this is the dining room in the Akaboshi House (see pages 9-28).

The spiral stairs and other staircases in my house designs could not have been executed in any material but concrete. I use concrete even for fireplaces and for built-in furniture, either in natural finish, or polished, or painted, or lacquered.

Any concrete used for roofs or exterior walls or basement walls and floors should be waterproofed. The best method I have found to be integral waterproofing mixed either at the factory or at the site with the material. Waterproofing applied as a surface application is effective only for a short time; it is not permanent. I have obtained a concrete so dense that the roofs did not show any signs of leakage even without the membrane waterproofing which is always used on top of the flat concrete for absolute insurance against possible cracks.

All concrete buildings require furring of exterior walls for insulation and acoustical reasons, and so do all floors and walls where soundproof or heat-insulating qualities are required.

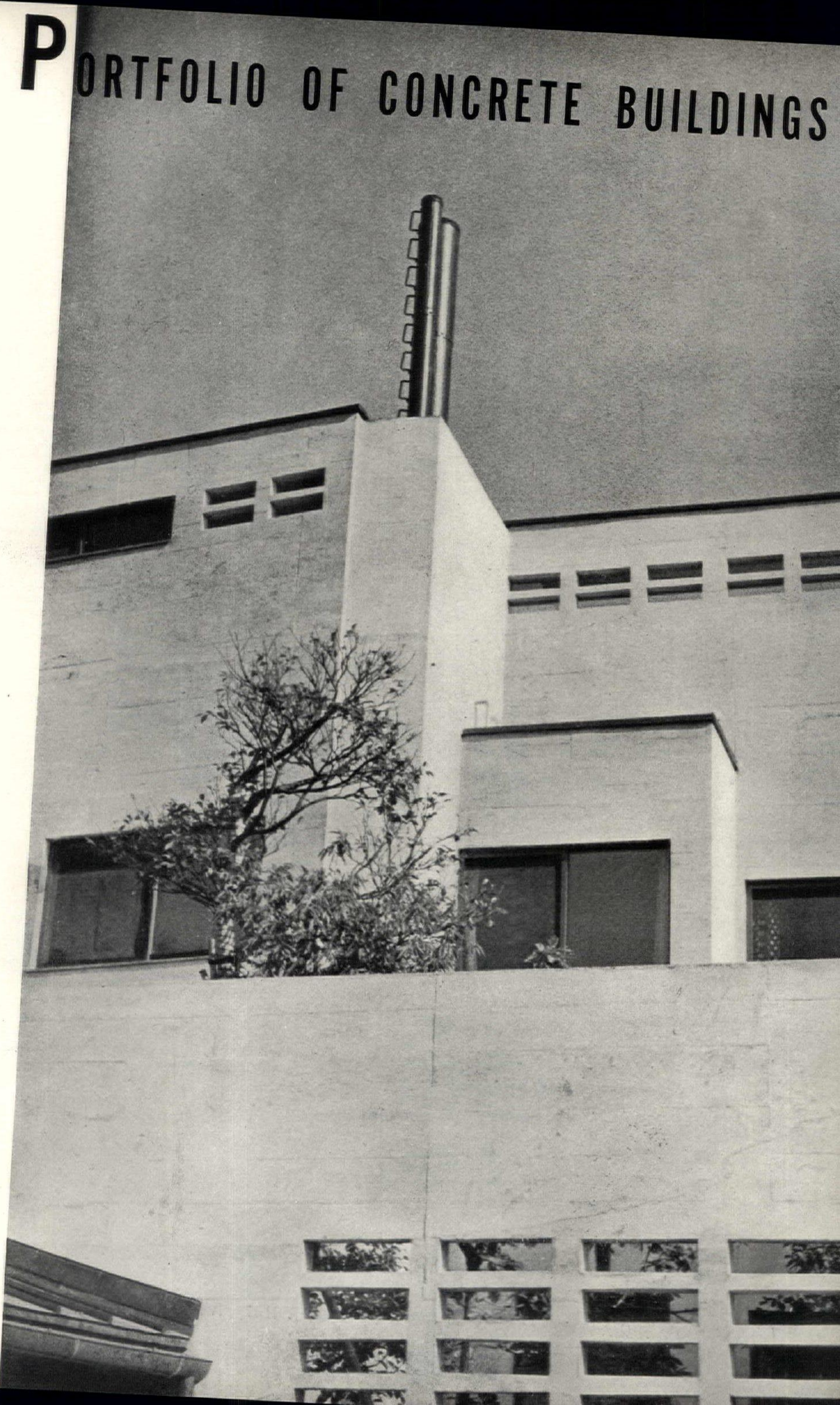
Should I practice architecture in the United States in places where there is no danger from earthquakes, I would not advocate monolithic concrete construction. The proper use of concrete for building in this country is in the structural framework, floors and roofs, but *not* in the curtain walls which should be of a lighter and more effective insulating material. This would lead to interesting designs involving the combining of materials.

The most effective earthquake-proof design for brick buildings or for high buildings undoubtedly is steel frame covered with reinforced concrete, both the steel frame section and the reinforcing bars being taken into account in calculating all the necessary structural members. This is a common practice in Japan.*

**Editor's note*—Asked to comment on the effectiveness of such structural design for American practice, the Portland Cement Association has this to say:

"California earthquake experiences refute the thought in this paragraph. Practically all of the main buildings in California which are designed for resistance to earthquake shock use concrete walls for distribution of shear, and in a majority of the cases it will be found that the frame of the building is also reinforced concrete, with concrete floor systems for distribution of the shear to the walls. Their performance to date would indicate that this is the most satisfactory type of construction."

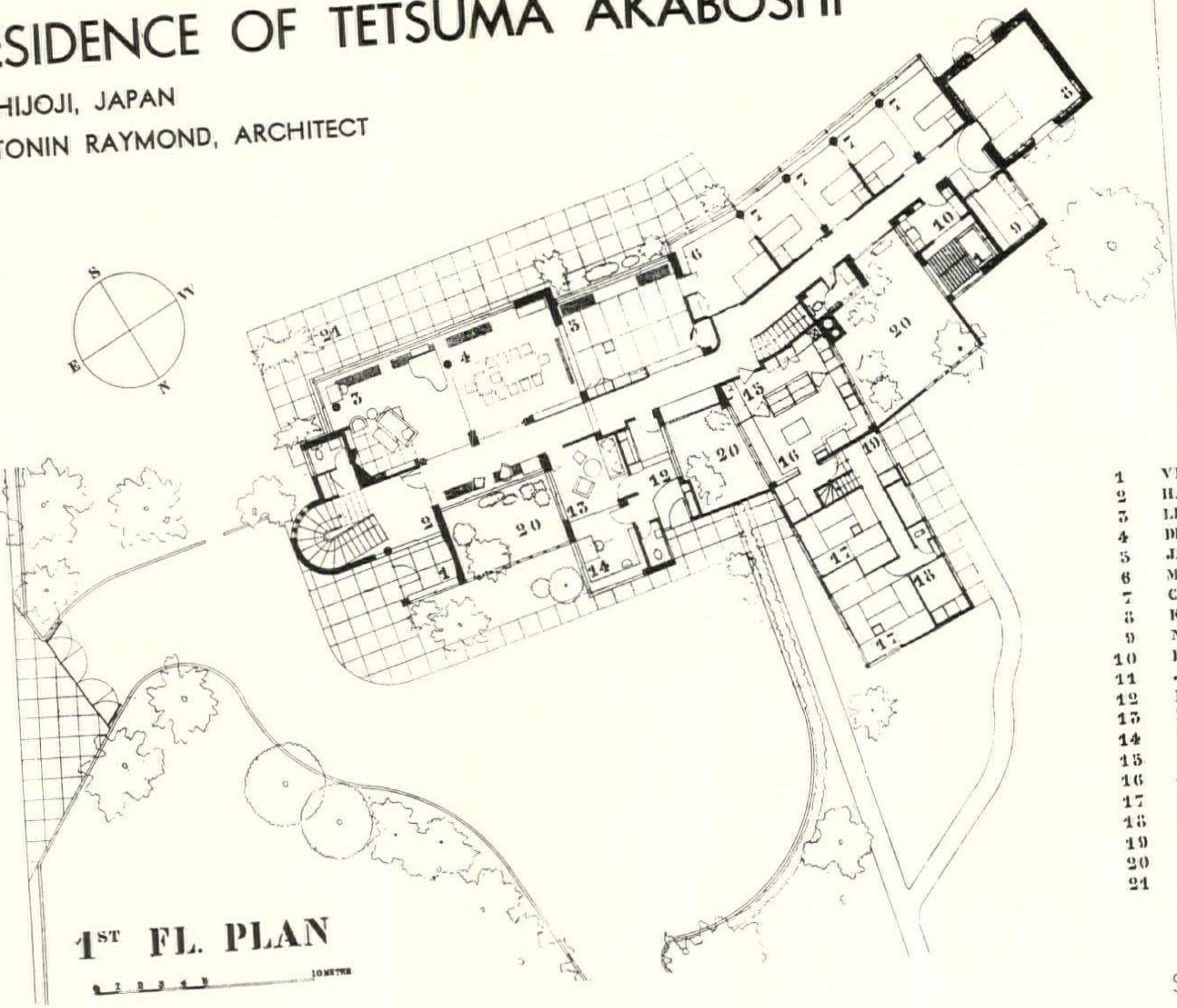
PORTFOLIO OF CONCRETE BUILDINGS



RESIDENCE OF TETSUMA AKABOSHI

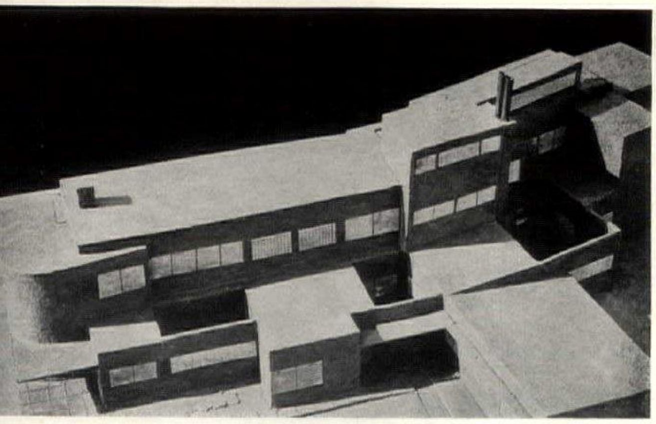
KICHIJOJI, JAPAN

ANTONIN RAYMOND, ARCHITECT

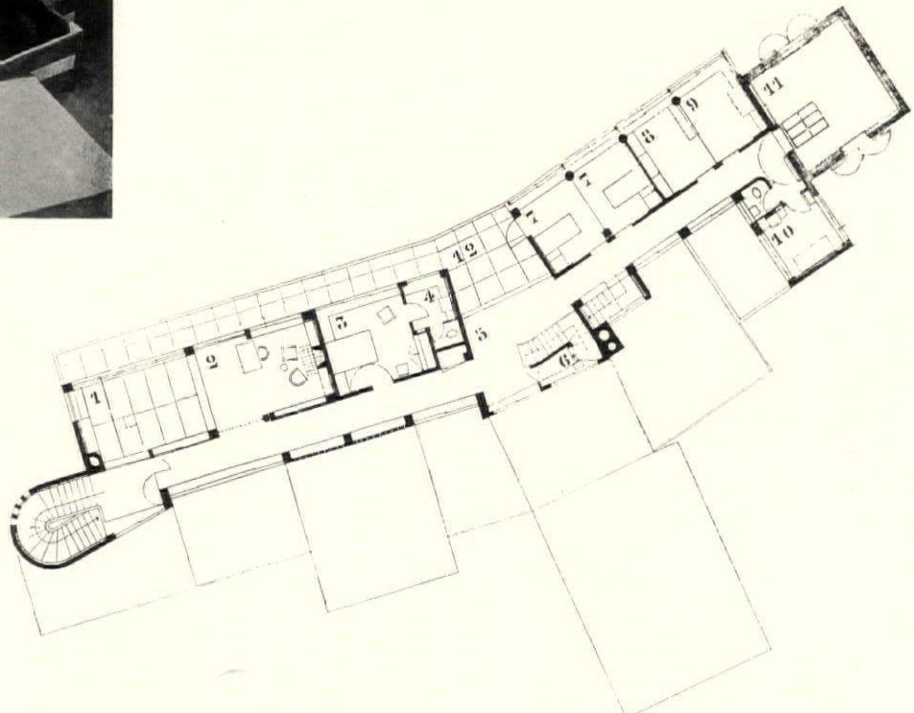


1 VESTIBULE
2 HALL
3 LIVING RM.
4 DINING RM.
5 JAPANESE RM.
6 MADAM'S BED RM.
7 CHILDREN'S RM.
8 KURA
9 NANDO
10 DRESSING
11 JAPANESE BATH RM.
12 FAMILY ENT.
13 RECEPTION
14 INTENDANTS
15 PANTRY
16 KITCHEN
17 SERVANT'S RM.
18 LAUNDRY
19 SERVICE ENT
20 PATIO
21 TERRACE

South Façade



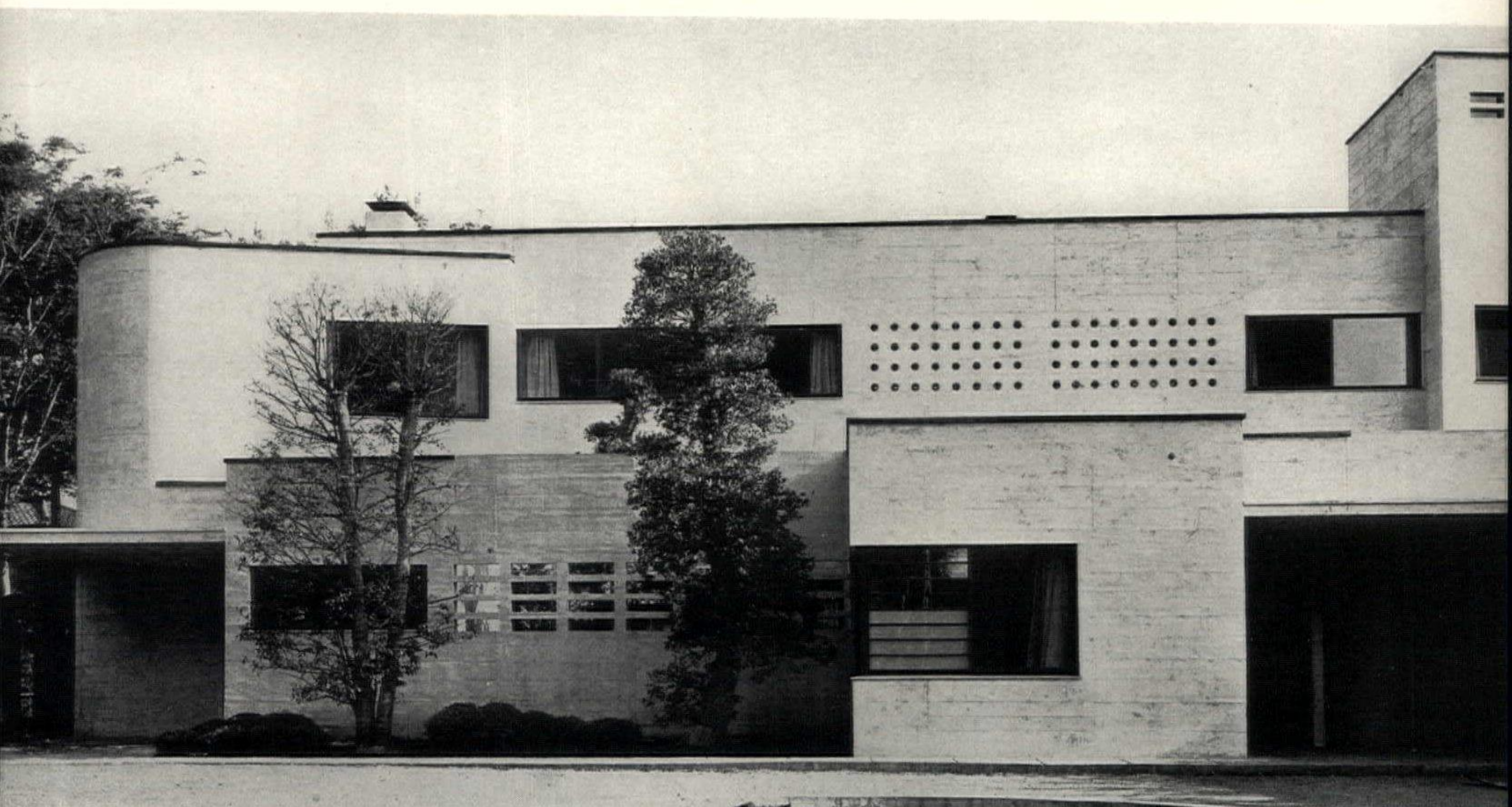
This model shows how the interior gardens provide natural ventilation. High walls give protection against intruders and permit rooms to open into the gardens on hot summer nights.

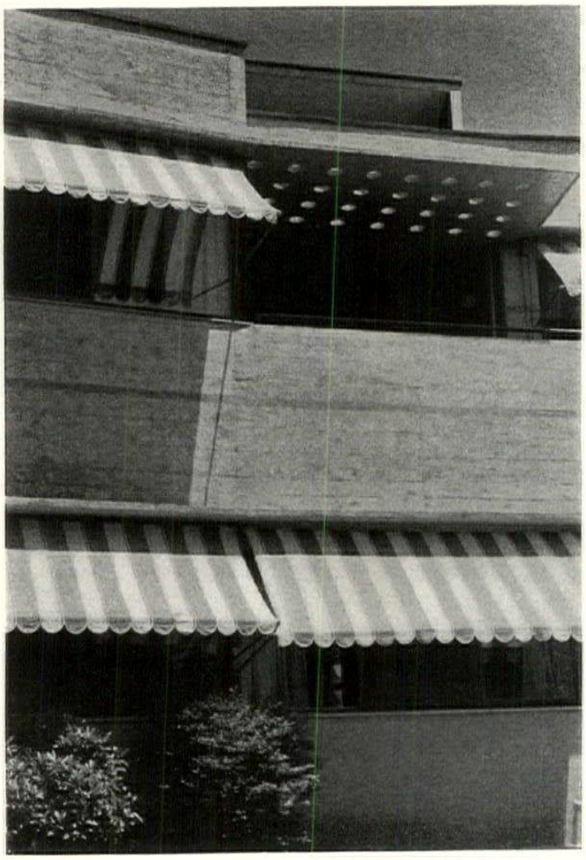


1 JAPANESE RM
2 STUDY
3 MASTER'S BED RM
4 DRESSING RM
5 HALL
6 PANTRY
7 CHILDREN'S RM
8 NANDO
9 SHRINE
10 BATH RM
11 KURA
12 BALCONY

SECOND FLOOR PLAN

North Façade

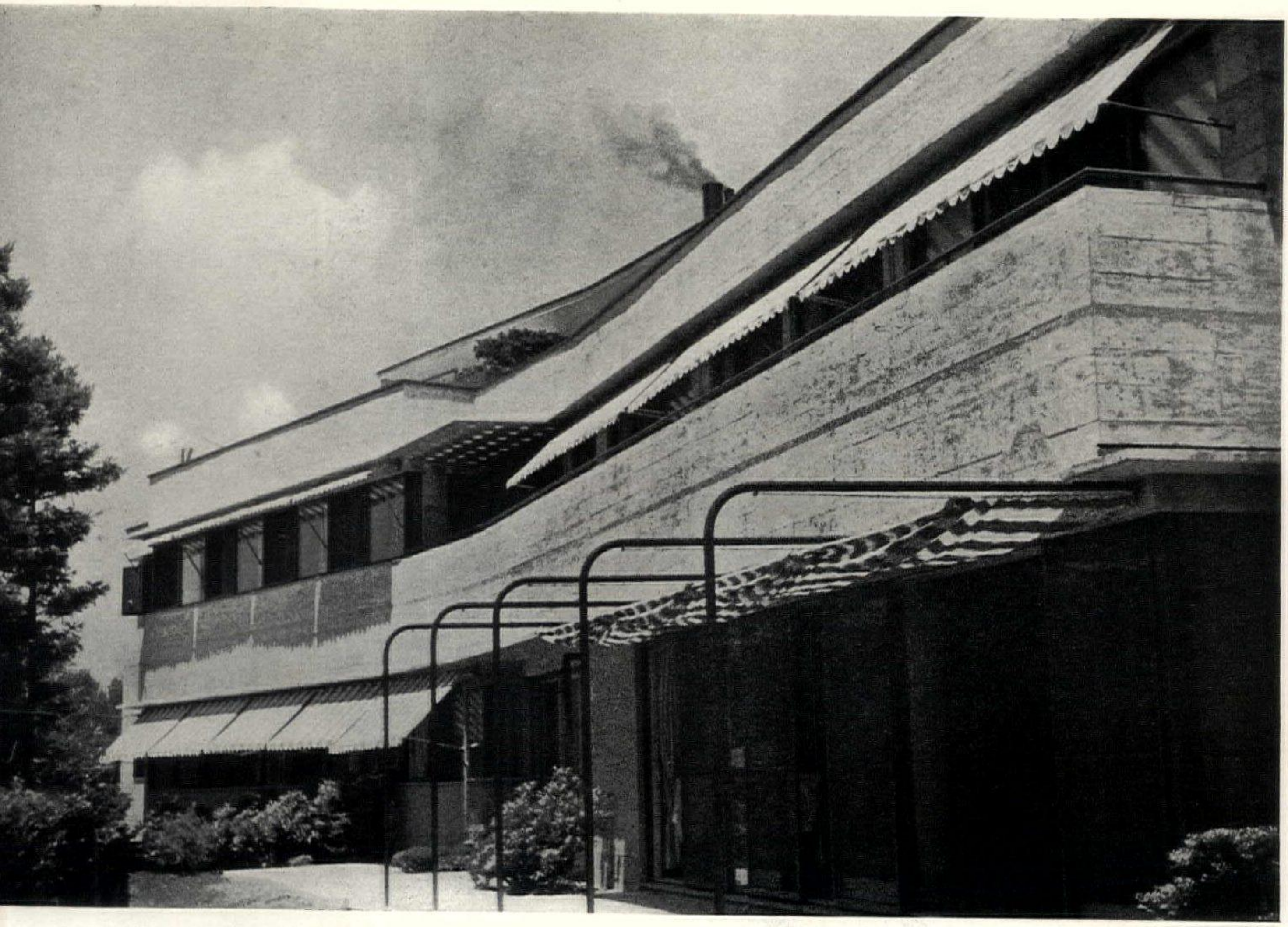




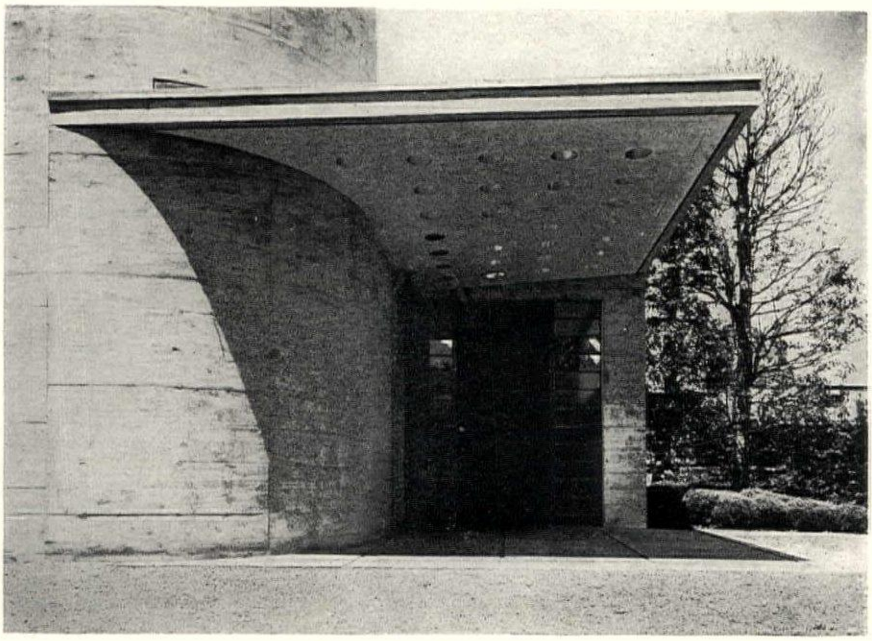
RESIDENCE OF TETSUMA AKABOSHI

ANTONIN RAYMOND, ARCHITECT

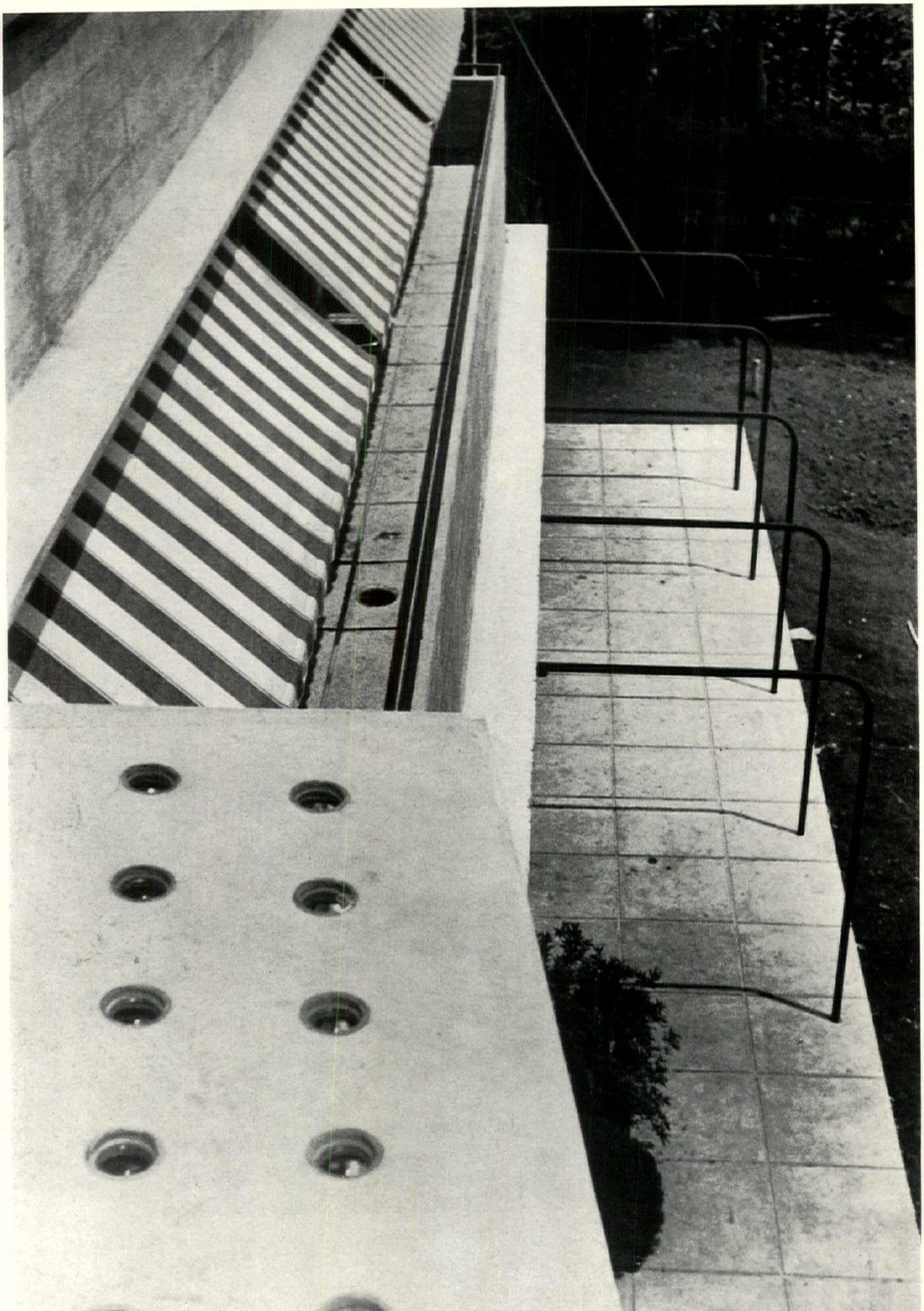
Bright awnings and copper copings add to the colorfulness of this house. The concrete façades are a warm gray, with the overhangs painted on undersurfaces—yellow on the first story and light blue on the second. Walls behind shrubbery are a light green and the window sash red.



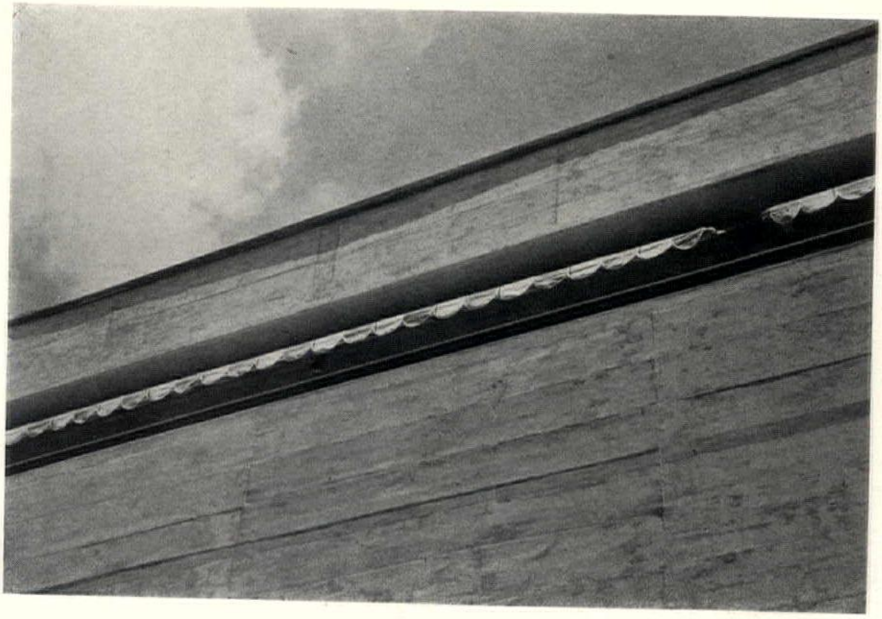
A detail view showing the sliding glass walls of the living room and the exterior frame on which the awnings can be drawn to provide shade.

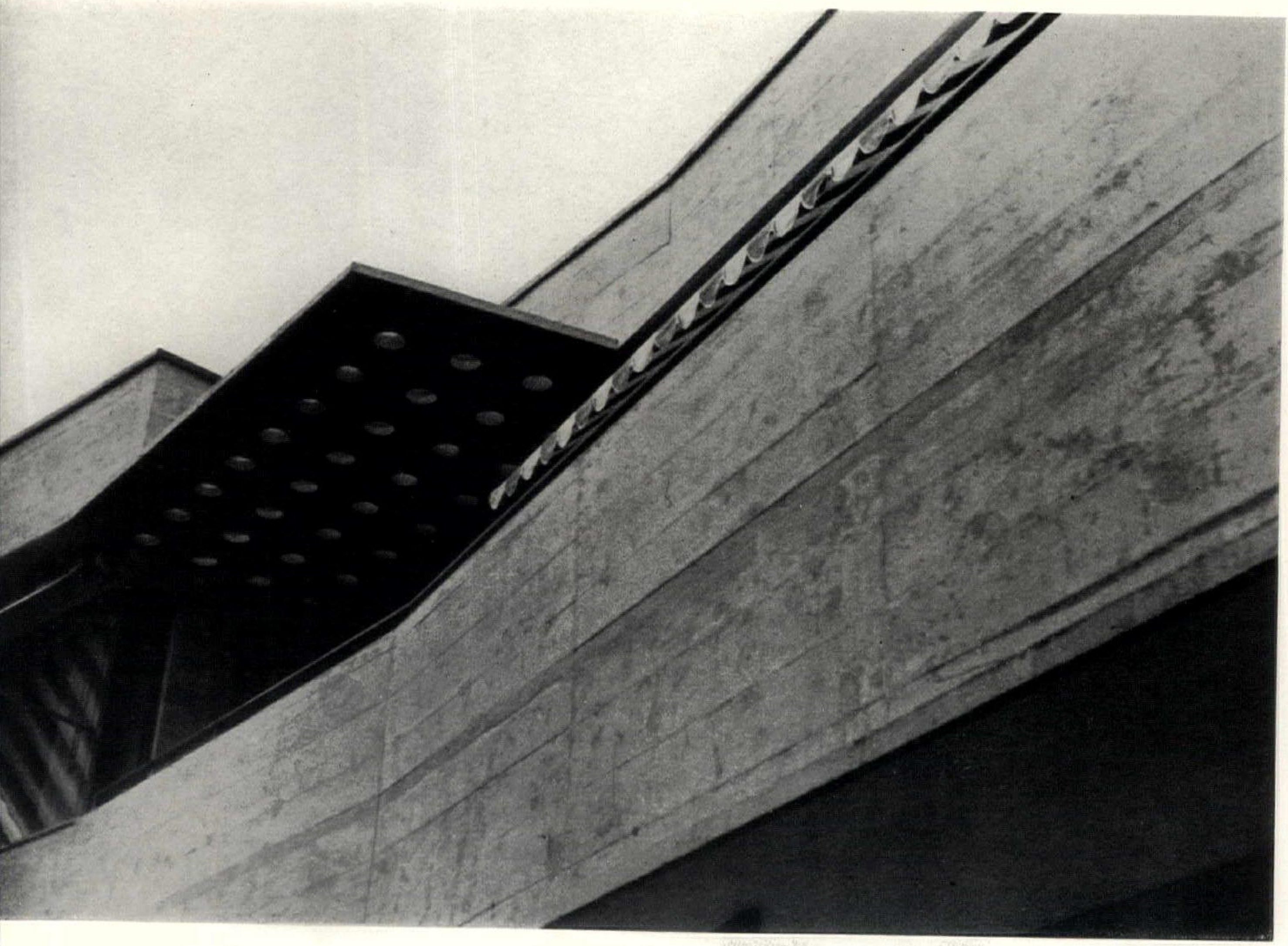


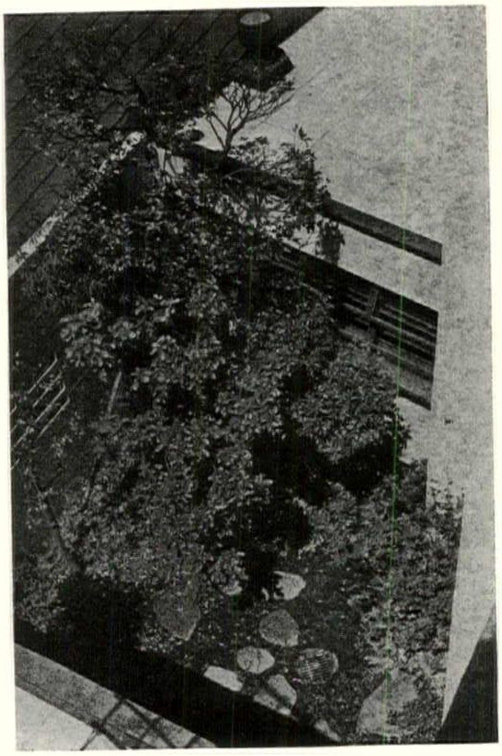
This concrete porte-cochère at the main entrance is cantilevered from two sides, meeting diagonally and resulting in a light construction. The under side is painted a light yellow.



On opposite page: View looking down from roof garden. . . . **On this page:** Detail photographs showing the concrete texture. Glass is used in the overhangs to emphasize lightness.

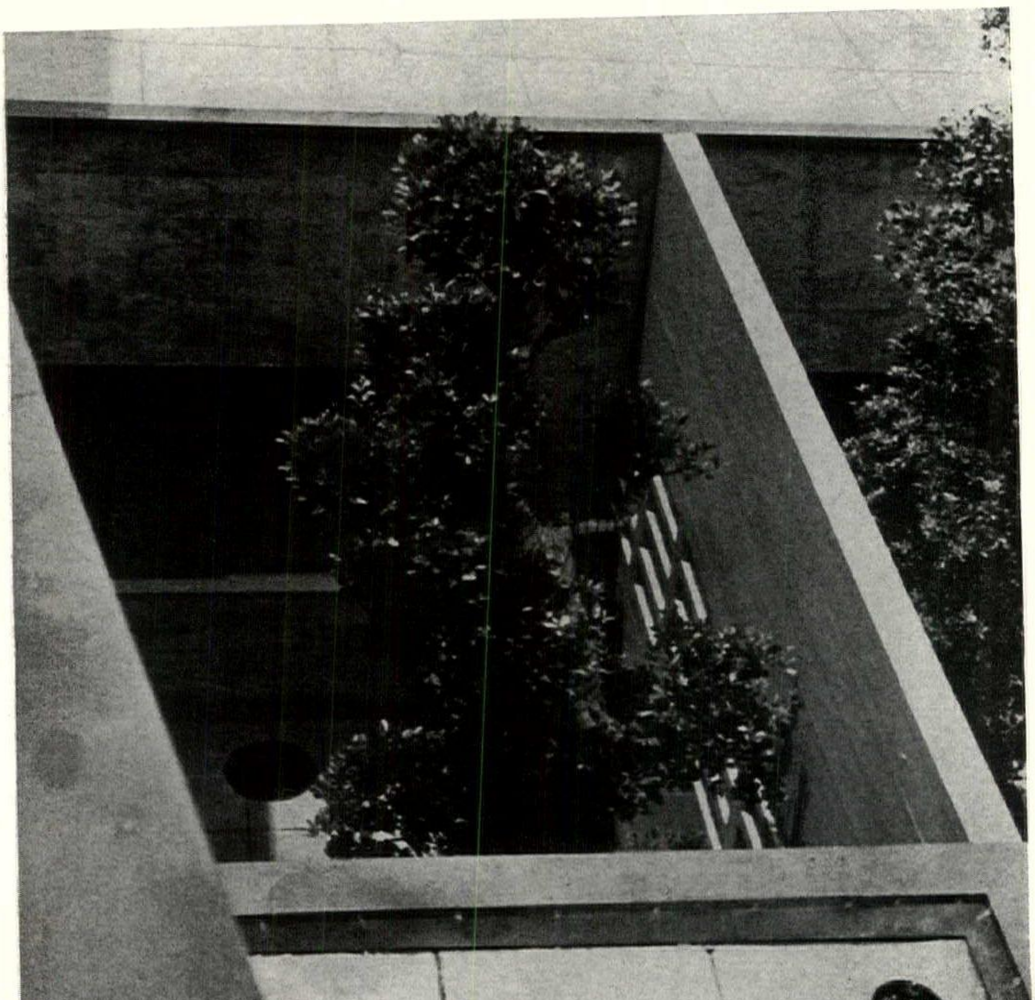




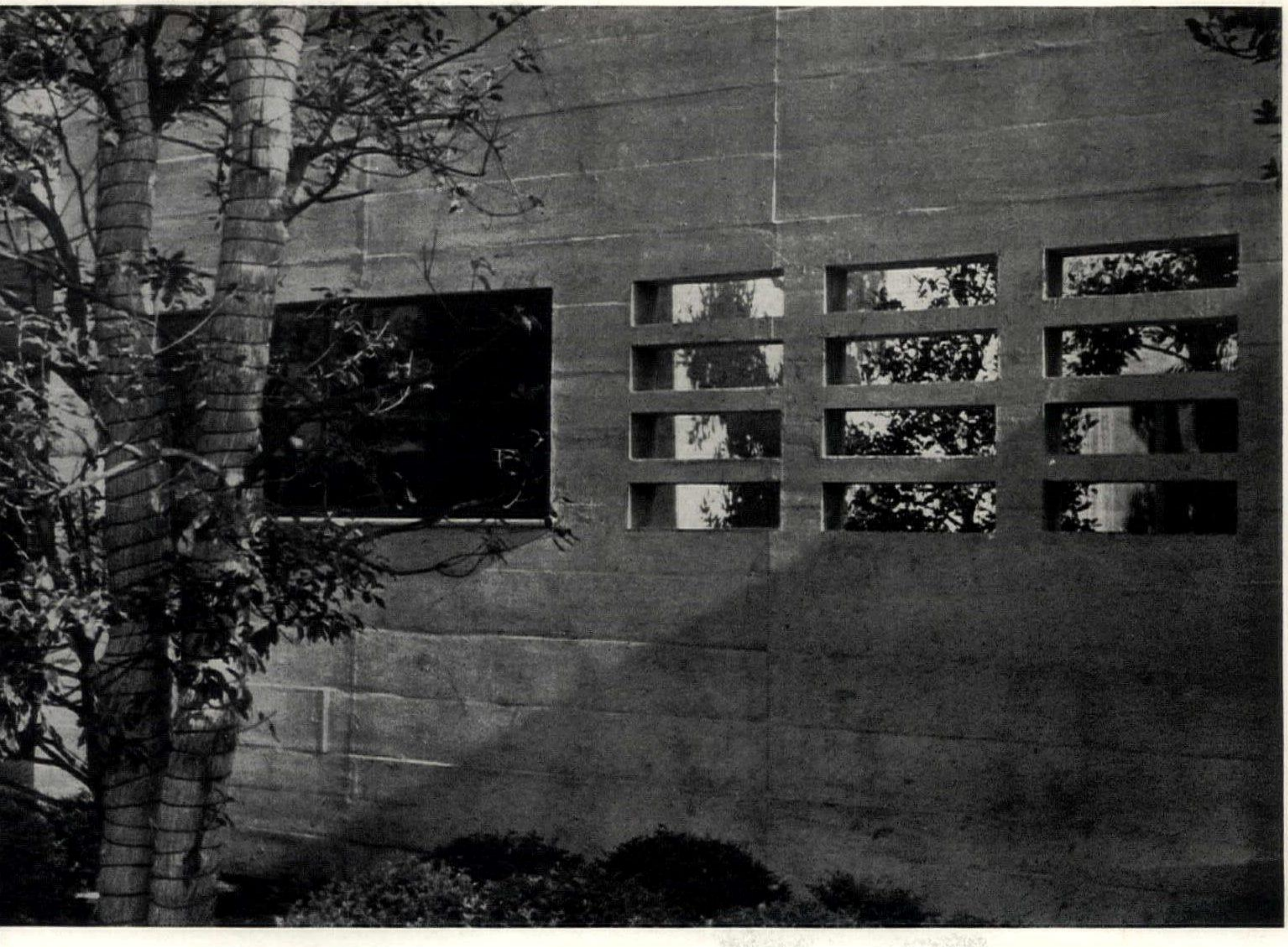


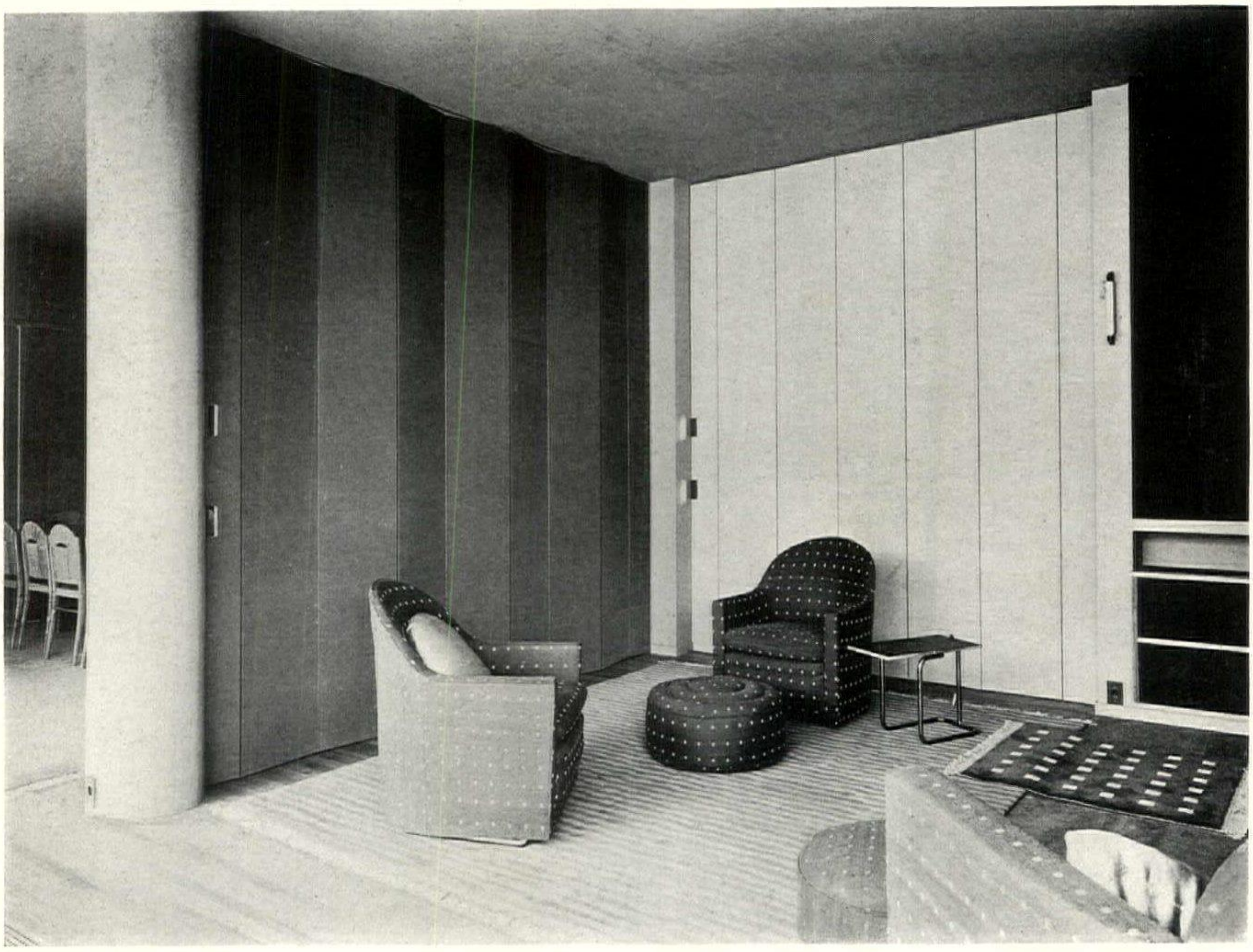
RESIDENCE OF TETSUMA AKABOSHI

ANTONIN RAYMOND, ARCHITECT

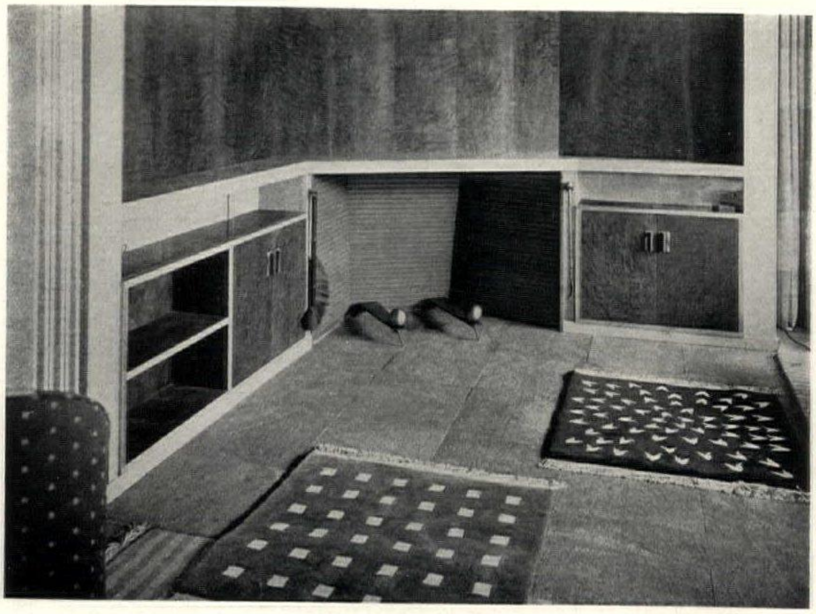


The walls of the interior gardens are tinted with oil paint as a background for the carefully composed planting. The natural earth is partly covered with moss and stepping stones or split stone paving.





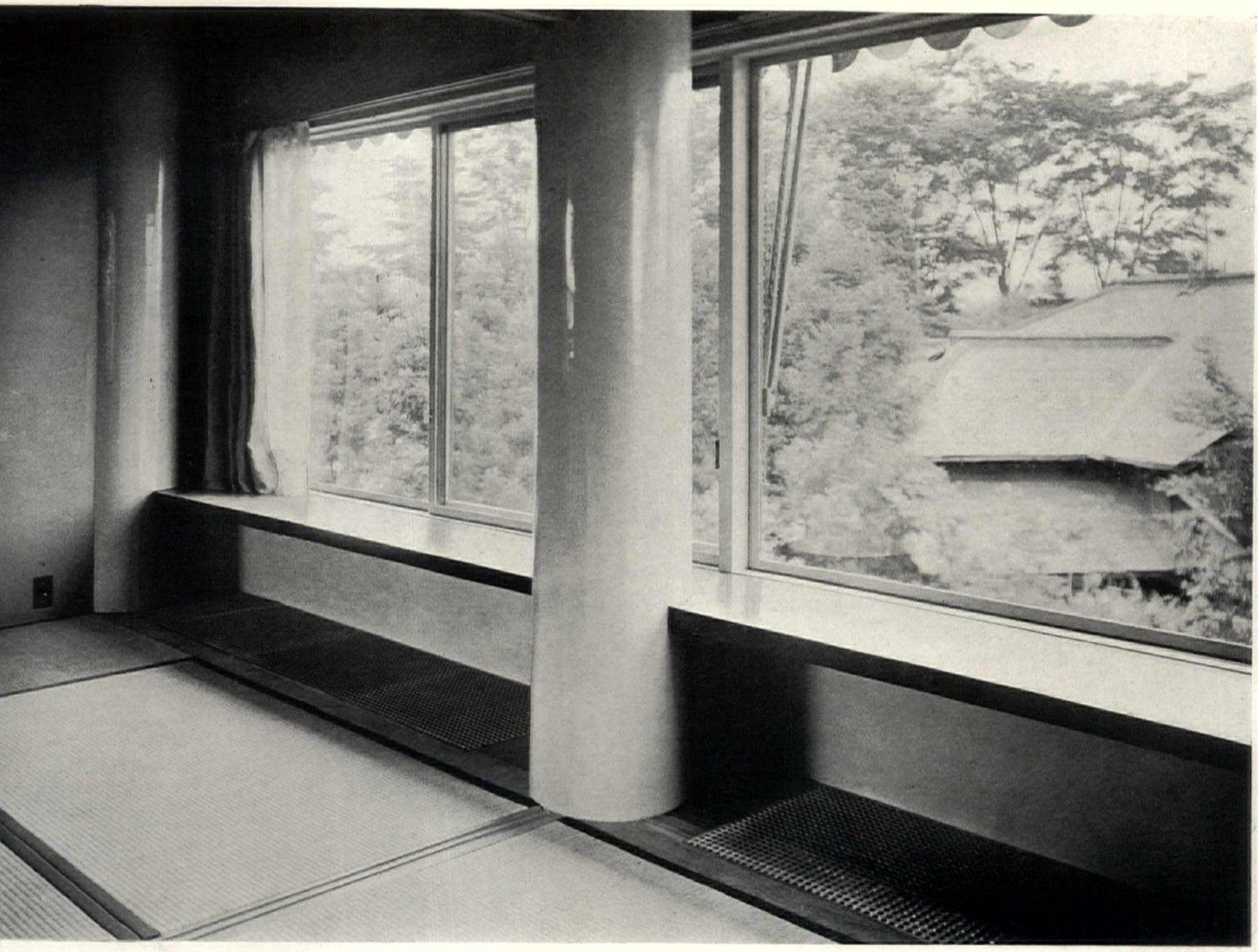
On opposite page: Folding partitions, shown open and closed, separate or make into one general space the hall and the living and dining rooms, as desired. The partitions are made of light wood frames covered with cloth of two colors; they are arranged with piano hinges and ball-bearing hangers. **On this page:** The living room fireplace has a concrete shelf, lacquered on top, a cast-iron hearth back and split stone paving. Panels are redwood veneer, and the walls plaster, finished with a flat oil paint. The concrete columns are lacquered.



RESIDENCE OF TETSUMA AKABOSHI

KICHIJOJI, JAPAN   ANTONIN RAYMOND, ARCHITEC

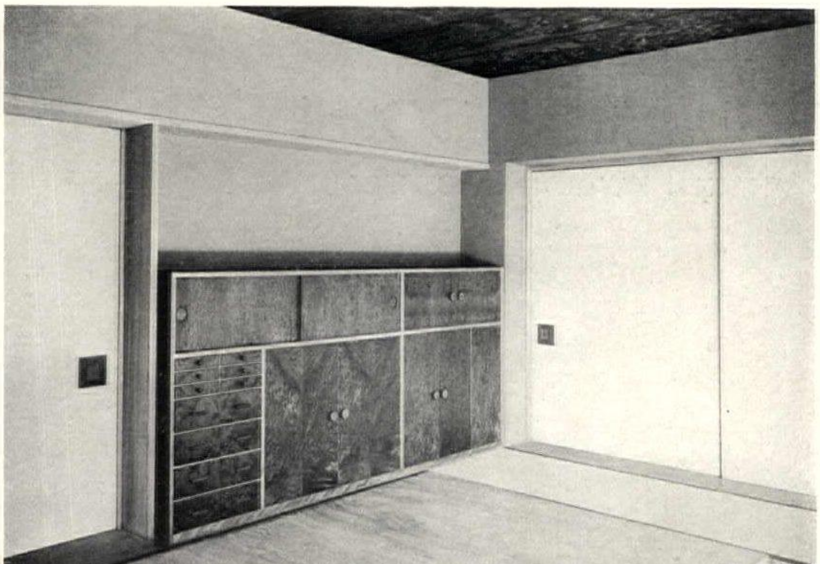
opposite page: Movable partitions of coarse linen also separate the children's
oms. . . . **On this page:** By an ingenious arrangement of rooms and mirrors, a view
the entire length of the house is had from the centrally-located Madam's room.

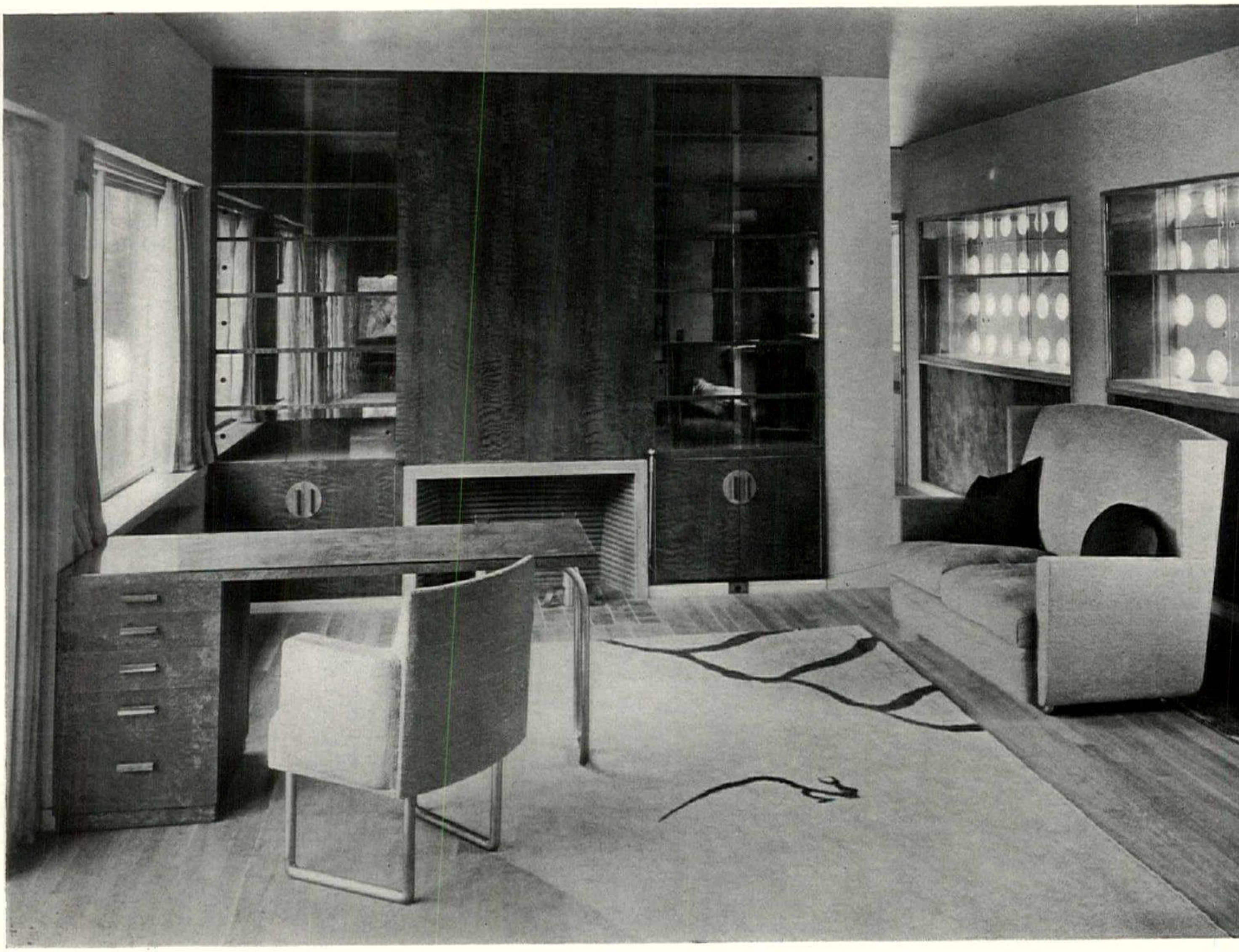


ESIDENCE OF TETSUMA AKABOSHI

ANTONIN RAYMOND, ARCHITECT

On opposite page: The concrete stairs have risers of artificial stone, rubber nosings and treads, and steel railings. . . . **On this page:** Above, a view of a second floor room shows how heating is supplied through chrome steel grilles set in the hardwood floor. To the right, the Japanese dining room, with redwood veneer ceiling and built-in sideboard, painted muslin walls, sliding doors of coarse linen, and straw floor mats with linen borders.

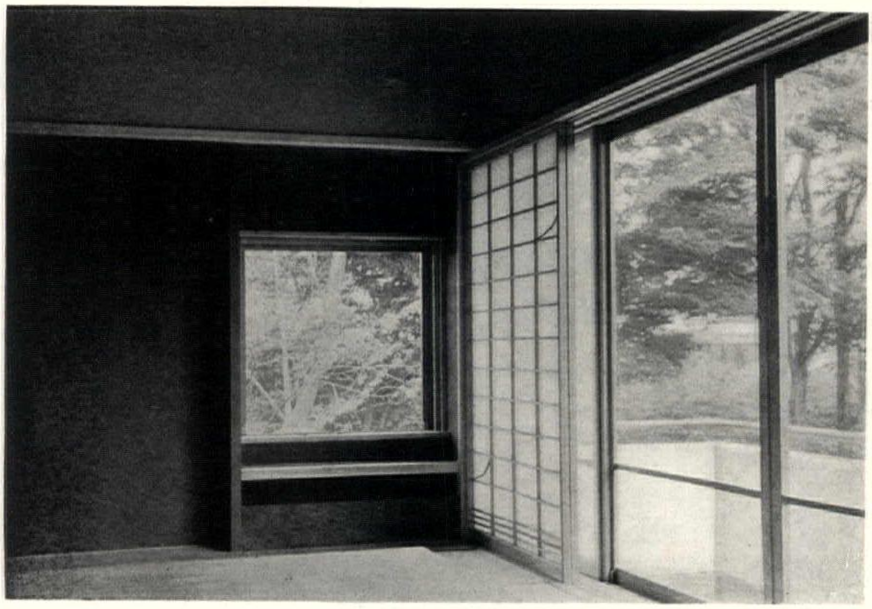


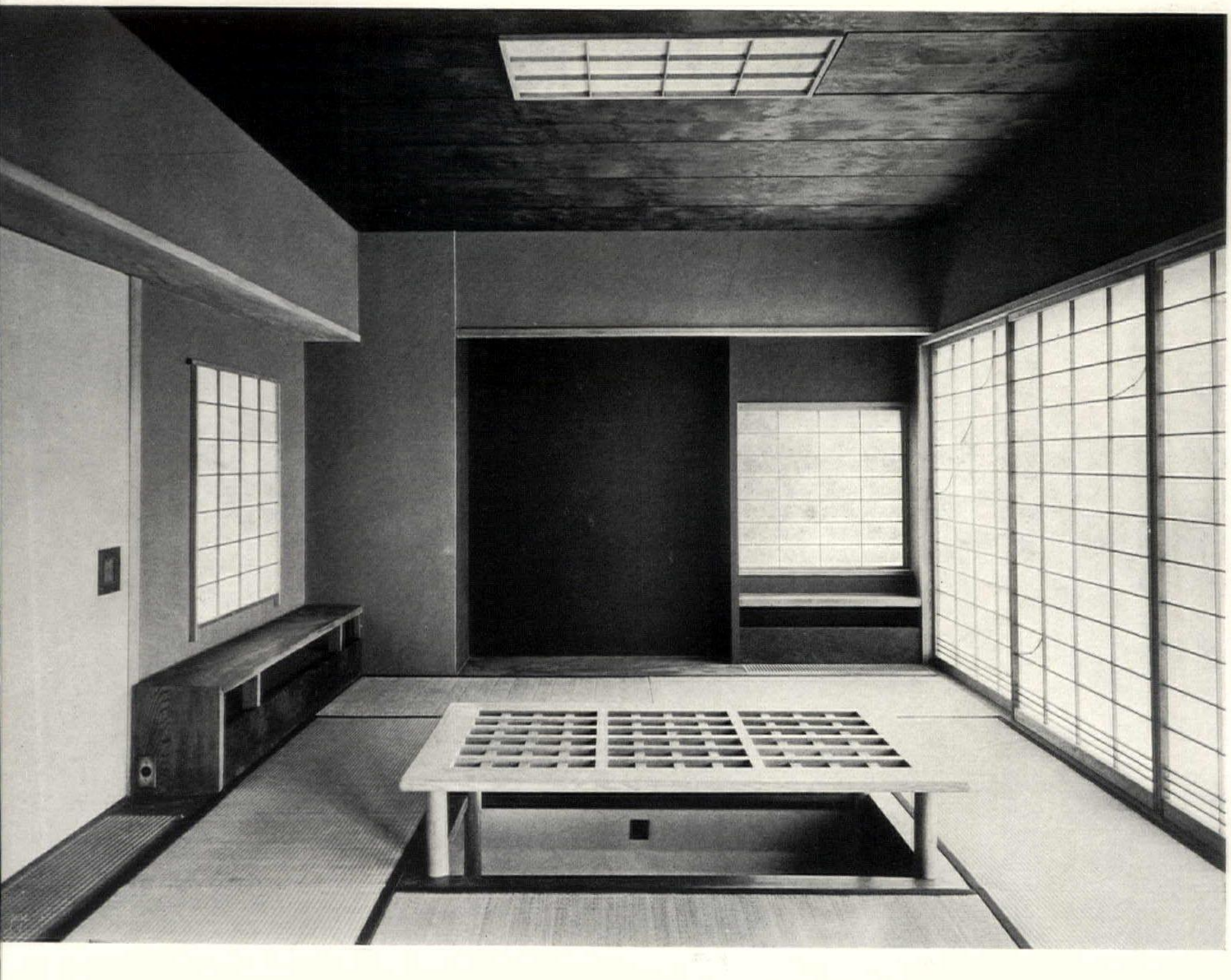


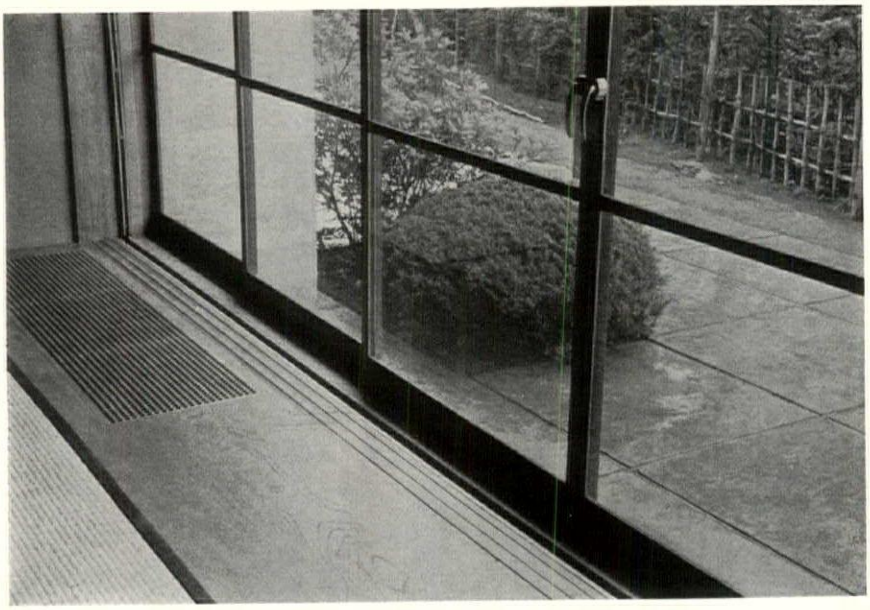
RESIDENCE OF TETSUMA AKABOSHI

ANTONIN RAYMOND, ARCHITECT

On this page: The study. In the corridor at the right are glass cases, illuminated by small openings of molded glass, where rare fish—a hobby—are displayed. . . . **On the opposite page:** A Japanese room, also on the second floor.

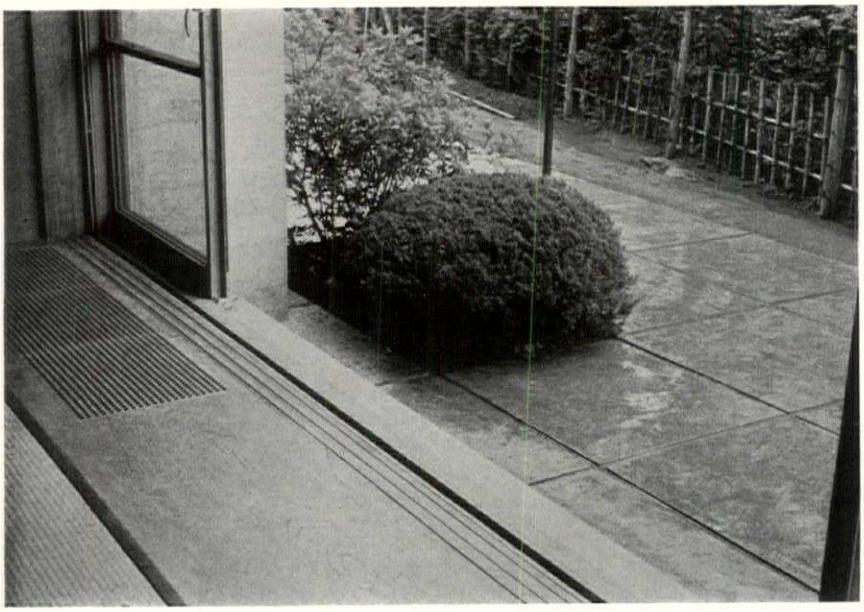


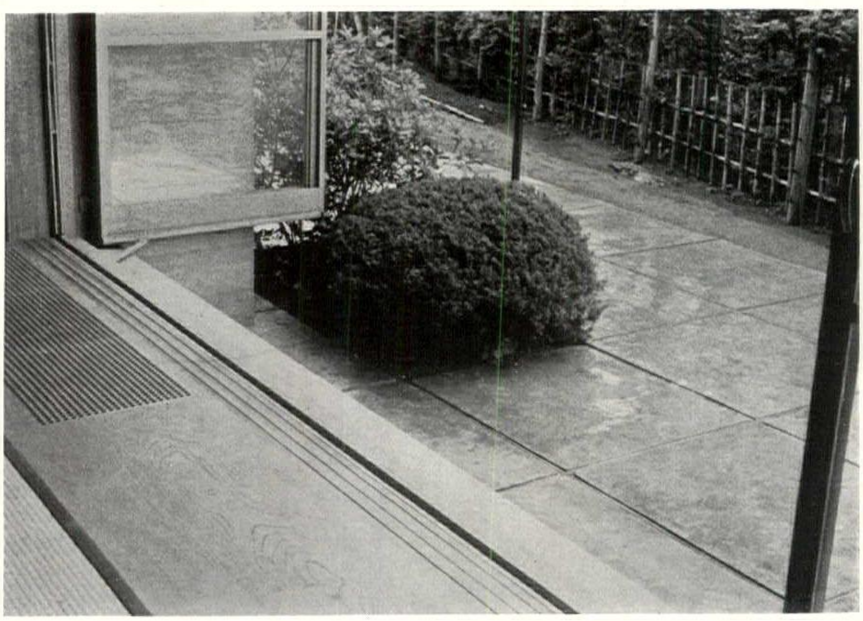




RESIDENCE OF TETSUMA AKABOSHI

ANTONIN RAYMOND, ARCHITECT

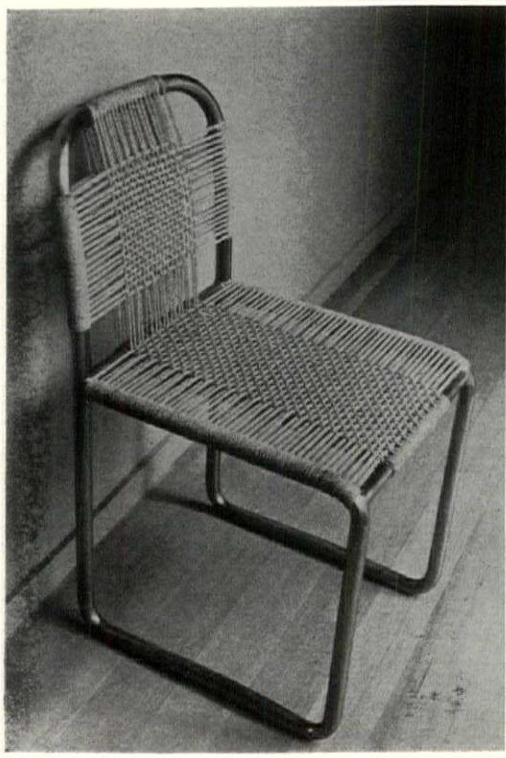
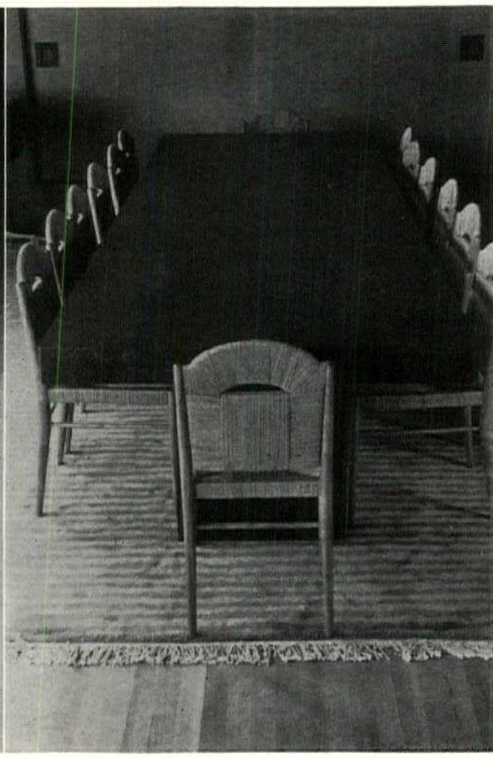




The south wall of the Japanese dining room consists of sliding steel sash which fold and turn at the sides like casements, giving an entirely unobstructed opening. For details of a somewhat similar window construction, see page 53.

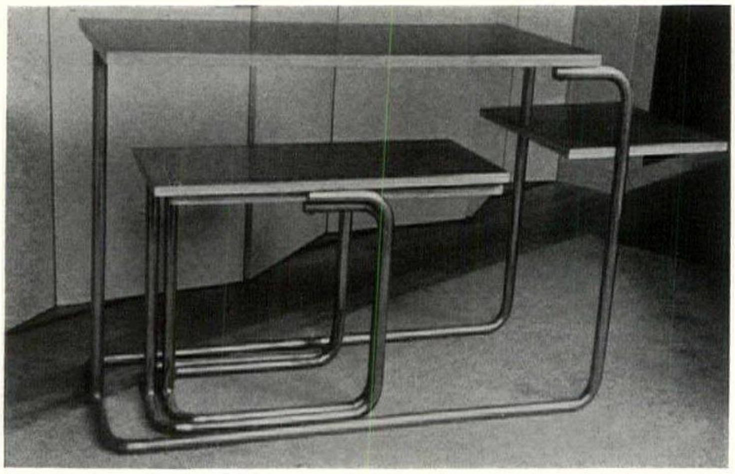
This bathroom ceiling is natural wood so arranged that condensation drips from the middle boards to the tops of the adjoining boards and thence to copper gutters along the wall.

he kitchen is ventilated with window sash perated by levers. For working drawings f this kitchen, see page 52.


RESIDENCE OF TETSUMA AKABOSHI

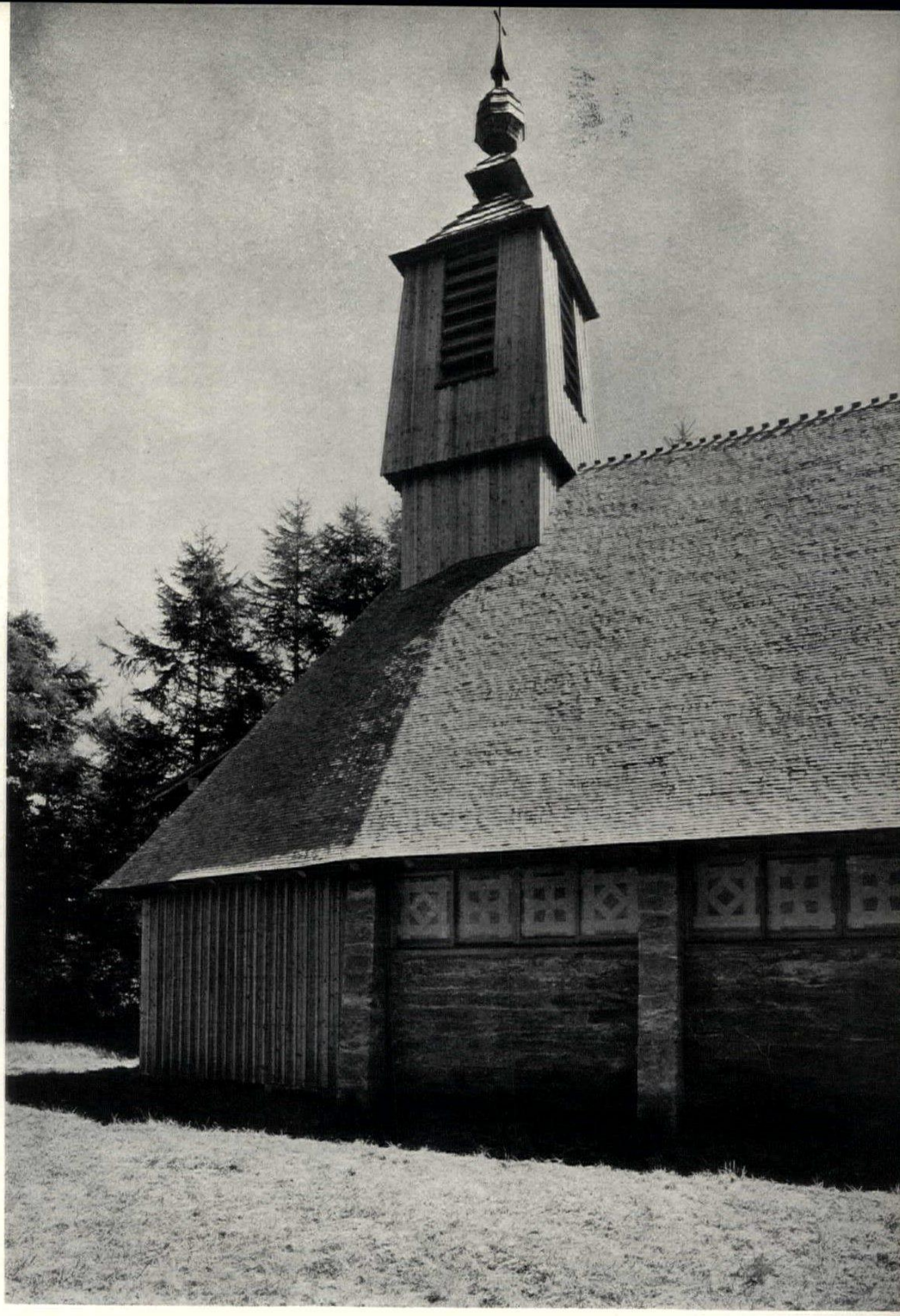
ANTONIN RAYMOND, ARCHITECT



The dining table is redwood. The chairs are made of cherry wood and rope. The color scheme of the Chinese wool rug is taupe and brown.

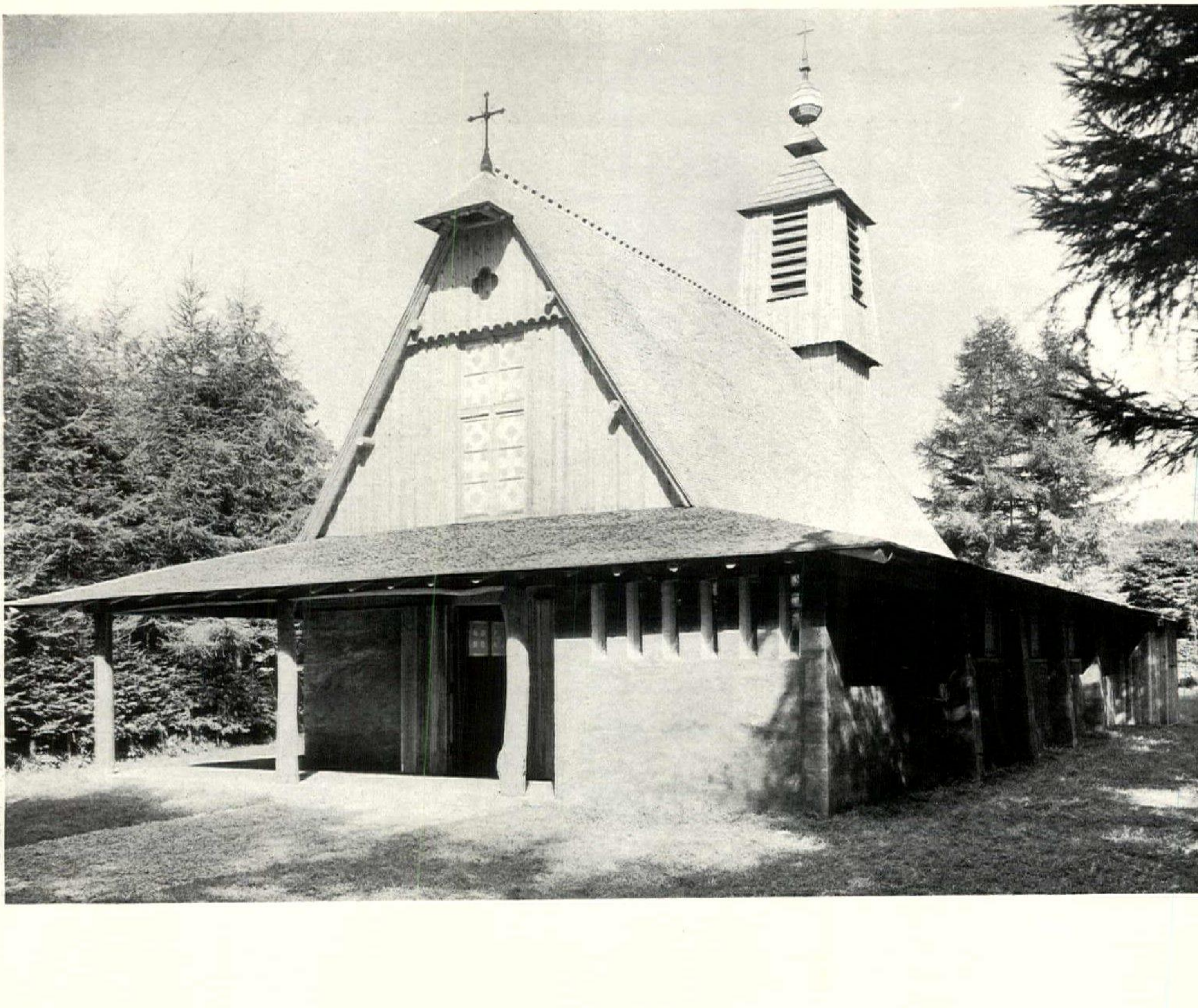
ANTONIN RAYMOND

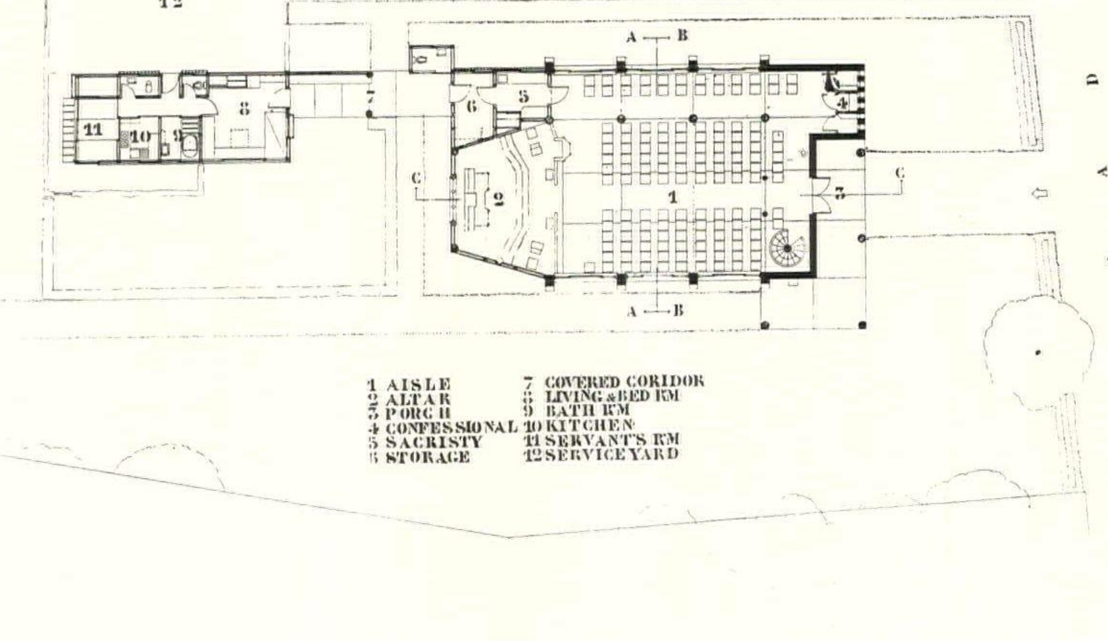
ARCHITECT



CHURCH OF SAINT PAUL

is Roman Catholic chapel was built entirely of materials found the site. Lava aggregate and sand made of lava were used the concrete walls, cedar and chestnut for the lumber. No ns were used in construction: only verbal instructions were given workmen after the lumber had been cut and available sizes certained. (Measured drawings shown on following pages were de afterwards.)

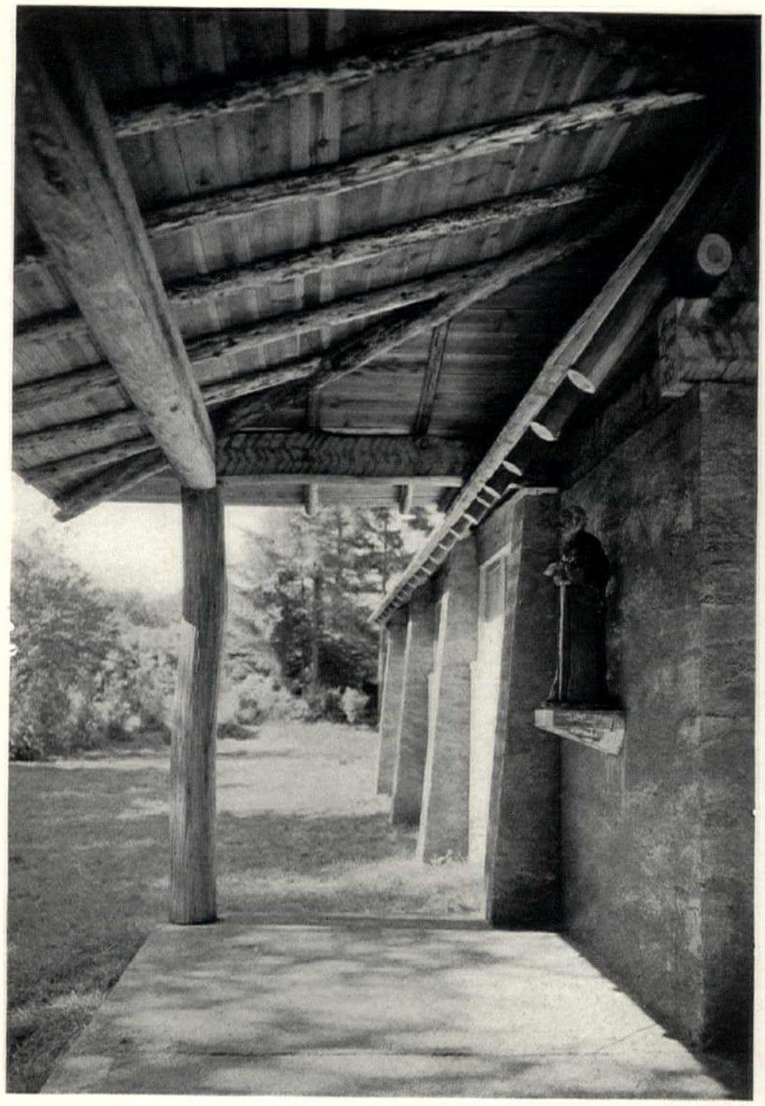




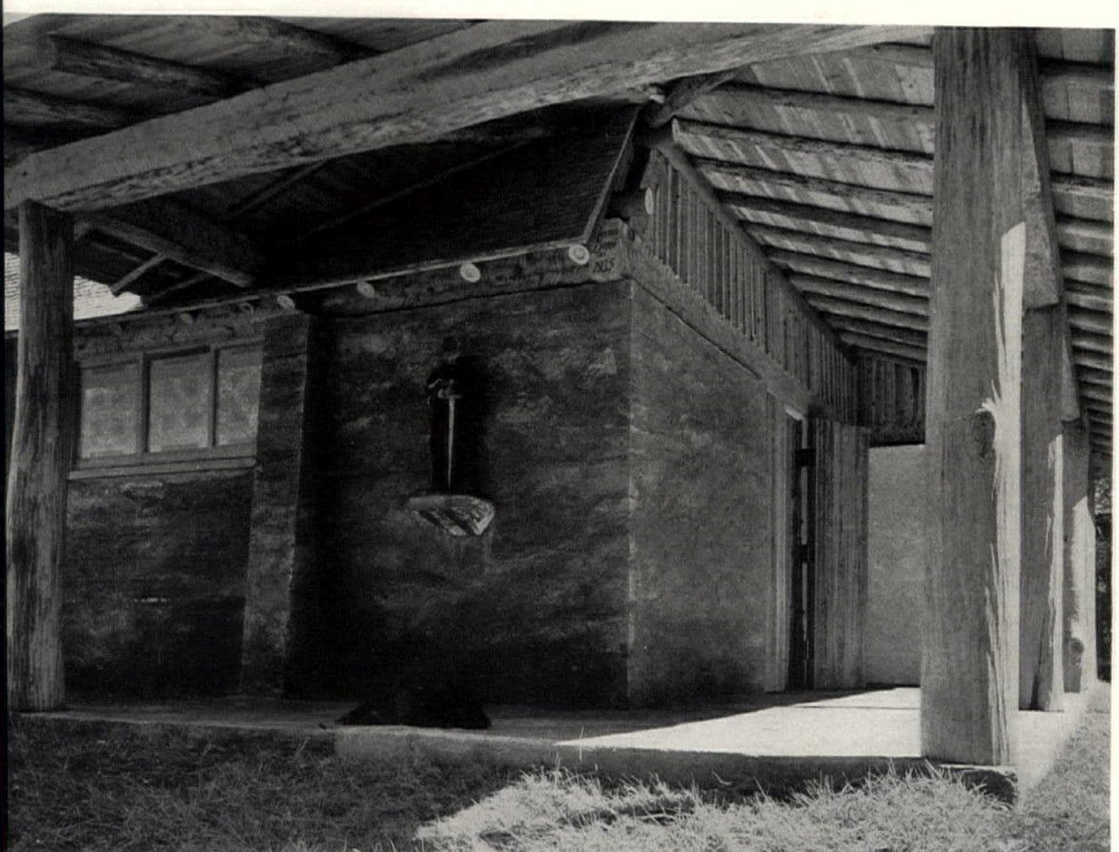
12
A — B
1
2
3
4
5
6
7
8
10
11
C
ROAD
1 AISLE
2 ALTAR
3 PORCH
4 CONFESSIONAL
5 SACRISTY
6 STORAGE
7 COVERED CORIDOR
8 LIVING & BED R'M
9 BATH R'M
10 KITCHEN
11 SERVANT'S R'M
12 SERVICE YARD

CHURCH OF SAINT PAUL

KARUIZAWA, JAPAN



The lava concrete walls are left natural in finish, providing their own colorful texture. Upper walls are cedar and the roof is covered with chestnut shingles. The glass in the sliding wood sash has a design pattern obtained with white rice paper pasted in several thicknesses. . . . The wall of the open porch, with the confessional, is finished in one coat of white plaster. The statue of St. Paul is partly painted and partly left in natural concrete.

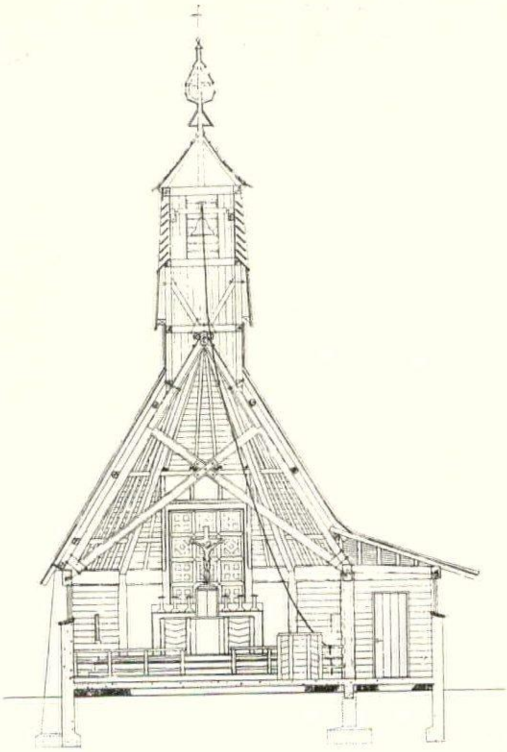


ANTONIN RAYMOND SUPERVISING ARCHITECT

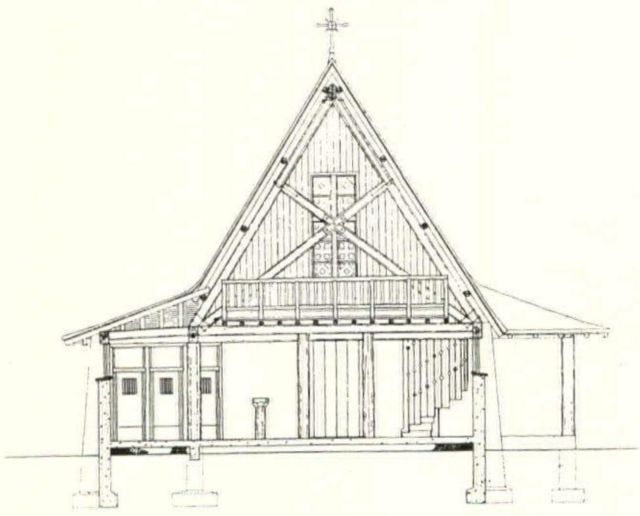
STATUE SCULPTURED BY NOEMI PERNESSIN RAYMOND

CHURCH OF SAINT PAUL

KARUIZAWA, JAPAN



A – A

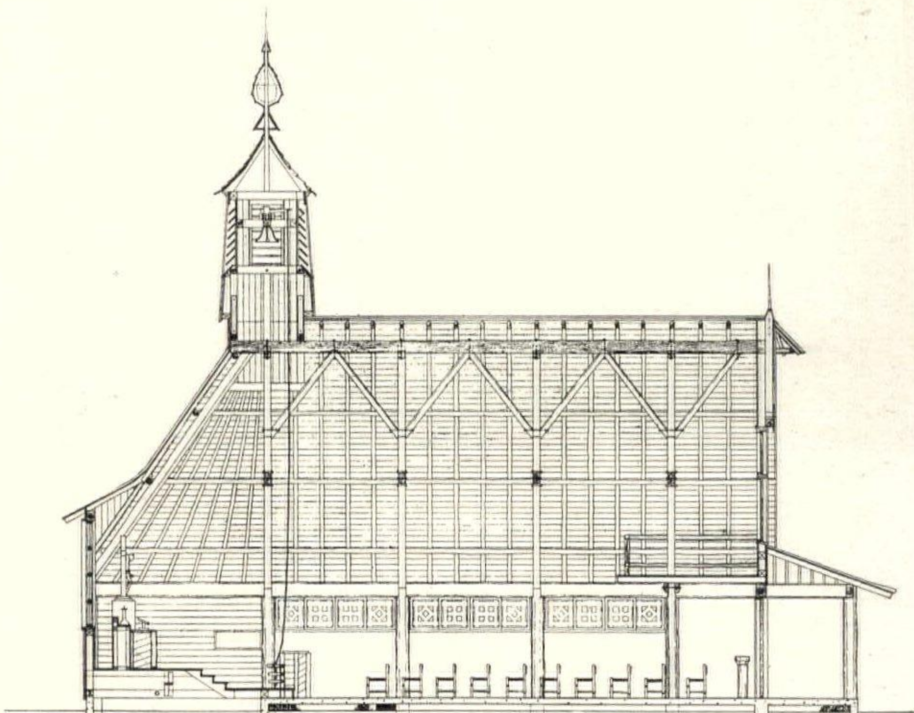


B – B

View toward organ loft.

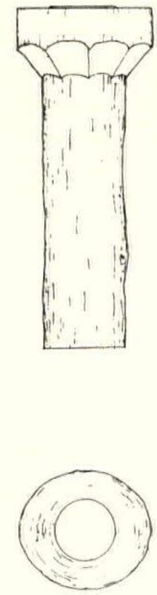
View toward the altar.

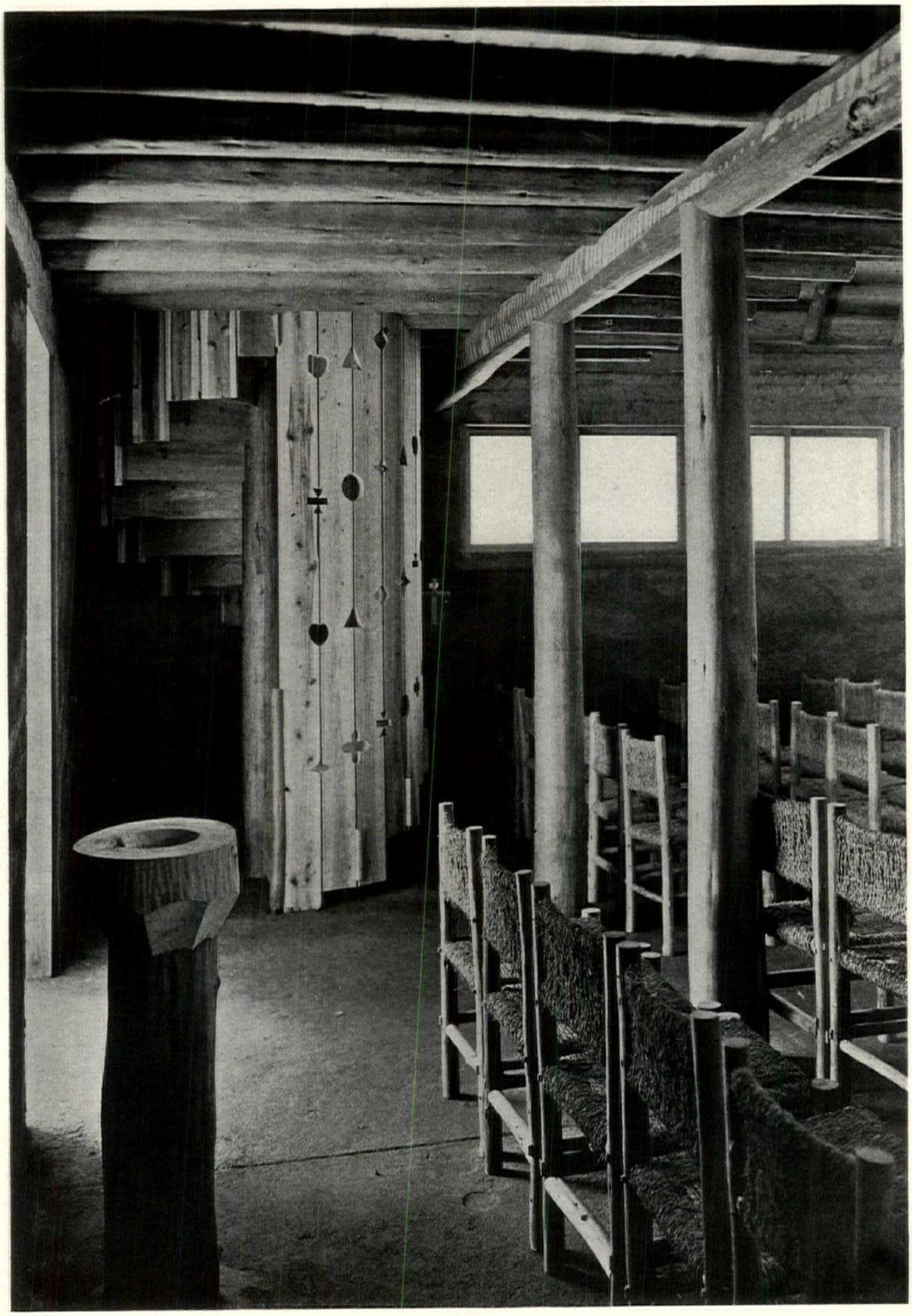
ANTONIN RAYMOND
ARCHITECT



C — C

HOLY WATER FOUNT

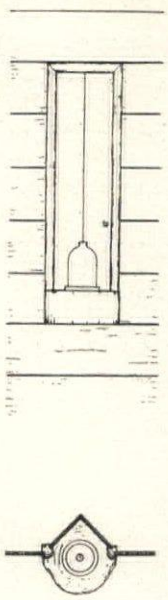




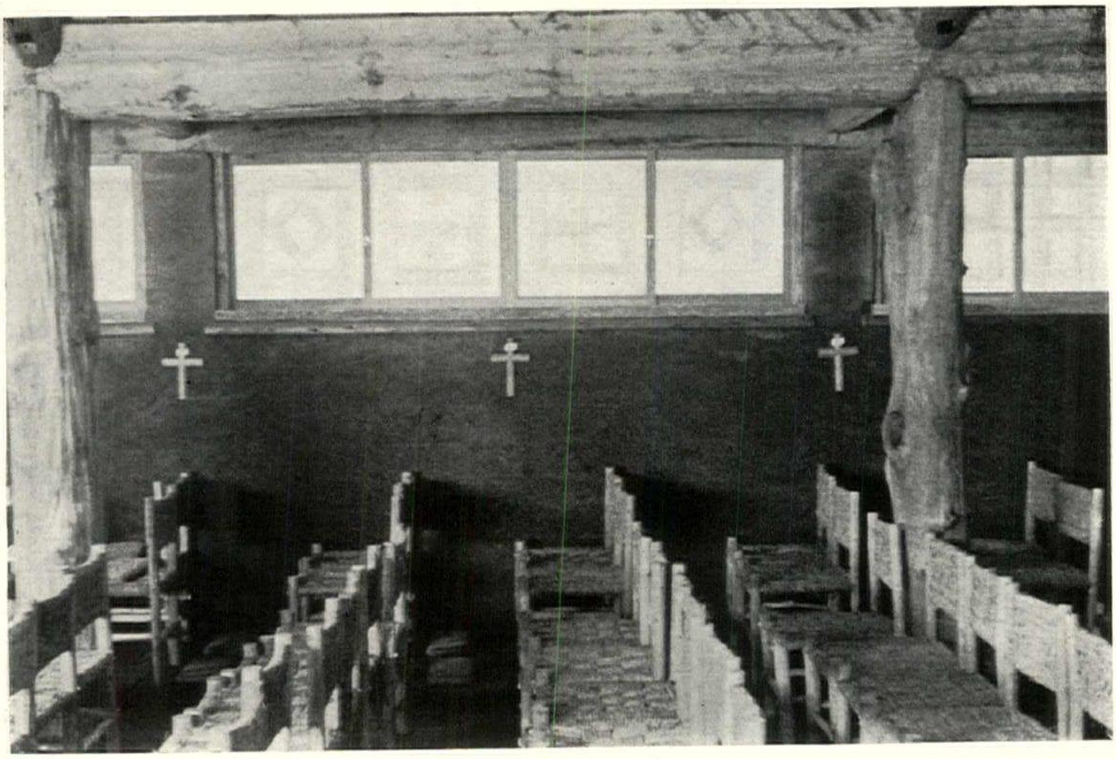
CHURCH OF SAINT PAUL

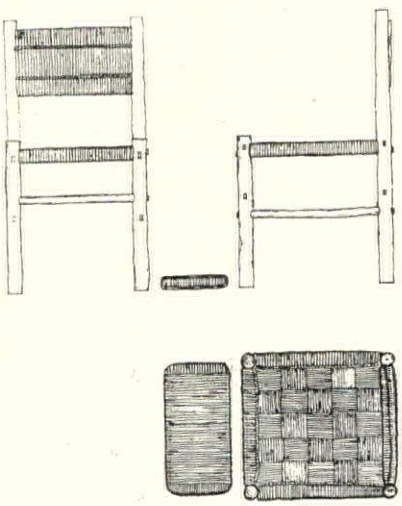
ANTONIN RAYMOND, ARCHITECT

WALL LIGHT NICHE

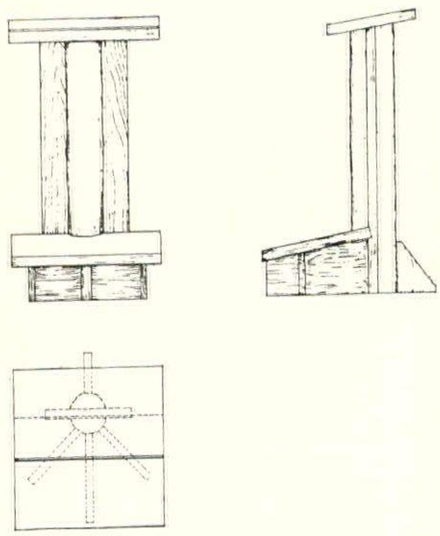


n opposite page: The central post of the circular stairway is a natural trunk of edar, polished by water and sand, with risers grooved into it and suspended from the eiling by means of planks. . . . **On this page:** The altar is natural cedar, with some arts papered. The wooden crucifix is the design of Mrs. Noemi Pernessin Raymond.





HINOKI STICKS, RICE, STRAW



CEDAR

CHURCH OF SAINT PAUL

KARUIZAWA, JAPAN

ANTONIN RAYMOND, ARCHITECT

Photograph by F. S. Lincoln

CONCRETE BOATHOUSE IN CANADA

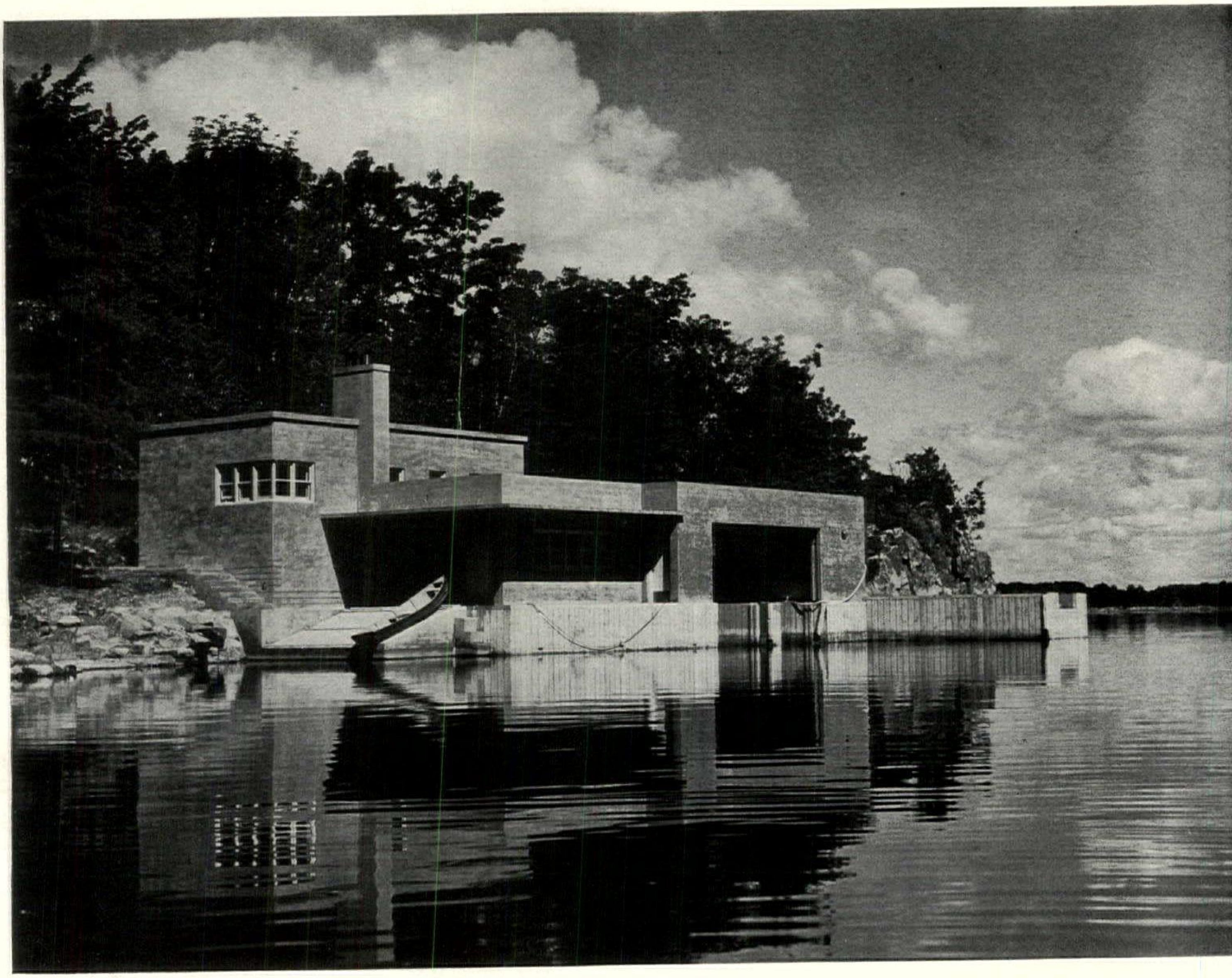
BUILT FOR SHERMAN PRATT

JOHN WALTER WOOD, ARCHITECT

The site of this ferro-concrete structure is a 12-acre thickly wooded, rocky island in the middle of the St. Lawrence River on the northwestern edge of the Thousand Islands, three miles from the Canadian mainland and six miles from the United States. On Niagara Island, owned by Mr. Sherman Pratt, is also situated a concrete house designed and built by Mr. Wood in 1931. Both buildings are intended for all-year usage.

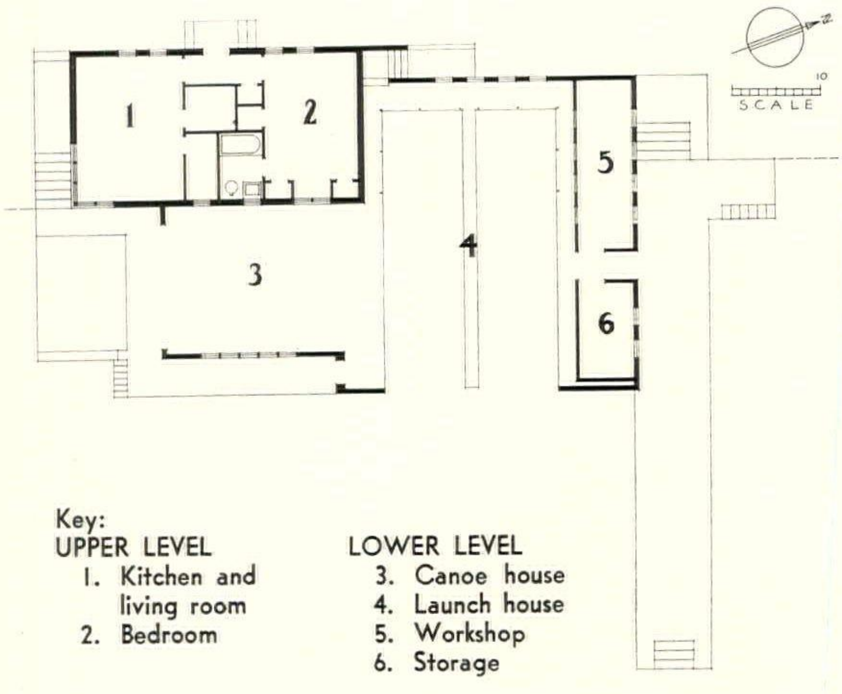
The boathouse has two slips for motor boats, storage for five canoes or rowboats, an inclined slide, a workshop and store room, a boat landing and a 53-foot concrete pier (24 feet cantilevered). The caretaker's quarters are on an upper level and comprise a double bedroom and bath, a combined kitchen and living room, a large store room, and a small pump room.

Contractors: J. L. E. Price & Company, Ltd., of Montreal.



BOATHOUSE OF SHERMAN PRATT

The main house is on a rock bluff 35 feet above the river over which it commands an extensive view. The rocky shore below drops off steeply to depths of water varying between 100 feet and 200 feet. It was therefore necessary to locate the boathouse a few hundred feet to the west on the southern shore in a small natural cove. Some rock excavation was done in order to move the boathouse inshore and thus reduce the depth of the underwater foundations.



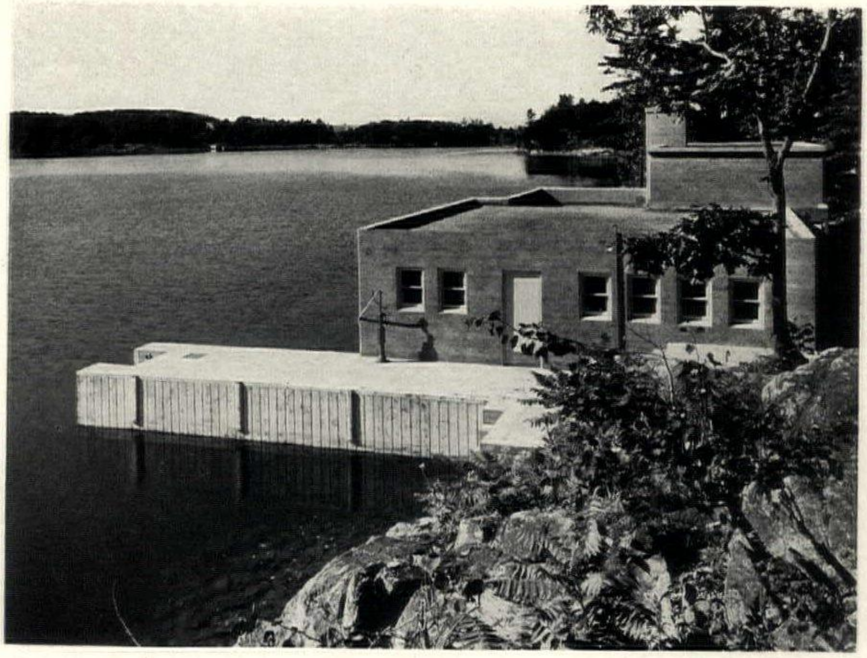
Key:

UPPER LEVEL
1. Kitchen and living room
2. Bedroom

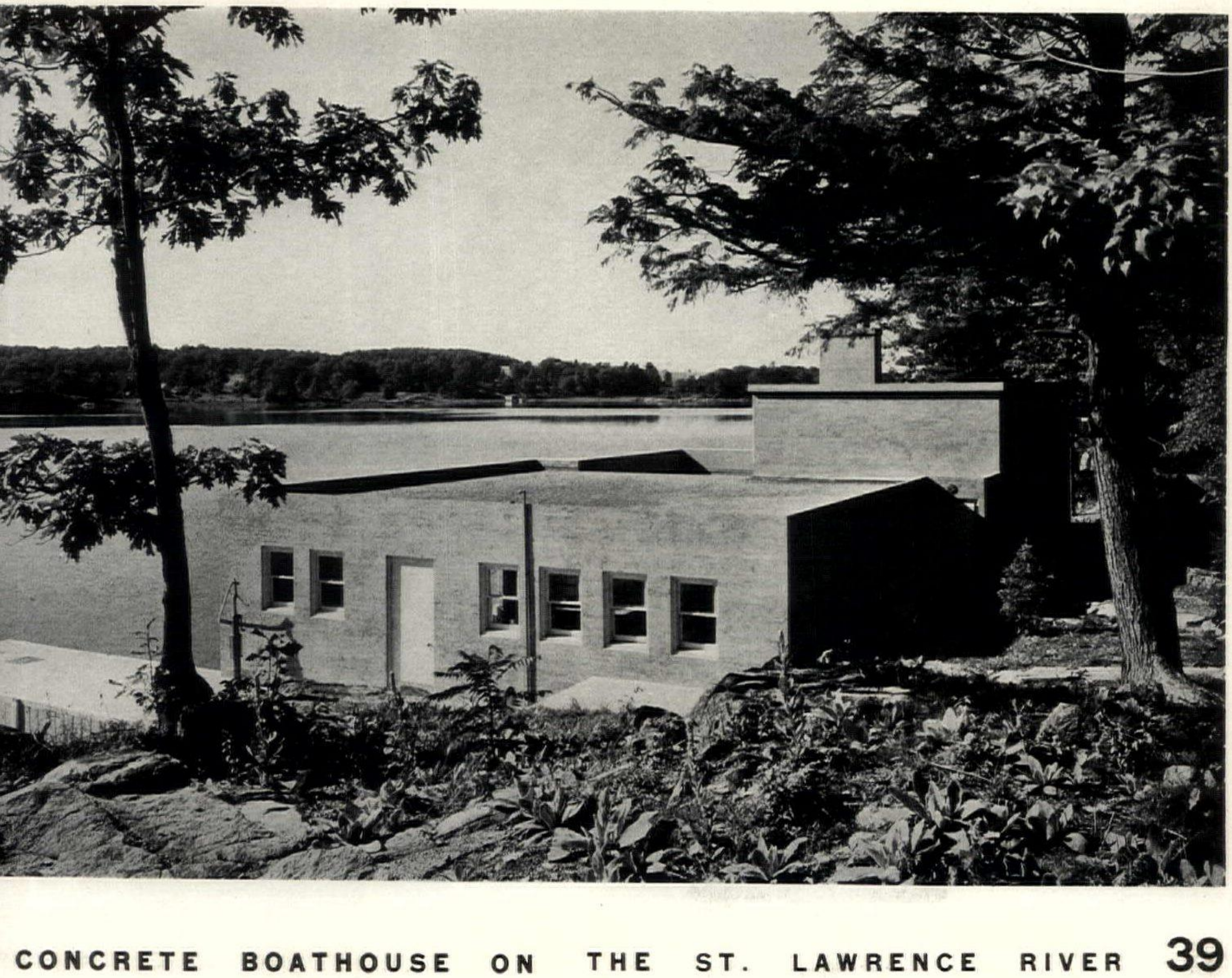
LOWER LEVEL
3. Canoe house
4. Launch house
5. Workshop
6. Storage

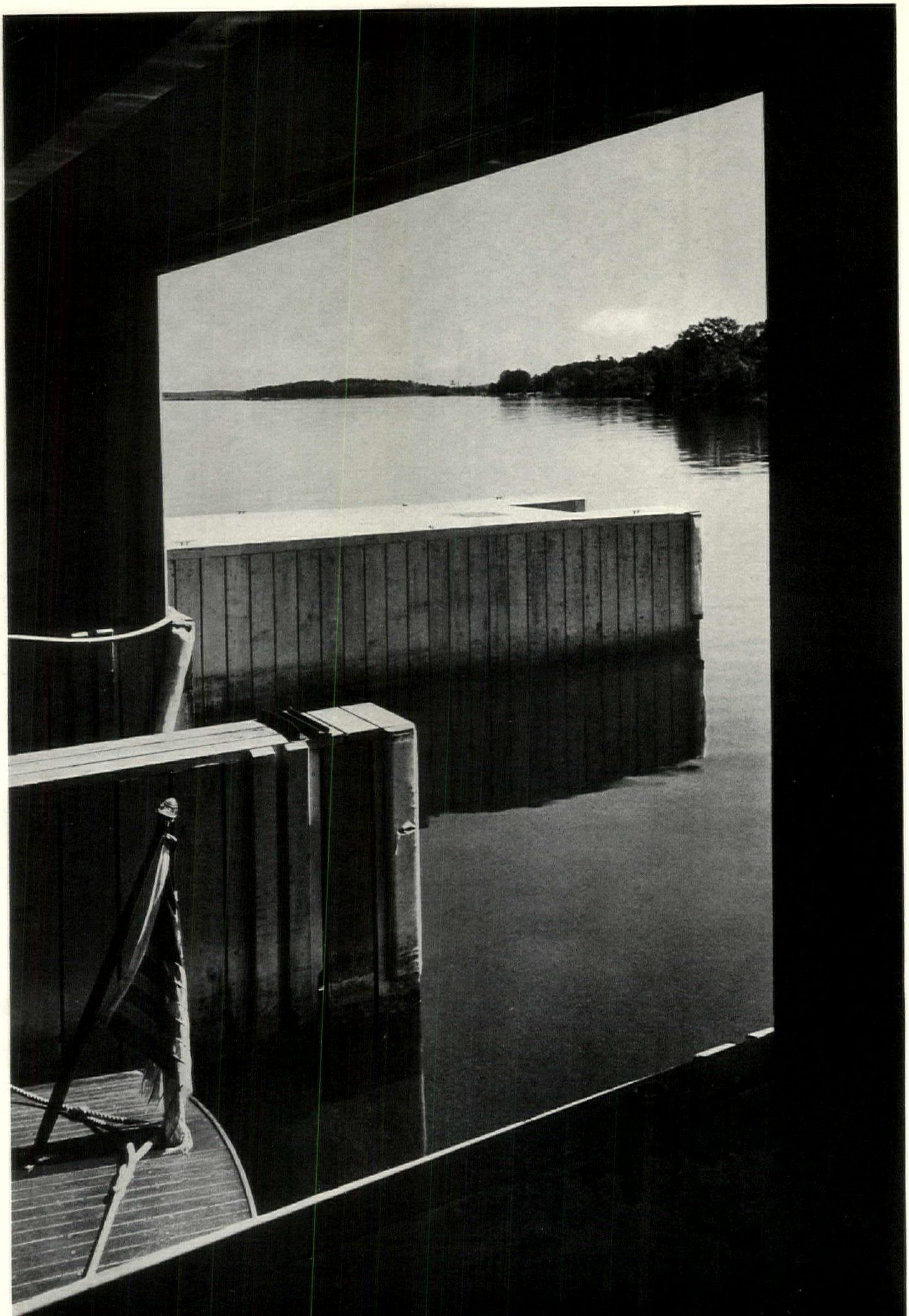
lls, floors, roof slabs, steps, boat-
se slip, boat landing and breakwater
concrete. Floors, ceilings, partitions
interior walls in the caretaker's
rters are wood, and the walls in
workshop and store room are
ter. An air space is provided
ween the concrete and the interior
od finish, and 2 inches of cork
rd and a Barrett specification roof
e been used over the living quarters.
od forms were used for the 6-inch
crete walls and a smooth finish ob-
ed by electrically operated car-
undum discs.

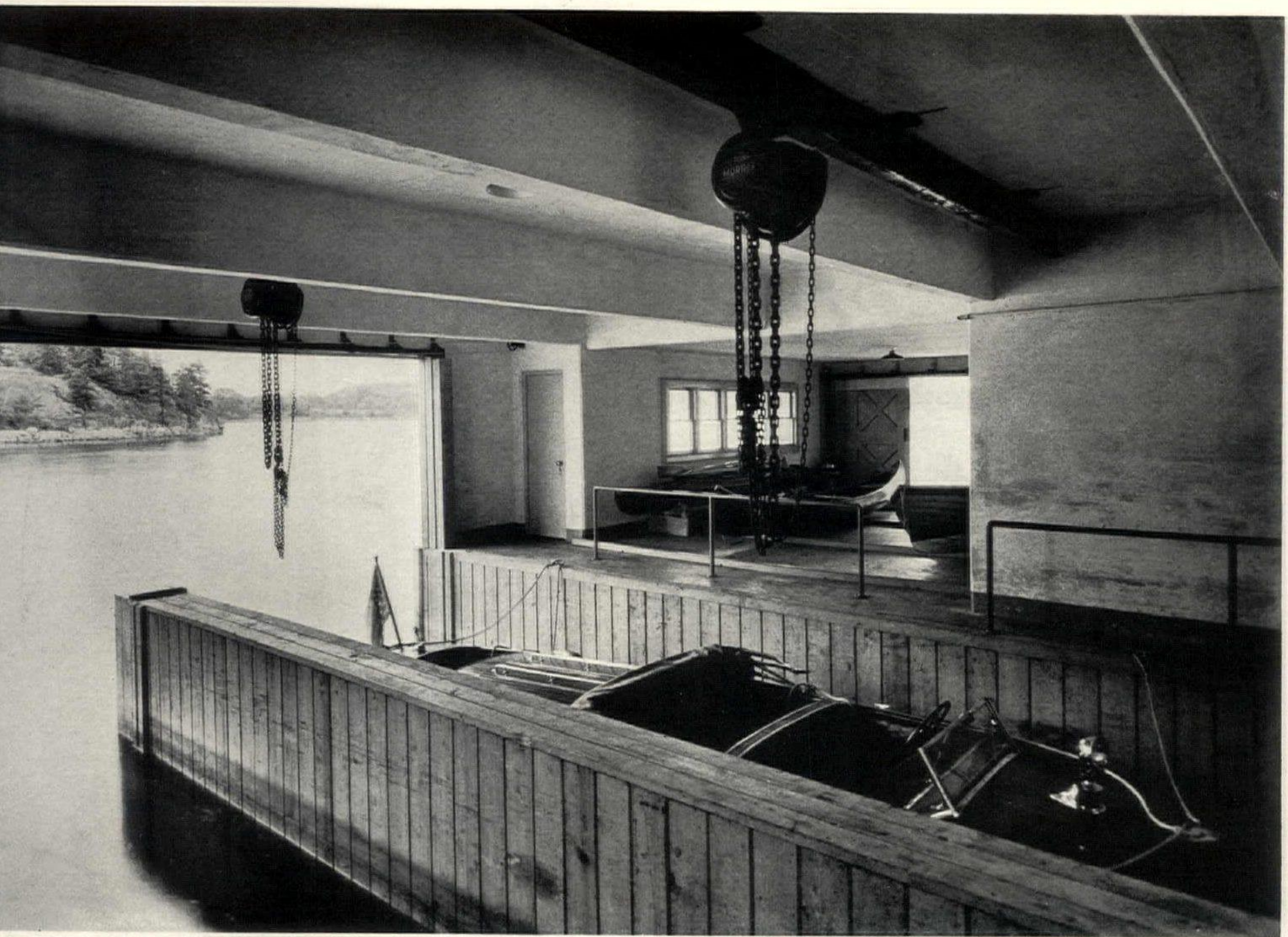
dered pigment was mixed with dry
ent to obtain a reddish cast in the
rior concrete. This color was se-
ed as a contrast to the dark green
he woods. The interior of the boat
canoe house was given a coat of
e cold-water paint, and the win-
s were finished in a warm gray buff.



ographs by F. S. Lincoln

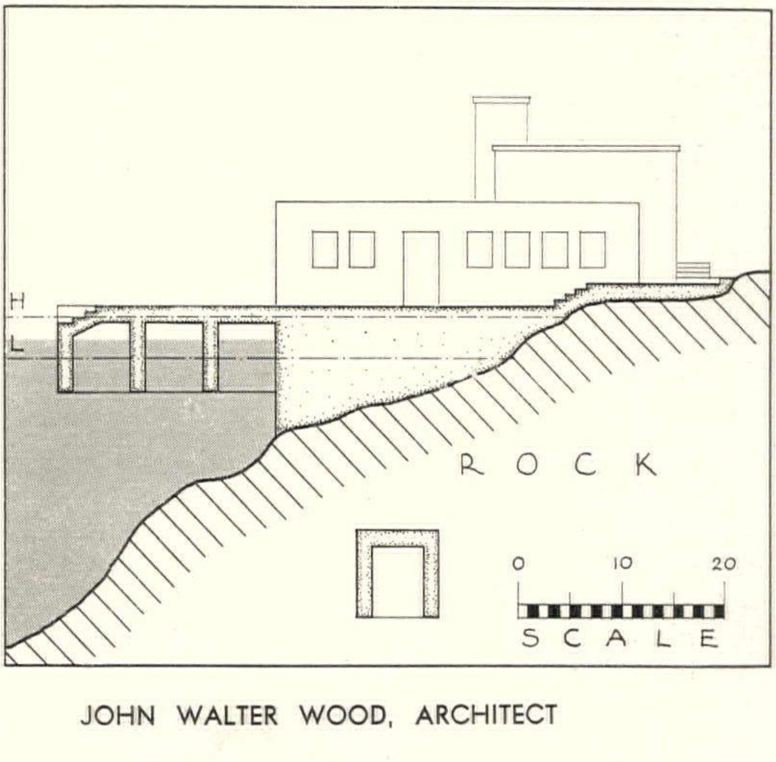




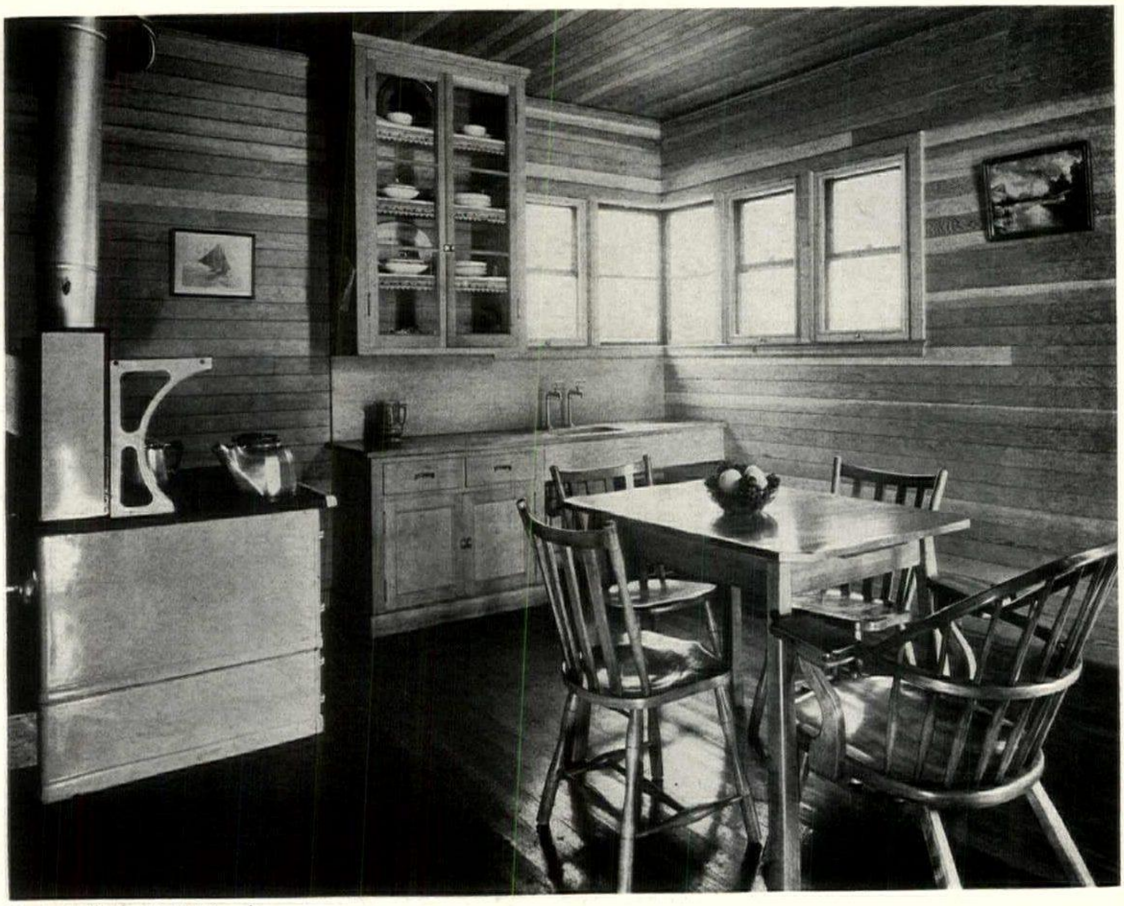


tographs by F. S. Lincoln

A breakwater (see photograph on opposite page) was necessary to protect the maneuvering of boat at the landing from a 10-mile sweep of the river to the northeast. A water depth of 35 feet was found at the proposed location of the end of the dock. Therefore instead of being built solid to rest on the river bottom, the dock was cantilevered, as shown in the accompanying sketches of the longitudinal and transverse sections. This hollow cantilever of reinforced concrete saved extensive under-water work and provided increased strength in resisting lateral and vertical pressure from the ice of the St. Lawrence River. It is estimated that by its use only one-fifth of the building material was required which otherwise would have been necessary.



JOHN WALTER WOOD, ARCHITECT



Photograph by F. S. Lincoln

LIVING ROOM IN BOATHOUSE OF SHERMAN PRATT

NIAGARA ISLAND, GANANOQUE, ONTARIO　　**JOHN WALTER WOOD, ARCHITECT**

In the combined living room and kitchen of the caretaker's quarters a special coal-burning stove combines the uses of a cooking stove and a furnace in one unit. It is made by the Heaterange Corporation of Jeddo, Pennsylvania. Air is heated in the stove, which is no larger than an ordinary small kitchen range, and then distributed by gravity to the various rooms through ducts. An electric fan connection in the duct system accelerates the distribution of heated air when necessary. The heating system normally supplies the required amount of heat by gravity; during the past winter, which was somewhat more severe than usual, the caretaker used the fan less than half a dozen times. The consumption of coal was surprisingly low.

Electricity is furnished by a Lister Bruston electric power plant located on another part of the island and built to furnish electricity for the main house.

The pump room houses a pressure tank and a gasoline-operated water pump which supplies water from the river.

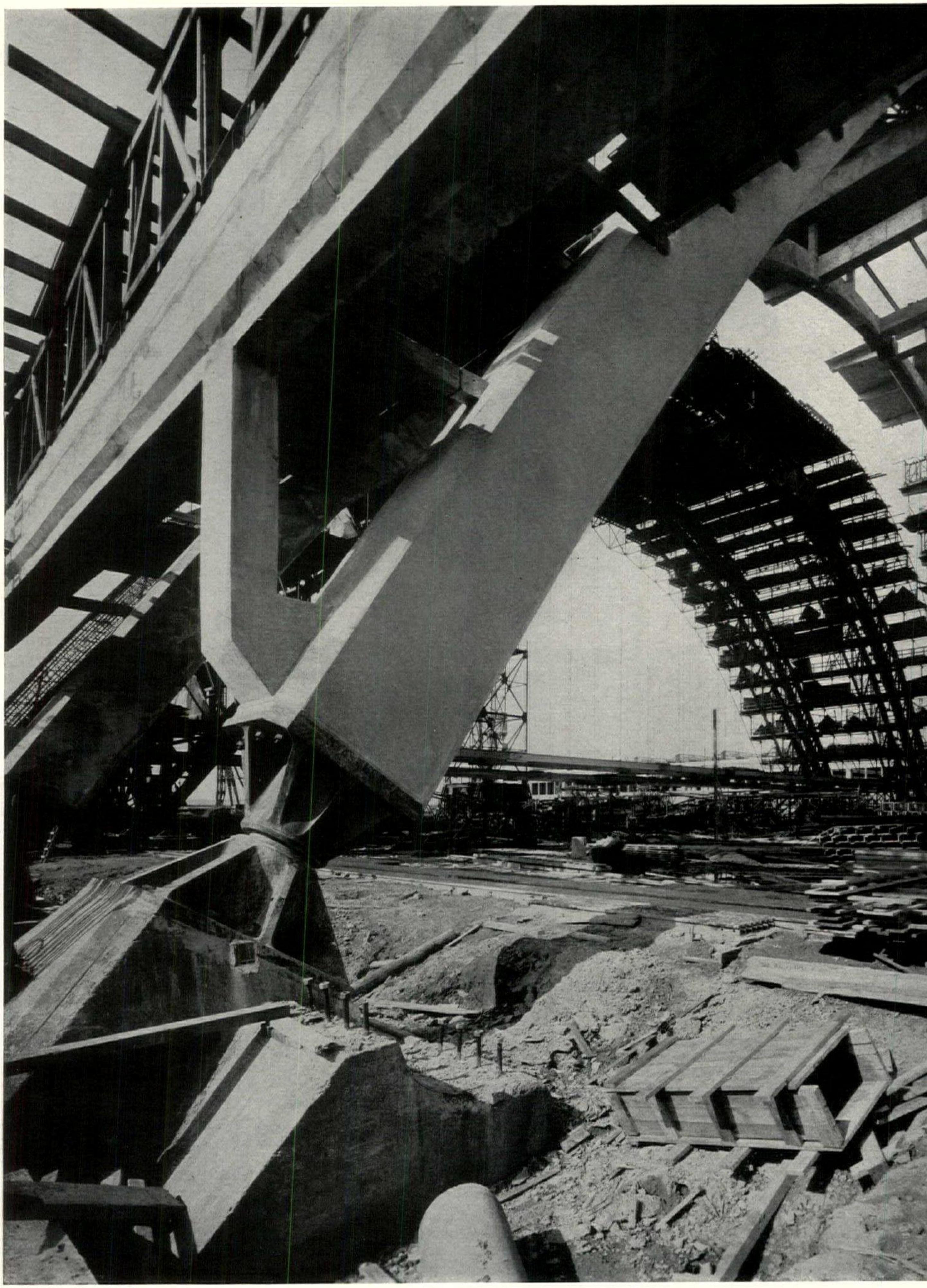
Two movable chain hoists are provided above the boat slips for lifting the engines out of the boats, for raising the boats out of the water for winter storage, and for raising them to change propellors.

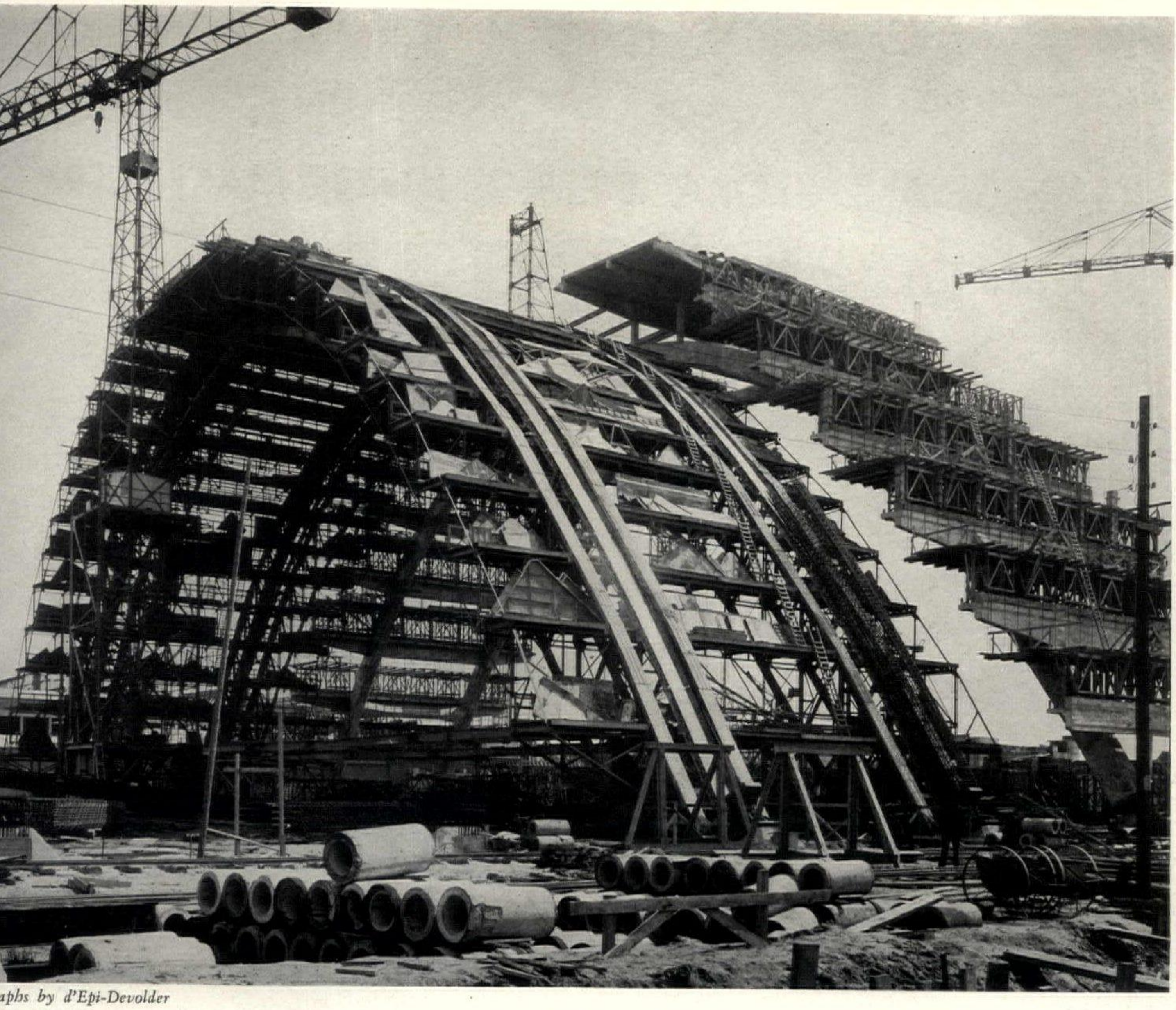
The rocky nature of the terrain near the boathouse made a septic tank impractical To avoid contamination of the river water, a Kaustine tank is used for sewage disposal.

RAND CENTRAL PALACE OF BRUSSELS EXPOSITION

J. VAN NECK, ARCHITECT LOUIS BAES, CONSULTING ENGINEER

graph by E. Sergysels





aphs by d'Epi-Devolder

THE BRUSSELS GRAND CENTRAL PALACE UNDER CONSTRUCTION

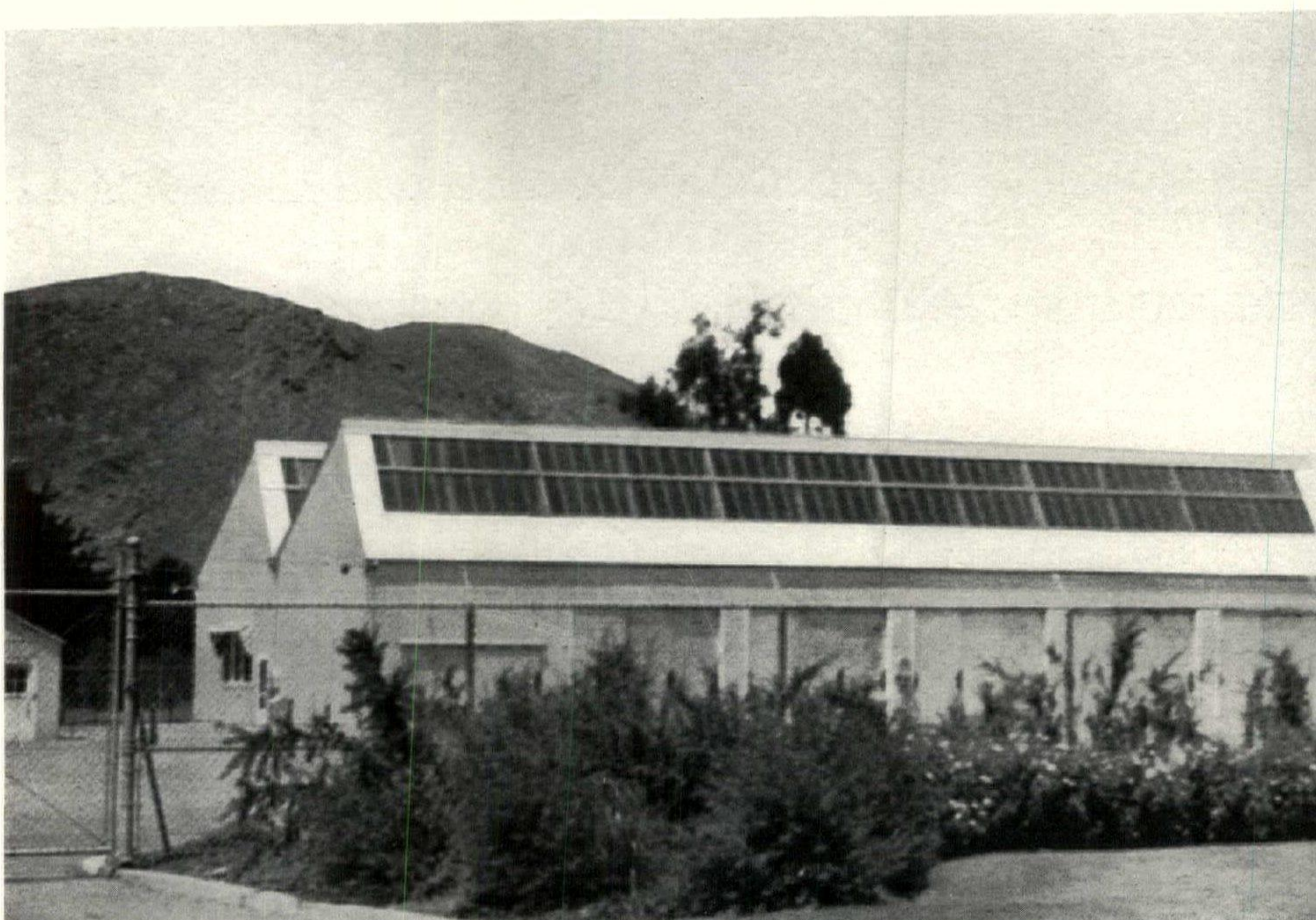
J. VAN NECK, ARCHITECT

LOUIS BAES,
CONSULTING ENGINEER

This huge structure envelops a clear area of 3¾ acres, entirely unbroken by interior supports. The hall is 528 feet long and its concrete slab roof-terraces and the glass window-walls are supported on twelve great arches spaced about 40 feet apart with a span of 282 feet and a rise of almost 100 feet. At the crown of each arch is a cylindrical metal hinge, and at the footings are spherical metal hinges. . . . The reinforced concrete arches are tied in pairs by beams cast in place with the arches. Cantilevered beams extend on both sides of these paired arches for a distance of about 20 feet. This arrangement makes each group of arches completely independent of the adjoining groups. The framework is, in effect, a series of six bridges, each composed of two arches coupled together. Both façades inclosing the ends of the structure are self-supporting and totally independent of the arches. . . . Oblique reaction on the footing hinge is about 850 tons, and the thrust upon the crown hinge is 300 tons. The arches rest on massive foundations of concrete which distribute the load of each arch to 29 piles. . . . The coupled arches were erected by means of movable steel centering arches having the shape and dimensions of the lower curve of the concrete arches. Reinforcement for each arch comprises about 60 tons of steel, fabricated in 1-ton sections on the ground and hoisted into the forms by a crane.

GARAGE AND STORAGE BUILDING FOR MACHINERY AT SANTA MARIA, CALIFORNIA

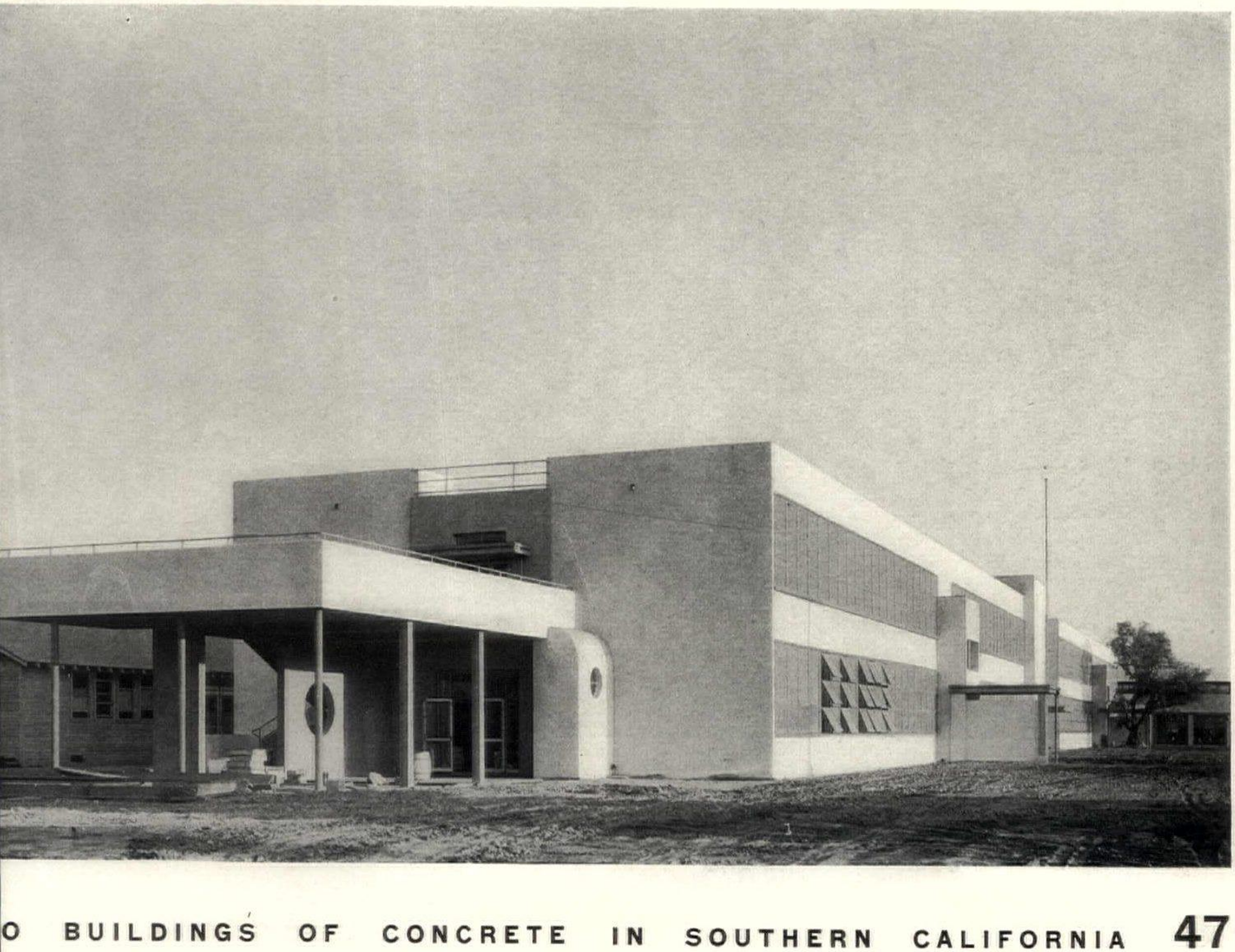
BUILT BY CALIFORNIA STATE DEPARTMENT OF ROADS



POLYTECHNIC HIGH SCHOOL IN LONG BEACH, CALIFORNIA

HUGH R. DAVIES, ARCHITECT

ograph by courtesy of E. L. Bruce Co. who supplied the flooring.



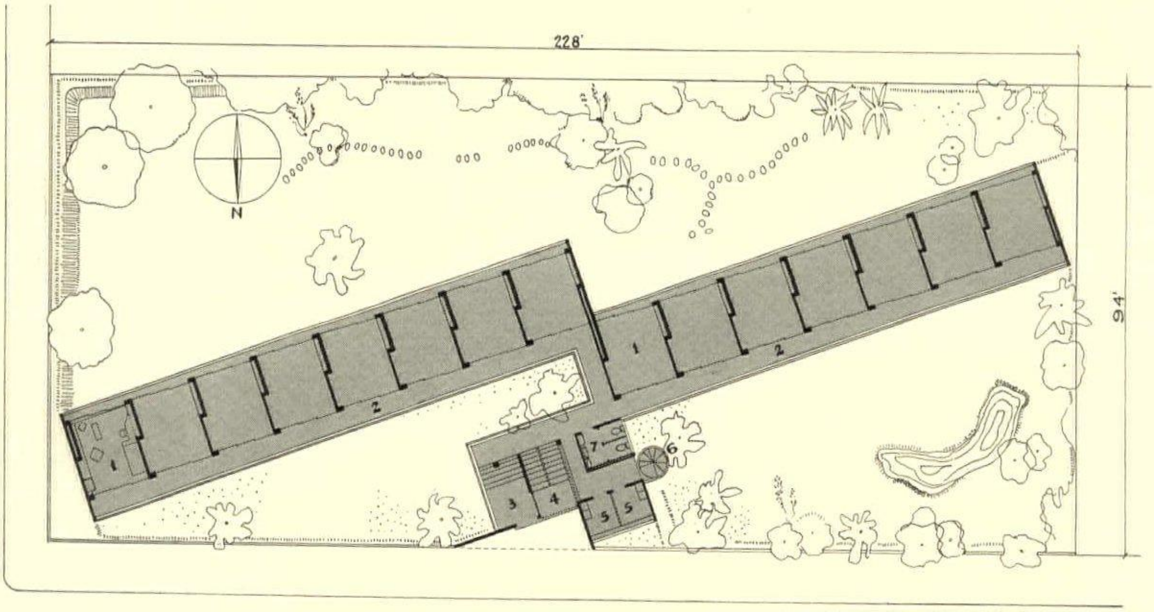
Photograph by Sigfrid Larson

NEW CALVERT BRIDGE IN WASHINGTON, D. C.

MODJESKI, MASTERS AND CHASE, ENGINEERS PAUL P. CRET, CONSULTING ARCHITECT

WORKING DRAWINGS BY ANTONIN RAYMOND

The structural systems and mechanical details illustrated in this section were designed for foreign buildings but are based on American practice.

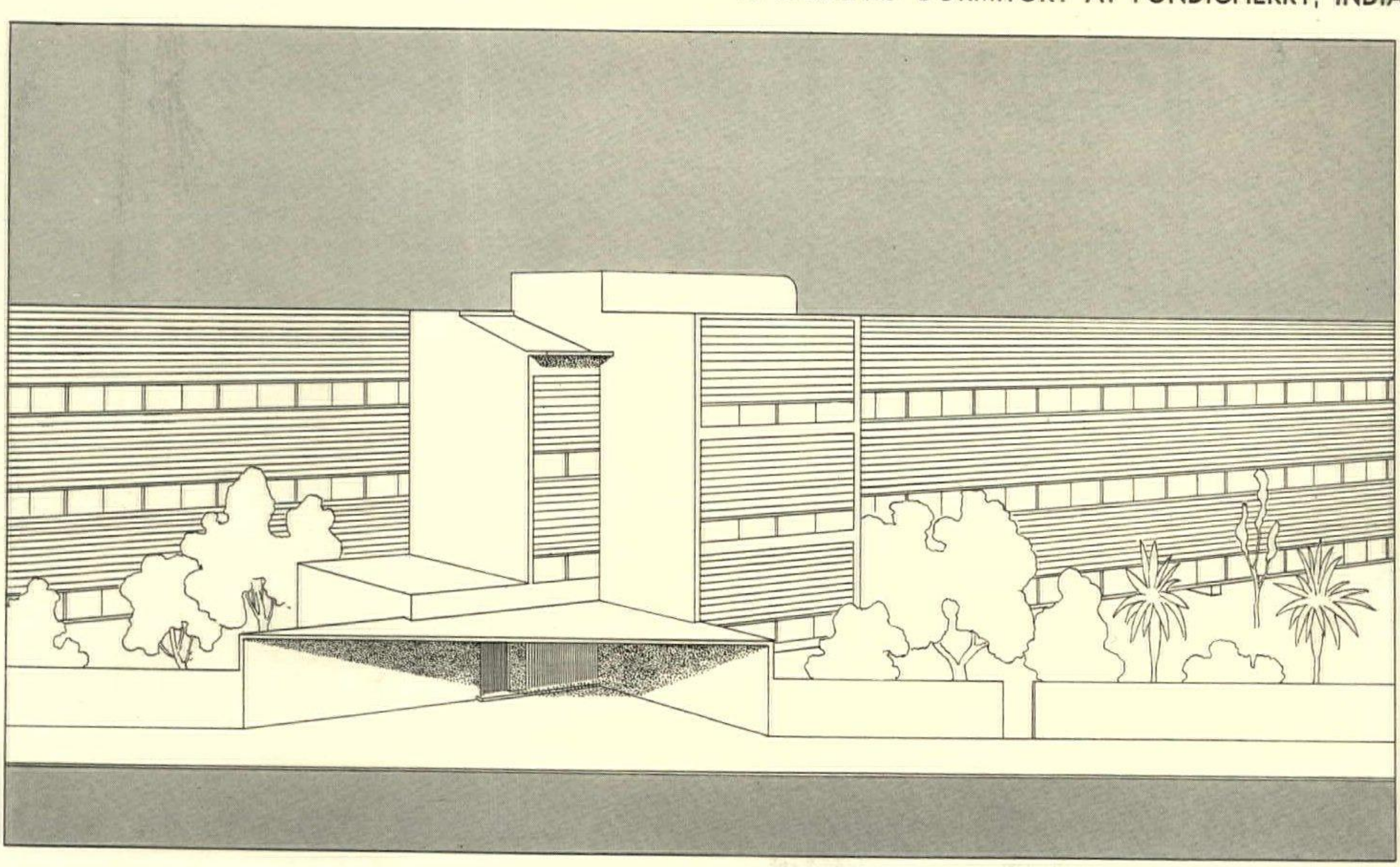


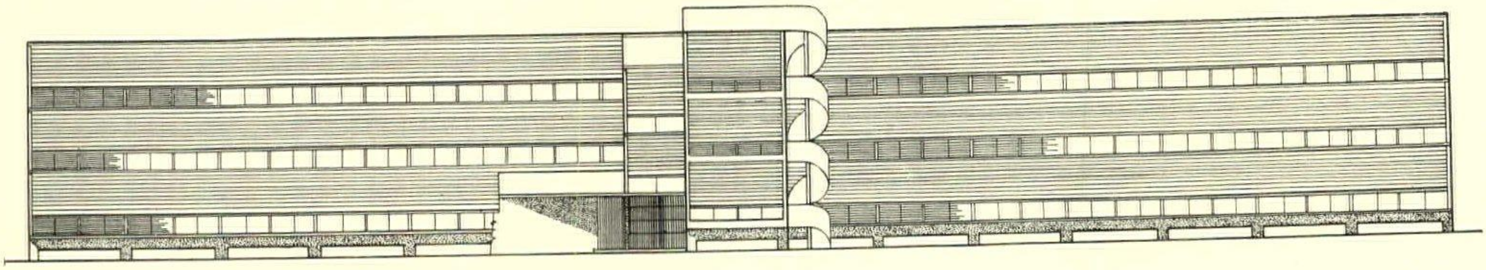
FIRST FLOOR PLAN

0 5' 10' 15' 20' 25'

1 STUDENT'S R'M
2 CORRIDOR
3 VESTIBULE
4 STAIRS
5 SHOWER
6 SERVICE
7 W.C.

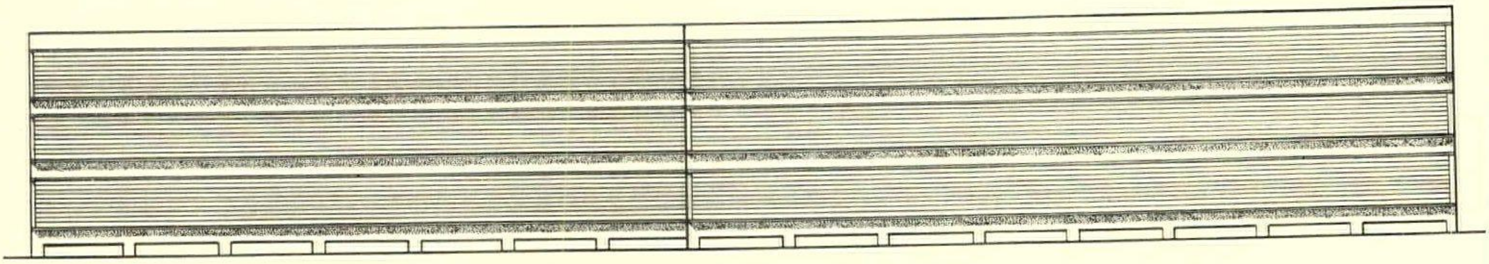
A STUDENTS' DORMITORY AT PONDICHERRY, INDIA

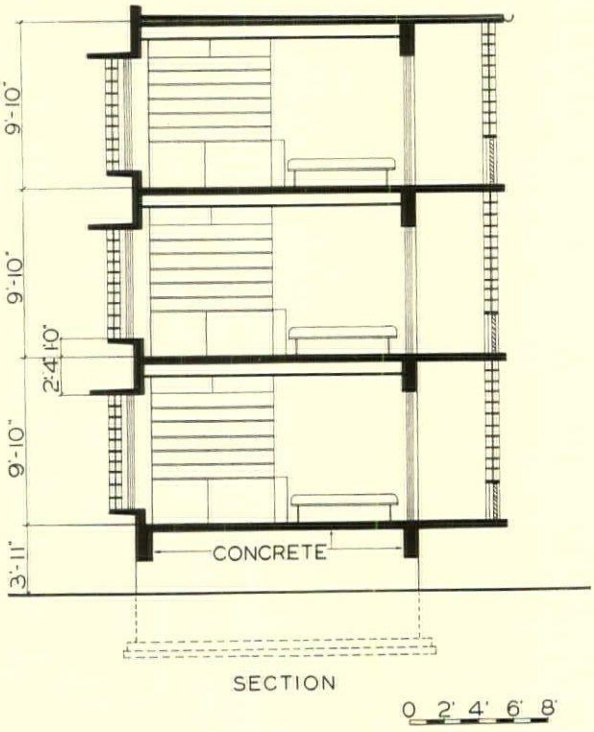




Entrance Façade of Dormitory

Garden Elevation





SECTION

The climate is tropical and comparatively dry, except during the rainy season when the rainfall is accompanied by winds.

The building is orientated towards the south and southeast and placed on the lot in such a way as to give adequate gardens of interesting shapes. All rooms face south-southeast and have full-width cross-ventilation. Toilets and baths are centrally located.

The mess hall and kitchen are in another building.

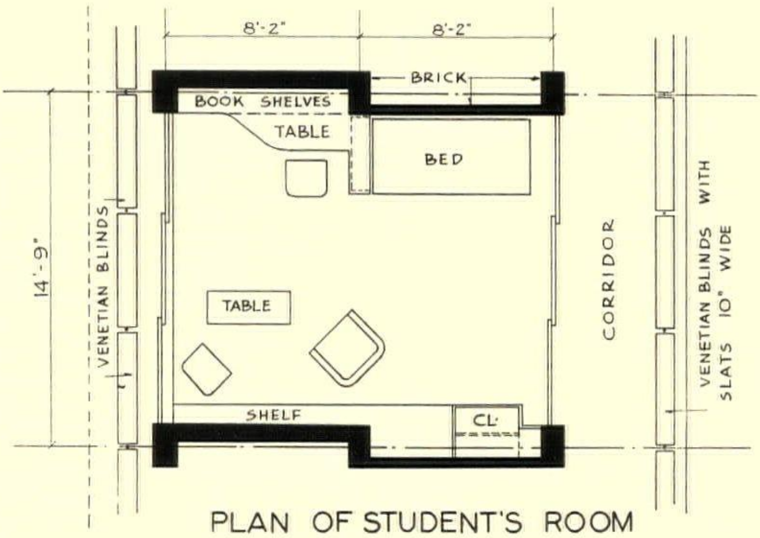
The simplicity of construction offers economy of cost. Brick is quite cheap in the locality, so the bearing walls are built of this material and designed to accommodate built-in furniture. The first floor, a reinforced concrete slab, is raised on brick piers from the ground for the sake of dryness, then the brick wall is continued again with another concrete floor slab and so on up to the roof. There are no curtain walls except on the two ends. The corridor slab is cantilevered from the main slab and the window overhangs and the sills are also monolithic with the floors.

Venetian blinds with wood blades about 8 inches wide protect the interior against glare; overhangs give protection against direct sunshine. Sliding wood sash allow full closing in case of driving rain.

Sliding doors, consisting of light wood frames covered with cloth, separate the dormitory rooms from the open corridor which is provided with wide-bladed Venetian blinds only, for protection against weather.

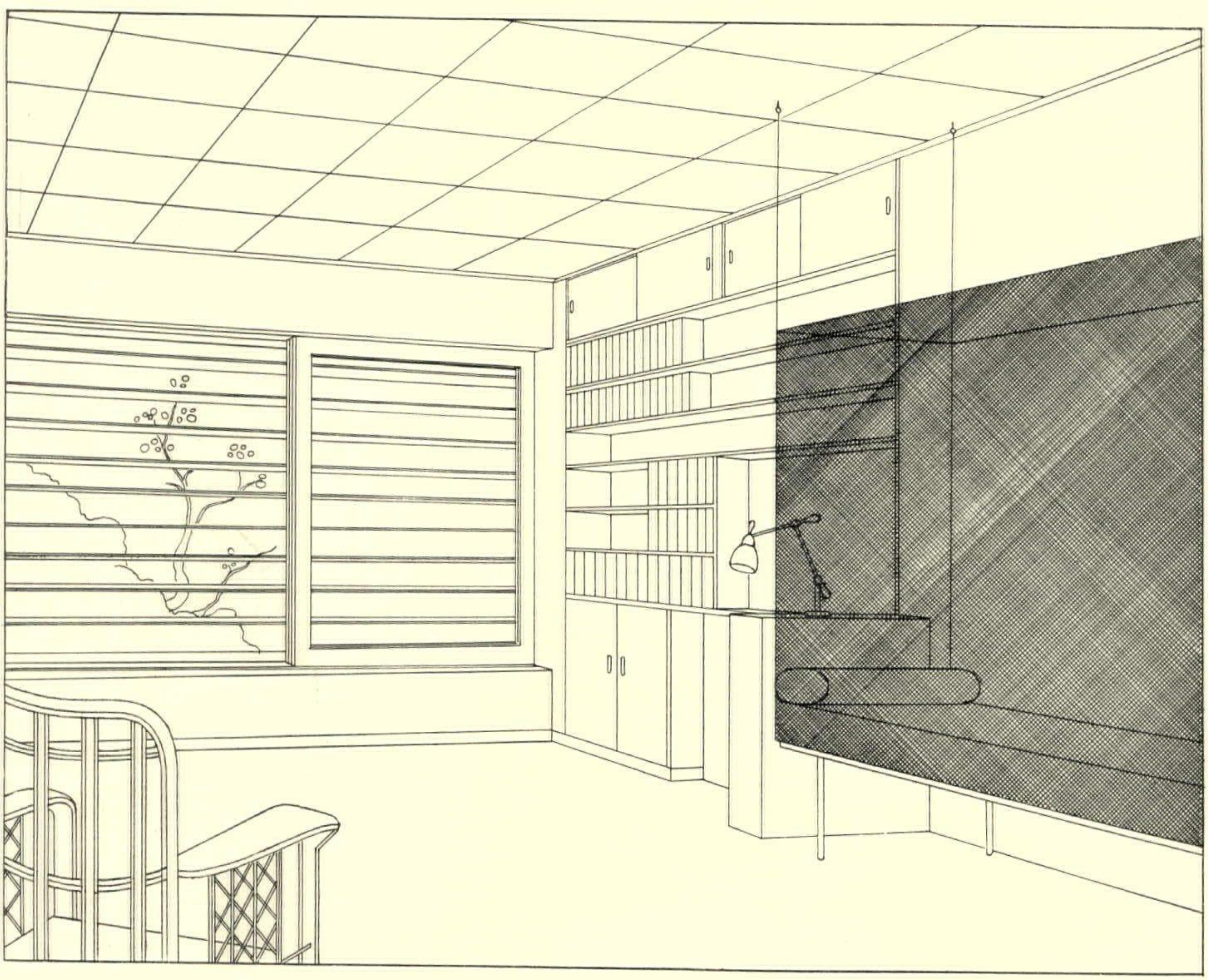
WORKING DRAWINGS BY ANTONIN RAYMOND

A STUDENTS' DORMITORY AT PONDICHERRY, INDIA



PLAN OF STUDENT'S ROOM

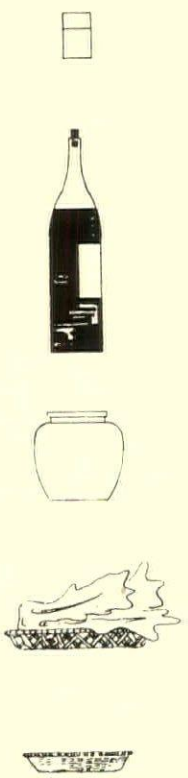
A student's room—the furniture is built-in and open blinds give full ventilation.



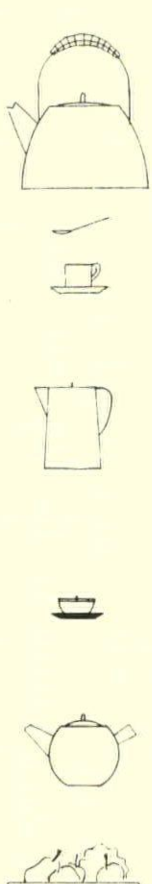
A KITCHEN AND PANTRY

House of Tetsuma Akaboshi (see pages 10-29)

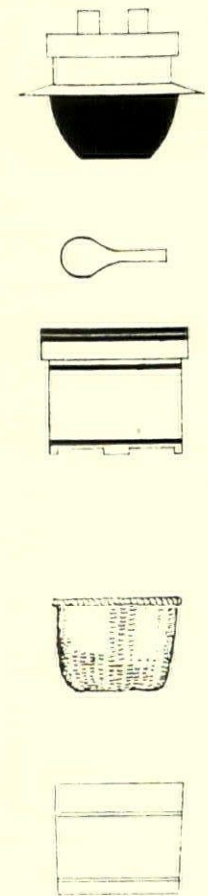
SPICES

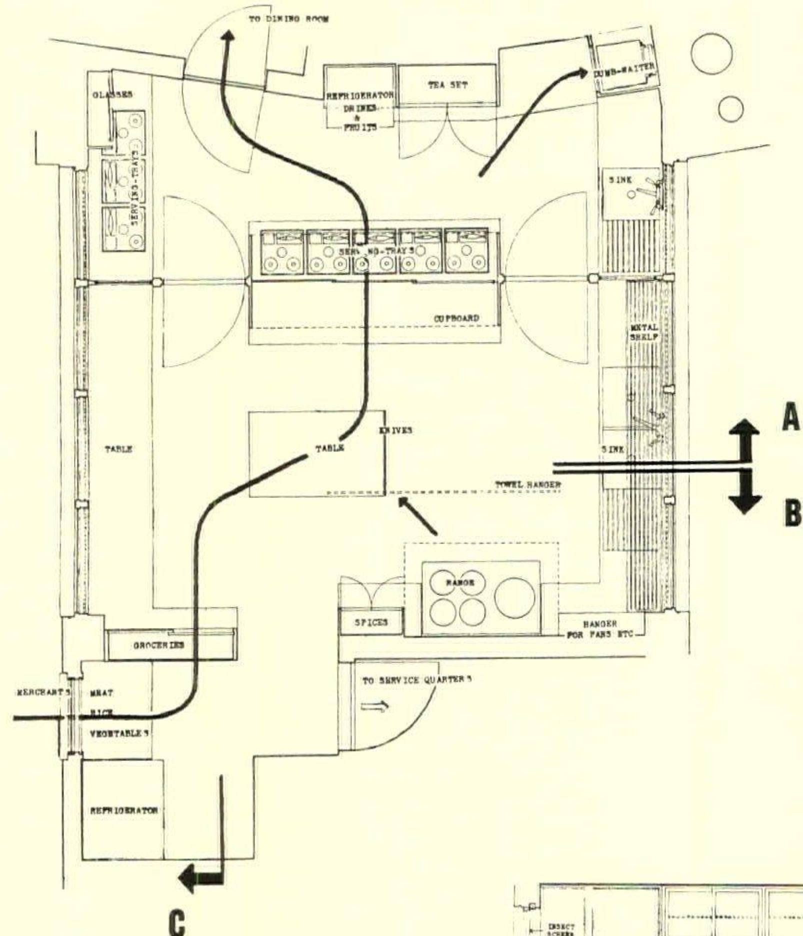


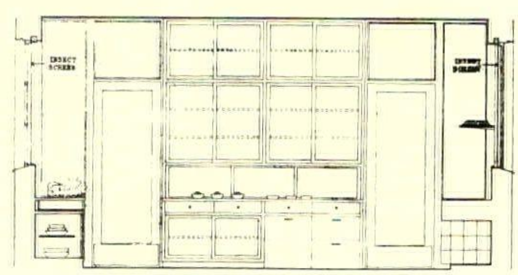
TEA



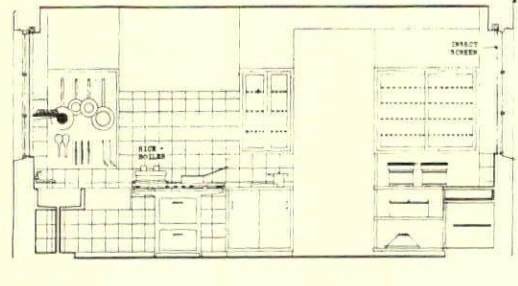
RICE



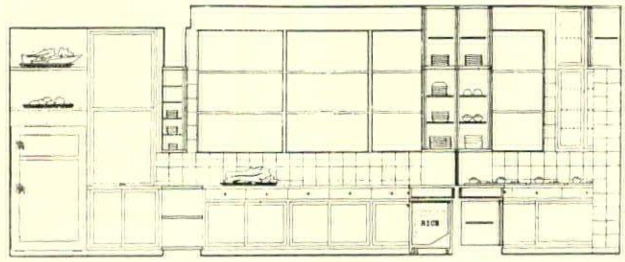




A Section Toward Pantry

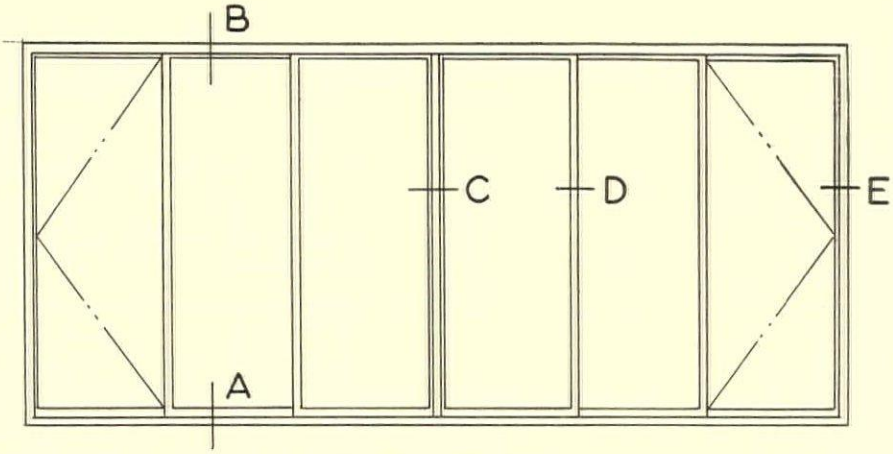


B Section Toward Range

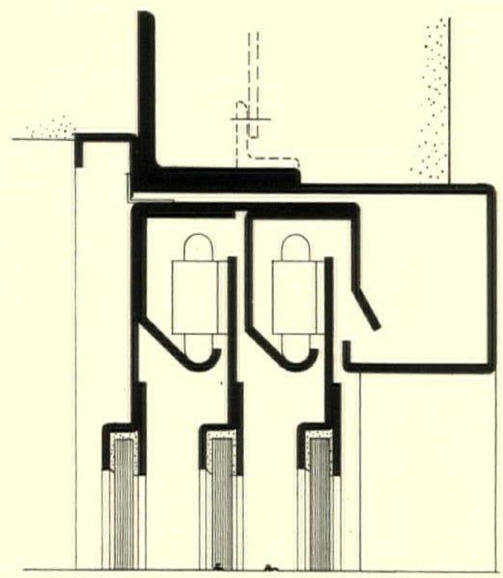


C Longitudinal Section

WORKING DRAWINGS BY ANTONIN RAYMOND



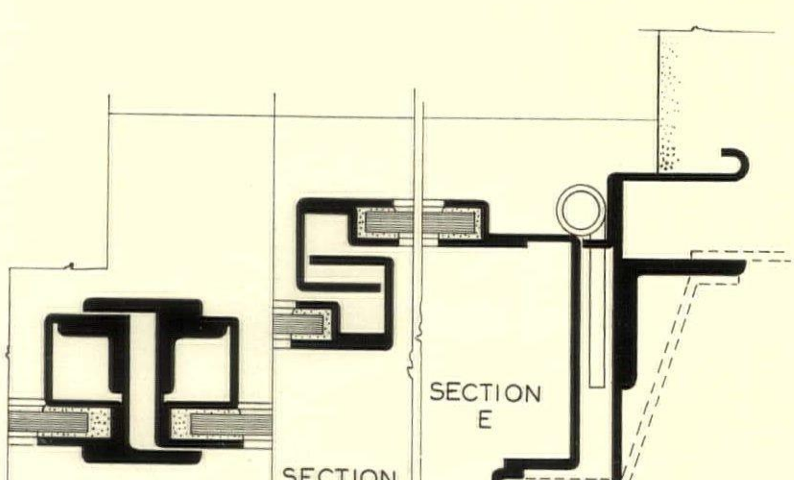
ELEVATION

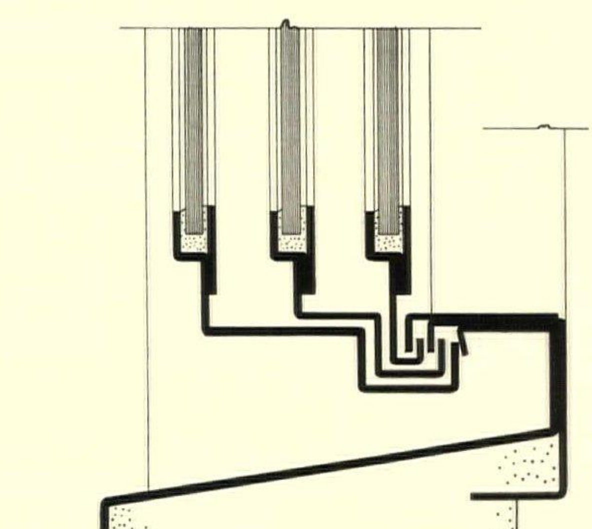


SECTION B

SLIDING - FOLDING WINDOW FRAME

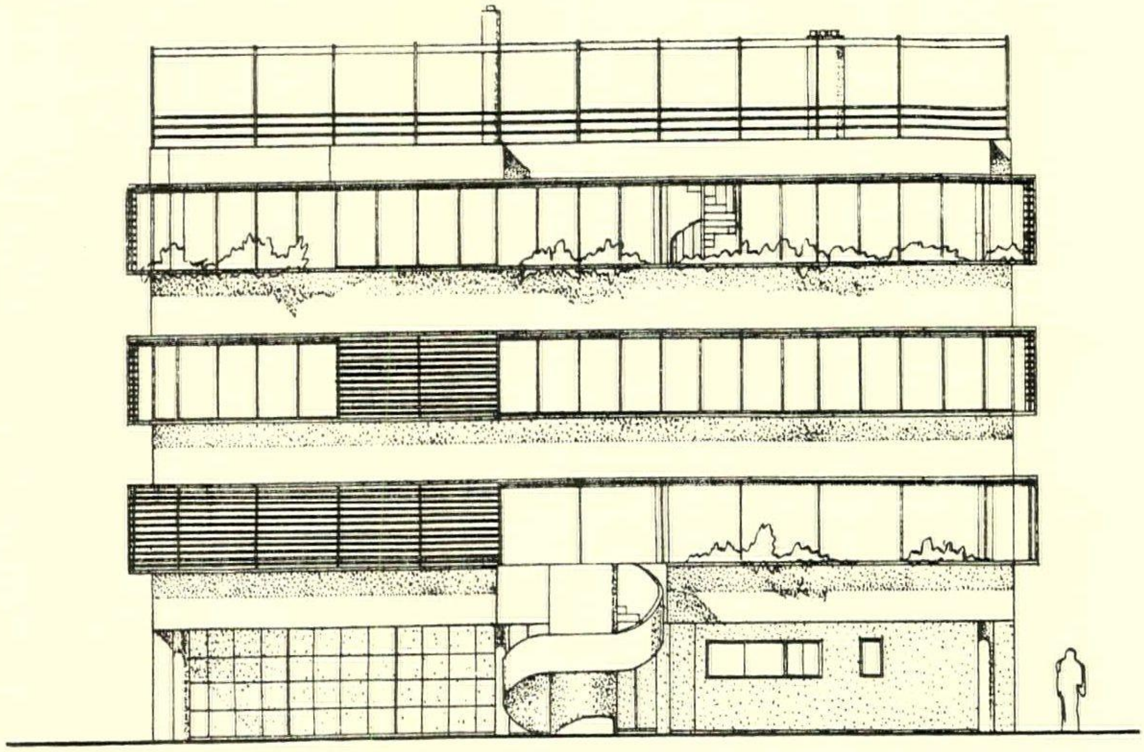
This casement is an adaptation of a customary Oriental door opening, such as the one illustrated on page 26, in which the four middle door panels slide two to each side into position with the end doors and then both sets of three panels each swing on hinges, thus leaving the entire opening unobstructed. In this adaptation American methods of fabrication are utilized: the sash and sections are stamped steel, and the profiles are reduced to a minimum of metal necessary for protection against moisture penetration and for a sturdy but light construction.



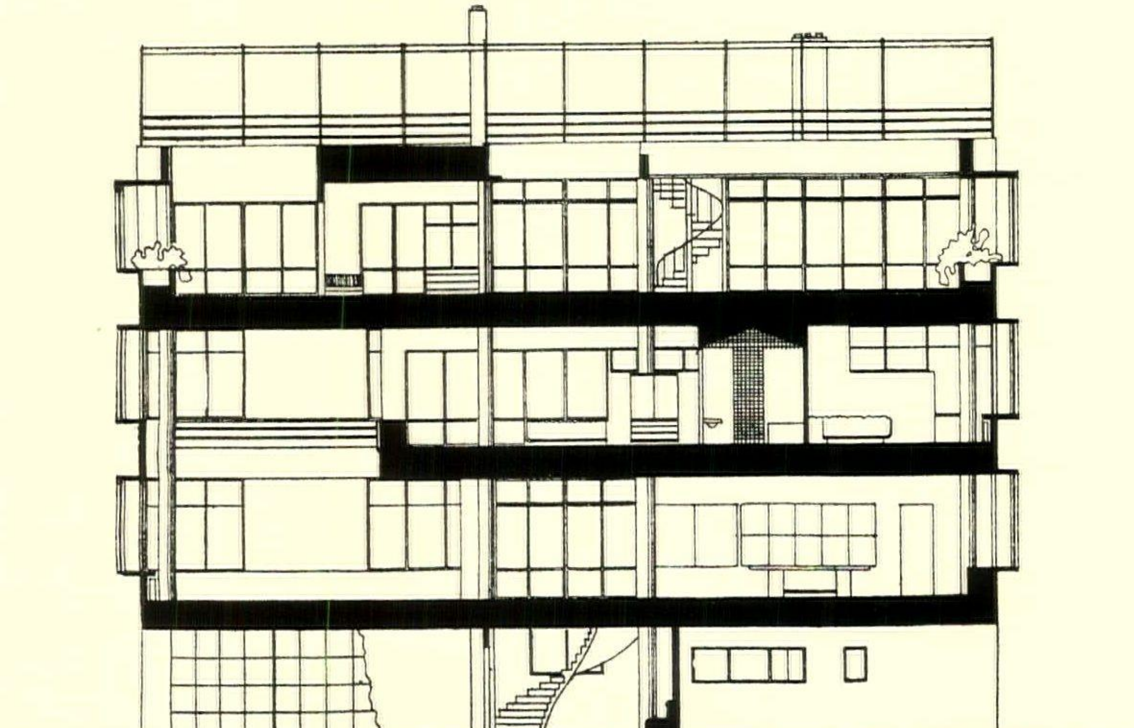


WORKING DRAWINGS BY ANTONIN RAYMOND

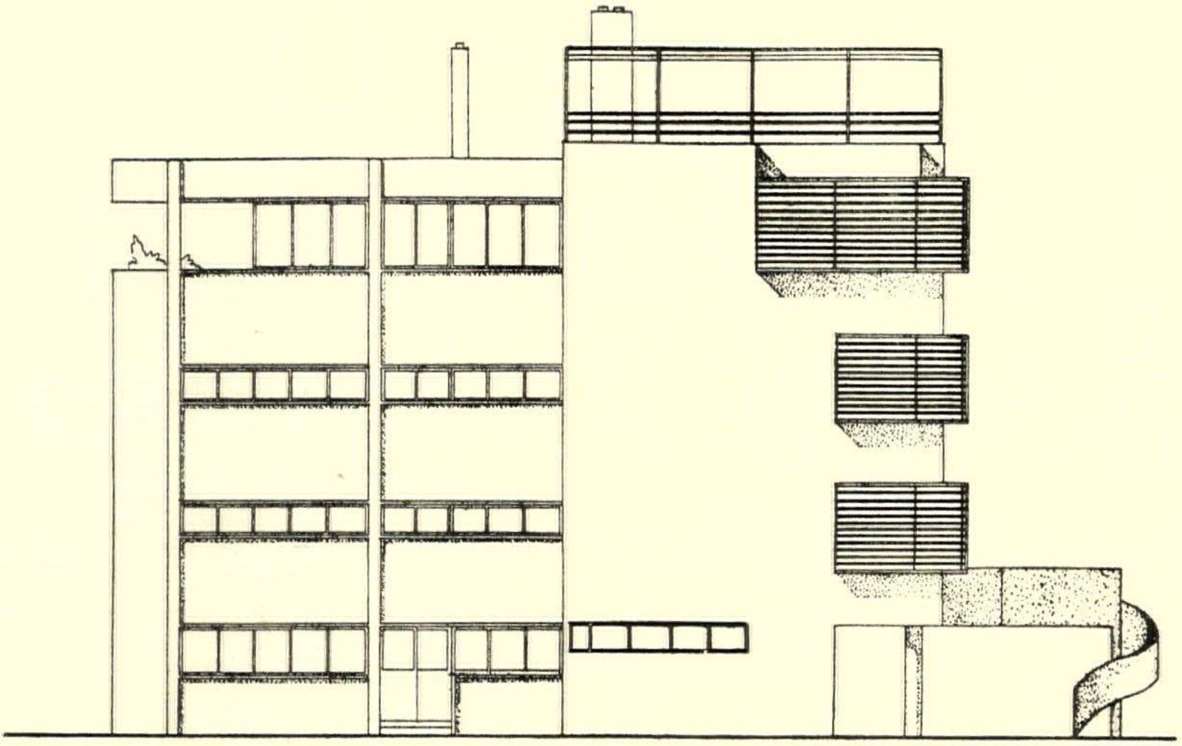
A TOWN RESIDENCE IN SHANGHAI, CHINA



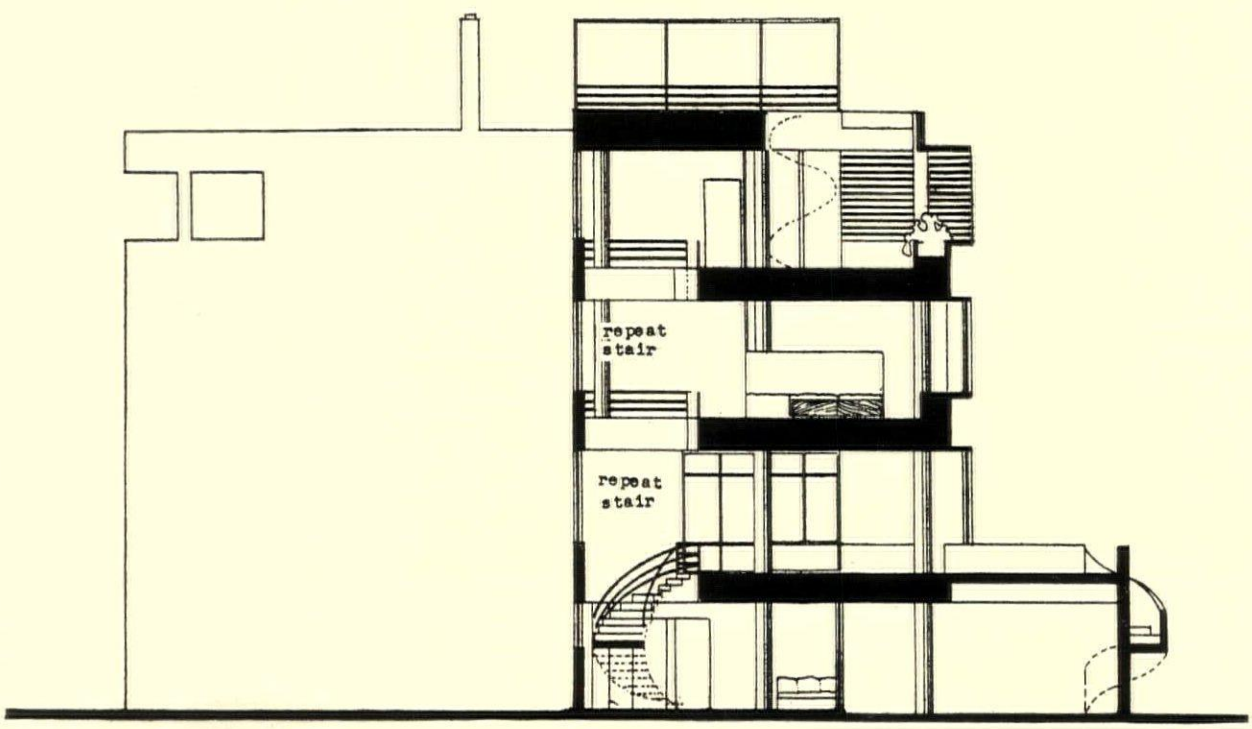
South Elevation



Longitudinal Section



East Elevation



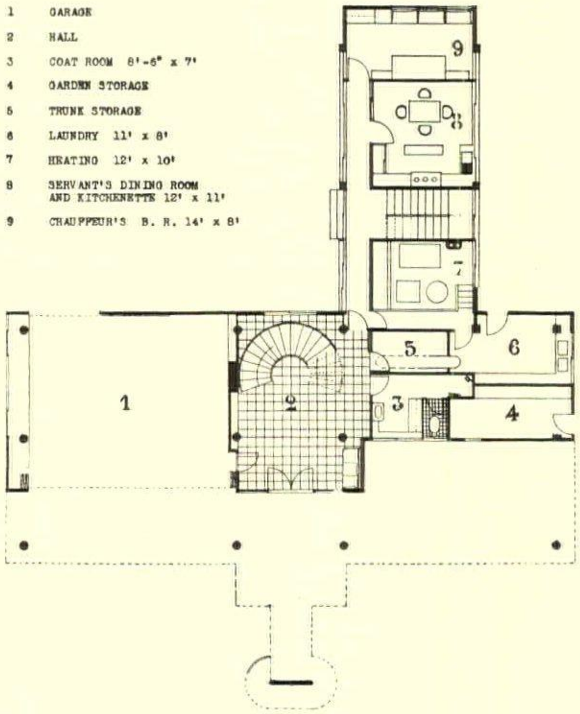
Transverse Section

Shanghai has a hot and dampish climate, a fact which is considered in the structural design of this house. The windows extend out from the walls in wide overhangs so as to accommodate the wide-bladed Venetian blinds which subdue the hot rays of the sun, the sliding sash (described on page 53) and the continuous fixed mosquito screen on the outside.

WORKING DRAWINGS BY ANTONIN RAYMOND

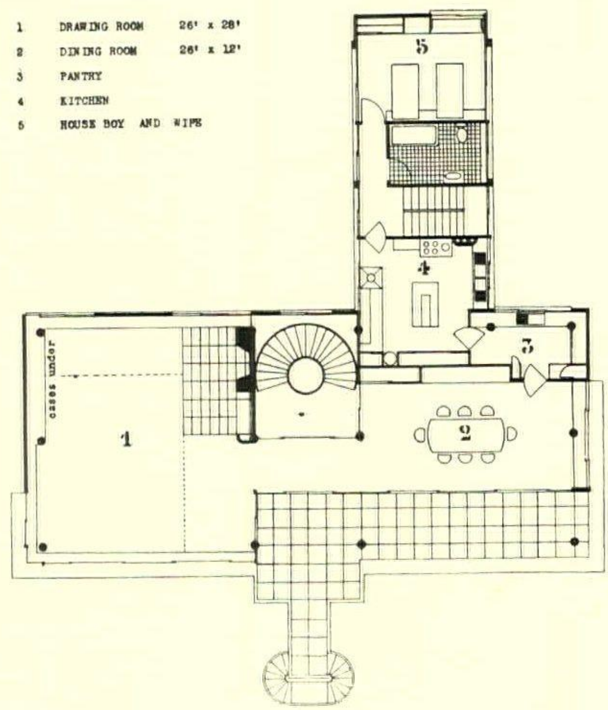
FLOOR PLANS OF A TOWN RESIDENCE IN SHANGHAI

1 GARAGE
2 HALL
3 COAT ROOM 8'-6" x 7'
4 GARDEN STORAGE
5 TRUNK STORAGE
6 LAUNDRY 11' x 8'
7 HEATING 12' x 10'
8 SERVANT'S DINING ROOM AND KITCHENETTE 12' x 11'
9 CHAUFFEUR'S B. R. 14' x 8'



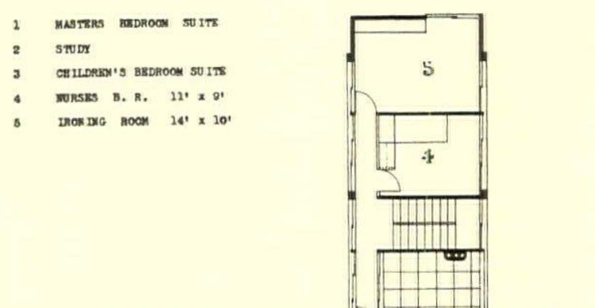
Ground Floor Plan

1 DRAWING ROOM 26' x 28'
2 DINING ROOM 26' x 12'
3 PANTRY
4 KITCHEN
5 HOUSE BOY AND WIFE



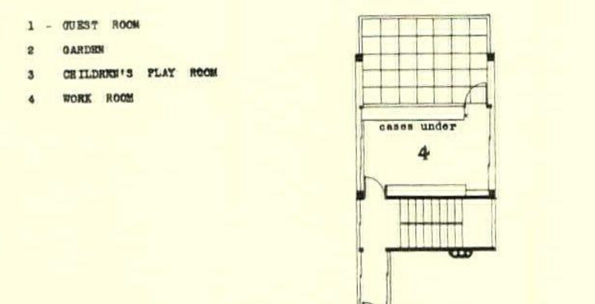
First Floor Plan

1 MASTERS BEDROOM SUITE
2 STUDY
3 CHILDREN'S BEDROOM SUITE
4 NURSES B. R. 11' x 9'
5 IRONING ROOM 14' x 10'



Second Floor Plan

1 - GUEST ROOM
2 GARDEN
3 CHILDREN'S PLAY ROOM
4 WORK ROOM



Third Floor Plan

ARCHITECTURAL CONCRETE AND ITS USE

By W. F. LOCKHARDT, Portland Cement Association

With architectural concrete, the designer is freed of the limitations of scale imposed by the commercially practicable sizes of structural units with which he must work. He can think of the entire structure as a compositional unit rather than as an assemblage of relatively small structural blocks.

Because of its flexibility, a narrowly defined technique for architectural concrete is not likely. Such technique as there may be can, however, be analyzed as a compound of several factors: technological, structural, architectural.

TECHNOLOGICAL FACTORS

Under this heading is included all that has to do with the making of good concrete—in the mixer and in the forms. Fortunately, the research which developed the water-cement ratio law of concrete strength has measurably simplified this work. For those readers who may wish to have this law restated, it runs thus:

"For plastic mixtures, using sound and clean aggregates, the strength and other desirable properties of concrete under given job conditions are governed by the net quantity of mixing water used per sack of cement.

"Designing a concrete mix, therefore, consists in selecting the water-cement ratio which will produce concrete of the desired resistance to exposure and the required strength, and finding the most suitable combination of aggregates which will give the necessary workability when mixed with cement and water in this ratio."

With this law, it is possible to set up a table of recommended water-cement ratios for concrete to meet different conditions of exposure. This is given in Table 1.

The design of a concrete mix can usually be accomplished most directly by starting with the proportions of cement and water indicated by Table 1 as being suitable for the specific exposure and then adjusting the quantity and proportions of fine and coarse aggregates until the desired character of concrete is obtained. Trial mixtures for various water-cement ratios are given in Table 2.

These trial mixtures will serve as a convenient start; if a more plastic mix is desired, the fines may be increased and the coarse aggregate curtailed. If the concrete turns out to be too dry, do not add more water (as this would obviously destroy the water-cement ratio) but reduce the quantity of aggregate in the next trial batch. If the mix is too wet, it may be made less fluid by increasing the fine and coarse aggregates in the proportions which have been found to give the desired plasticity.

In determining the water-cement ratio, it must be remembered that aggregates are always damp and therefore carry with them into the mixer a measurable amount of water, for which allowance should be made and subtracted accordingly from the amount of water to be added at the mixer. Table 3 gives a rough approximation of the quantity of surface water carried by average aggregates.* The water should be satisfactory—"suitable for drinking" is a good criterion—and the aggregates clean and structurally sound; weak, friable or laminated materials are undesirable.

Before pouring any concrete, all débris and ice should

*The subject of the Design and Control of Concrete Mixes is covered in booklet T-12, published by the Portland Cement Association, Chicago, which may be had free of charge.

TABLE 1 RECOMMENDED WATER-CEMENT RATIOS FOR CONCRETE TO MEET DIFFERENT DEGREES OF EXPOSURE

These requirements are predicated on the use of concrete mixtures in which the cement meets the present standard specifications of the A.S.T.M. and to which an early curing is given that will be equivalent to that obtained when protected from the loss of moisture for at least 7 days at a temperature of 70 degrees Fahrenheit. For curing conditions less favorable than this, correspondingly lower water-cement ratios should be used. The values are also based on the assumption that the concrete is of such consistency and is so placed that the space between the aggregate particles is completely filled with cement paste of the given water ratio.

EXPOSURE	CLASS OF STRUCTURE	WATER-CEMENT RATIO, U. S. GAL. PER SACK[1]		
		Reinforced piles, thin walls, light structural members, exterior columns and beams in buildings	Reinforced reservoirs, water tanks, pressure pipes, sewers, canal linings, dams of thin sections	Heavy walls, piers, foundations, dams of heavy sections
EXTREME	1. In severe climates (northern U. S.), exposure to alternate wetting and drying, freezing and thawing, as at the water line in hydraulic structures. 2. Exposures to sea and strong sulphate waters in both severe and moderate climates.	$5\frac{1}{2}$	$5\frac{1}{2}$	6
SEVERE	3. In severe climates (northern U. S.), exposure to rain and snow, and freezing and thawing, but not continuously in contact with water. 4. In moderate climates (southern U. S.), exposure to alternate wetting and drying, as at water line in hydraulic structures.	6	6	$6\frac{3}{4}$
MODERATE	5. In climates (southern U. S.), exposure to ordinary weather, but not continuously in contact with water. 6. Concrete completely submerged, but protected from freezing.	$6\frac{3}{4}$	6	$7\frac{1}{2}$
PROTECTED	7. Ordinary inclosed structural members; concrete below the ground and not subject to action of corrosive groundwaters or freezing and thawing.	$7\frac{1}{2}$	6	$8\frac{1}{4}$

[1]Surface water or moisture carried by the aggregate must be included as part of the mixing water.

be removed from places to be filled and the forms oiled. If the preceding fill has been too wet, and a layer of slick mud-like laitance has formed on its surface, this should be carefully and thoroughly removed before fresh concrete is placed.

Concrete should be deposited at numerous points in the forms, rather than at one spot from which it will be expected to flow (perhaps aided by puddling) to distant points. Attempts to make the concrete flow long distances after depositing will cause the water and fines to segregate from the rest of the mass, resulting in long diagonal lines across the face of the structure following the top of the various slopes thus formed.

Where ornamentation of any kind is built into the forms, it is necessary to deposit the concrete so that it will not splash up into, and encrust, the ornamental molds before the concrete level has reached them. A vertical pipe or canvas chute, usually called an "elephant trunk,"

TABLE 2 TRIAL MIXTURES FOR VARIOUS WATER-CEMENT RATIOS

Indicated water-cement ratios in Table 2 include moisture contained in the aggregate.

Proportions are given by volume, aggregate dry and compact. Thus 1-2-3½ indicates 1 volume of cement, 2 volumes of sand and 3½ volumes of coarse aggregate.

If the aggregates are to be measured in the damp and loose condition they will occupy greater volume than when dry and compact. Amount should be determined by test. Approximate average value for sand 20 per cent, for coarse aggregate 6 per cent.

For approximate proportions by weight add 15 per cent to proportions of aggregate shown in the table.

The mixes are given as a guide only. The first batch should be made with measured water content and the proportions thereafter adjusted to give the desired workability, maintaining the specified water-cement ratio.

SLUMP INCHES	TRIAL MIX, DRY COMPACT VOLUMES FOR MAXIMUM SIZE OF AGGREGATE INDICATED: 1 INCH	2 INCH
	Water-Cement Ratio 5½ Gallons per Sack	
½-1	1-2-3	1-2-3½
3-4	1-1¾-2½	1-1¾-3
5-7	1-1½-2	1-1½-2½
	Water-Cement Ratio 6 Gallons per Sack	
½-1	1-2¼-3¼	1-2¼-4
3-4	1-2-3	1-2-3½
5-7	1-1¾-2½	1-1¾-3
	Water-Cement Ratio 6¾ Gallons per Sack	
½-1	1-2½-3½	1-2½-4
3-4	1-2¼-3¼	1-2¼-3¾
5-7	1-2-3	1-2-3½
	Water-Cement Ratio 7½ Gallons per Sack	
½-1	1-3-4	1-3-4¾
3-4	1-2½-3¾	1-2½-4¼
5-7	1-2¼-3½	1-2¼-3¾

TABLE 3 APPROXIMATE QUANTITY OF SURFACE WATER CARRIED BY AVERAGE AGGREGATES*

Very wet sand	¾ to 1 gal. per cu. ft.
Moderately wet sand	about ½ gal. per cu. ft.
Moist sand	about ¼ gal. per cu. ft.
Moist gravel or crushed rock	about ¼ gal. per cu. ft.

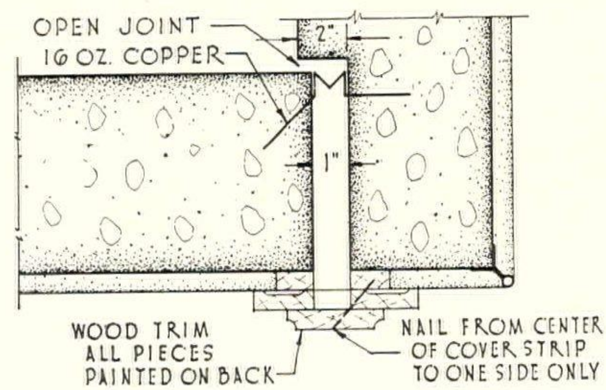
* The coarser the aggregate, the less free water it will carry.

can be used to deposit the concrete, the lower end of the pipe being kept almost at the surface of the concrete to avoid splashing.

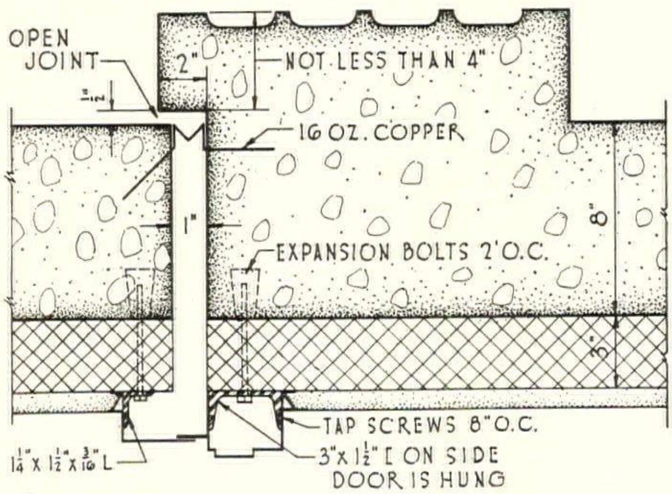
It is desirable to plan, wherever possible, to stop the concrete pour at some horizontal element in the design, such as a molding or belt course. The forms should be slightly over-filled and after the concrete has settled, the water which rises to the top can be struck off, leaving clean sound concrete ready for the next fill. It is obvious that care should be taken to see that these joints are straight and true to avoid unsightly irregular lines after the forms have been removed.

Before starting the next fill, the concrete should first be wetted and then an inch or two of mortar placed in the forms to avoid any possible honeycomb at the juncture of the old and new concrete. Some engineers find it satisfactory to reduce the coarse aggregate by half in the first batches. Either method is permissible.

EXPANSION JOINTS

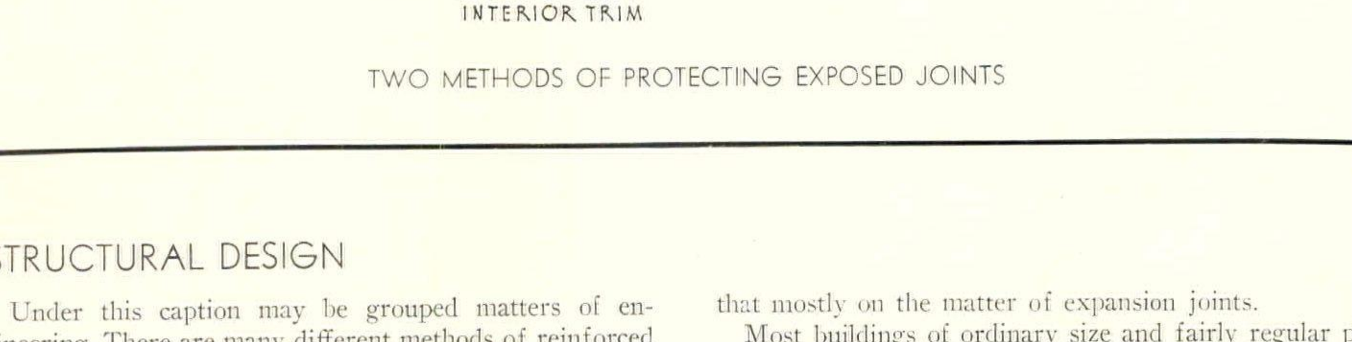


A CONCEALED CORNER JOINT



WALL JOINT AT PILASTER
FURRED AND PLASTERED INTERIOR WITH
EXPANDING DOOR BUCK AND FRAME

Structural details recommended by Portland Cement Association



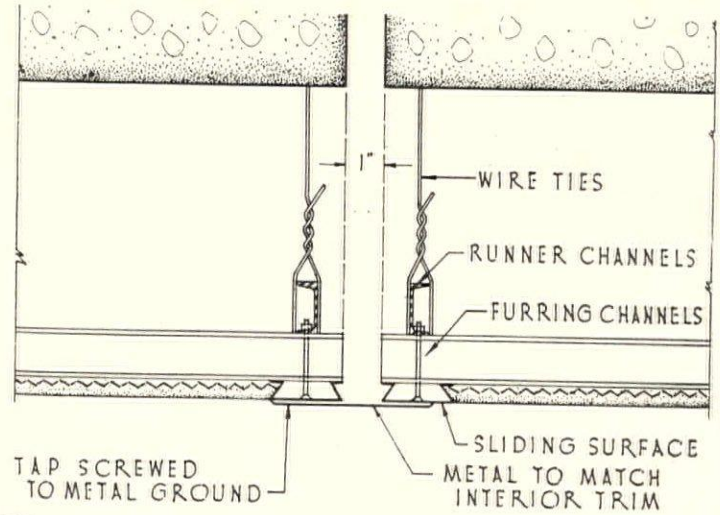
TWO METHODS OF PROTECTING EXPOSED JOINTS

STRUCTURAL DESIGN

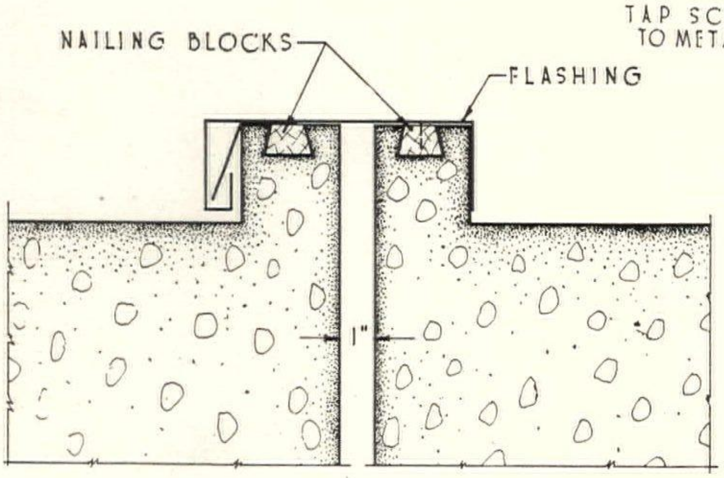
Under this caption may be grouped matters of engineering. There are many different methods of reinforced concrete floor construction from which the designing engineer can select the one best suited to architectural needs. This applies also to column construction and reinforcement. The whole subject is one of collaboration between the architect and his structural engineer in solving specific problems. There is little that can be said here, and that mostly on the matter of expansion joints.

Most buildings of ordinary size and fairly regular plan do not need expansion joints, but with some conditions of size and plan it is well to provide them. Buildings under 200 feet long are seldom provided with joints; longer buildings should have at least one. In general the joints should not be more than 200 feet apart. If the plan has a large interior court, a bank of large elevators,

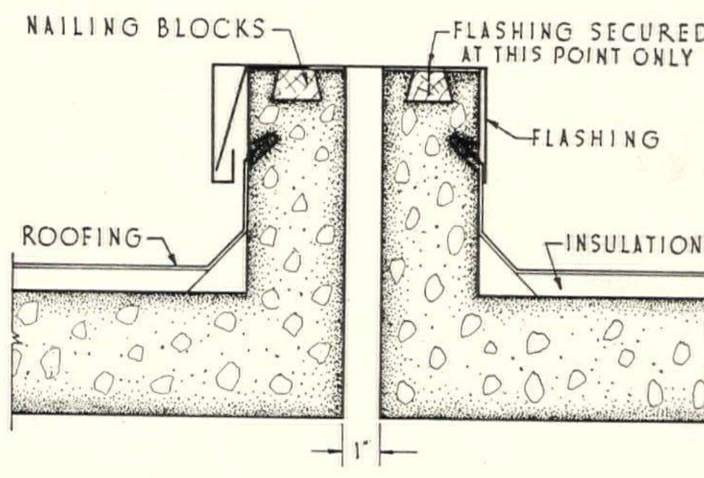
EXPANSION JOINTS



JOINT IN SUSPENDED CEILING
BENEATH CONCRETE FLOOR



COPING JOINT



ROOF JOINT
DISCONTINUOUS MEMBRANE ROOFING

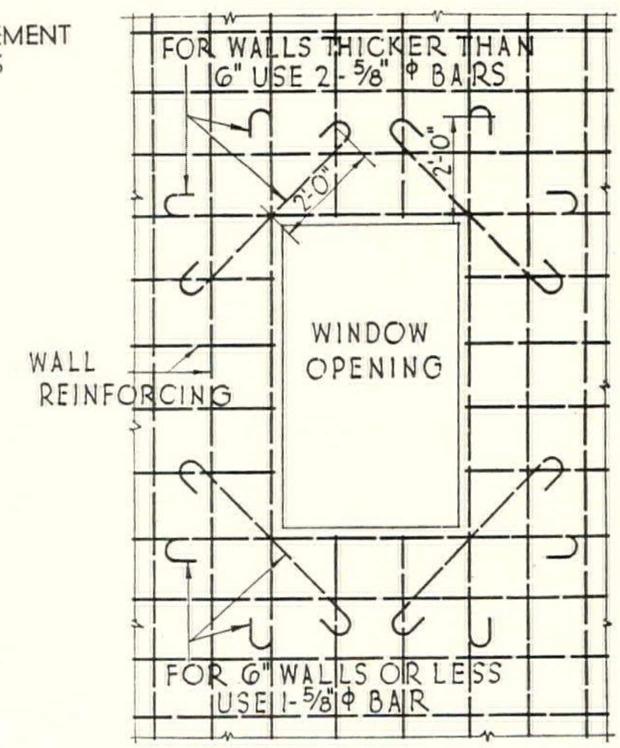
Structural details recommended by Portland Cement Association

or the like, joints at one or both ends of the vulnerable section may be in order. Where a building changes direction, as in L-, T-, or U-shaped plans, joints are generally advisable. Suggested expansion joints are shown in the accompanying illustrations.

Adequate reinforcement should be provided around window openings to avoid the fine radial cracks sometimes found where this precaution is neglected. Recommended practice is shown in the diagram on the next page.

To localize in a predetermined suitable plane any cracks that might tend to form, some engineers advise filling the forms to either the sill or window head, and letting the concrete stand for several hours, or overnight, before concreting is resumed. Any strains which might otherwise result in a crack will then tend to follow the fill plane, and remain practically invisible.

TYPICAL REINFORCEMENT
AROUND WINDOWS



ARCHITECTURAL FEATURES

Various characteristics may be impressed on the finished wall by the methods of form construction. The type and kind of finish will depend on the architect's imagination and his repertory of form construction materials.

Board marks can be minimized or emphasized by proper choice of lumber. Board-joints can be reduced in number by the use of wider boards, or increased by the use of narrower pieces. The joint can be emphasized still more by chamfering lightly the edges of the boards, which will result in a raised triangular fillet at each joint.

Smooth surfaces can be obtained by lining the forms with plywood or Presdwood, using fine nails having thin flat heads which do not leave an impression on the finished concrete.

Corrugated black iron has been used with success for limited wall areas and for pilaster fluting. (Black iron will not adhere to the concrete; galvanized iron will do so even if oiled.)

Half-rounds tacked to the forms to leave flutes in the concrete surface, strips to form rustication, and the like, are best nailed so lightly that when the forms are removed, the strips will remain in the concrete, thus protecting the still-tender arrises. It is also wise to make one or two longitudinal saw-cuts on the backs of such pieces before nailing to the forms; if the wood has partly dried out, it will expand when the wet concrete is placed against it, and the saw-cuts will provide room for this expansion, which might otherwise damage fine edges.

If the design involves small members or fine detail it is well to avoid construction in wood, even where possible, in order to lessen the likelihood of damage by swelling. For such cases, and where elaborate ornamentation is desired, waste plaster molds are employed.

From the original clay model, a plaster mold is made. In this, after the clay has been removed, a glue reproduction of the original model is cast. From this, in turn, as many plaster molds can be made as required by the design. It follows that the more times a given piece of ornament can be used the less will be the cost.

In making waste molds (so called because they are "wasted" or destroyed in removing them from the concrete), it is usual to place a layer of colored plaster (1/8" or 1/4" thick) next to the concrete so that the workman who is chipping away the plaster will know when he is about to reach the concrete and so will take precautions.

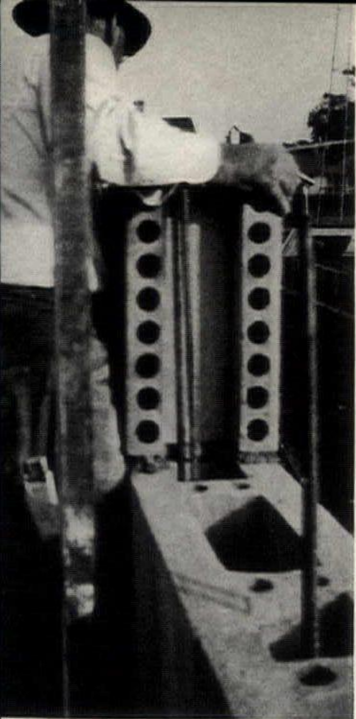
In regions of scanty rainfall, drip moldings are not of great importance, but in other parts of the country where there is normal precipitation, especially in the industrial regions, they are worth careful consideration. Adequate provision for drips on the underside of sills, belt courses, copings, cornices, and so on, will prevent accumulated soot from being washed in unsightly streaks down the face of the structure.

Cornices can sometimes be drained to the rear, and water discharged through vents in the base of the parapet onto the roof proper, to be handled by the roof drainage system. It is also feasible to slope the top of the parapet wall to the back, if it is desirable to avoid the front overhang which a drip would require.

Lest these notes appear to indicate unusual difficulties in architectural concrete, it should be remembered that the suggestions embrace nearly the whole field of details to which thought must be given. They can well be contrasted with the complicated technique of construction in which the walls are assemblages of various materials unrelated in size, composition and behavior, with consequent necessity for intricate spandrel waterproofings and flashings. Joints through which moisture could conceivably enter the structure are reduced from vast numbers to three or four, or, at the most, not over a dozen on the largest buildings. The hazards of leaky sills and the maintenance of exposed metal lintels and spandrels are avoided, together with the technical problems involved in their satisfactory installation.

PRECAST CONCRETE BLOCK CONSTRUCTION

BLOCK DESIGNED BY ERNST A. BENKERT OF BENKERT & MITTELBUSHER, ARCHITECTS
WINNETKA, ILLINOIS — MANUFACTURER: NEIL GATES



1

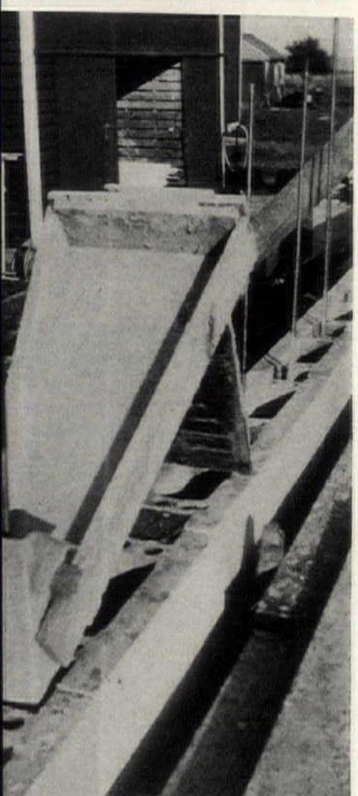
UNIT: 2′-0″ x 1′6″ x 8″. Materials: cement, sand, Zonolite, asbestos, water.

METHOD OF MANUFACTURE: Mix is poured into molds containing vertical and horizontal rubber tubing which are inflated when mold is filled. This pressure displaces a large amount of water, sets mix: block may be removed almost immediately.

METHOD OF CONSTRUCTION: Units are laid directly on footings and/or floor slab, with a constant vertical and horizontal joint (Figure 3), using either cement mortar or mastic as bond. The vertical joint coincides with steel reinforcing bars sunk in footings; the joint, when poured, gives a concrete stud 2′ on centers (Figure 2). Various types of floor construction may be used but the designer suggests system indicated below. Precast hollow tiles, 2′ square, are placed on a temporary form; these serve as formwork for poured joists, appropriately reinforced, 2′ on centers each way. Center section of each tile may then be filled with insulation—against sound between floors or against heat loss under the roof. This method serves as a foundation for any type of floor or roof finish. Recommended for the floor is a precast floor tile of proper size to center joints on poured joist.

ADVANTAGES: Unit carries own insulation in form of cells (Figure 1) and Zonolite and asbestos aggregates; center air space suitable for heating, plumbing and lighting conduits; finished block allows for nail and sawing, serves as natural plaster base; walls may be only spray-painted inside and out, plaster omitted; surface susceptible to sculptural treatment; unit may be handled easily by one man.

DISADVANTAGES: Because of bond with joist, units cannot be removed after building is finished; use of poured concrete definitely limits time of year during which construction can be properly undertaken; not suitable for traditional styles, since economies of wall construction tend to disappear in pitched roofs, ornament, etc.



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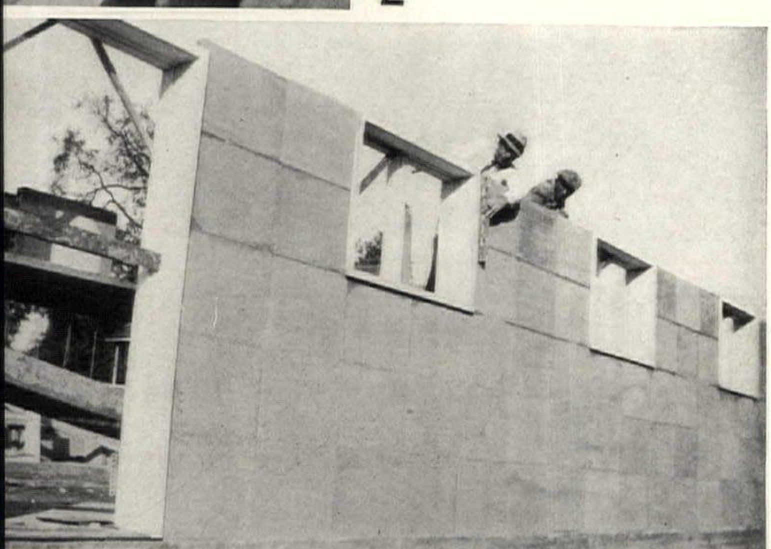

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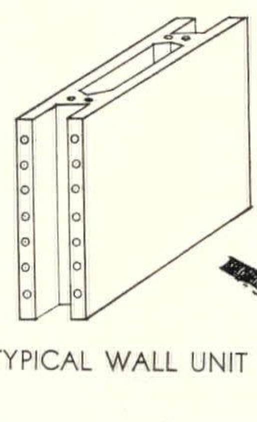
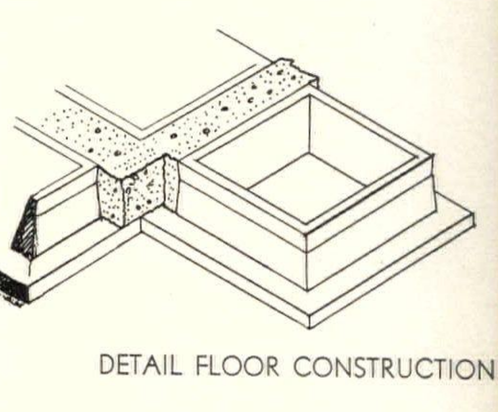


TYPICAL WALL UNIT



DETAIL FLOOR CONSTRUCTION

NEWS OF THE MONTH

GOVERNMENT UNDERTAKES CENSUS OF CONSTRUCTION

Authoritative studies show that the durable goods industries are the ones that encounter the greatest difficulty in a period of economic stress. Because construction is one of the largest industries in this group, widespread interest is being displayed in the Construction Census that is to be taken by the Bureau of the Census as part of the Census of Business. It is designed to secure the basic facts for construction activities; the contribution that will thus be made to the knowledge of construction will be an important step towards stabilizing conditions in this industry.

On January 2 representatives of the Bureau of the Census begin calling upon contractors to request information that is needed. Figures will be secured for the number of persons employed by contractors, man-hours of work in 1935, disbursements for salaries and wages, value of contracts and orders received during 1935, value of construction work performed, and expenditures for materials. In addition, information is to be obtained for the location of the business establishments that are regularly maintained by contractors, the legal form of organization (firm or corporation), and the kind of construction business in which they were engaged during 1935.

At the request of some of the leading members of the construction industry who have assisted in planning the Census, detailed information is to be secured for some items. Work performed, for example, will be shown separately for one- and two-family houses, other residential building and non-residential building, heavy construction and highways. Each of these groups will be further subdivided by new construction and by remodeling, repairs and maintenance. Private construction and public construction are also to be shown separately. These breakdowns will make a detailed analysis of the industry possible.

Construction activities are directed toward providing and maintaining the facilities required for production and the structures needed for housing. In normal times a large proportion of workers are employed directly in these activities. Many additional workers are engaged in the manufacture of the materials used in construction. The total of constructional and related manufacturing operations therefore results in very large disbursements for wages. With many industries dependent upon construction for markets for their products, it is evident that the degree of construction activity has a marked effect upon general business conditions. Because of this last consideration, the information to be secured by the Census will be of great value to those concerned with the analysis of the business situation.

It is not to be inferred that statistical facts are lacking for the construction industry. A number of different agencies are compiling statistics currently. Without such data very little would be known about the changes that take place in construction activities. The current statistics, however, are based on reports from varying proportions of the total number of contractors. The Census, on the other hand, will secure reports from all contracting establishments and will thus furnish a background for increasing the usefulness of the current statistics.

The Census figures will be secured by trained field men of the Bureau of the Census who will explain the report forms and assist the contractors in filling them out. Every effort will be made to complete the field canvass in three months. This will make it possible to issue the first results by July.

Headquarters for the Census of Business have been established in Philadelphia with Fred A. Gosnell, Chief Statistician, in charge. Only sworn employees of the Bureau of the Census are permitted to examine the individual reports and then only for the purpose of compiling statistics. No access to information furnished is permitted under the law, not even to other Governmental agencies, and no information will be disclosed which would reveal any of the facts or figures in the individual reports.

George J. Lawrence, *Chief*
Construction Division, Census of Business.

PURDUE BEGINS HOUSING EXPERIMENTS

Research in housing is actively under way by the Housing Research Foundation at Purdue University. Houses costing less than $5,000 are being built and studied with the object of finding a way to meet the demand for an adequate low-cost house for the average American family.

Through the generosity of David E. Ross, 143 acres of land have been donated to the Foundation for the purpose of a Housing Research Campus. Upon this campus will be built a community group of homes which can serve as a cross-section of average American housing adjusted to contemporary conditions. These houses will become the object of research to determine why houses cost what they do, how costs can be reduced, and low-cost housing can be improved in plan, construction, equipment.

Under the direction of Mr. Frank Watson the first group of nine houses is now under way. Contracts for three houses have been let and construction started. Roads have been rough-graded. A sewage disposal plant of 50 families capacity is under construction. Water will be supplied from a deep well which is completed. Trenches are now being dug for the gas, water and sewer lines. A feature of the development will be the use of underground electric service throughout the property.

The first house in the development was designed by Howard T. Fisher, Chicago architect, and is being erected by General Houses, Inc., at a cost of $4,236. It is a cellarless, one-story house with detached garage, built with a new system of prefabricated units used for the first time in this house. These units are a modification of a built-up plywood unit recently developed and tested at the United States Forest Products Laboratory. The living accommodations include a combination living and dining room, kitchen, utility and storage room, three bedrooms and bath.

The design of the second house was awarded the first prize in a competition conducted by the New York Chapter, American Institute of Architects. The architect is

J. André Fouilhoux, New York City. The contractor is Ed Schroyer, Lafayette, Indiana. The cost of this house exclusive of the land, will be $4,681. This is also a cellarless house, but unlike the first will have two stories and built-in garage. It will be of wood frame construction, finished with stucco on the exterior and plywood on the interior. The living and dining rooms are combined as are the kitchen and heater rooms on the first floor. The second floor contains three bedrooms and an unusual feature for a small house in the form of separate toilet and bathrooms.

Reinforced concrete was selected for the construction of the third house which was designed by Burnham Brothers and Hammond, Inc., Chicago architects. It will cost $4,997 and the contractor is Charles Gambsky Co., Inc., Menasha, Wisconsin. In contrast to the other two houses, this will have a basement containing laundry, heater and recreation room. The first floor provides for a combination living-dining room, kitchen and garage; the second floor, three bedrooms and one bath.

Six additional houses which will complete the first research unit are now in the final design stage. They will be built of wood, brick, steel, Haydite block, and Rostone, and will conform to the general specifications established for the entire group.

Since the project is being undertaken for research study it was viewed as essential that as many different building materials and construction methods as possible should be utilized. For purposes of comparison it also appeared essential to have the design for all houses based upon requirements common to all. The designing specifications consider three factors; first, a house to cost less than $5,000 exclusive of the land; second, accommodations for a family of two adults, two children—a boy and a girl; and that each house must contain some distinctive feature.

To make the results of the Housing Research Project of practical value, it is being removed from the realm of research as typified by the scientific laboratory. In other words, the procedure followed in the designing and erection of these houses is exactly that which would be followed by the average citizen who sets out to build himself a house. The problem is placed in the hands of an architect, bids are obtained from contractors, materials are those normally available in any locality, labor is of the type and quality normally used on construction work. No advantage is taken by the Purdue Research Foundation in the matter of obtaining materials or equipment at a discount or free from manufacturers or producers.

The site of the Housing Research Campus is free from building code restrictions. Thus unrestricted the project is free to adopt construction methods and details which might not otherwise be permitted and still erect safe, substantial houses.

After these houses are completed, they will continue to be the object of research. An attempt will be made to furnish them adequately and in good taste at a cost in proportion to the cost of the house. The houses will be lived in by members of the scientific staff of Purdue University who will pay a minimum rental. Records will be kept of the maintenance costs, water, gas and electric consumption, heating costs, performance of the equipment, structural soundness, and home arrangement.

BENJAMIN F. BETTS.

A. I. A. REPORTS SCARCITY OF DRAFTSMEN

Improved conditions in the construction industry are reported from all sections of the United States by the Regional Directors of the American Institute of Architects, according to a survey of progress in architecture and building during 1935 by Stephen F. Voorhees, president of the Institute.

A marked increase in architectural employment, amounting in some localities to an actual scarcity of draftsmen, is a significant feature of the recovery in this industry.

The Institute Directors urge that governmental participation in the field of low-rental housing be limited to procuring and disseminating necessary general information and to furnishing financial aid for such projects, leaving to local agencies such functions as location, design, construction, and administration.

"One of the most encouraging experiences of the past year," Mr. Voorhees states, "has been the higher rating attained by plans prepared by architects when submitted for government insured mortgages as compared with plans prepared without benefit of architectural service.

"To further this work the Directors of the American Institute of Architects indorsed a plan to establish local groups of architects prepared to furnish architectural service in the small house field in a manner to meet local opportunities and demands for such professional service.

"The Directors also tendered to Government agencies promoting better small house building the assistance of the Institute in raising the standards of value by means of the employment of competent architectural service."

A. I. A. CONVENTION AT WILLIAMSBURG

The Directors of The American Institute of Architects have adopted the recommendation of the Convention Committee that the 68th Convention be held May 5 to 8 at Williamsburg, Va.

It is proposed to establish Convention headquarters at Old Point Comfort, 38 miles away, where hotel accommodations suitable for the Institute's requirements can be had. Sessions will be held there and at Williamsburg; automobile busses will be used for transportation between the two points.

AIR HYGIENE FOUNDATION OF AMERICA, INC.

An organization bearing this name has been formed by a large group representing various industries, with headquarters in Pittsburgh. It is intended to conduct investigations of and to stimulate research on problems in the field of air hygiene and to gather and disseminate factual information relating thereto. It will also cooperate with and assist other agencies active in this field and will collaborate in the coordination of such research efforts. A comprehensive investigation has been begun at Mellon Institute of Industrial Research, Pittsburgh, under support of Air Hygiene Foundation of America, in which the hygienic, technologic, and economic aspects of air contamination, especially by dust in the industries, will be studied. H. B. Meller, who has been appointed managing director of Air Hygiene Foundation of America, will head this investigation at Mellon Institute. Mr. Meller is co-author with L. B. Sisson of an article, "Air Pollution," which appeared in the March 1934 issue of *The Record*.

Editorial in the Richmond (Va.)
NEWS LEADER, *December 16, 1935*

WILLIAMSBURG PUBLICITY.

Publicity for restored Williamsburg has been directed in the same spirit as the restoration itself—without the blare of bad taste or the boast of achievement. Whatever has been printed with the approval of the men responsible for the restoration has been issued in flawless form. The published pamphlets on the different buildings are admirable; RUTHERFORD GOODWIN'S *Brief and True Report for the Traveler Concerning Williamsburg, in Virginia*, is unique in spirit as in format. Pictorially, nothing could be finer than the photographs of Williamsburg, to which *The Architectural Record* devotes the whole of its December issue (Vol. 78, No. 6).

We had occasion to remark the other day, in reporting on German publicity for the Olympic games, that American cameramen must look to their laurels, because the Germans are doing some amazing things with new films and lenses. After examining the photographs of Williamsburg in the architects' magazine, we are quite sure Americans can defend their laurels. It is hard to see how photography could more perfectly reflect the spirit of an incomparable restoration.

FAN MAIL ON WILLIAMSBURG

The December issue, which was devoted entirely to a presentation of the Restoration of Colonial Williamsburg in Virginia (a project executed with funds given by John D. Rockefeller, Jr.), has evoked much reader-interest, as shown by the increase in congratulatory letters to the editors. Although an extra supply of copies of this issue was printed, the demand proved greater than had been anticipated and it has been found necessary to prepare a special reprint edition. These reprints, as suggested by Mr. Schwinley of Washington, D. C., whose letter appears below, have been bound in permanent board covers, finished in a blue cloth, and can be obtained from The Record's circulation department at $1 a copy; they are also available at the office of Colonial Williamsburg, Inc., in Williamsburg.

Merrill C. Lee, State Director of the Federal Housing Administration at Richmond, Va., in his letter to The Record calls attention to an editorial which appeared in the Richmond *News Leader* in praise of the F. S. Lincoln photographs. The editorial is reproduced herewith.

I have just received the December issue of The Record, which I think presents the restoration of Colonial Williamsburg in a splendid manner, and I certainly wish to extend my congratulations on this excellent number.

J. BINFORD WALFORD,
Architect for the College of William and Mary

I cannot close this letter without expressing my great admiration of the Williamsburg issue. It was a beautiful job, and you are certainly to be congratulated.

T. R. GOODWIN,
Colonial Williamsburg, Inc.

Congratulations on a splendid issue.

W. DUNCAN LEE, *Architect*
Richmond, Va.

The issue is superb.

CHAS. I. BARBER,
Barber & McMurray, Architects
Knoxville, Tenn.

I have just received my December issue of your magazine and wish to tell you I think it worth much more than the price of a year's subscription. The photographs of Williamsburg are marvelous and it is quite a treat to look at so much beauty when "modernism," the cult of ugliness, is in vogue.

I am not an old "traditionalist"—in fact, I am a young man who wants intelligent progress in architecture—but it seems to me that architects are going considerably out of their way for something "new." This in turn seems to me to denote pure egotism.

B. J. ALLEN, JR.
Dania, Fla.

Please accept congratulations on the December issue which illustrates the restoration of Williamsburg.

R. V. ARNOLD, *Architect*
Bristol, Va.

Congratulations on your excellent December issue. Williamsburg is a fine Colonial monument, and your published treatment of it has been beautifully done.

C. E. SILLING,
Warne-Tucker-Silling, Architects
Charleston, W. Va.

I have just received my December number of The Architectural Record and find it *very* interesting in view of the Williamsburg material.

ARTHUR B. HEATON, *Architect*
Washington, D. C.

I have just received the December issue —it is a most unusual and valuable edition, both to architects and to others interested in architecture.

There are several persons to whom I should like to give copies of this issue. However, it occurs to me that it would be more satisfactory for one's private library if it were bound. Have you considered having an edition of this issue bound in boards for the trade?

KEITH SCHWINLEY, *Architect*
Washington, D. C.

Your December issue is a *total loss*. I thought I was taking an architectural magazine, not one on archaeology. If such things must be included, why not go 50-50 so there will be something of value?

ELBERT BROWN, *Architect*
Los Angeles

The presentation of the subject matter was beautifully handled; we all send our congratulations, and also think that Lincoln should be congratulated for his photography.

EARL G. VON STORCH,
Oakland Housing, Inc.
Walled Lake, Mich.

We think very highly of your presentation of the Williamsburg Restoration. Mr. Cret said he thought it better done than anything he had seen for some time.

JOHN F. HARBESON,
Office of Paul P. Cret
Philadelphia

As a student of architecture who is deeply interested in Colonial Architecture, I was delighted with the many fine photographs and excellent text in the December issue. Here's a vote for more on Williamsburg in the near future.

DAVID M. HOLLENBACH
Reading, Pa.

Your reproduction of Colonial and Georgian designs is second to none in the architectural field. Perry Shaw & Hepburn have done remarkable work in this restoration and I say, personally, that everybody's hat should come off to them.

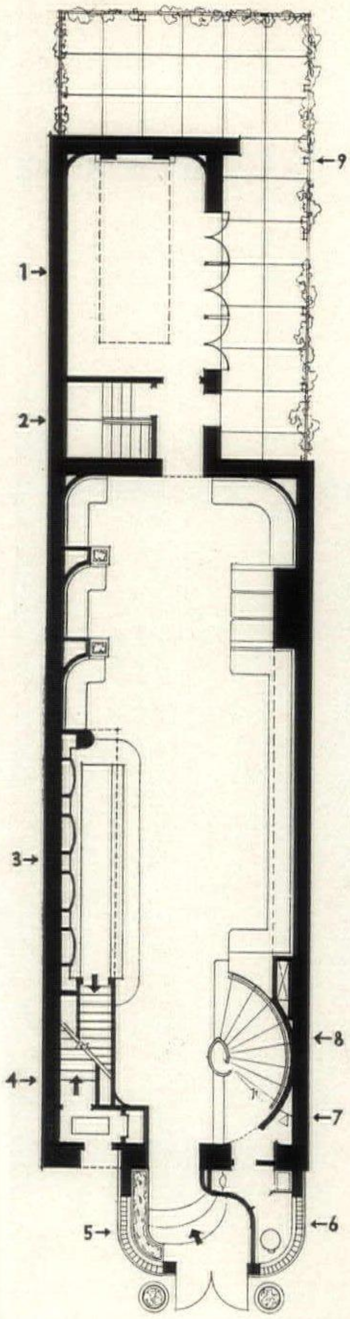
ARTHUR A. HOEFLER, JR., *Designer*
Epple and Kahrs,
Architects and Engineers
Newark, N. J.

Congratulations! Your December issue is marvelous, and we have all enjoyed it tremendously. It is a very valuable addition to our Library.

DANIEL PAUL HIGGINS,
Office of John Russell Pope
New York City

PORTFOLIO OF RESTAURANTS AND SHOPS

TONY'S RESTAURANT - CHARLES SHILOWITZ, ARCHITECT



1. Private Dining Room
2. Service Stair
3. Bar
4. To Apartments
5. Plants
6. Men's Room
7. 'Phone
8. To Rest Rooms and Private Dining Room
9. Dining Terrace

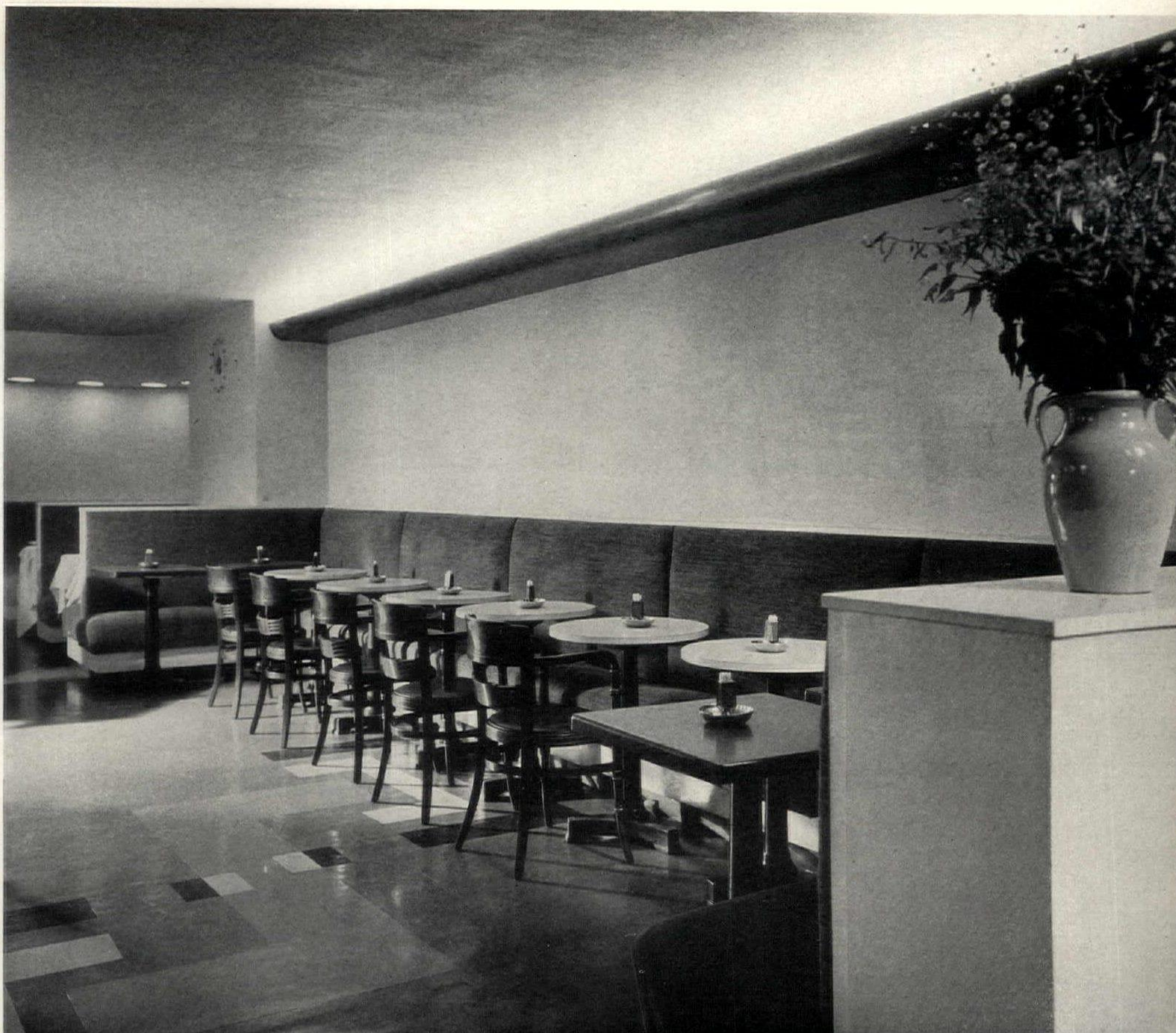
Photograph by F. M. Demarest

White stucco and black concrete base; glass brick; maroon doors.

INTERIOR OF TONY'S RESTAURANT CHARLES SHILOWITZ, ARCHITECT

The plaster walls and ceilings are finished in a pale coral. The light trough is American walnut. The linoleum floor has a brown field with coral and black inlays. The upholstery is brown.

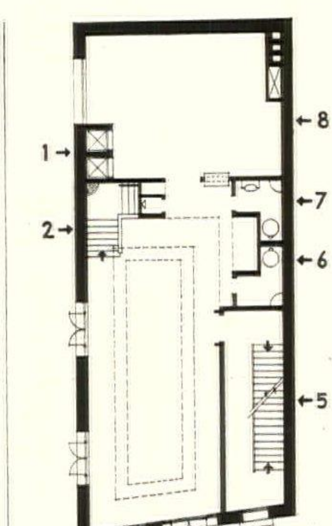
Photograph by F. M. Demarest



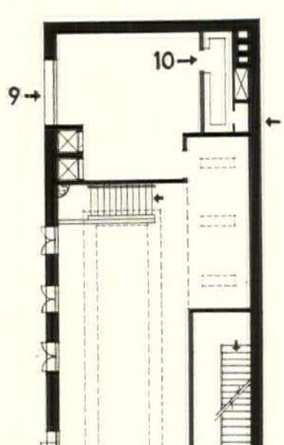
RESTAURANT AT 57 WEST 52 STREET, NEW YORK

LEE'S RESTAURANT

CHINATOWN, NEW YORK CITY



Second Floor



Third Floor

The plaster ceiling is painted a pale olive. The walls are gray harewood. The linoleum floor has a black field with inlays of vermilion and white. Vermilion tapes emphasize the olive Venetian blinds. Lighting fixtures are glass and red copper.

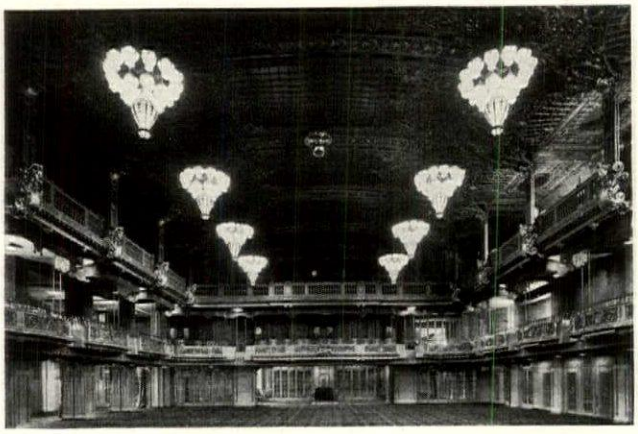
KEY TO PLAN

1. Dumb-waiter
2. To Upper Floor
3. Neon Sign
4. Entrance Below
5. Stair Hall
6. Women's Room
7. Men's Room
8. Kitchen
9. Kitchen
10. Supplies

Photographs by F. M. Demarest

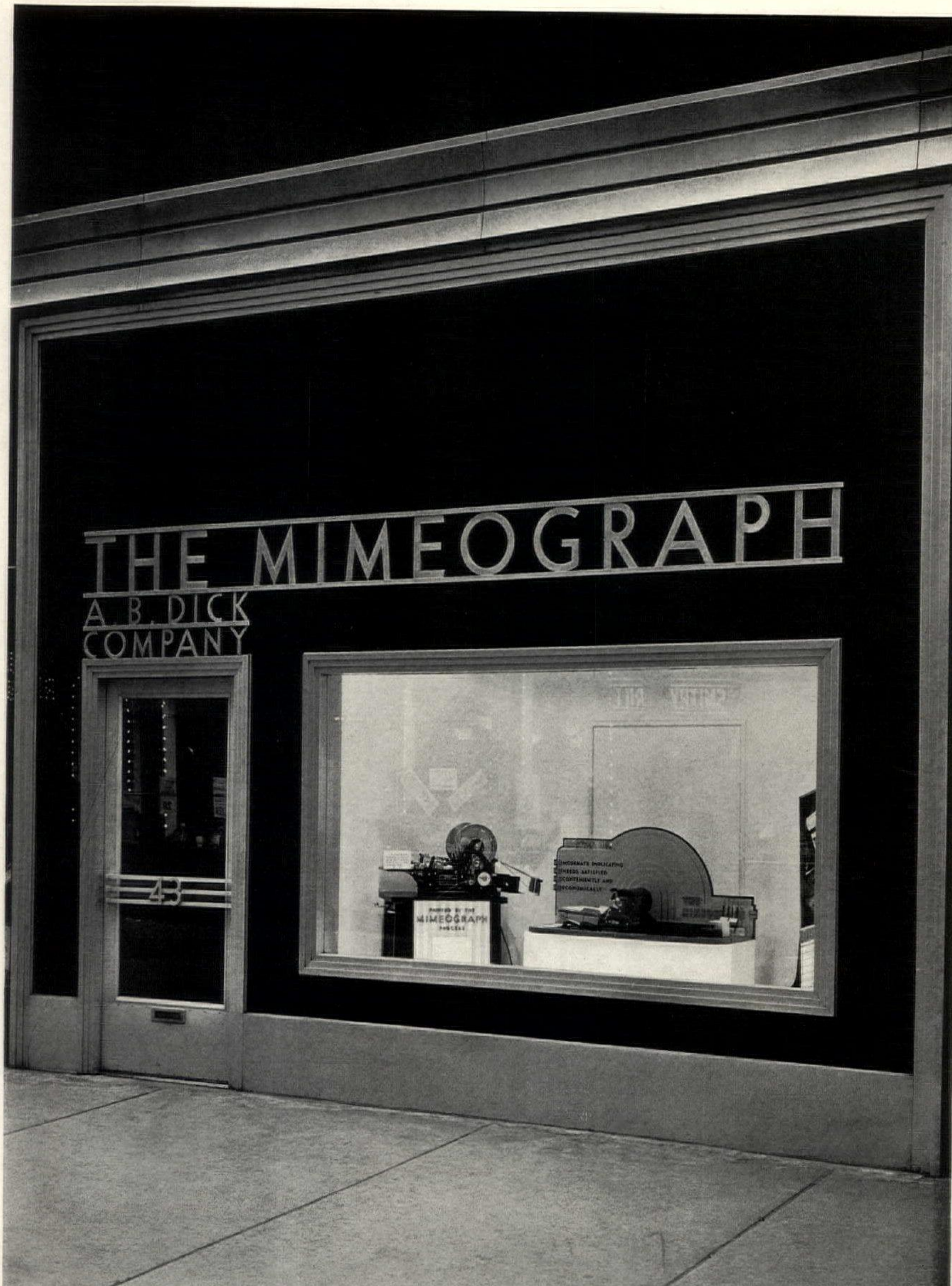
HOTEL BALLROOM TRANSFORMED INTO AUTOMOBILE DISPLAY SPACE

DESIGNED BY WALTER DORWIN TEAGUE



Within a span of 12 hours the rococo ballroom of the Hotel Astor in New York City was recently turned into a modern interior for the temporary display of the new Lincoln-Zephyrs. Plans for the transformation had been made in advance, so the changes were quickly executed. The piers shown in the photograph below are wood frames covered with stretched white cloth, the sides being accented in cobalt blue. The large pillars at the ends of the hall are a vermilion red. In place of a stretched false ceiling, strips of cloth are hung like louvers from the ceiling, making possible a system of indirect general lighting. Two bands of lighting troughs ran the length of the room, connecting the end pillars. The side piers are also illuminated.

Photograph by Wendell MacRae

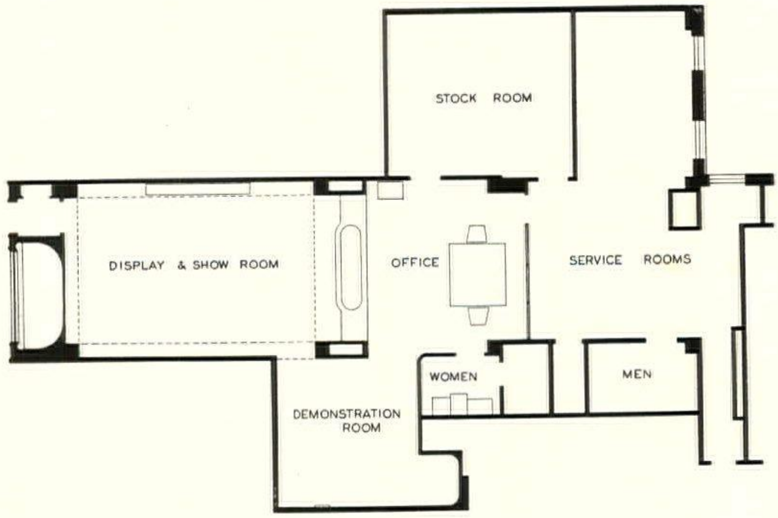


Photograph by Hedrich-Blessing Studio

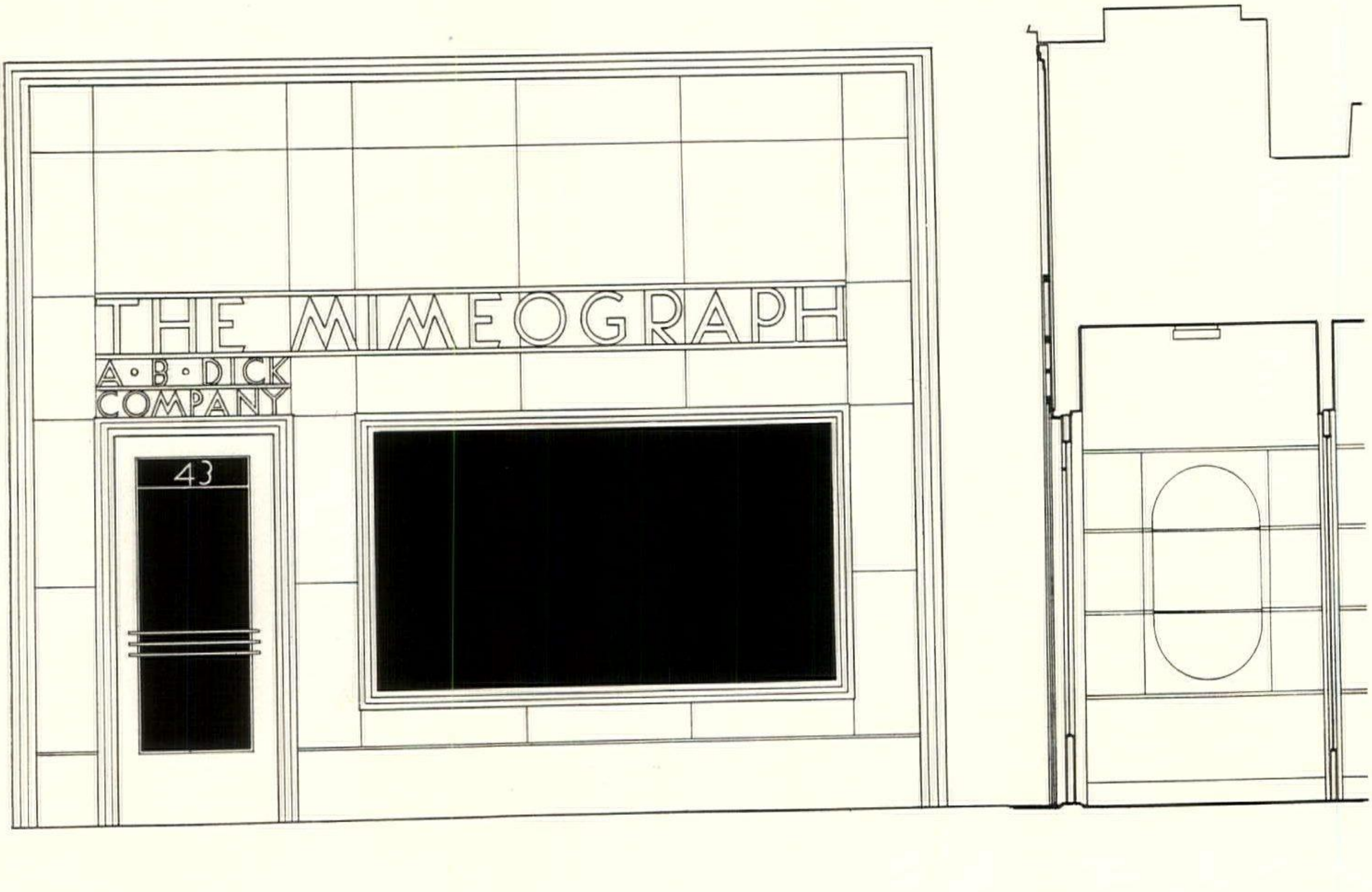
A SALES OFFICE

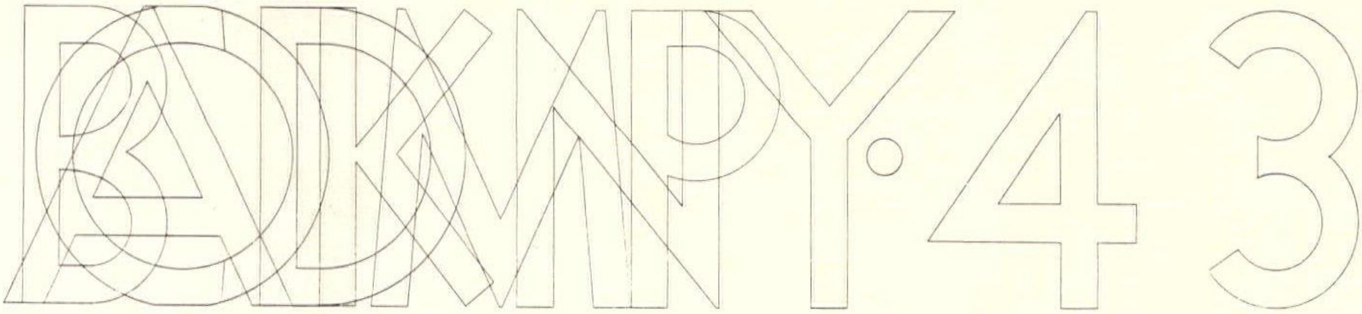
BY WALTER DORWIN TEAGUE, DESIGNER

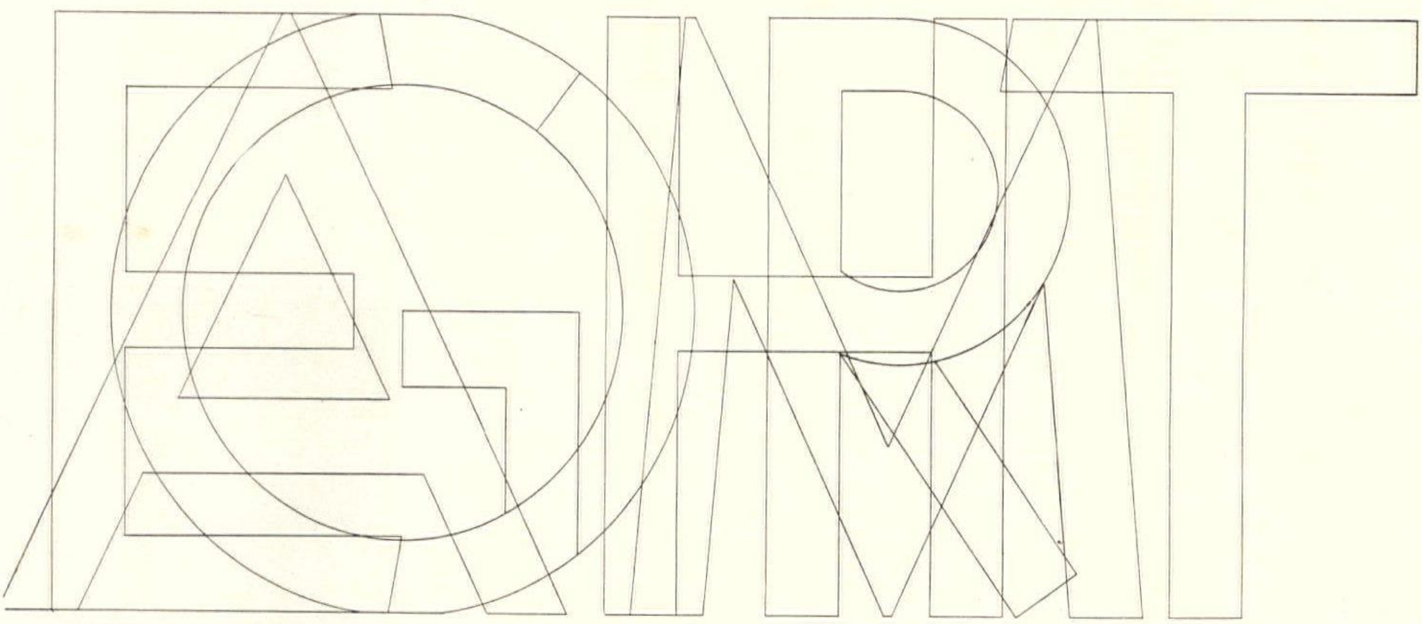
A. B. DICK CO. STORE ON MONROE STREET, CHICAGO



DESIGNED BY WALTER DORWIN TEAGUE

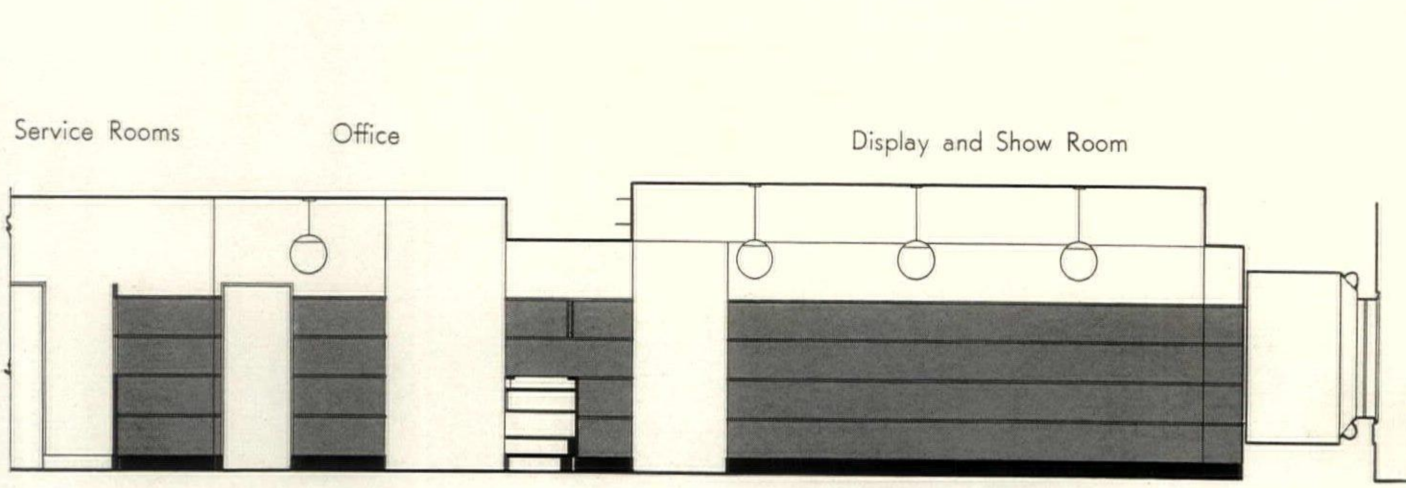






Lettering on exterior sign is satin-finish, anodic-treated aluminum ("Alumilite").

The entrance façade is made of black Carrara structural glass with aluminum trim and clear plate glass for the show window and door. Interior plaster walls are painted white and have a Flitch Prima Vera Flexwood wainscot with satin-finish chromium-plated "snap-on" moldings. The flooring is rubber-tile linoleum.



INTERIOR OF DISPLAY ROOM AND OFFICE IN A. B. DICK COMPANY STORE, CHICAGO

The furniture has Prima Vera veneer with satin-finish chromium hardware.

The hanging spherical lighting fixtures and the tubular wall fixtures are by Kurt Versen, Inc.

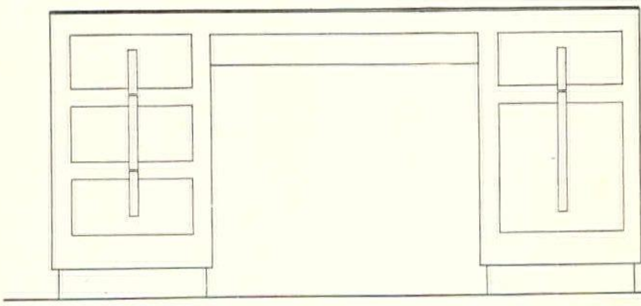
DESIGNED BY WALTER DORWIN TEAGUE

Photographs by Hedrich-Blessing Studio

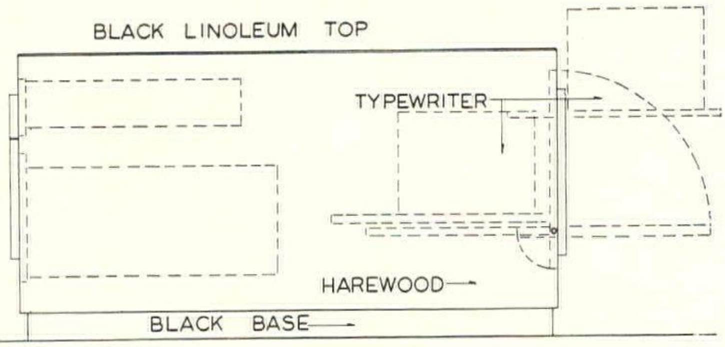
B. DICK CO. STORE ON MONROE STREET, CHICAGO

WORKING DRAWINGS OF FURNITURE IN A. B. DICK CO. STORE

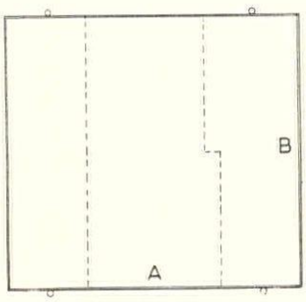
DESIGNED BY WALTER DORWIN TEAGUE



ELEVATION A



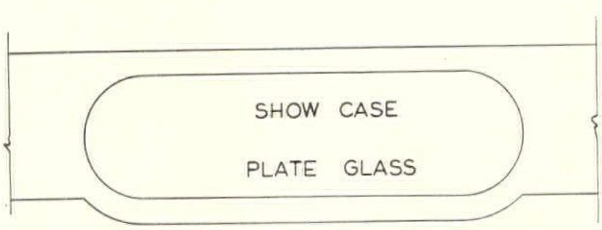
ELEVATION B



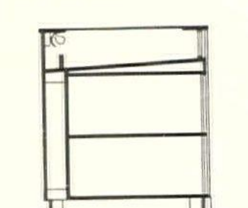
PLAN

Details of Order Desk and Show Case

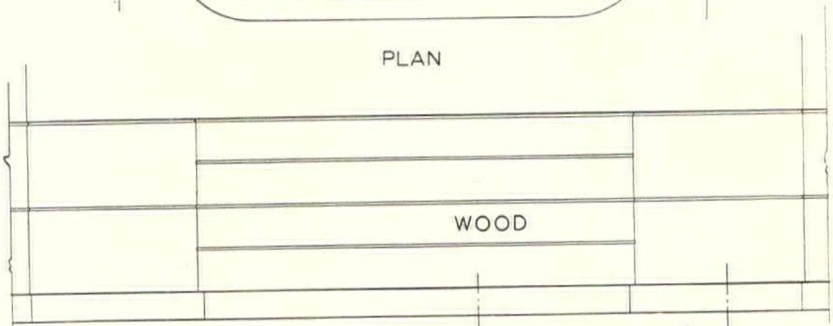
Tops of the desk and wrapping table are surfaced in black linoleum; the recessed bases are 3″ black rubber tile.



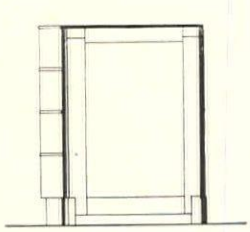
PLAN



SECTION A



ELEVATION



SECTION B

THE

ARCHITECTURAL RECORD

VOLUME 79 NUMBER 2 FEBRUARY 1936

ARCH ISSUE

ECIAL BUILDING TYPES, including:

Railroad Station by Edgar I. Williams, hitect.

Resort Hotel by William Lescaze, archi-t.

Book Shop designed by Morris Lapidus.

Remodeled Café by Otto Teegen, archi-t.

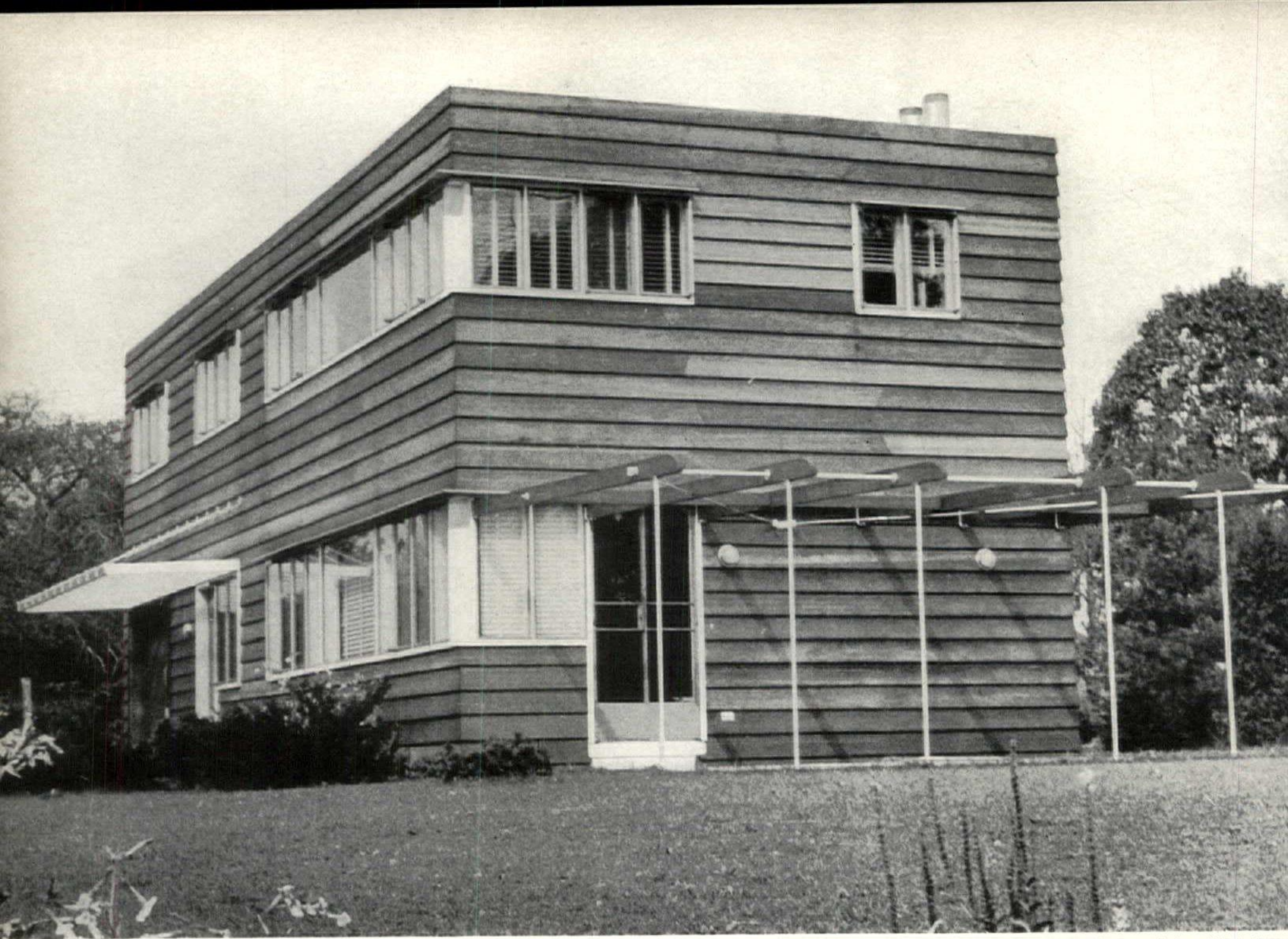
Bathing Establishment by Moestue and istad.

Service Station by L. Raymond White, hitect.

ASSOCIATES

JAMES M. FITCH, JR., has joined the editorial staff of The Architectural Record. He studied architecture at the University of Alabama and at Tulane University. Following special studies under the direction of Henry Wright, architect and city planner, he engaged in housing research and regional planning. He was formerly with the Nashville Planning Commission and later Director of Population Statistics, Tennessee State Planning Commission, and finally was with the Low-Cost Housing Division of the Federal Housing Administration.

GENE HAWLEY has been placed in charge of format. He was graduated from the College of Fine Arts, Syracuse University, where he won a Fellowship for a year's study in Paris. Before joining The Architectural Record he was engaged in the preparation of displays and exhibits for the Colonial National Monument Museum at Yorktown, Virginia.



Photograph by Albert Frey

This issue is devoted to the low-cost private house. The topic has been chosen in recognition of the growing practical interest of architects in the problem of designing a livable house with modern mechanical equipment that can be built for $4,000 or less. Study of the problem may be facilitated by considering (1) architectural standards, (2) mechanical equipment, (3) placing mechanical equipment with a view to economy in plan and construction and (4) construction materials and methods appropriate to the expected economic life of the building.

THE LOW-COST HOUSE

OST RANGE

This has been fixed at $4,000 to $2,400 for the following sons:

. The upper limit has been placed at $4,000 on the ground , taking the country as a whole, many architects, especially he smaller urban places, have had experience in designing ate dwellings above that limit.

. The lower limit has been placed at $2,400 on the ground urban families with a yearly income of $1,500 can afford ouse of that value but that urban families with incomes of than $1,500 are at subsistence or poverty levels and must homes. It is for the upper brackets of the income groups w $1,500 that the Federal government is promoting the struction of low-rent housing. "The Housing Division was up as a self-contained unit in the Public Works Administra- to make a study and demonstration of decent housing for income urban workers. If you will grant that by and large such worker with an income of less than $1,500 per year a sufficient margin of economic security to justify home ership, you will find that nearly half of all urban families ld always remain on a rental basis." (A. R. Clas, Direc- of Housing Division, in National Radio Forum, Nov. 18, 5.)

ccepting the assumptions of the reorganized home mort- market that the cost of a home should not exceed two es the family's annual income and that the family should in an owned equity of 20 per cent, the building or buying omes is restricted to families with incomes of $1,500 or e, because with less income savings are too meager. (*Ameri- Capacity to Consume,* by Maurice Leven, Harold G. ulton, and Clark Warburton. The Brookings Institution, shington, D. C., 1934, p. 261.)

he price which a family can afford to pay for a home de- ds upon many factors besides income; for example, the ber of children and other dependents, financial obligations r than the mortgage, and so on. The Federal Housing ninistration, therefore, in considering applications for mort- insurance insists upon no fixed ratio between value of e and income except that the value must not exceed four es the annual income. The general rule that the value should exceed two times the annual income was formulated by President's Conference on Home Building and Home nership on the basis of experience and practice in the mort- market.

he normal relationship between the cost of the lot and cost of the house is 20 per cent for the lot and 80 per for the house.

On the foregoing premises the following table is based:

Income	Lot	House	Total
$2,500	$1,000	$4,000	$5,000
2,000	800	3,200	4,000
1,500	600	2,400	3,000

A house at $2,400 is out of the question in large urban places with building codes adapted to closely spaced buildings on narrow lots. However, the census defines an urban place as one with a population of 2,500 or more. In the majority of villages and small towns conventional frame construction is not only permitted but justified by generous spacing on wide lots.

SIZE

As the average number of persons per family in the 1930 census was a fraction over four, it would seem that the typical house set up for study should have three bedrooms, to insure privacy for children of different sex. It is true that plenty of families have couch beds in the living room, but the very fact that so large a proportion of existing low-cost homes are sub-standard in privacy as in other qualities makes an architectural study desirable not only for professional advantage but for social service.

Whether the low-cost house may have a living room and a dining room or must be content with a living-dining room is one of the questions which the study should answer.

A kitchen with laundry extension or with separate laundry and a bathroom are essential, while cellar and attic are warranted only if their utility is worth the cost. A garage is essential, because the low-cost home is normally at a distance from low-fare rapid transit; but it may or may not be economical to combine it with the house.

The low-cost house, according to approved architectural standards with generous room dimensions, would probably have a volume of 10,000 cubic feet, not including garage.

The objectives of the study should be to answer these questions: Is it possible to design a single house in conformity with good architectural practice at the costs suggested, using products now on the market? If not, is it possible to do so in large-scale projects? The results of the study should reveal to architects whether there is a chance for professional service in the low-cost house field and to manufacturers whether through volume fabrication products heretofore restricted to moderate-cost dwellings can be adapted to low-cost houses. The contents of this issue have been brought together and organized to promote such a study by architects and manufacturers.

CONSTRUCTION COST VARIES WITH LOCALITY

Prices in this issue are given merely to indicate that the products mentioned are available to the low-cost house designer. Unless otherwise stated, they apply to the New York retail market. The products are of standard size and quality, not seconds.

Prices, wages and transportation and financing costs differ with the locality, making comparative construction cost studies difficult. The difficulty is increased by the fact that construction and mechanical equipment differ with conditions of climate and natural hazards (tornadoes, earthquakes, termites and the like). However, the problem of comparing construction costs will be simplified by index numbers for some 70 cities which began to appear in the Federal Home Loan Bank Review for January.

The index numbers are based on an identical house, a detached house of 24,000 cubic feet volume of sound design and workmanship, containing living room, dining room, lavatory and kitchen on the first floor, three bedrooms and bath on the second floor, an attic and a cellar. The exterior is of wide-board siding with brick and stucco trim. A one-car, attached garage is included. The design meets the requirements of the average municipal building code.

The basic data consists of prevailing unit prices of materials and labor, compiled by the personnel of the Reconditioning Division of the Home Owners' Loan Corporation, which includes architects and builders familiar with local construction practices. Items for overhead expense and contractor's profit are added, but not home mortgage financing costs.

The same home that can be erected in Columbia, S. C., for $4,337 costs $6,442 in Providence, R. I. It can be constructed in Baltimore for $5,028, but costs $6,033 in Cumberland, Md., 125 miles away. In Chicago, it costs $6,361, in Hartford, Conn., $5,846, in Oklahoma City $5,756, in Pensacola $5,095 and in Colorado Springs $5,972.

The house represented by the Federal Home Loan Bank Review's index numbers is undoubtedly typical of current construction. According to the Dodge Statistical Research Service, the average contract award for 23,425 single-family dwellings placed under construction for owners' occupancy during the first ten months of 1935 in 37 Eastern States was $6,362.

This average suggests that houses costing considerably less must have been fairly common. It is generally understood that, speaking for the country as a whole, many architects have experience in designing houses costing $4,000 or more. At any rate, this figure may be arbitrarily accepted as the dividing line between moderate-cost houses and low-cost houses, with the further assumption that examples of good architectural practice are rare with regard to the latter.

ARCHITECTURAL STANDARDS

Uniform architectural standards are needed as a starting point for comparable cost studies. The most comprehensive architectural standards of general validity are those incorporated in the Underwriting Manual of the Federal Housing Administration. The Manual is in the form of risk rating instructions to appraisers who report on applications for mutual mortgage insurance.

This insurance is restricted to mortgages on residential erty appraised at not more than $20,000. A mortgage eli for insurance may cover 80 per cent of the appraised v tion, may run for 20 years, and must be amortized by mo payments. The insurable amortizing single mortgage stand safety and liquidity to the lending institution and for a financing cost with definite monthly obligations to the rower. Thrift institutions are therefore lending money construction of new dwellings on this type of mortgag curity, protected by the Federal Housing Administr through its appraisals, construction inspections and m mortgage insurance.

As the amortizing mortgage is the dominant lending in ment of the reorganized home mortgage market, and as conditions upon which insurance is granted are set fort the Underwriting Manual, familiarity with the content the Manual is prerequisite to practical cost studies in s house architecture.

The architectural standards incorporated in the Manua expressed in terms of quality and consequently require i pretation. For example, the Manual demands "an econor layout" and goes on to say: "An economical layout is which presents the greatest proportion of usable area in tion to gross floor area. An excess of unusable space mak house undesirable. Aside from the added cost of constru and maintenance, it adds to the cost of furnishing and to labor of sweeping and cleaning."

Interpretation of this standard—economy of layout— with the Federal Housing Administration. The designe a moderate-cost house knows from experience what room di sions and plan arrangement will be accepted, because the eral Housing Administration in connection with any partic mortgage insurance application demands neither more nor than good architectural practice.

However, the low-cost house is new to architectural p tice. The designer is obliged to evolve minimum room di sions by analysis of the uses of rooms and their furniture. a guide to what the Federal Housing Administration is li to accept he will be helped by precedents established by o government agencies—the Housing Division of the Pu Works Administration, the Tennessee Valley Authority the like. Economical layout is therefore illustrated in this i by citing room dimensions and giving examples of floor rangements used by government construction agencies or ommended by research.

This procedure is followed with respect to all architect standards.

NEIGHBORHOOD STANDARDS

In the past there has been no encouragement for archit to study either the low-cost house or subdivisions approp to low-cost houses. However, the agencies through which home mortgage market has been reorganized insist upon qu in the neighborhood as well as in the house—the Federal H Loan Bank System in connection with discounting of mortg and the Federal Housing Administration in connection mortgage insurance. The house and the neighborhood are a constituent part of a larger problem—the low-cost h which can be achieved only in a neighborhood where pu improvements, utilities and services are planned as econom ly as is the house. Besides, the cost of homes is greatly ced by large-scale projects, beginning with the subdivision acreage and ending with the building of a dozen or more ises at a time. House design and subdivision design logically ong together in architectural practice, especially as related low-cost homes. The fact that the reorganized home mortge market demands technically informed treatment in (or tudied cost relationship between) both kinds of design offers v possibilities for the architectural profession.

The neighborhood standards incorporated in the Underiting Manual are clarified as to detail in a series of articles, itled Neighborhood Standards As They Affect Investment k, in the Federal Home Loan Bank Review. The fifth icle (December 1935), following the lead of Clarence rry in the Regional Survey of New York and Its Environs ol. 7, Monograph 1), says in substance: "New neighborods may be protected from decay and run-down districts y be measurably restored through a gradual subdivision of cities into neighborhood units, largely self-contained. rough traffic arteries automatically constitute the bounies of such units, since freedom from traffic hazards is ential to successful development of a home area.

'The size of the neighborhood area is determined chiefly by population necessary to support an elementary school, usual-2,000 to 6,000, and by the proximity of the school. Its ius may vary from ¼ to ½ of a mile, depending on the ance from the center of the city, the one mile square dimen-n being feasible in the suburbs. Shopping districts along the indary streets would thus be within convenient walking disce from any part of the area.

'Another requirement of the neighborhood is that it possess identity of its own in which the occupants may take pride. luntary neighborhood associations, organized to improve the olic services and to prevent undesirable encroachments, rarely elop in areas occupied by more than 5,000 people.

'An area measuring from one-half to one mile on a side, ending on its location, is ideal for a community of medium t, single-family homes because it encourages efficient neighhood services, traffic safety and neighborhood character."

The Federal Housing Administration favors a lower maxim of lot coverage than is frequently permitted by local linances. A major point in its housing policy is that ample it and air in all inhabited rooms is essential. It indorses trend in modern housing development towards lower land erage. Provisions for light and air that are inadequate acding to enlightened practice are increasingly a factor in olescence and will give a mortgage a low rating as an inance risk. A desirable maximum coverage for single family ached homes, including all accessory buildings, is 20 per it of the lot. (Circular No. 2, Property Standards, Federal using Administration. p. 7.)

LANNING AND ACCOMMODATION

The Federal Housing Administration permits fewer rooms l less mechanical equipment than are suggested for the threelroom house set up for study in this issue, but does so only ere the smaller requirements conform to the character of the ghborhood. For example, the minimum accommodation for lwelling is three rooms and a bathroom. However, such a elling would probably not be accepted for mortgage insurce if located in a neighborhood of typical six-room houses. any event, the study is intended not to illustrate minimum standards under special conditions, but good architectural practice under typical conditions.

MECHANICAL EQUIPMENT

This includes plumbing and sewerage, heating system and electric light and power. In the absence of precedent from good architectural practice with respect to the low-cost house, it is necessary to determine (1) what equipment is essential to health and utility, (2) what appliances for comfort and recreation are customary in low-income families and (3) what low-price equipment and appliances are available on the market.

Effort has been made to present in the following pages information on each of these three points as complete and useful as possible. The position has been taken that mechanical equipment must be adequate and of good quality, to withstand undue obsolescence during the life of a 20-year mortgage, and also to avoid heavy repair costs and frequent damage.

Quite a few manufacturers are producing equipment and appliances suited to the low-cost house, although heretofore sold mainly in the modernization market. The prices cited are those which an architect can obtain for a client building a single house. The impression received is that the low-cost house designer has a wider choice of mechanical equipment than might have been expected without investigation.

It is, for example, something of a surprise to learn from the special study for this issue by Henry L. Logan, consulting electrical engineer, that a light and power system conforming to the fire underwriters' code, with outlets of sufficient number and so located as to provide proper intensity and distribution of light, with adequate convenience outlets located in relation to furniture layout, with wiring of proper gauge, with sufficient number of circuits, with knife switches, cabinets and wall switches of substantial construction can be installed for as little as $80 without fixtures and $122 with fixtures.

The placing of mechanical equipment with a view to economy in plan and construction is of special importance in small house design and pains have been taken to find or to originate illustrative examples.

CONSTRUCTION MATERIALS AND METHODS

Mechanical equipment represents so large a part of the total cost of the modern house that consideration must be given to the relationship between the probable useful life of the structural shell and the probable useful life of the equipment. If, for example, the fixed mechanical equipment depreciates at a rate of 4 to 5 per cent a year, more durable materials for the shell are not economical except where needed to achieve a satisfactory degree of resistance to use, weather, fire, decay and, in some neighborhoods, tornadoes or earthquakes.

A wood frame house of traditional construction is no doubt still the least expensive in first cost, but maintenance is high. Such a house is possibly not as economical over twenty or twenty-five years as one of fabricated units, including concrete blocks, moisture-proof plywood, fireproof roofing, and so on.

Useful depreciation tables covering mechanical equipment. and the traditional types of house construction have been compiled by the Bureau of Internal Revenue for use with income tax returns.

TABLE 1

MEDIAN VALUE OR RENTAL OF NONFARM HOMES FOR THE UNITED STATES, 1930

MEDIAN VALUE OF OWNED NONFARM HOMES		MEDIAN RENTAL O[F] RENTED NONFARM HOM[ES]	
Total	$4,778	Total	$2
Urban	5,743	Urban	3
Rural Nonfarm	2,661	Rural Nonfarm	1

TABLE 2

DWELLINGS, BY CLASS OF DWELLING, FOR THE UNITED STATES, 1930

CLASS	NUMBER	PER C
Total	25,204,976	100.
One-family dwellings	22,833,110	90.
Two-family dwellings	1,728,087	6.
Three-or-more-family dwellings	643,779	2.
Urban	13,046,699	100.
One-family dwellings	11,001,861	84.
Two-family dwellings	1,430,570	11.
Three-or-more-family dwellings	614,268	4.
Rural	12,158,277	100.
One-family dwellings	11,831,249	97.
Two-family dwellings	297,517	2.
Three-or-more-family dwellings	29,511	0.

TABLE 3

TENURE OF HOMES FOR THE UNITED STATES, 1930

(Private-family homes, not including premises having quasi-family groups)

TENURE	NUMBER	PER C
All homes	29,904,663	100
Owned	14,002,074	46
Rented	15,319,817	51
Tenure unknown	582,772	1
Farm homes	6,668,681	100
Owned	3,498,688	52
Rented	2,968,268	44
Tenure unknown	201,725	3
Nonfarm homes	23,235,982	100
Owned	10,503,386	45
Rented	12,351,549	53
Tenure unknown	381,047	1

TABLE 5

NUMBER OF CITIES HAVING AVERAGE INCOMES IN DESIGNATED GROUPS, 1929 AND 1933

	HOME-OWNERS		TENANTS	
	Number of Cities	Number of Cities	Number of Cities	Numb[er] of Cit[ies]
INCOME GROUPS	1929	1933	1929	193[3]
$500 - $749	..	..	.	3
$750 - $999	..	3	2	17
$1,000 - $1,499	..	25	20	32
$1,500 and over	52	24	30	..

THE MARKET FOR LOW-COST HOUSES

Families with incomes of $1,500 to $2,500 constitute a large market for houses as well as for food, clothing and other necessities. The authors of *America's Capacity to Consume* estimate that there were in the 1930 census 21,674,000 nonfarm families of two or more persons, of which 6,905,000 or 31 per cent had (in 1929) incomes of $1,500 to $2,500.

That low-cost homes are numerically important may be inferred from the fact that 54 per cent of the 10,503,386 owned nonfarm homes (house and lot) enumerated in the 1930 cen were valued at less than $5,000. The number valued at $3, to $4,999 was 2,343,769 or 22 per cent of the total.

Owned nonfarm homes included 7,385,968 urban and 117,418 rural nonfarm homes. As defined by the Census reau, the urban population is in general that residing in ci and other incorporated places having 2,500 inhabitants or m while the rural nonfarm population is made up of persons ing in villages having fewer than 2,500 inhabitants or in open country but not on farms.

The three census tables at the top of this page confirm importance of the low-cost home.

ABLE 4

ERAGE FAMILY INCOME
ME-OWNERS AND TENANTS

AREA AND NUMBER OF CITIES	HOME-OWNERS Yearly[1] average income 1929	1933	Decline from 1929 Per Cent	TENANTS Yearly[1] average income 1929	1933	Decline from 1929 Per Cent
Average—52 Cities	2,269	1,478	35	1,512	1,052	30
New England—4 Cities	2,746	1,857	32	1,701	1,217	28
Middle Atlantic—4 Cities	2,183	1,445	34	1,556	1,079	31
East North Central—6 Cities	2,251	1,291	43	1,657	1,027	38
West North Central—10 Cities	2,152	1,436	33	1,580	1,132	28
South Atlantic—9 Cities	2,275	1,619	29	1,218	924	24
East South Central—3 Cities	2,212	1,351	39	1,218	783	36
West South Central—6 Cities	2,444	1,591	35	1,543	1,091	29
Mountain—6 Cities	2,142	1,300	39	1,561	1,045	33
Pacific—4 Cities	2,157	1,395	35	1,648	1,142	31

[1] An arithmetic average of the averages for individual cities has been used to minimize the effect of variations in size of sample.

ABLE 6

RCENTAGE DISTRIBUTION OF HOME-
NERS' FAMILY INCOME BY INCOME
OUPS AND GEOGRAPHIC AREAS

AREA AND NUMBER OF CITIES	Total Per Cent	INCOME GROUPS — HOME-OWNERS: Under $500	$500 to $999	$1,000 to $1,499	$1,500 to $1,999	$2,000 to $2,999	$3,000 and Over
61 Cities	100	25.0	21.5	17.7	14.1	12.3	9.4
New England—6 Cities	100	18.8	19.2	19.4	14.7	15.0	12.9
Middle Atlantic—5 Cities	100	28.2	24.3	18.5	11.8	10.0	7.2
East North Central—7 Cities	100	28.7	22.7	16.8	12.4	10.8	8.6
West North Central—10 Cities	100	21.0	22.4	19.5	15.5	12.8	8.8
South Atlantic—10 Cities	100	22.3	19.4	16.8	13.5	14.4	12.6
East South Central—4 Cities	100	31.9	19.7	15.9	13.7	11.3	7.5
West South Central—7 Cities	100	22.3	19.3	16.3	15.0	14.5	12.6
Mountain—8 Cities	100	27.2	21.4	17.1	14.3	11.6	8.4
Pacific—4 Cities	100	24.7	21.2	18.2	15.8	12.4	7.7

ABLE 7

RCENTAGE DISTRIBUTION OF TENANTS'
MILY INCOME BY INCOME GROUPS AND
OGRAPHIC AREAS

AREA AND NUMBER OF CITIES	Total Per Cent	INCOME GROUPS — TENANTS: Under $500	$500 to $999	$1,000 to $1,499	$1,500 to $1,999	$2,000 to $2,999	$3,000 and Over
61 Cities	100	30.8	25.4	18.4	12.4	8.6	4.4
New England—6 Cities	100	21.1	27.3	23.0	14.2	9.3	5.1
Middle Atlantic—5 Cities	100	31.5	27.6	18.6	11.4	7.5	4.4
East North Central—7 Cities	100	29.8	25.3	18.6	12.1	8.9	5.3
West North Central—10 Cities	100	23.4	27.2	21.2	14.1	9.7	4.4
South Atlantic—10 Cities	100	40.1	24.5	13.9	9.8	7.8	3.9
East South Central—4 Cities	100	49.7	21.2	12.6	8.6	5.4	2.5
West South Central—7 Cities	100	29.4	24.0	19.5	13.1	9.6	4.4
Mountain—8 Cities	100	30.6	24.5	18.1	13.3	8.9	4.6
Pacific—4 Cities	100	25.8	26.2	20.3	15.0	8.8	3.9

WNED CITY HOMES AND FAMILY ICOMES

A valuable study of a group of 789 home-owning families Buffalo, N. Y. (population, 573,076), was conducted in 30 for the Committee on Relationship of Income and The ome under the direction of Prof. Martin A. Brumbaugh of e University of Buffalo, with the technical assistance of Mr. illiam M. Haenzel (Publications of The President's Con- ence on Home Building and Home Ownership, Vol. IV, . 76—134). The families were selected on the following conditions: 1. Total income not exceeding $3,000 in 1930, 2. Family composed of husband and wife and at least one dependent child, 3. Both parents born in the United States, 4. Ownership of home, and still in process of paying for it in 1930, 5. Not more than two roomers or boarders, 6. Living in a one- or two-family dwelling, 7. No doubling up with one or more other families in quarters intended for one family.

Eighty-two per cent of the 789 houses were single-family dwellings. All except three were of frame. The majority were bought after 1922, the average purchase price being $6,131 for single houses (with lots) and $8,530 for two-family houses. The average earnings of the principal breadwinner at the time of purchase, excluding nine unknown cases, amounted to $2,057, which in 1930 had fallen to $1,902.

AVERAGE FAMILY INCOME OF HOME-OWNERS AND TENANTS

Tables 4, 5, 6, and 7 were compiled by the Financial Survey of Urban Housing, a CWA project conducted in 1934 by David L. Wickens, under the auspices of the Bureau of Foreign and Domestic Commerce. The survey obtained information in 61 cities, representing every State and covering on a sampling basis all parts of each city and all types of dwelling. The final report, entitled Financial Survey of Urban Housing, now at the Government Printing Office, provides information on urban residential values, mortgage debt, arrearages, family incomes and other aspects of the housing problem.

For 1929 all 52 cities in Table 4 had average owner incomes over $1,500 and 30 had average tenant incomes over $1,500. In 1933 only 24 cities reported owner-incomes over $1,500 and no city reported average tenant income equal to that amount.

Incomes under $500 were more numerous in 1933 than for any other group of equal range. The incomes between $500 and $1,000 were almost equal in number to those less than $500 while those between $1,000 and $1,500 numbered more than for any other group over $1,000.

Incomes below $500 were about one-half of the tenant cases and one-third of owner incomes in four East South Central cities. They constituted from 32 to 43 per cent of all owner incomes in 12 cities and from 33 to 60 per cent of the tenant incomes in 22 cities. Owners of homes in all areas have a generally higher level of incomes than those renting their housing accommodation.

SUBSTANDARD DWELLINGS PREVALENT

That a large proportion of owned homes are inferior in quality is proved by many federal, state, city and private housing reports and property inventories. The best recent factual study of substandard dwellings of all kinds is Edith Elr Wood's *Slums and Blighted Areas in the United States* (Ho ing Division Bulletin No. 1, Government Printing Offi Washington, D. C., 1935).

It is probably safe to say that the majority of existing lo cost private dwellings were inferior as to essential qualities plan, construction and equipment when they were built. T prevalence of substandard low-cost dwellings is undoubte due more to original deficiencies than to obsolescence. I ficiencies in the house were in a way inevitable, because small a part of the cost of the home was available for the ho under former financing and lot costs.

The cost of the home is conditioned by (1) the cost of mo gage financing, (2) the cost of the lot and (3) the cost the house.

Financing consisted generally of a first mortgage and a s ond mortgage. The first mortgage was for a short term, three years, and usually cost, with renewal charges, more th 6 per cent a year. Junior mortgages frequently cost, w bonuses, 18 to 20 per cent. (Publications of The Presider Conference on Home Building and Home Ownership, V II, Home Finance and Taxation, p. 9.)

Lot prices were inflated for a variety of reasons, one which was that subdivisions were rarely, if ever, planned c sistently for a low-income population and low-cost priv dwellings. The price of land adjusts itself to the type of and for the first time in America the Federal Housing A ministration assures a correlation between subdivision devel ment and housing improvement. The best recent survey modern principles of community plan and house design i paper entitled "The Inter-relation of Site Plan and Types Units," by William Stanley Parker, in *The Octagon* for N vember 1935.

The reorganization of the home mortgage market throu the Federal Home Loan Bank system and the Federal Ho ing Administration has completely changed the situation architects and manufacturers as well as for home buyers w respect to low-cost private dwellings. Not only has a subst tial sum been liberated for use on the house by reduced fina ing costs and deflated lot prices, but the Federal Housing A ministration in effect insists that this sum be put into impro plan, construction and equipment before insuring mortga

TABLE 8

NEW SINGLE-FAMILY DWELLINGS FOR OWNERS' OCCUPANCY
CONTRACTS LET DURING DECEMBER 1935, IN 37 EASTERN STATES
DODGE STATISTICAL RESEARCH SERVICE

	TOTAL No.	TOTAL Value	PLANNED BY ARCHITECTS No.	PLANNED BY ARCHITECTS Value	PER CENT OF DOLLAR VALUE BY ARCHITECTS
Under $3,000	136	$278,700	8	$17,500	6.28%
$3,000 - $3,999	217	708,900	37	123,300	17.39%
$4,000 - $4,999	276	1,162,200	55	231,700	19.94%
$5,000 - $7,499	536	3,126,500	199	1,170,800	37.45%
$7,500 - $9,999	221	1,827,900	117	973,900	53.28%
$10,000 - $12,499	157	1,683,700	109	1,170,700	69.53%
$12,500 - $14,999	27	363,800	18	244,000	67.07%
$15,000 and over	131	3,180,500	108	2,654,500	83.46%
TOTAL	1,701	$12,332,200	651	$6,586,400	53.41%

STANDARDS FOR THE LOW-COST HOUSE

HOUSE REQUIRED FOR LOW-INCOME GROUP

The house considered in this study is a freestanding one-family house, for a site of which only 20 per cent is to be covered by the house and any subsidiary buildings and which is to be located in a planned community, protected by zoning and other legal restrictions.

Size of House. The most important measure of a dwelling is the amount of accommodation. The size of the house here discussed is determined by the floor area required for health and comfort by the typical American family composed of two adults and two children. It is not a house of minimal room sizes. Reasonable spaciousness is provided.

Accommodation consists of: three bedrooms, a combined living-dining room, a bathroom, a kitchen, closets, cabinets and other storage space, a stair hall if house is of two stories and either a utility room or a cellar. As a garage can be built separately, it has not been included in our study.

Cubic Contents. In measuring a dwelling by the amount of accommodation it has been customary, but not entirely exact, to compare costs and to determine costs on the basis of cubic contents. It is clear, however, that houses having the same accommodation may vary greatly in cubic contents, depending on roof, porches, height of rooms, and whether or not a utility room takes the place of a cellar or basement.

When the sizes of rooms are reduced below what is convenient, the saving is comparatively small, while the injury to the plan and value of the dwelling may be great.

"In some localities an increase of 10% in the superficial area only increases the cost by 5%. Economy is therefore best secured where value is proportionate to accommodation and accommodation is proportionate to needs of those who use houses, remembering always that in every house a certain minimum of equipment is common to all, whatever the area of the house may be."*

Ten thousand cubic feet contents are assumed as providing the reasonable accommodation within the definition and purpose of this study.

Ceiling Height. A ceiling height of 8′-0″ is recommended. This conforms to most building codes where specific floor to ceiling dimensions are specified. Ceiling heights as low as 7′-6″ have been approved by the Federal Housing Administration but this height is not considered best practice. In all cases windows are placed with head near ceiling so as to permit best natural daylighting and ventilation.

Cost of House. It is believed that the cost of a constructed house of this defined size and accommodation is capable of sensible reductions by means at the command of architects. Savings will be achieved by elimination of waste space through skillful planning technique and by studied selection and purchase of materials and equipment.

The building of dwellings within our cost limits is, in fact, by no means uncommon at the present time. Examples of houses built within the United States during the past two years with a verified cost of less than $4,000 are published as a part of this issue.

*International Housing Conference, Paris. p. 119.

Character of the House

STANDARD OF LIVING

The fact that the house set up for study is termed a low-cost house does not imply any cheapening by shoddy or unsafe construction, undue reduction of needed room sizes, or elimination of equipment to the extent of discomfort or inconvenience. On the contrary, consensus upon standards superior to ordinary practice is one of the objectives of the study. Higher standards, for example, are looked for under the following headings:

Sanitation.

Quality and convenience of accommodation.

Closer approach of heating to requirements of health and comfort.

Adjustment of daylighting and artificial illumination to needs.

Interior and exterior finishes (surfaces requiring little or no upkeep, greater simplification).

Sound and heat insulation.

Termite and other vermin prevention.

Construction (rapidity of erection, fire safety). Analysis of the functions of the house, as well as improvement in building materials and equipment, demands an adjustment of planning and building technique—elevated to the level of current social and economic needs.*

Character of the House. The house should be more flexible than it has been in the past and an altogether more unconventional type of house planning must be evolved. Safety of investment will be better insured by the house that permits easy alteration and addition of new or improved equipment. The ideal would be to obtain the utmost in usable internal space by elimination of waste or excess size. The dual use of rooms can, in some instances, lead to economy of house cubage. For the lowest cost house it is deemed reasonable to combine living and dining areas.

Internal partitions may be of light but soundproof material which could be easily moved in case of alteration of size or use of rooms. This kind of planning and building would be favored by some "unit system" or "framed" method of construction.

Planning of the house should definitely follow the requirements for healthful and pleasant living. Convenience of arrangement should be accepted as an aim in planning.

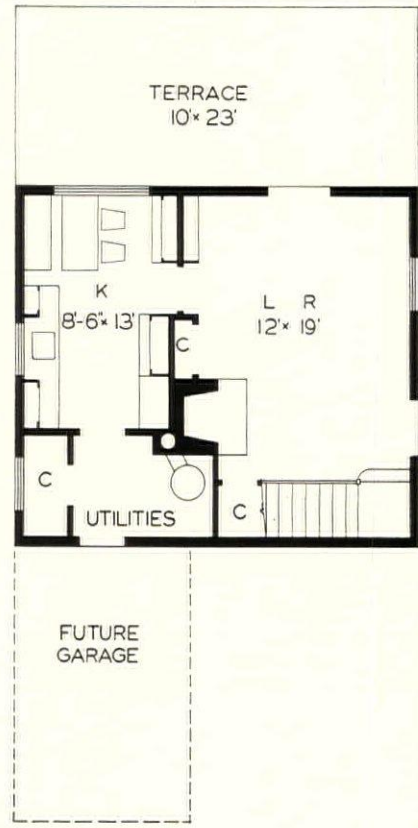
The basic design of a house resolves itself into a study of (1) required areas and (2) needed furniture and equipment. Both of these items should be studied in advance of drawing plans.

For both economy and successful "working of a house" the exterior design should follow the determined plan. This means an exterior which would be simple in outline but varied in the relation of the house to its plot. The designer would find opportunities for expanding the living room on to a paved garden terrace. Sun balconies would be featured and there would be wide window spaces.

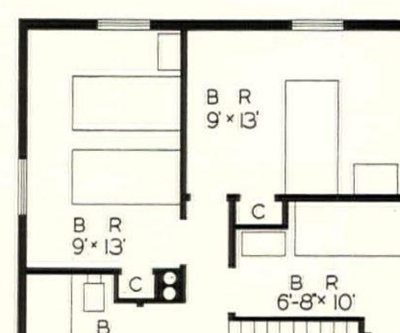
The function of walls for dwellings, as for other buildings, is changing with new construction technique. Walls are no longer the sole element of support as in a solid brick wall. The new space-saving construction transfers the supported loads to a concrete framework or to light steel columns. With this construction walls become

*Minimum desirable standards for living as they influence house design can be regarded as the least that should be provided but, by no means, as the limit of what should be provided. Mrs. Edith Elmer Wood has defined housing standards for multi-family dwellings as follows: "Housing is substandard if each family is not provided with an ample and pure supply of running water, with an indoor flush toilet for its exclusive use, with a bathtub or shower, and if, in a built-up community, it is not connected with the sewer system. The small and middle-size towns, as well as the large ones, are very backward in this respect."
From *Slums and Blighted Areas in the United States.* Housing Division Bulletin, No. 1, p. 6, 1935.

COMBINED LIVING AND DINING RO arranged with a furniture separation of two functions of room. Furniture by Gilb Rohde.



ECONOMICAL PLAN for low-cost house Frank J. Forster, architect. Plan of squ shape, dining alcove in kitchen, and dir space in living room, kitchen combined v utility room. Exterior walls 8" cinder bl and double core furring. Floor framing, cast concrete joists and cinder slab filling v wood floor finish. Total cubage, 8,705 cu feet.

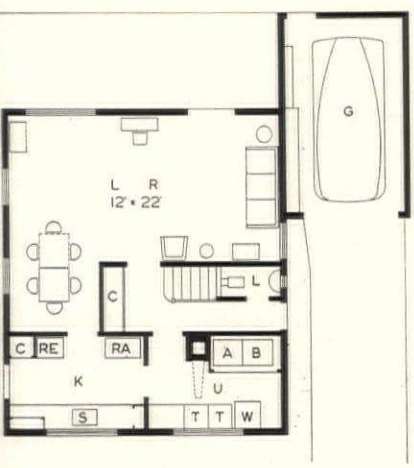


SECOND FLOOR PLAN. Bedroom of a quate size having cross-ventilation and am storage space.

Planning Economies

screens to keep out rain, cold, and noise. Walls also (as screens) serve as sources of light, controlled at will of occupant.

"Systematic technical improvement in steel and concrete, and nicer and nicer calculations of their tensile and compressive strengths are steadily reducing the area occupied by supporting members. This, in turn, naturally leads to a progressively bolder (i. e., wider) opening up of the wall surfaces, which allows rooms to be much better lit. It is therefore only logical that the old type window—a hole that had to be hollowed out of the full thickness of a supporting wall—should be giving place more and more to the continuous horizontal casement, subdivided by their steel mullions, characteristic of the new architecture. And as a direct result of the growing preponderance of voids over solids, glass is assuming an even greater structural importance."*



MPACT HOUSE PLAN by Philip L. Good- submitted in low-cost house competition nducted by New York Chapter, A. I. A. nple living-dining room; highly convenient angement of kitchen, laundry and utility ms. The addition of garage at side permits ation of a garden terrace with privacy over- king garden. Estimated cost of house, $3,200 less entirely fireproof, when it might ex- d this cost slightly.

The house of square or almost square shape is more economical to construct than one of L or other rambling type. This applies particularly to a wood-framed house. A house of square shape requires less foundation, less walls and insulation and is cheaper to heat.

The house of five or more rooms is more economical when rooms are arranged on two floor levels.

The house of prefabricated units, on the other hand, has been found by experience to be less costly to erect as a one-story house. There is simplification of bracing, fewer connections, less hoisting, no stairway.

The two-story house reduces land coverage, leaving more space for gardening, for outdoor extension of the functions of the living room and for outdoor play area for children.

PLANNING ECONOMIES

In locations with mild climate, as the South or the West Coast, open porches used as sitting spaces may also serve as passageways to bedrooms. This may eliminate interior halls.

Where a cellar is provided, the stairway should be planned to permit cellar stairway descent from kitchen.

A slight widening or lengthening of the garage will give extra space for bulk storage of screens, lumber, garden tools, etc.

A trunk rack at the end of the garage may be placed over the low front end of cars and give additional storage without increase of the garage size.

Store screens (1" x 2" frame racks) under ceiling of garage.

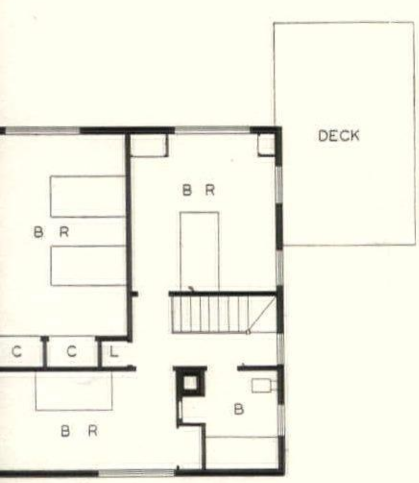
Combine kitchen and laundry by extending length of kitchen, or similarly combine kitchen, laundry, and utility rooms. Space and material for door and wall can be saved in this manner. If desired, visual separation can be achieved by a canvas curtain.

In bedrooms all furniture may be built-in. The combination of wardrobe closets, linen drawers and dressing table will save much space and eliminate all other areas except for beds and circulation (illustration, page 148). Built-in furniture increases the contract cost of a house but savings are revealed in room sizes and when considering cost of a house *furnished*.

For built-in equipment, such as closets, walls may be most economically built of ¾-in. plywood. This will produce saving in space from 3" to 5" as compared with conventional stud walls.

In many cases entrance halls may be entirely omitted by the convenient placing of a wardrobe closet with mirror near the outside entrance door to the living room.

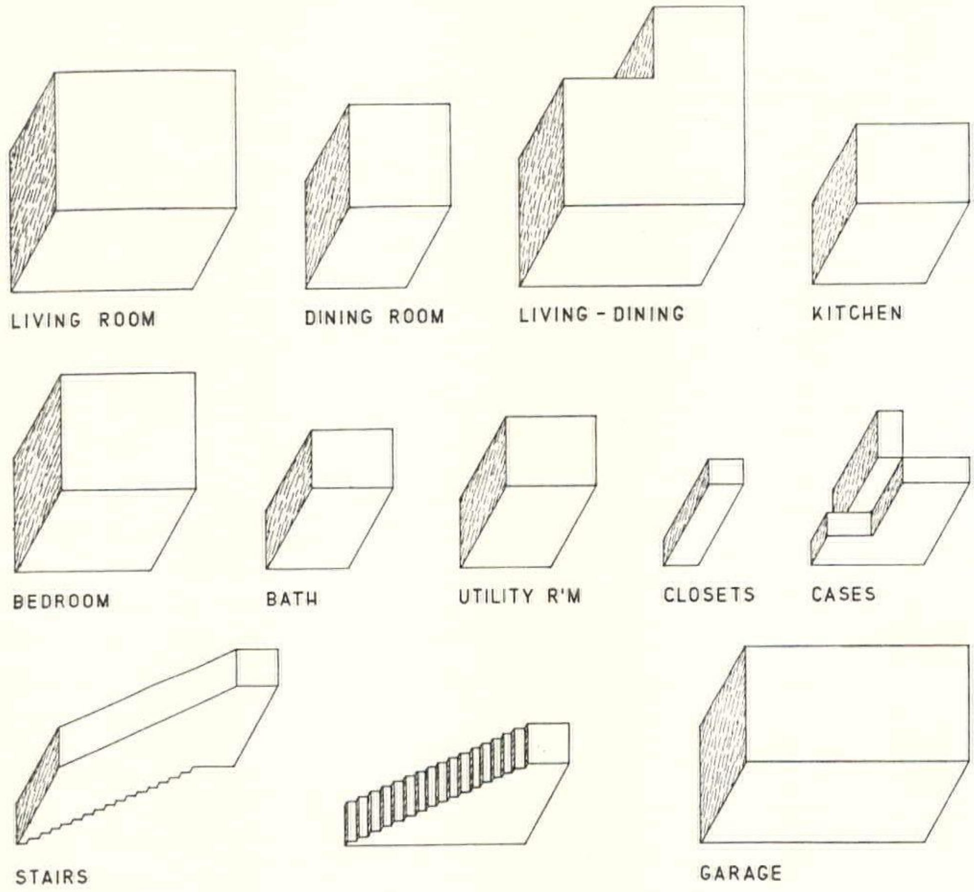
One wall of the living room entirely glazed will produce the outdoor feeling of a porch and obviate the need for the latter. A sliding type awning over such a glass wall will provide the necessary protection against too intense sun in warm weather.



undations: concrete or cinder blocks. Studs: od or metal. Sheathing: ½" Transite or nilar materials. Roofing: painted tin or lead- vered copper of standing seams. Windows: ck aluminum. Doors: wood painted. In- ior floor beams: wood or metal. Floors: ne, linoleum covered. Insulation: aluminum ulating paper. Heating: oil or gas burner; midified air with summer circulation.

*_The New Architecture._ By Walter Gropius. pp. 22, 23.

Required Accommodation for the Low-Cost House



SPACE REQUIRED FOR THE LOW-COST PRIVATE HOUSE. For economy, a combined living-dining room is acceptable. A garage, while generally necessary, is not included in the cost range of $2,400-$4,000.

Exact minimum standards for room sizes cannot be laid down to apply in all circumstances and in all localities. The room volumes in this study will, it is hoped, be acceptable as a working basis under average conditions. The sizes indicated are more than minimum but are recommended for convenience and workability of house plan. In most cases the dimensions shown exceed the minimum standards set up by the Housing Division of the Public Works and the Federal Housing Administration.

Dimensions of needed equipment and furniture have also influenced the determination of room areas. Each kind of room was studied for the amount of furniture as well as for the equipment that will go into it, and walking space around all of these was carefully considered. The Housing Division of the Public Works Administration recommends the combination of living and dining room for low-cost housing. All bedrooms are made wide enough for occupancy by two persons.

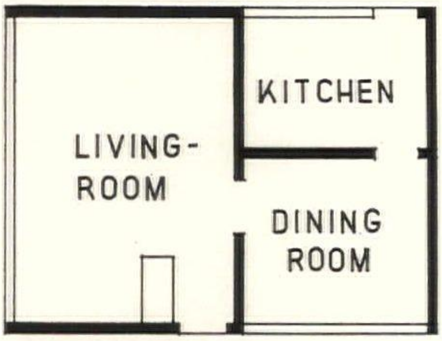
Acceptable Areas:	**Floor Area**	**Cubage**
Living Room, 11'-6" x 16'-0"		
Dining Room, 11'-0" x 11'-0"		
1 Combined Living-Dining Room, 11'-6" x 20'-0" (alternate, 11'-6" x 16'-0" plus dining alcove, 7'-0" x 9'-0")	230 " "	1,840 " "
1 Kitchen, 7'-6" x 10'-0"	75 " "	600 " "
1 Main Bedroom, 11'-6" x 12'-0"	138 " "	1,104 " "
2 Other Bedrooms, 9'-6" x 10'-0"	190 " "	1,520 " "
1 Bathroom, 5'0" x 7'-0"	35 " "	280 " "
1 Utility Room and Laundry, 7'-6" x 8'-0"	60 " "	480 " "
6 Closets, ... total area	20 " "	160 " "
Kitchen Cabinets, 20 running feet of shelves		
Stairway and Hall (2 floors)	110 " "	880 " "
Garage not included, 10' x 18'		
Totals for 2 floors	858 " "	6,864 " "

Summary:

Number of rooms 5 Floor Area 858 sq. ft. Net room volumes 6,864 cu. ft.
Such a dwelling, if of two stories and square, would measure approximately 22'-0" x 22'-0" on plan.
Recommended ceiling height, 8'-0".

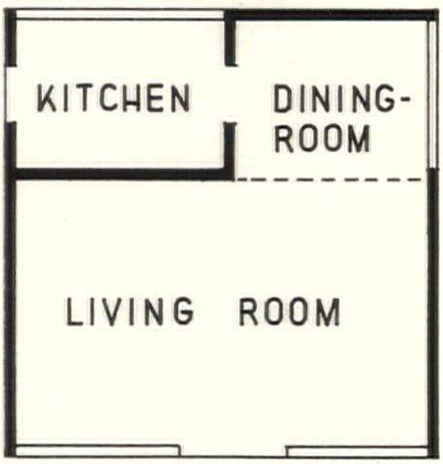
The listed computations of floor areas and cubage are net and do not include walls, roof, floors and foundations.

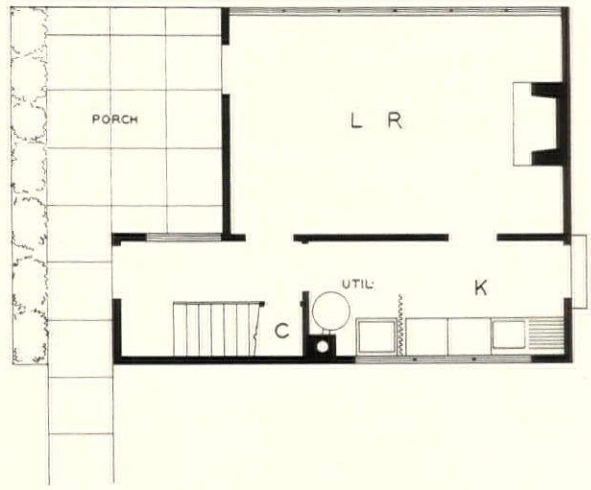
1



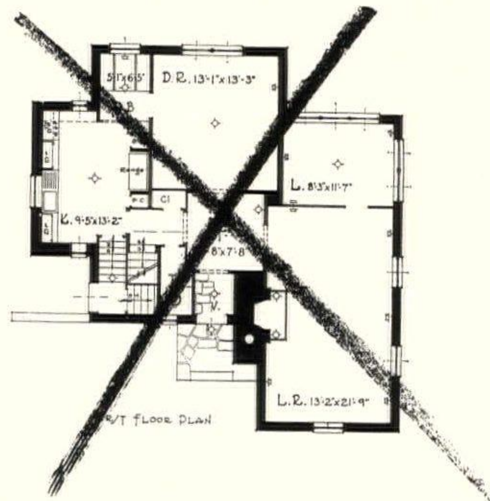
DIAGRAMS OF GROUND FLOOR ARRANGEMENTS to show essential relationship of rooms. (1) Living room, dining room, kitchen: (2) Combined living-dining room and kitchen. Advantages with arrangement (2) are: Greater unobstructed room space; fewer partitions; greater flexibility; better ventilation.

2

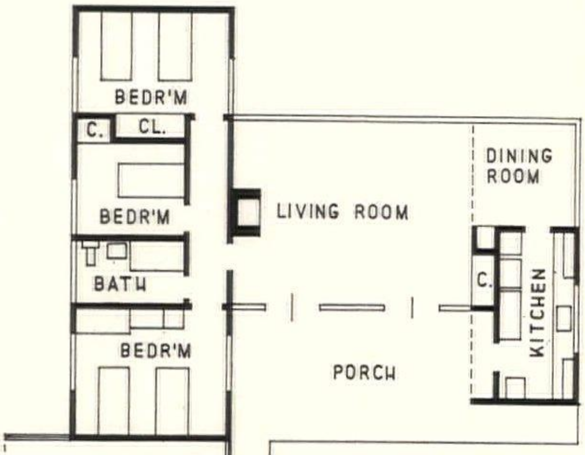




COMPACT PLAN having desirable entrance hall, direct access from kitchen to main entrance door, combined kitchen and utility room, sheltered porch reached from living room or hall. There are three bedrooms on second floor.



HOUSE FOR DEVELOPMENT. Costly because of broken contour of house plan. Lack of simplification of floor arrangement.



THREE-BEDROOM HOUSE ACCOMMODATION ON ONE FLOOR. A large and low-cost plot required. Separation of bedrooms from living area. Desirable relation between living room and porch or terrace. No stairway required. Estimated cost without garage, $3,800. Design by Albert Frey.

Planning Economies (Continued)

Use insulation board as plaster base so as to combine insulation with plastering.

Economies through simplification of framework can be obtained by roofing of the room volumes with shed or flat-type roofs, rather than the conventional gabled or hipped roof.

Installation of a metal air chamber type fireplace, lined with ducts and having air grilles, will help to heat the living room and an adjoining bedroom or may be the only heat source in localities having a mild climate.

Exterior doors with screened casement insert may take the place of both door and window.

FINISHES

Integrally colored stucco on walls and ceilings of rooms gives a satisfactory finish at little greater cost than straight plaster finish, which would often require an additional cost for painting.

By treating plastered walls of kitchen and bath with a special stucco wax, the costly enamel paint finish can be saved.

A saving in upkeep of exterior trim and woodwork can be obtained by use of aluminum paint which gives surface protection and does not fade.

Aluminum paint over composition roofs will help to keep houses cool in summer by reflection of solar heat rays or it can be used as base coat for ordinary paint on decks. It prevents bleeding-through of asphalt.

EQUIPMENT

In kitchens, sink compartments of acid-resisting enamel, built into an ash or maple drain board and counters, cost less than individual and complete sink or drain board units which, besides, are difficult to fit into cabinet units.

Hosebibs for garden sprinkling at outside of house should be placed at short distance from interior piping of cold water, thus saving on pipe and trenches.

OTHER ECONOMY FACTORS

Adopt room sizes to permit standard length materials (no cutting).
Shape of house approaching a cube.
Utility room as substitute for cellar.
Standard size and type; doors, windows, cabinets.

Ordinary wood window frames for stud wall construction (window opening 2′-4″ x 4′-6″) in the knock-down made of Ponderosa Pine with pockets and pulleys. The price is $3.18 each. The ordinary window, two lights, check rail, opening 2′-4″ x 4′-6″ in 1⅜″ thickness, glazed with SSB ordinary window glass. The price per sash is $1.94. Windows of better grade are recommended where possible. Highest quality double-hung sash cost $8.50-$11.90 per window, including screens and weather-stripping.

Standard size doors. Ponderosa Pine, four or five panels: 2′-6″ x 6′-6″ cost $3.77; 2′-8″ x 6′-8″ cost $4.01. Birch doors, two panel: 2′-6″ x 6′-6″ cost $5.90. Exterior doors of white pine: 2′-10″ x 6′-10″, 1¾″, cost $11 and upward.

Partitions reduced to minimum.
Insulation used as sheathing or plaster base.
Fill, blanket, or structural insulation reduces required radiation and boiler size.
Insulation board as ceiling, left natural or painted.

Required Rooms

nderson

NGLE OF LIVING ROOM with book elves and cases under windows. Walls of essboard. William Wiide, architect.

LIVING ROOM

THE SPACIOUSNESS OF THE PRESENT-DAY LIVING ROOM NEED NOT BE LIMITED TO THE INCLOSING WALLS, BUT MAY BE EXTENDED TO THE GARDEN BY MEANS OF WINDOWS AND DOORS THAT OPEN ON TO A TERRACE OR PORCH.

In warm climates the outdoor dining porch or terrace is a necessity and should be located with reference to shade and cooling breezes. It should have privacy and pleasant outlook.

LOCATE LIVING ROOM SO AS TO OBTAIN VIEW (GARDEN, OPEN LAWN, PARK). SOUTH AND WEST EXPOSURES ARE PREFERRED.

LOCATE FIREPLACE WITH RELATION TO FURNITURE GROUPING.

A fireplace of moderate size adds $100 or more to the cost of a house. Actual cost depends on height, size of fireplace opening, treatment of facing, materials, etc.

LIVING ROOM WINDOW AREAS SHOULD BE AT LEAST ONE-FOURTH OF TOTAL FLOOR AREA.

There should be provisions for screens, shades, and curtains, possibilities for maximum ventilation, unobstructed vision of outside when occupants are seated or standing. Ease of cleaning windows, preferably from interior; operation should permit full opening or at both top and bottom.

MBINED LIVING-DINING ROOM. Above showing use of table for living room purses. Below—showing same table used for ning. Furniture by Gilbert Rohde.

DINING AREAS

SIZE OF THE DINING AREA.

The size of the dining area, whether it be a separate room or a part of living room, is determined from the dimensions of the dining table and of the seating area around it. The dimensions given below are sufficient for the determination of the sizes of dining areas of the various sorts required in the average house.*

SPACE REQUIRED FOR OCCUPIED SEAT OR NON-MOVABLE SEAT.

Since the front edge is in a line with the edge of the table, this measure depends on the floor area required by the seat itself; 18″ x 18″ is a common measure.

WIDTH OF PASSAGES.

Between front of seat and edge of table when seat is drawn back:

To permit person to pass to seat beyond, 12″.

To permit person to take own seat, 9″.

Between corner of table and corner of adjacent article of less than elbow height, 15″. Back of occupied seat and article of furniture of less than elbow height:

For person passing to seat beyond, 15″.

For person serving table, 21″.

Assuming table width of 34 inches, having persons seated on both sides and with space required for serving, the width of dining space required would be 9 feet, 4 inches.

DINING SPACE IN KITCHEN.

The omission of a separate dining room in the low-cost house makes desirable the provision of dining space or alcove as a part of the kitchen. There are other reasons favoring such provision: (1) convenience of food service; (2) to keep the muss out of other parts of the house, especially when there are children; (3) to provide a place to serve the younger children who eat before or after the other family members.

It is recommended that where dining space is included in the kitchen or an adjoining alcove it be so located as not to interfere with the efficiency of the work area. The space should be large enough to be useful and not too cramped for "real meals." Such areas should be well lighted and ventilated, and they should not duplicate a dining room or increase the difficulties of serving in the dining-living room combination.

If most of the meals are to be eaten in the kitchen a corner can usually be pro-

*Information by Maud Wilson. See *The Architectural Record*, April 1934, page 329.

vided for serving food without interfering with the food preparation. The same table may be used for preparation jobs such as canning or for extra service space when the meals are served in the living or dining room.

THE DINING ALCOVE, AS PART OF LIVING ROOM, REQUIRES LESS FLOOR AREA THAN A SEPARATE DINING ROOM.
Width of alcove may range from 9 feet, 6 inches to 12 feet. When the dining table is placed in an angle of the living room, unusual demands for seating are cared for by usurping a part of the actual living room space.

THE DINING AREA CAN BE CONVERTED TO OTHER USES SUCH AS A STUDY FOR SCHOOL CHILDREN OR FOR ENTERTAINING.

POSSIBILITIES FOR SCREENING TABLE WHILE IT IS BEING PREPARED FOR MEALS.
Standard folding partitions, curtains, movable screens.

WHERE EVERYDAY MEALS ARE SERVED IN DINING AREA OF LIVING ROOM, THE DISTANCE BETWEEN DINING TABLE AND SERVING AREA OF KITCHEN SHOULD BE AS SHORT AS POSSIBLE.

DINING TABLE USED FOR EVERYDAY MEALS SHOULD BE SO PLACED THAT IT DOES NOT REQUIRE MOVING IN SETTING IT FOR A MEAL.

SPECIAL LOW TABLE FOR CHILD OF LESS THAN THREE YEARS OF AGE.

WHEN BENCHES ARE USED, THE LIGHTWEIGHT MOVABLE SINGLE BENCHES WITH HANDHOLDS ARE PREFERRED TO FIXED BENCHES SEATING MORE THAN ONE PERSON.

AN OUTDOOR DINING AREA IS DESIRABLE.
This should adjoin kitchen or dining room. The location should have privacy, shade, and view.

PROVIDE OVERHEAD ILLUMINATION FOR DINING TABLE.

DINING ALCOVE IN LIVING ROOM. tition produced by simplest means, nan 1" plywood with lumber core.

THE KITCHEN*

The kitchen is the work center of the house and the efficiency of the entire household depends to a large extent upon the plan and arrangement of this center. For the *low-income class* the kitchen as a work center is not confined to food preparation but may include home laundering, canning, and possibilities for dining in the kitchen.

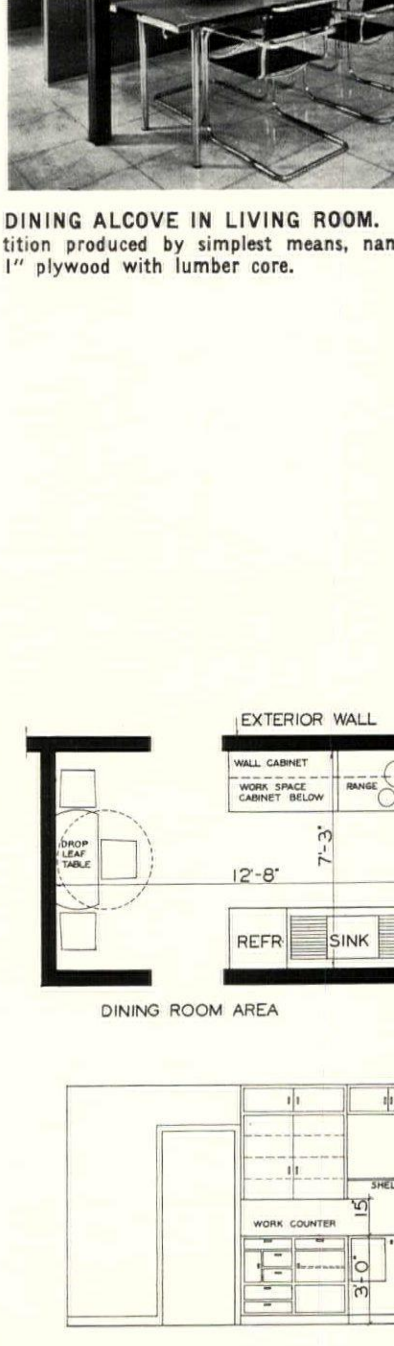
There is no one model or ideal kitchen plan. Any kitchen, to be convenient, must be adapted to the needs of the type of family most likely to occupy the house. These needs vary with the size and composition of the household, the amount of entertaining that is done, the standards for meal preparation and service, the amount of food purchased ready prepared and the utilities available. Type kitchens are here set up which will meet various needs.

Certain equipment is required in every kitchen: A range; water supply and sink; work tables or work surfaces at satisfactory heights; refrigeration; and adequate space for utensils and food not requiring refrigeration. This space, of course, should be located as nearly as possible where these articles will be used.

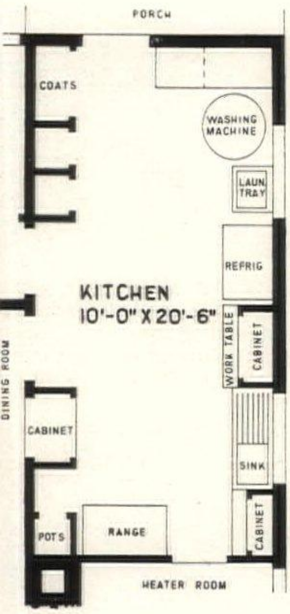
Kinds of Work To Be Done. Kitchen equipment should be selected and arranged with reference to the different kinds of work which must be carried on in the kitchen.

(1) *Preparation of foods for cooking.* Vegetables are prepared at the sink and small quantities should be stored nearby. Short mixing jobs are done near the stove, and longer jobs at a work table which should be located near the main storage center, so staple supplies will be at hand. If possible, the refrigerator should be nearby.

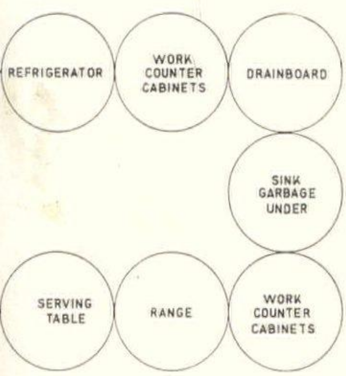
*Developed from information supplied by Dr. Louise Stanley and Maud Wilson, Home Economists, Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.



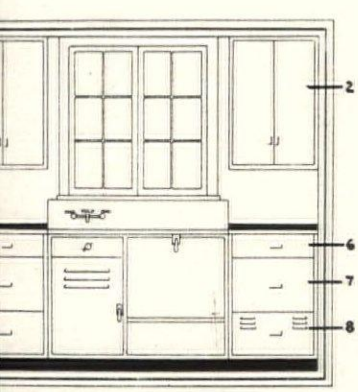
KITCHEN WITH BREAKFAST-DI SPACE; range on opposite wall from light on sink from left; work space pendent of passage between doors. pared by Division of Home Econ Washington, D. C.



IEN AND LAUNDRY. Work table, nd cabinets on one wall. Range at ll.



RAM OF KITCHEN, showing loca- f equipment with regard for sequence rk in food preparation and service.



NGHOUSE ELECTRIC KITCHEN. *abinets,* (1) Dish storage; (2) Glass- torage; *Drawers,* (3) Top drawer, (4-5) Center and lower drawers, ns and cooking utensils; (6) Top cutter board and small food prep- equipment; (7) Center drawer, bak- hes; (8) Lower drawer, non-perish- getable storage.

(2) *Cooking.* The range should be easily reached from food preparation and service centers; it should be well lighted, and the utensils used there should be stored close at hand.

(3) *Serving.* For this there should be a collecting station between the stove, the refrigerator, and the dining table. If there is a cupboard between the kitchen and the dining room, a shelf on a level with the work center serves this purpose. A wheel table makes a desirable serving surface for the housewife. The food can be arranged upon it and wheeled into the dining room at one trip. If families entertain much there should be facilities for increasing serving space by means of a hinged shelf or movable table.

(4) *Cleaning up and dishwashing.* A center for this work should include provisions for receiving soiled dishes, scraping and sorting, washing and rinsing them, draining and stacking the clean dishes. A satisfactory dishwasher, located away from the all-purpose sink, is possibly the ideal solution for the dishwashing problem, but as yet this is too costly for most homes. Next best is a separate sink planned for dishwashing. For the lower-priced homes the all-purpose sink should be selected and located with the different needs in mind. A double-compartment sink simplifies the dishwashing job. Otherwise the sink should be of sufficient size to accommodate a dishpan and for convenient handling of the dishes.

Arrangement of Equipment for Efficiency. The various pieces of kitchen equipment are available at different cost levels and in great variety of size, quality, and finish. Wise selection of equipment is always an important factor in efficiency, but equally important is the arrangement of the large pieces of equipment in a step-saving sequence to form a compact working area.

Sequence of kitchen jobs. In general, the jobs indicated above as being carried out in a kitchen follow a definite order. The raw food is collected, prepared, cooked, and served. In the cleaning up process, the soiled dishes are removed, scraped and stacked, washed, drained, and put away. This furnishes a guide to the order in placing the equipment on the floor plan. In the preparing process, first the food storage cupboard and refrigerator, the work surface and usually the sink, then the stove, and last the serving table. In the clearing away process, first the stack table, then the sink, then the drain board, and last the shelves for china.

In the preparation sequence, the work can proceed either toward the right or toward the left, but should end at the door to dining area. In clearing away, however, work proceeds most efficiently to the left. For each dish or utensil as it is washed is held in the left hand, and if the drain board is on the right side of the sink, the left hand must cross over the right with every piece that is put down.

The arrangement possible is limited by the size and proportions of the room and the location of the door openings. So it is important that the architect have in mind a definite plan for placing the kitchen equipment before finally fixing these structural features.

In case all the desirable equipment cannot be had at one time the kitchen should be planned about that which the client hopes ultimately to have. This will mean using cheaply constructed tables and shelves until such time as the more permanent ones are available.

Kitchen Planning (Continued)

STUDIES IN KITCHENS WITH DIFFERENT ARRANGEMENTS HAVE RESULTED IN THE FOLLOWING DEFINITE RECOMMENDATIONS AS TO THE LOCATION OF SPECIFIC PIECES OF EQUIPMENT.

Sinks should be installed with drain board to the left and flat surface or drain board to the right, both at height of top edge of sink. A double sink should have flat surface at either side. The drain board, or surface at the left of the sink, should be at least 32 inches long and the stacking surface at the right at least 36 inches. The sink, to be large enough to hold a dishpan, should measure 18 by 22 inches, with a minimum depth of 6 inches. There should be open space under the sink itself so as to allow knee room when seated. Some space within reach of the sink should be available for narrow shelves for the storage of cleaning materials, and a wider shelf or cabinet nearby for the storage of any materials or utensils used there first. Small utensils used at the sink, dish scraper, paring knife, can opener, etc., should be hung within easy reach. A cabinet with outside ventilation for vegetable storage, or a draft cupboard, is desirable near the sink. Most vegetables deteriorate rapidly at room temperature unless proper ventilation is provided.

The sink should be well lighted with a window preferably in the wall at right angles, so placed as to throw light on the sink. If the window is on the same wall, it should not be placed directly over the sink unless on the north side or unless there is some protection from the glare. If the window is placed over the sink, it should be sufficiently high for the back of the sink to fit underneath and still allow space for a small shelf. Artificial light should be so placed as to provide good light on the work at the sink without throwing a shadow.

If dishes are to be stored in the kitchen, the storage should be above the left drain board or within reach of it. Dish storage accessible from both kitchen and dining room saves steps. In this arrangement the sink must be on a common wall between the kitchen and the dining room or on a wall at right angles. When dish storage is not possible within reach of the sink, a wheel table is desirable.

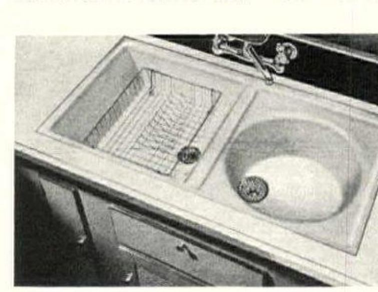
The Range may be at right angles to the sink, or directly across from the sink if the kitchen is narrow. Shelves or a cabinet for storage of utensils used at the stove should be within reach of the cooking surface. A small preparation surface or table (which may be movable) should be available adjoining the stove (burner portion) at the same height as the burner, and if at the dining room door or pass cupboard, it can be used also as a serving surface.

The Serving Surface should be located between the stove and the area where food is most frequently served. It may be a part of the stove center or of the sink center. Space should be provided in this center for any foods not requiring refrigeration and used without additional preparation, such as bread and cake; for serving dishes and silver; and for trays.

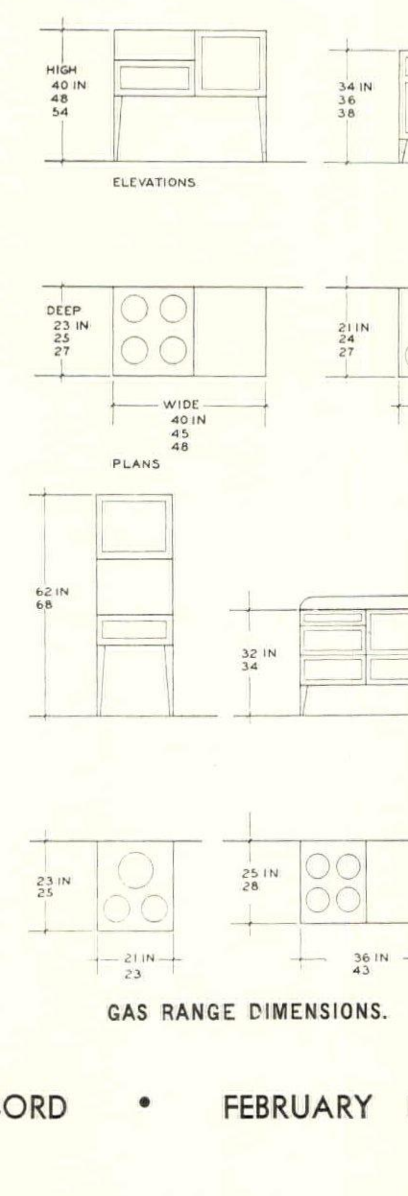
The Work Table for long mixing jobs, such as bread-making, cake-making, and dessert, should be of such height as to permit work sitting, and should have knee space below. Staple supplies should be within reach of the worker so seated. This work table should, if possible, be near both the refrigerator and stove.

The Refrigerator should be as near as possible to both work table and stove, and also near the serving center. That is, from the point of view of convenience in use the refrigerator should be given a central location rather than one out of the sequence as is so often planned. It must be remembered, however, that the higher the surrounding temperature the greater the cost of operation of the refrigerator. In most cases the housewife prefers convenience at a slight increase of expense in operation. If an ice refrigerator is used, a position near the door facilitates icing. A properly constructed draft cooler is desirable in most climates and makes possible a more efficient use of the space in the refrigerator.

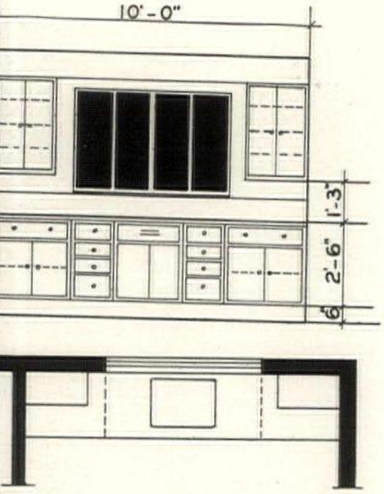
DOUBLE COMPARTMENT SINK with for dishwashing and draining, each equ with a dual shut-off strainer. Counte and splash back surfaced with Napanee leum). J. P. Cox & Co., White Plains,



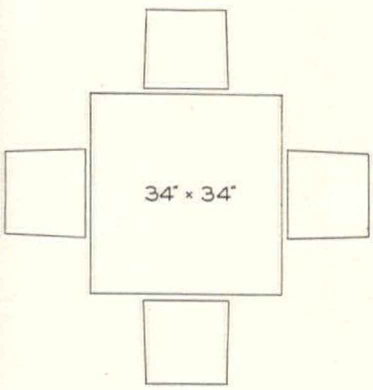
COUNTER surfaced with Napanee leum). Edge of stainless steel. This ty sink (bowl only) is inexpensive, costing $8 to $10. The counter board is instal any required length.



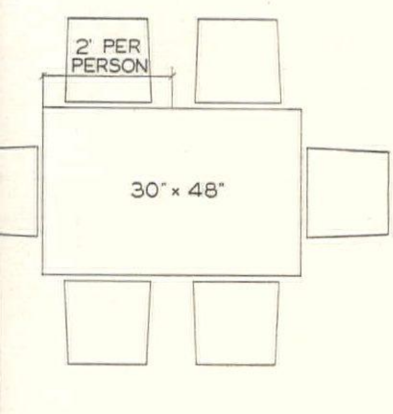
GAS RANGE DIMENSIONS.



CHEN WITH ALL BUILT-IN EQUIP-
NT. Indication of desirable counter
ht and space under wall cabinets. Cour-
, Janes and Kirtland, New York.



ICAL TABLE SIZES AND CHAIR
CING.



Size and Shape of Kitchen. Since the wall space is needed for placing equipment, the rectangular kitchen makes possible a more satisfactory arrangement than a square one. Unless a coal or wood range is used the width should not exceed 8 or 9 feet. A kitchen should be at least six and a half feet wide, otherwise only one side wall can be used for placing equipment, which is inefficient. The kitchen floor plan with all the proposed equipment should be drawn to scale before final decision as to location of openings and of utility outlets. So far as possible, the work portion of the kitchen should be kept free from doorways to prevent breaks in working surfaces and a traffic way across the work area.

Height of Working Surfaces and Storage Cabinets. Convenient heights for working surfaces and storage spaces planned to minimize stooping and stretching contribute much to the efficiency of the kitchen. The sink and work surfaces for short jobs should be at satisfactory heights for work standing. This varies with the worker, good averages being from 34 to 36 inches. Work surfaces for longer jobs should be provided with knee space underneath and arranged at a suitable height for work sitting either on a stool or in a comfortable chair with both feet on the floor.

Storage space should be adapted to the size of the articles to be stored and placed, so far as possible, where the particular articles will be first used or most often used. The large one-purpose kitchen cabinet has served its day. It is replaced with built-in units placed where needed. Unfortunately, too many of these installations are planned by the architect or manufacturer and with too little knowledge of the kitchen activities and articles to be stored. As a result, there is likely to be an over-elaboration of cabinet space, artistically balanced, but poorly arranged in relation to size or location of the articles to be stored.

The same amount of cabinet space, if arranged with reference to the activities of the kitchen and the equipment to be stored, will make possible much more efficient work. Kitchen units of standard size planned for specific uses allow great flexibility in arrangement, but any satisfactory arrangement must be carefully thought out.

A satisfactory procedure in determining the built-in facilities is first to decide on the amount and the location of work spaces required following the above listing of tasks to be done. No more work table space should be planned than is actually needed, not only for the sake of keeping down the cost of built-ins but also to keep the floor area as small as possible. Having decided the amount and location of work table spaces, the next step is to plan the wise utilization of the cabinet spaces above and below each work area. In most home kitchens this will take care of all the articles to be stored; if not, floor to ceiling storage cabinets can be used to advantage for the extra space necessary.

CLASSIFICATION OF SUPPLIES AND UTENSILS TO BE STORED

As a guide in planning these storage spaces the following classification of material to be stored has been prepared by Maud M. Wilson. ("Closets and Other Storage Arrangements for the Farm Home," issued by Bureau of Home Economics, U. S. Department of Agriculture):

Serving center

Bread; cake; cookies.
Ready-to-eat cereal; crackers; wafers; zwieback; rusks; etc.
Loaf sugar; honey; candies; dried fruits served from packages.
Relishes not requiring low temperature.
Bread and cake knives; bread board; cake rack.
Ladles and serving spoons; serving forks; butcher knives.
Dishes, silver, and linen used for everyday meals (unless warmed compartment is provided for platters, vegetable dishes, plates and cups).

Kitchen Planning (Continued)

Dishes, silver, linen, and table decorations used for company meals, and infrequently used dishes, unless storage is provided in dining room.
Mats for hot dishes.
Serving trays.

Sink center

Stew kettles; double boilers; sauce pans.
Dried fruits which require washing or soaking.
Colanders; strainers.
Ice cream dipper.
Paring knives; slicing knives; scissors; vegetable brushes.
Dishpans; rinse pans; dish drainers.
Pot cleaners; cleaning brushes.
Sink strainers; dish scraper.
Dish towels; dish cloths; hand towels.
Soap containers.
Garbage containers.
Drinking glasses.
Cloth for wiping up spilled water from floor.
Drain cleaner; scouring powder; soap.
Hand lotion.

Mixing center

Flour; meal; other uncooked cereals used mainly in preparation of made dishes.
Sugar.
Leavening agents; dry yeast.
Cornstarch; gelatin; junket; macaroni, tapioca.
Spices; flavorings, and colorings used in made dishes; cake decorations.
Dried fruits used without washing or soaking.
Mixing bowls; chopping bowl.
Measuring cups.
Grinders; choppers; shredders; graters; reamers; nut crackers; scissors; egg beaters; egg whips; meat pounder; meat saw.
Spatulas; knives; mixing spoons; measuring spoons.
Dough cutters; sifters; rolling pins.
Cake decorators, cookies "guns," etc.; molds.
Baking pans—bread, cake, pies, muffins, cookies, casseroles.
Boards—pastry, meat, vegetables.
Electric mixer.
Wax paper; paper napkins (for lunches); paper dishes.
Recipes.

Stove center

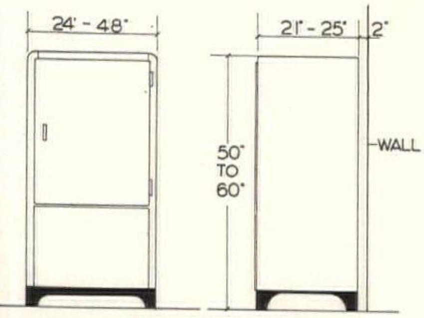
Coffee and coffee substitutes; tea.
Salt; pepper; other seasonings. Flour in dredger.
Ladles; stirring spoons; masher; ricer.
Spatulas; turners; forks; wire toaster.
Skillets; griddles; broilers; roasters.
Coffee pot; tea pot.
Utensil lids.
Deep-fat kettles and basket.
Pressure cooker and steamer.
Thermometers.
Pan-holders; lifters.
Matches; stove polishes.

Draft cooler

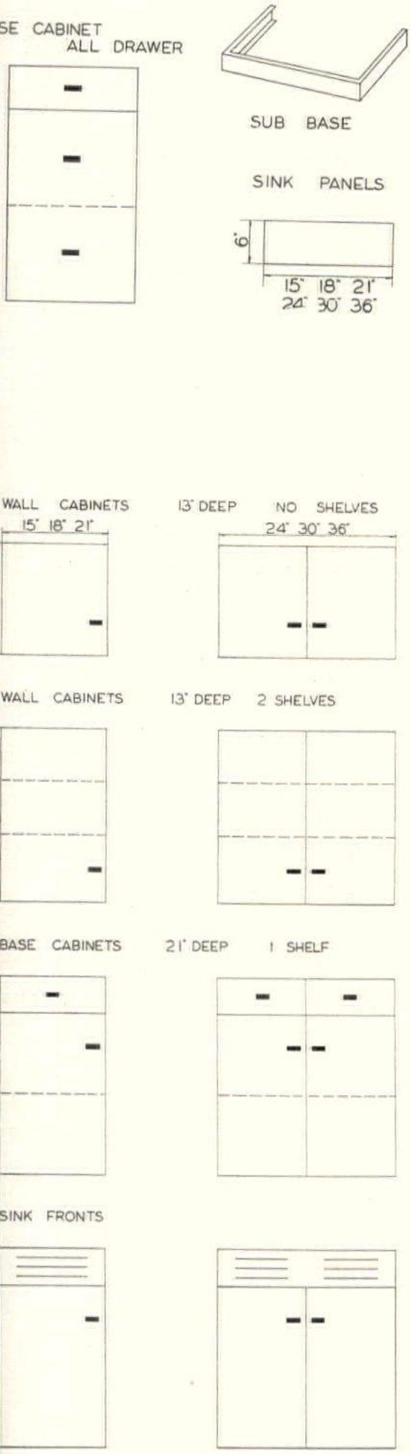
Fresh fruits and vegetables, unless highly perishable.
Cured meats; cured cheese.
Cooking fats.
Sirups; molasses.
Chocolate; cocoa; coconut; malted milk.
Opened jellies; jams, relishes, etc. Candied fruits.
Salad dressing; vinegar.
Unshelled nuts.
Bouillon cubes.

Hawthorne Studios

CABINET WITH REVOLVING SHELV
for storing foods, canned and bottled go
Trays can be removed from frames for cl
ing. Shelves cannot be reached by ants.
costs of one unit, with one set of veget
baskets, is: 14", $11; 16", $12.50, ni
plated steel finish. Cost for aluminum,
size, $17.70. Manufactured by E. S. Rob
107 South Serrano Avenue, Los Angeles



STANDARD REFRIGERATOR DIMENSIONS.



tchen cabinet sizes, base and wall types.

Refrigerator (allowing minimum space because of cost)
- Foods requiring chilling before use.
- Left-over foods; perishable foods prepared in large quantities.
- Milk and cream; butter; eggs; fresh meat.
- Highly perishable fruits and vegetables.
- Salad oil; peanut butter; shelled nuts; cod liver oil.
- Opened packages of perishable foods—fruits, vegetables; meat, fish, evaporated milk.
- Soft yeast.

Unassigned

- Containers used for foods kept in cooler or refrigerator should be kept near work surface which is most convenient to use in transferring foods to them.
- Unopened canned foods.
- Empty fruit jars, before taking to food storage room.
- Kitchen aprons.
- Scales. Can openers; bottle openers, etc.
- Tub for ice-cream freezer.
- Popcorn; popper.
- Sacks; wrapping paper; string.
- Hammer and other tools; knife sharpener.
- Picnic kit.
- Clean rags, cheesecloth, etc.
- Electric toaster; waffle iron; percolator; electric cords.
- Waste basket. Paper; pencil.
- Table leaves; false table-top (unless storage is provided outside kitchen).
- Water jugs.

Construction of Kitchen Storage Facilities

Shelves should be readily removable and adjustable as to distances apart.

More efficient use can be made of space intended for articles which will hang, such as door or side of cabinet, if the material used for lining permits one to place a hook wherever desired.

An upper cabinet should be made as shallow as possible, allowing for a single row of the largest articles that are to be stored in it.

Movable trays are better than shelves in compartments below work counters. The trays should be two to six inches narrower than the compartment itself, to allow space for articles hung or placed in racks on the door.

Drawers may be used advantageously as bins. Larger drawers with several movable metal insets are preferable to small drawers for supplies stored in less than twenty-five pound lots.

The farm kitchen, while not the subject of this study, may be mentioned as being traditionally larger than the urban kitchen. It developed this way because of the use of the kitchen as a living and dining center, and the provision for carrying on there a number of activities in a separate workroom or a segregated portion of the kitchen. This makes possible the planning of the space devoted to food preparation on a more efficient basis and follows the same general principles outlined above. Where a wood or coal range must be used, additional width may be needed.

Other Specification Items

Built-in ironing board, 48" to 56" high, 12" to 16" wide.

Sink counter of ash, 1½" thick.

A cheap installation can be made by using a 1½" thick counter board of clear ash, grooved for drain and recessing a porcelain lined sink. Wood counters of spacious size are preferred by many. The wood counter may also be surfaced with linoleum.

Where ice-refrigerator is installed, provide drainage to separate sump, not to sewer. Provide deep trap under refrigerator.

Kitchen Planning (Continued)

Provide light, washable finish to walls; white ceiling, color to side walls; use enamel paint over hard plaster; use may be made of *Flexboard* for walls of kitchen.

Build in electric clock at time of constructing house.

Build in can and bottle opener.

Provide attachment for meat chopper.

As far as Government housing of low-cost is concerned, the separate dining room has been ruled out. This necessitates providing space in living room for dining and preferably some space in kitchen for eating purposes. (Standards for Housing Requirements set up by PWA Housing Division.)

Lighting

Artificial light in the kitchen should be uniformly diffused and quite shadowless. Indirect light is preferred but more costly than direct lighting.

Electric sockets in kitchen should be of porcelain and, where drop chain is provided, there should be an insulated pull-knob to prevent electric shock.

Where one light is provided in kitchen, the location should be at ceiling directly over the sink. A supplementary light is desirable over the cooking range.

Kitchen Floors

Kitchen floors should be non-slippery, non-absorbent, durable, easy to clean by scrubbing and not tiring to walk on.

Cork has most of the qualities suited to the ideal kitchen. It is easy to walk on, resilient, quiet, warm and superior to oak or pine floors for wear. It is more costly than linoleum or mastic tile. It is kept in order by washing and some waxing. It is applied with waterproof mastic on a sub-floor of California redwood or pine or on a sub-floor of waterproofed concrete.

Linoleum makes a very satisfactory and cheap kitchen floor surface. It can withstand hard wear, is easily cleaned by scrubbing and is satisfactory for walking. It comes in six-foot widths and can be laid with few joints. Lay over felt layer with glue supplied by manufacturer. Provide space for expansion at wall edges. Linoleum should not be laid over concrete slab at ground unless concrete has been waterproofed.

Composition. This composition is widely used for floors of busses and railroad cars. It consists of magnesite, sawdust, wood flour and other aggregates. It takes a smooth surface and has some resilience. The cove skirting can be integral with floor. Follow recommendation of manufacturer.

Walls and ceilings for kitchens where plastered should be plastered with Keene's cement with smooth-finished surface and, when thoroughly dry, painted, enameled or lacquered. Enamel should be applied over a special zinc undercoating. See U. S. Government specification for applying paint over plastered walls. ⅛″ cement-asbestos board makes a satisfactory kitchen wall finish. This material may be obtained in a variety of colors. Metal jointing strips may be obtained, when required, from the manufacturer.

Some of the desirable arrangements for kitchens are as follows:

Kitchen, utility room and laundry combined as one long room. See plan, page 89.

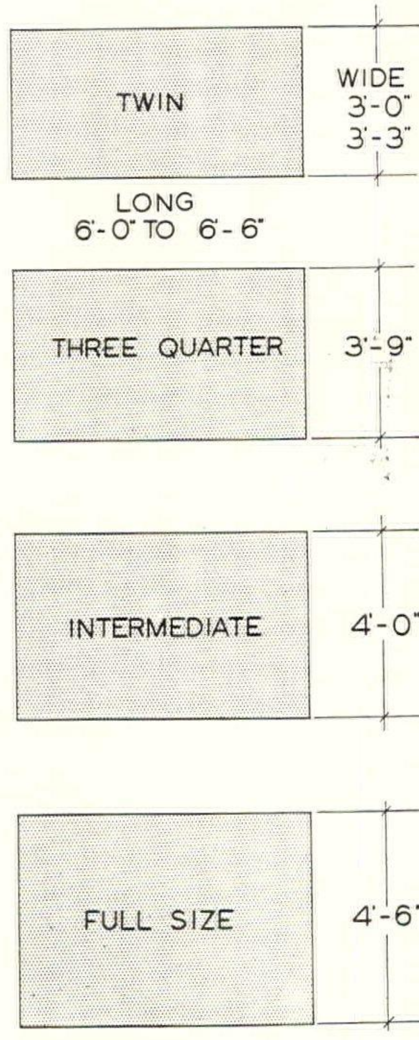
Kitchen dining table, accommodation for five, on the same side of work area as the door to the dining space in living room.

Refrigerator near work table and serving area.

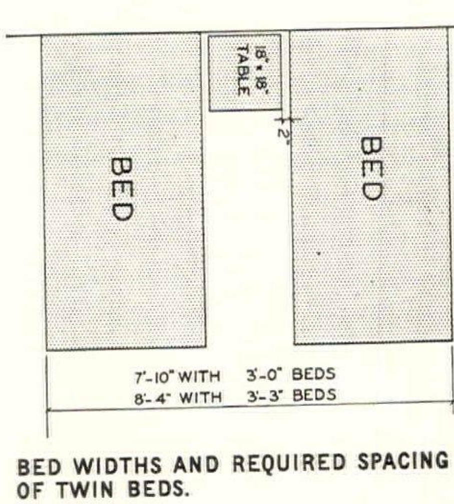
Range between sink and work table units.

Sink and work table opposite.

Sink and serving units combined so that the serving counter may also be a drain board.



BED SIZES for use in planning the bedro



BED WIDTHS AND REQUIRED SPACING OF TWIN BEDS.

Bedroom and Bathroom Planning

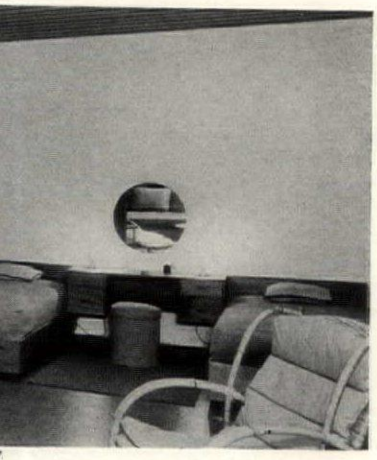
Articles of equipment stored near where they are used.

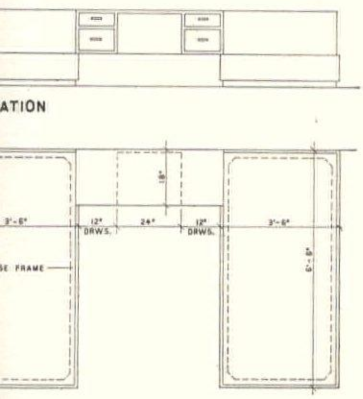
Supplies that do not deteriorate unduly in room temperature stored near point of use.

Shelf or shallow cupboard near sink for drinking glasses, cleaning powders, etc.

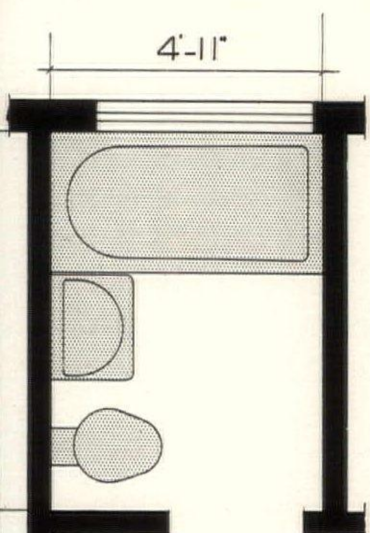
Provide a stool to be used at sink.

Roller shades instead of doors used on cupboards.





I BEDS, built-in, with dressing table en. A space-saving arrangement. By A. ence Kocher and Albert Frey.



HROOM PLAN showing location of fix- and dimensions, recommended by the ng Division of the Public Works Ad- tration.

BEDROOM

SPACE FOR DOUBLE BED OR TWIN BEDS IN MAIN BEDROOM.

SPACE FOR TWO SINGLE BEDS, EACH 3'-3" WIDE, IN OTHER BEDROOMS.

SPACE AT BOTH SIDES OF BED AND PASSAGE AT FOOT.
Width of space at side of bed, for convenience of person making it, 20".
Width of passage at foot of bed, 20".

FULL VISION MIRROR.
Preferably on wall near dressing table for main bedroom.

TWO CLOSETS FOR MAIN BEDROOM.

ONE CLOSET EACH FOR OTHER BEDROOMS.
A double closet or two single closets preferred.

FURNITURE FOR MAIN BEDROOM.
1 double bed or twin beds
1 dresser
1 chest of drawers
1 stand at bed
2 chairs

FURNITURE FOR OTHER BEDROOMS.
1 or 2 single beds
1 chest of drawers
1 small table
1 or 2 chairs

ROOF DECK OR OPEN PORCH.
As place for outdoor sleeping in summer.

BATHROOM

THE BATHROOM SHOULD BE LOCATED CONVENIENT TO ALL BEDROOMS AND TO STAIRWAY.
A standard-size bathroom, 4'-6" by 6'-8", is recommended by the PWA Housing Division for multi-family housing projects under Federal supervision. The setting up of an exact size for the house is not entirely practicable. This is because house planning is less uniform than the planning of apartment units. The dimensions adopted for apartments may, however, be accepted as minimum standards with modifications required by framing of adjoining bedrooms and closets.

THE BATHROOM REQUIREMENTS MAY BE SUMMARIZED AS FOLLOWS:
—Convenience in planning (placing of fixtures without interference, one with another; spacious dressing space).
—Ample daylighting, exposure preferably south or west.
—Modern sanitary fixtures.
—Smooth and sanitary walls and floors.

FLOORING.
Linoleum, cork, composition.

PROVIDE SHUT-OFF COCKS OR VALVES FOR CONTROL OF WATER.

RECESSED MEDICINE CABINET WITH MIRROR AND LIGHT.
Sizes, 16" to 20" wide, 20" to 30" high, 3" to 4" deep.

Closets and Other Storage

TWO HOOKS ON INNER SIDE OF DOOR.

SOAP RECEPTACLE FOR TUB.

TWO TOWEL RACKS.

TOILET PAPER RACK.

SPACE FOR LAUNDRY HAMPER.

HOOK AT TUB FOR HOT WATER BAG.

OUTLET FOR ELECTRIC HEATER AND CURLING IRON.

PROVISION FOR VENTILATION.

MEDICINE CABINETS. Standard size (M
Cabinet). Wall opening, 12" x 16"; ou
dimensions, 14" x 24". Price $7.50. M
Cabinet Division of Philip Carey Co., Mi
town, Ohio.

WHAT CLOSETS AND STORAGE SPACE ARE REQUIRED FOR THE TYPICAL LOW-COST HOUSE?

KINDS OF STORAGE.

The modern and convenient kitchen includes provision for cabinets for general storage of utensils and foodstuffs. The first step in determining the amount of required storage is to decide on the amount and location of work space required. Having decided on the minimum requirements for work table space, the next step is to plan location of cabinets to space above and below the work tables or counters. (See listing of articles for kitchen storage, pages 97 and 98.)

CAPACITY AND ASSUMED METHOD OF STORAGE FOR A HOUSE FOR SMALL FAMILY:

Shelf Space	Width	Length
For utensils	12"	7'
Dishes for six	12"	7'
Large quantity staples	16"	5½'
Other foods	12"	20'

Space for Hanging Articles

Large articles 18" wide
Small articles on door
Flat articles, such as pie tins, 2 slots 3" wide.
Lids—in rack on door.

Note: Large cans and two-quart jars are used for bulk supplies, as flour, sugar, etc.

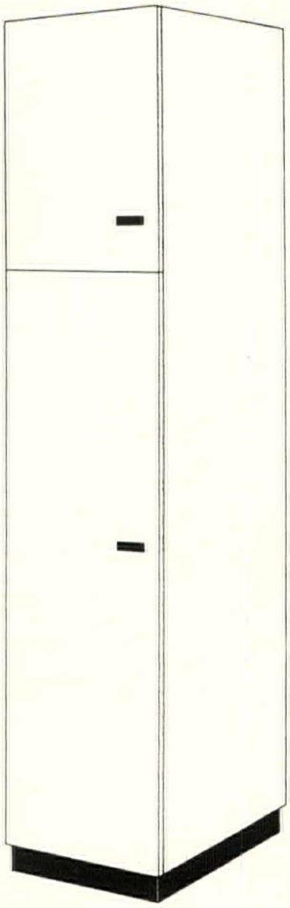
COAT CLOSET (NEAR ENTRANCE DOORWAY).

Shelf for hats requires average height of 8"; overcoats, 5'; width required for a coat on a hanger is at least 22".

	Required Space
Coats, hats, overshoes, scarfs, umbrellas, gloves. Provide shelf; hanger rod, top 63" above floor. Extra hooks at wall, 7" spacing.	Minimum depth of closet, 2'-0" inside; desirable width, 3'-0".

LINEN CLOSET.

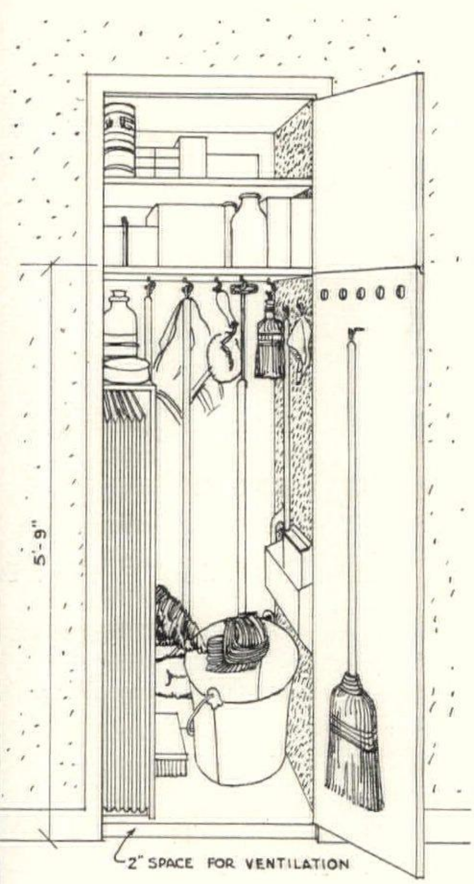
2 blankets, 1 quilt, 2 pillows 8 sheets 8 pillow cases 18 towels 10 wash cloths 3 spreads	3' x 1'-8", floor to ceiling; 3 shelves or trays; 3 drawers.
Extra storage	Top shelf, 15" high.



BROOM AND LINEN CABIN

Closets and Other Storage

aning Closet (size 14″ x 27″ or 17″ x
). Dimensions and arrangement based on
ipment and supplies found in represen-
ve home or apartment. Five hooks for
 articles; four hooks for short articles.
er shelf 9″ deep; lower shelf 14″ deep.
igned by Maud M. Wilson, Home Econo-
t.



BEDROOM CLOSETS (THREE REQUIRED).

One closet for each bedroom is minimum standard; two closets for main bedroom is preferred; minimum closet size should be 2′ deep, 3′ wide; 4′ width closets are preferred.

Provide storage for:

Men's Apparel and Accessories

- Hats
- Suits
  - Daily use
  - Work
  - Recreation
- Overcoats
- Shirts
- Underwear
- Pajamas
- Neckties
- Collars
- Sweaters
- Gloves
- Scarfs
- Handkerchiefs
- Collar buttons, studs, clasps
- Belts
- Socks
- Shoes, slippers, pumps
- Luggage

Women's Apparel and Accessories

- Hats
- Dresses
  - Street
  - House
  - Sports
  - Evening
- Coats
- Furs
- Undergarments
- Stockings
- Nightdresses and pajamas
- Gloves
- Woolens
- Scarfs
- Handkerchiefs
- Handbags
- Costume jewelry
- Suitcases and hatboxes
- Umbrellas and parasols
- Shoes, slippers

Full-length mirror on door.

Clothes brush, shoe brush, and whisk broom.

Bottle, spot remover.

Hanging space for suits and overcoats: Hanging rod not more than 5′-10″ above floor; drawers for lesser garments, 3″ to 4″ high; shelf for shoes, 8″ high; shelf for hats, 9″ high; height for suits, 3′-3″; height for overcoats, 5′-0″; width for 8 suits, 22″; width for 4 overcoats, 12″; depth of closets, 20″ to 24″.

Hanging space for dresses and coats: Hanging rod not more than 5′-6″ above floor; drawers for lesser garments, 3″ to 4″ high, 12″ wide; shelves for shoes, 5″ high; shelf for hats, 12″ high; height of hanging space, 5′-6″; width for 9 dresses, 27″; depth of closet, 20″ to 24″.

CLEANING CLOSET.

Dimensions and arrangement of cleaning closet are based on equipment and supplies found in the representative home. Portable ironing board and table leaves may or may not be included here, depending on whether or not space is found elsewhere. The following over-all dimensions would be considered in providing space for cleaning items:

Vacuum cleaner, 49″ high, 16″ wide, 14″ deep, hose 9′ long; step ladder, 49″ high, 20″ wide, 6″ deep; ironing board, 62″ high, 16″ wide, 4″ deep; pail, 13″ diameter (over handles), 10½″ high; table leaves, 13″ wide, 54″ high; dust mop, 61″ long; mop end, 9″ wide; wet mop, 57″ long; mop end, 7″ wide; wall brush, 60″ long, 10″ wide, 3″ deep; dustpan, 34″ long, 13½″ wide, 3″ deep; broom, 54″ long, 14″ wide, 2″ thick; carpet sweeper, 54″ long (box, 14″ x 10″ x 5″); waxer, head, 9″ x 5″ x 3″.

Lower part of closet should be fitted with hooks for equipment that will hang, while the upper is equipped with shelves. If shelving is extended to ceiling, then provide separate doors for upper and lower sections. Upper shelves should be narrower than lowest one.

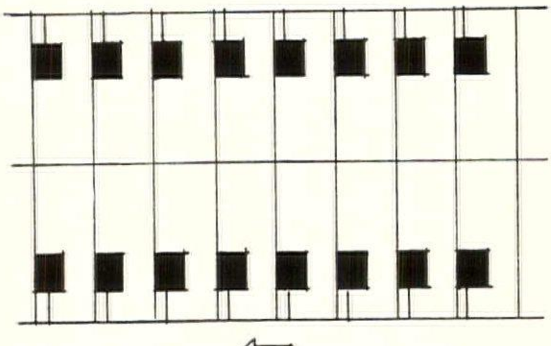
ADDITIONAL STORAGE.

Baby carriage, 2′ x 4′ over-all; height, 3′ (top down).

Lawn mower

Screens	Trunks
Garden tools	Unused furniture
Children's play cycles	Step ladder

SITE PLANNING FOR LOW-COST PRIVATE DWELLING



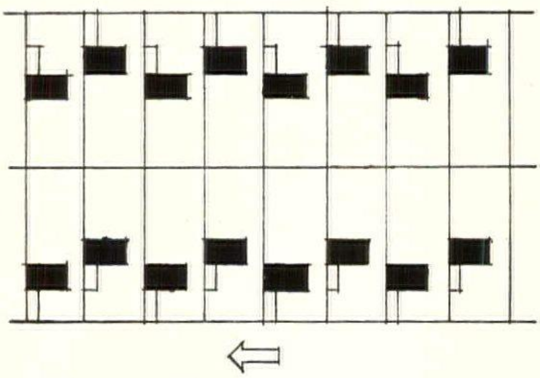
1 WITH PLAN 2

Advantages:

1. All costs of utilities from street to houses equal.
2. Combining of garage walls (if alternating garages shifted to south lot line).

Disadvantages:

1. Monotony of appearance.
2. Vista to south interrupted.
3. Late morning and early afternoon winter sun cut
4. South terrace closed in on two sides by high wall



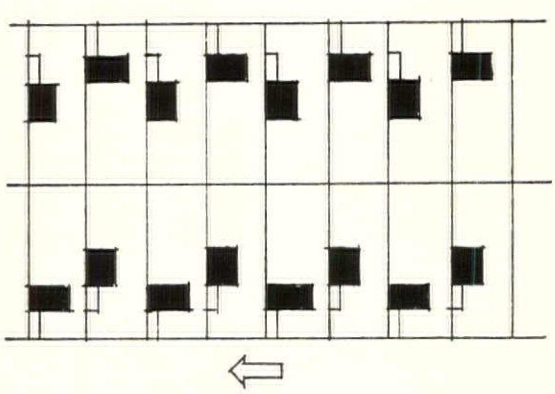
2 WITH PLAN 1

Advantages:

1. Southern vista and noise abatement.
2. Prevailing breeze in second floor.
3. South terrace privacy by low wall of adjoining gar

Disadvantages:

1. Similarity of appearance.
2. Extra cost of utility service on alternate houses.
3. No combining of exterior walls for garages.
4. Division of garden area in alternate plots by na terrace.



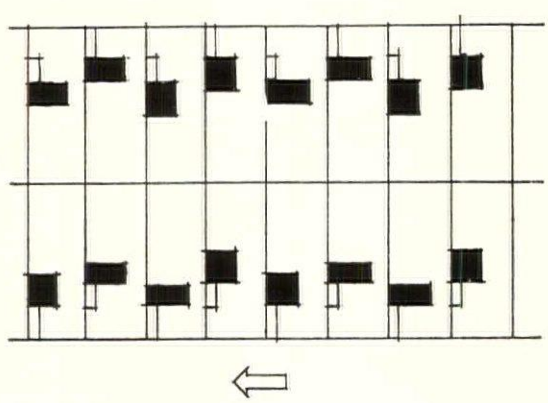
3 COMBINATION PLANS 1 AND 2

Advantages:

1. Relieving monotony.
2. East, south, and west exposures for living-dining, sl ing and terraces.
3. Vista and noise abatement.

Disadvantages:

1. Extra cost of utility service on alternate houses.
2. No combining of exterior wall.
3. Shadow cast by House No. 2 in late morning.



4 COMBINATION PLANS 1 AND 2

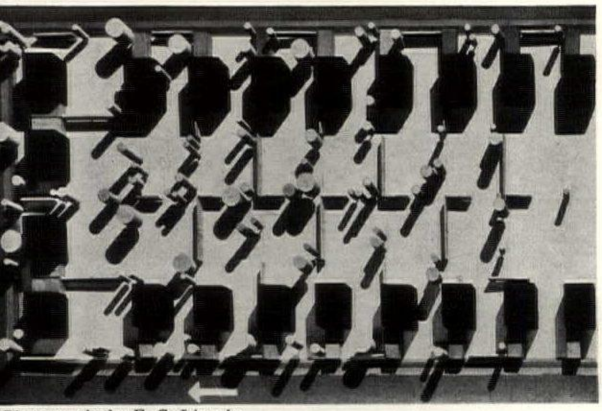
Advantages:

1. Giving maximum variation with these two plans. E fifth house repeating.
2. Advantage over arrangement No. 3 is that shado late morning is reduced.
3. East, south, and west exposures for living-dining, sl ing and terraces.
4. Vista and noise abatement.

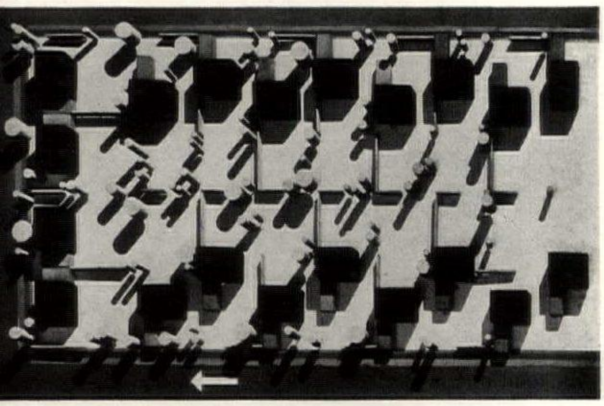
Disadvantages:

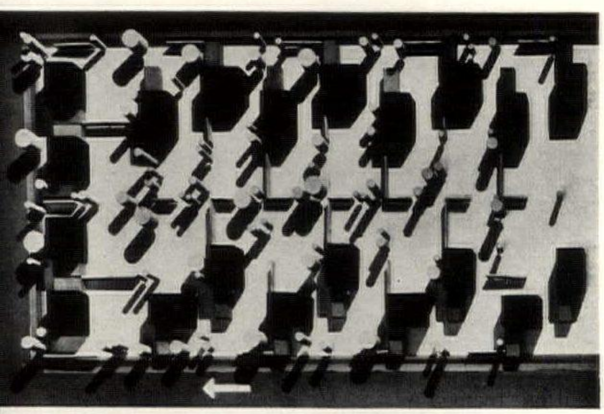
1. Extra cost of utility service on alternate houses.
2. No combining of exterior wall.

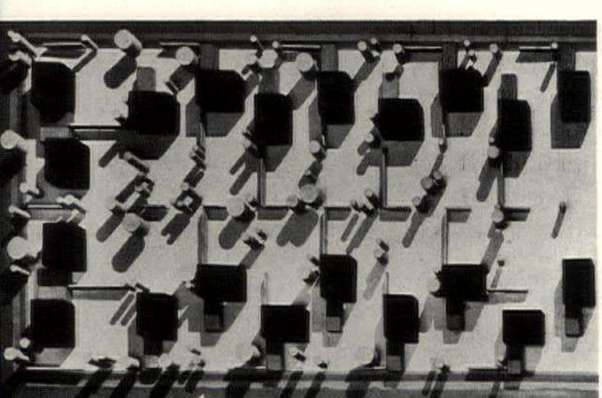
Prepared by DON E. HATCH, Architect



Photographs by F. S. Lincoln







GENERAL:

This is not row housing. Every effort has been made to keep away from a row effect.

This is an attempt toward an "individual" dwelling with all that the term "individual" implies.

An individual dwelling to house a family of four people with an income of approximately $2,000. It is believed that this annual income economically justifies owning a home which necessitates an expenditure of $4,000 for lot and house.

An effort has been made to eliminate idealistic obstacles from the path of the small house development and the individual owner. No closing of streets, changing of existing utilities, complicated lot lines, introduction of unattainable materials.

PERTINENT TO GENERAL SCHEME:

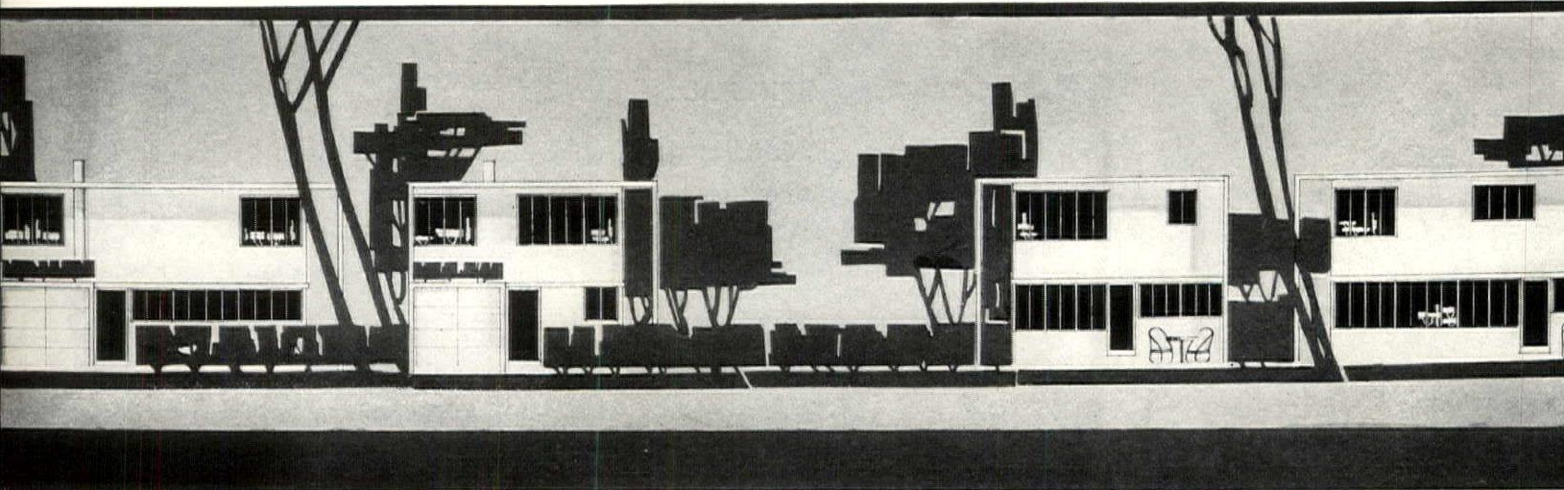
Lots have been divided, for the most part, with a frontage of 40 feet. The price per front foot (100 feet deep) should be approximately $20, or $800 for the land with complete public and basic lot improvements.

Houses on 40-foot lots have been kept to one side lot line, insuring concentration of garden areas and development of side terraces. Allowing private mobility from lot line to lot line. No house faces directly on windows or terraces of the adjoining house. The walls adjacent to the side lot line are completely void of windows.

The recommended stagger system of placing the houses on the lots enables each house to have the added vista of the width of the adjacent lot. Insures noise abatement, excellent sun and prevailing breeze.

Both House No. 1 and House No. 2 have a cubage of 8,500 cu. ft. (not including the garage). Both should be built for 28¢ a cubic foot, or a total of $2,400, leaving $800 for the garage, living room terrace, driveway, walk and planting.

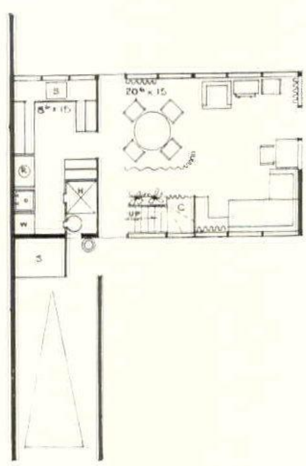
STUDIES FOR LOW-COST PRIVATE DWELLING



FRONT ELEVATIONS REAR ELEVATIO

• PLAN 1

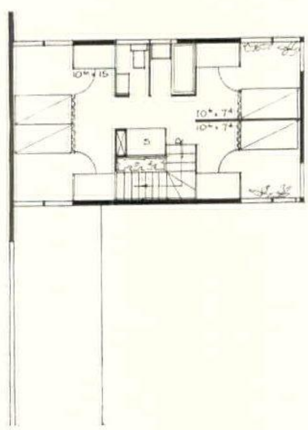
LOT. North wall on lot line. Lounging terrace on south with east and west exposures. Shiel from noon sun by wall of adjoining garage. Dining terrace with east and south exposures, privacy from north by wing wall; close to kitchen. Private mobility from lot line to lot line. yard visible from kitchen. Main body of house 22 feet from front building line.



PLAN. FIRST FLOOR. Living-dining with east, south, and exposures. Kitchen and dining with direct eastern exposure.

Front entrance adjacent to garage door. Entrance space shiel from dining-living space by sliding curtain. Stairs free-stan from wall. Coat and card table storage under stair screened sliding curtain. Minimum partitions—separating dining-living kitchen.

Kitchen and utility in one space. Utility with heater, cleaning c and package receiver, washer and laundry tub. Kitchen arran in logical sequence with food receiving-storage at refrigera preparation and sink, to cooking at range ending appropriatel serving counter at dining door. China, linen, and silver sto above and below serving counter. Single door for serving to ing and access to front door. Minimum duct run from heate plenum chamber over second floor hall.



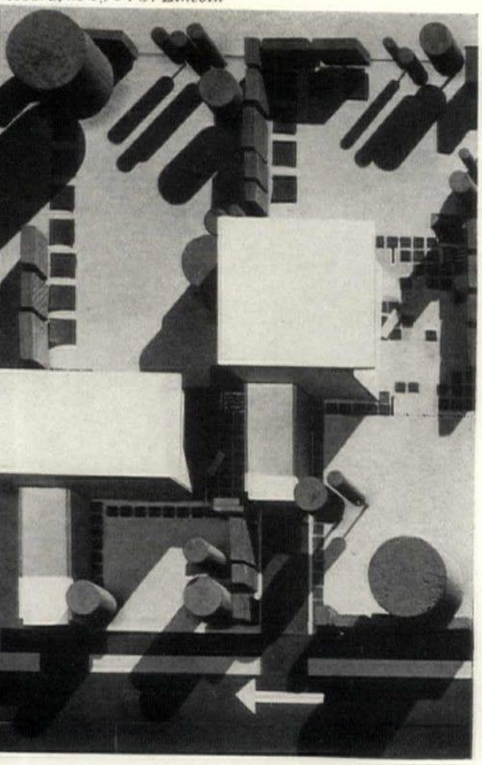
PLAN. SECOND FLOOR. All wardrobes standard, namely, id cal in size and forming part of partitions. Bath and toilet separa making for double capacity of single bathroom.

Sleeping portion separate from dressing by corrugated glass scr closed off by door from wardrobe. Chilling of all rooms and terior partitions eliminated. Gives warm place for dressing diminishes peak load and fuel consumption of heating appar Glass screen gives openness of entire room yet privacy in sum when doors are left open. Windows in sleeping portion may substituted by screens in summer. Openings protected from ing rains by projecting roof and wing walls. Summer and w location for beds.

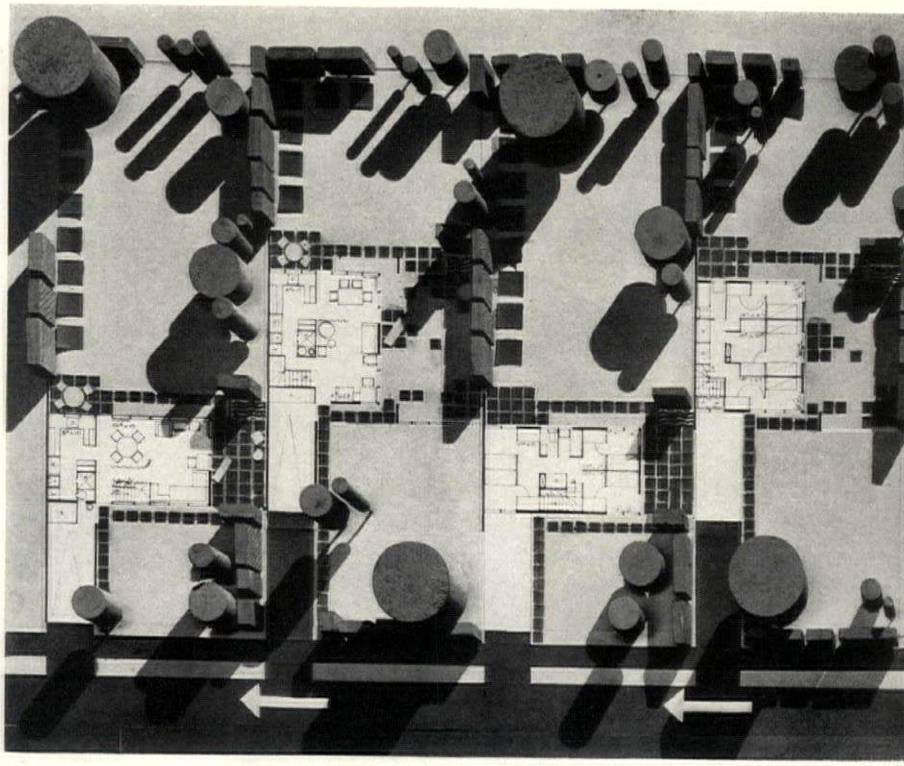
Rooms with southeast, southwest, and east and west expos

Designed by DON E. HATCH, Architect

hotographs by F. S. Lincoln



MODEL OF PLAN 1 AND PLAN 2 LOCATED ON A 40-FOOT PLOT



PLAN 1 PLAN 2 GROUND FLOOR PLANS

PLAN 1 PLAN 2 SECOND FLOOR PLANS

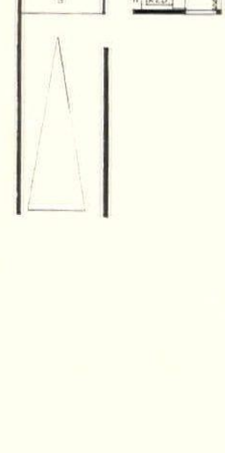
PLAN 2

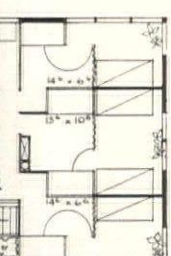
LOT. Concentration of garden area. Gives 20-foot-wide terrace between south wall and south lot line, allowing front and rear garden to flow as one with this terrace as a connecting link. Relieves row uniformity on street side, increasing possibility of individuality. Dining terrace with east and south exposures. Play yard visible from kitchen.

PLAN. FIRST FLOOR. Living-dining with east, south, and west exposures. Kitchen and dining with direct eastern exposure.

Front entrance adjacent to garage door. Stair free-standing. Coat and card table storage under stair screened by sliding curtain. Minimum partitions—separating dining from kitchen.

Kitchen and utility arrangement standard with that of Plan 1.





PLAN. SECOND FLOOR. All wardrobes standard with those of Plan 1.

Sleeping and dressing arrangement standard with Plan 1.

All rooms have southern exposure.

FOUNDATIONS FOR THE LOW-INCOME HOUS

By SHELDON D. WERNER
Consulting Engineer

Three kinds of foundations are considered as suitec the low-cost house.

THE PURPOSES OF FOOTINGS FOR A DUR BLE AND WELL-CONSTRUCTED HOUSE AR

—Capability of safely supporting superimposed lo

—Freedom from movement due to soil conditions frost action.

—There should be no disintegration from weather changing temperature.

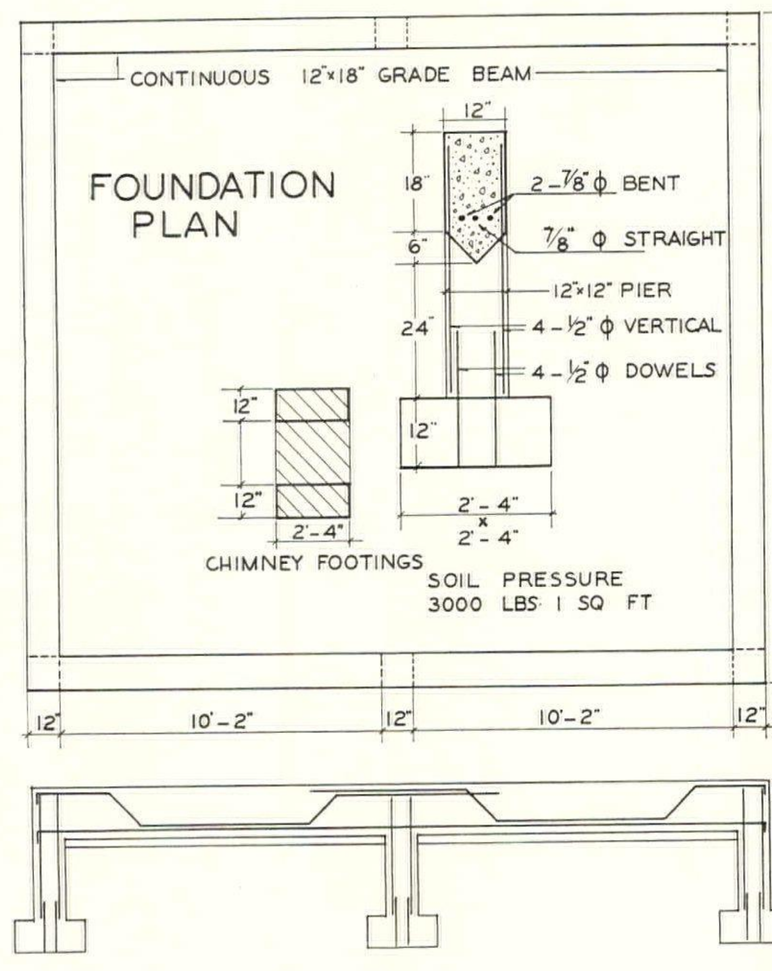
—No waste of material and labor for installation.

—Depth suited to locality (soil conditions, tempe ture).

—Protection against termites and rot.

—Waterproofing of foundation to prevent passage moisture to cellar or vertically to house framing.

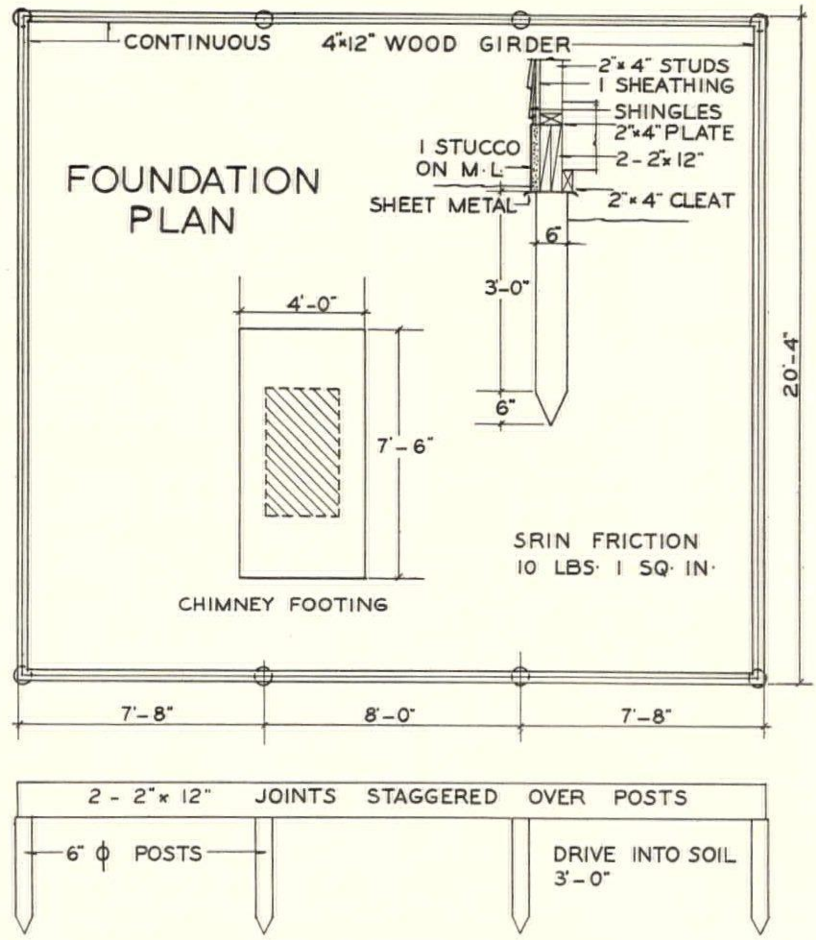
A MASONRY HOUSE



A CONCRETE BEAM AND PIER FOUNDATION—REINFORCED.

A frostproof foundation for use in severe northern climates, including Alaska. Will comply with any building code. This design results in minimum excavation and maximum stability and economy of material. Use in localities where material is expensive and labor is cheap. Foundation cost for pier and beam type, reinforced, $236, including rough first floor construction. A concrete block foundation, 2′6″ deep, would cost $170, including rough first floor construction. A concrete block foundation, 5′ deep, would cost $267.

B WOOD HOUSE

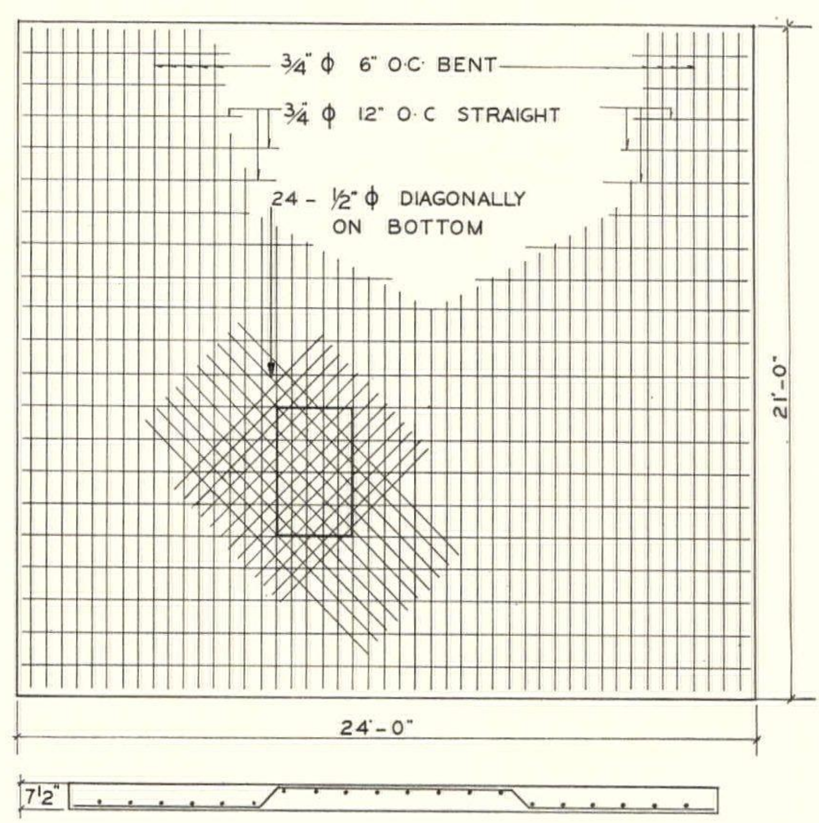


B WOOD POST AND WOOD GIRDER FOUN-ATION.

ie most economical foundation possible for the ıme house built in conventional wood framing ıd finish. Suitable for southern climate and where uilding codes do not specify foundation construc-on. Precaution must be taken against termites ıd rotting of wood. "Woods combining decay-sistance in a high degree are: black locust, Osage ange, chestnut, cedar, cypress, heart of red-ood."* All woods, regardless of species, should e given a good preservative treatment. Use cop-er discs, projecting 2" beyond all posts, for ter-ite protection.

orest Products Laboratory Recommendation.

C MASONRY HOUSE



REINFORCED CONCRETE SLAB, OR MAT OUNDATION.

f sufficient rigidity to insure movement of the tire structure as a unit. For use only on level ıd with uniform soil condition in any climate. ote that heater room floor must be raised to eneral level. Heat loss to earth would be objec-onable in severe climate. Can be built very onomically by experienced contractor. Move-ent of structure is negligible. Would be greatly ghtened for same house in frame construction. at foundation as detailed would cost $177. l prices are based on employment of union oor in New York metropolitan area.

INSULATING VALUES OF SOME FRAME CONSTRUCTIONS

NO.	CONSTRUCTION	INSULATING VALUE
1	¾-inch drop siding, paper, studs.	1.71
2	½-inch insulating board, paper, studs.	2.28
3	¾-inch drop siding, paper, 1-inch wood sheathing, studs.	2.69
4	¾-inch drop siding, paper, ½-inch insulating board, studs.	3.22
5	¾-inch drop siding, paper, studs, 1-inch matched boards.	3.60
6	¾-inch drop siding, paper, studs, ½-inch insulating board.	4.13
7	½-inch insulating board, paper, studs, ½-inch insulating board.	4.70
8	¾-inch drop siding, paper, studs, ½-inch insulating board, ½-inch plaster.	4.28
9	¾-inch drop siding, paper, studs, ½-inch insulating board, 9/16-inch ceiling.	4.83
10	¾-inch drop siding, paper, 1-inch wood sheathing, studs, 1-inch matched boards.	4.58
11	¾-inch drop siding, paper, 1-inch wood sheathing, studs, ½ inch insulating board.	5.11
12	¾-inch drop siding, paper, 1-inch wood sheathing, studs, ½-inch insulating board, ½-inch plaster.	5.26
13	¾-inch drop siding, paper, 1-inch wood sheathing, studs, ½-inch insulating board, 9/16-inch ceiling.	5.81
14	¾-inch drop siding, paper, ½-inch insulating board, studs, ½-inch insulating board, ½-inch plaster.	5.79
15	¾-inch drop siding, paper, studs, ½-inch semi-rigid insulation midway in stud space, paper, 1-inch matched boards.	6.07
16	¾-inch drop siding, paper, studs, ½-inch flexible insulation mid-way in stud space, paper,	6.36

INSULATING VALUES OF SOME FRAME CONSTRUCTIONS

NO.	CONSTRUCTION	INSULATING VALUE
17	¾-inch drop siding, paper, 2 x 4-inch studs, paper, 1-inch matched boards, stud space filled with 3/16-inch cork particles.	14.39
18	Same construction as No. 17, except dry fluffy gypsum fill insulation used here	10.24
19	Same construction as No. 17, except fluffy rock or mineral fiber fill insulation used here.	14.79
20	Same construction as No. 17, except dry shavings fill insulation used here.	11.54
21	Prepared roofing, 1-inch boards, rafters.	1.90
22	Wood shingles, 1-inch boards, rafters.	2.53
23	Prepared roofing, 1-inch boards, ½-inch insulating board, rafters.	3.41
24	Wood shingles, 1-inch boards, ½-inch insulating board, rafters.	4.04
25	Prepared roofing, 1-inch boards, rafters, ½-inch insulating board.	4.32
26	Wood shingles, 1-inch boards, rafters, ½-inch insulating board.	4.95
27	Wood shingles, 1-inch boards, ½-inch insulating board, rafters, ½-inch insulating board	6.46
28	Prepared roofing, 1-inch boards, ½-inch insulating board, rafters, 1-inch insulating board	7.35
29	Prepared roofing, 1-inch boards, ½-inch flexible insulation midway in rafter space, paper, 1-inch matched boards.	6.55
30	Same construction as No. 29, except ½-inch semi-rigid in-	6.26

ECONOMY OF INSULATION

In considering the cost of insulation one must take into account added comfort, both in summer and in winter.

There is also the initial saving in heating plant installation and radiators (hot-water and steam). This saving has been estimated as $12 to $20 for the typical house of 10,000 cubic feet. Fuel saving per year may be estimated as ranging from 2 to 3 tons per year or, in dollars and cents, from $20 to $30 saving each year.

With some types of construction the cost of insulation can be partly and even entirely saved, as with structural insulation (rigid insulation board) which, because of its rigidity, can be used as a combination insulating and structural material, such as for sheathing under shingles or clapboards, as a plaster base, or for internal finish of walls and ceilings. Here it often takes the place of a more expensive facing or structural material and at the same time offers good insulation.

"In winter insulation acts to keep heat inside buildings, and in summer to keep it outside."

The term "insulation" is commonly applied to those materials which have a *high degree* of heat-resisting ability, such as are manufactured for this express purpose.

Lightweight building materials containing innumerable small spaces are usually better insulators than are products or walls having a few large air spaces; they are also better insulators than are dense solid materials. Exception is cited in the case of thin sheets of polished metal, the bright surfaces of which reflect heat just as a mirror reflects light.*

MANUFACTURED INSULATION

1. **Rigid Insulation.** Insulation board manufactured chiefly from vegetable fiber (plant and wood fiber). It is produced in panels of various sizes and may be sawed and nailed. It may be used solely for insulating values, although because of its rigidity it is generally used as a combination insulating and structural material, such as outside sheathing, plaster base, or interior finish for walls and ceiling.

Standard sizes are 4 feet wide by 6, 7, 8, 9, 10 and 12 feet long. Common thicknesses are approximately ½, ¾ and 1 inch.

Rigid insulation of the non-structural type is made from the same fibrous materials as structural insulation and from cork. This is usually sold for "roof insulation" and is not intended for use where strength is needed in excess of that required to withstand handling. Corrugated fiberboard is another material of this general type.

2. **Semi-rigid Insulation.** Panels of semi-rigid insulation, sometimes called "felts," are less rigid in form than board insulation and possess a certain degree of flexibility. These materials are usually made from vegetable fiber such as flax and various grasses. In addition to their application in walls and roofs, they are used to wrap around ventilating flues.

Semi-rigid insulation is manufactured in sheets ranging from 5/16 inch to 1 inch in thickness; in widths of 16½, 24½, 32 and 36 inches; and in lengths of 8, 8½, 9, 9½ and 10 feet.

3. **Flexible Insulation.** Flexible insulation material consists of a loosely felted mat of wood fiber, hair, grass, Kapok, or mineral substance, usually covered on both sides with a layer of paper or fabric. It is sometimes called "blanket" and "quilt" insulation. This material is used only for its insulating properties. Its light weight and loosely matted form make it suitable for packing cracks around openings, wrapping pipes and ducts. It comes in sizes suitable for insertion between wall studs and

*Report of sub-committee on insulation. Twenty-fifth report of the National Committee on Wood Utilization. 1933. P. 2.

INSULATING VALUES OF SOME MASONRY CONSTRUCTIONS

NO.	CONSTRUCTION	INSULATING VALUE
31	8-inch brick.	2.37
32	8-inch brick, furring strips, ½-inch insulating board, 9/16-inch ceiling.	5.49
33	8-inch brick, furring strips, 1-inch insulating board, ½-inch plaster.	6.46
34	8-inch cinder concrete block.	2.38
35	8-inch cinder concrete block, furring strips, ½-inch insulating board, 9/16-inch ceiling.	5.50
36	8-inch cinder concrete block, furring strips, 1-inch insulating board, ½-inch plaster.	6.47
37	8-inch concrete.	1.44
38	8-inch concrete, furring strips, ½-inch insulating board, 9/16-inch ceiling.	4.56
39	8-inch concrete, furring strips, 1-inch insulating board, ½-inch plaster.	5.53
40	8-inch concrete block.	1.77
41	8-inch concrete block, furring strips, ½-inch insulating board, 9/16-inch ceiling.	4.89
42	8-inch concrete block, furring strips, 1-inch insulating board, ½-inch plaster.	5.86
43	8-inch hollow tile	2.44
44	8-inch hollow tile, furring strips, ½-inch insulating board, 9/16-inch ceiling.	5.56
45	8-inch hollow tile, furring strips, 1-inch insulating board, ½-inch plaster.	6.53
46	16-inch stone	2.05
47	16-inch stone, furring strips, ½-inch insulating board, 9/16-inch ceiling.	5.17
48	16-inch stone, furring strips, 1-inch insulating board, ½-inch plaster.	6.14

other framing members, and for application over the edges of these members.

Flexible insulation is produced in strips approximately 17, 25, 33 and 48 inches wide and in lengths up to 100 feet. Thicknesses, ¼ inch to 2 inches.

4. **Fill Insulation.** Fill insulation is granulated, shredded, or powdered material. Products commonly used are granulated cork, shredded vegetable fiber and powdered or fibrous minerals, such as gypsum, limestone or other rock and slag from metal refineries. It generally comes in bulk and, as the name implies, is used for filling spaces in wall, floor, ceiling and roof contruction.

Fill material may also be obtained in the form of "bats" made by felting mineral fibers into units several inches thick and in widths to fit between studs and other framing members.

N ANALYSIS OF SEVENTEEN HOUSES
COSTING LESS THAN $5,000

Materials and equipment that architects and builders have used in actual examples of low-cost houses are not to be accepted as a guide to new work. There is, however, some interest and, perhaps, some value in noting common practice as applied to the house of moderate price. The following chart was prepared by John R. Weber. It is a study of seventeen houses costing less than $5,000 each, exclusive of land cost. Construction materials and equipment items are separately listed and percentages of use indicated.

	No.	%
Foundations		
Concrete	12	71
Concrete Blocks	4	23½
Stone	1	6
Rough Construction		
Steel	1	6
Wood	13	77
Concrete Blocks	2	11½
Brick	1	6
Exterior Surface		
Wood	9	53
Stucco	2½	14¾
Brick	2	11¾
Shingles	1	6
Stone	2	11¾
Plywood	½	3
Roof		
Shingles	8	47
Slate	2	11¾
Wood	1	6
Tar Paper	4	23½
Tar and Gravel	2	11¾
Metalwork		
Copper	8	47
Galvanized Iron	9	53
Door and Window Frames		
Wood	7	41¼
Steel	10	59
Interior Finish		
Lath and Plaster	9	53
Wood	4	23½
Concrete Blocks	2	11¾
Compo. Sheets	2	11¾

	No.	%
Interior Trim		
Pine	13	77
Fir	3	17¾
Redwood	1	6
Insulation		
With	10	59
Without	7	41¼
Wiring		
BX	10	59
Conduit	1	6
Knob and Tube	6	35¼
Lighting		
Direct	15	88¼
Indirect	2	11¾
Bathroom Fixtures		
Tub, Toilet, Basin	11	65
Tub, Shower, 2 Toilets, 2 Basins	3	17¾
Tub, Shower, Toilet, Basin	1	6
Tub, 2 Toilets, 2 Basins	1	6
Shower, Toilet, Basin	1	6
Pipes		
W. I.	7	41½
Brass	5	29½
Copper	3	17¾
Steel	2	11¾
Heating		
Gas	8	47
Coal	6	35¼
Oil	3	17¾

Two thirds or more of these houses have:
- Concrete foundations
- Wood frame construction
- Pine trim
- Direct lighting
- One bathroom, one tub, etc.

About one-half of these houses have, in addition to the above:
- Wood exterior surface
- Shingle roofs
- Steel casement window frames
- Lath and plaster interiors
- Some kind of insulation
- BX wiring
- Gas heating

COST STUDY[1]: FOR A LOW-COST HOUSE FO

1. Figures based on composite bids: Alan-Lawrence Company, Inc., 301 Madison Avenue, N. Y. C.; Raymond D. Ritchie, 103 Park Avenue, N.

Element	Material	Specifications
EXCAVATIONS	Full	Full excavation: 7'-6" in heater room: 6'-6" in remainder.
FOOTINGS	Concrete	1' x 2' concrete: water-cement ratio 6-1: 1/2-3-5 mix.
A. Chimney	Concrete	Extra reinforced mat 1' x 3' x 5': same mix as above.
B. Ext. Steps	Concrete	Concrete: repeat mix: trowelled cement surface.
FOUNDATIONS	A. Concrete Blocks	12" cinder concrete blocks laid in cement mortar.
	1. Waterproofing	1 coat standard brand liquid asphaltic compound.
	B. Reinforced Concrete	8" concrete: repeat mix above.
	C. Brick	12" common brick wall: waterproofed cement mortar.
	Concrete Mat	7" reinforced concrete: same mix as above.
TERMITE PROTECTION	A. Chemical	Sills, plates, studs chemically impregnated under pressure.
	B. Mechanical	Continuous 10-oz. gauge copper band projecting 2" on both sides of all foundation walls.
CHIMNEY	A. Brick	Common brick in cement mortar: T.C. flue linings: firebrick backing in fireplace.
FLOORS A. Construction	A. Wood 1st Floor	3" x 10" joist: 16" o.c.: cross bridging: 7/8" x 6" diagonal sheathing.
	2d Floor	2" x 8" joist: 16" o. c.: cross bridging: 7/8" x 6" diagonal sheathing.
	B. Metal 1st and 2nd Floors	*Cellular Steel: cinder concrete fill: ready for finish floor.
	C. Concrete 1. Heater Room	4" concrete: wire mesh reinforcing: trowelled cement finish.
	2. 1st Floor	5" reinforced slab: repeat mix: structural steel included.
B. Finish	A. Linoleum	Medium gauge plain linoleum: laid in mastic on unimpregnated felt.
	B. Wood	No. 2 common P.S. oak flooring: sanded and finished.
EXTERIOR WALLS	A. Wood: Framing	2" x 4" studs braced at corners and openings: heavy building paper and 7/8" diagonal shea
	1. Flush Siding	6" T & G siding: select grade.
	2. Brick Veneer	4" common brick tied to walls framed as above.
	B. Concrete Block with Stucco	4" cinder concrete block tied to walls as above: sand-finished, waterproofed cement plaster
INTERIOR PARTITIONS A. Framing B. Finish	A. Wood Studs	2" x 4" studs, braced and doubled at openings.
	1. Wall Board	1/8" standard smooth finish wall board: battens at joints or joints pointed.
	B. Plaster on Wood Lath	3/4" plaster, smooth finish: on wood lath.
		3/4" plaster on expanded metal lath. (See alternate under Insulation.)
ROOF	A. Framing	2" x 8" rafters, 16" o.c.: bridging: 7/8" x 6" sheathing.
	B. Finish and Flashing	20-year built-up roof: 5-ply, felt, asphalt, slag: 16-oz. copper flashing on parapet: plastic slate
STAIRS	A. First Flight	Rough pine framing: milled treads, risers, rail.
	Second Flight	Rough pine framing: oak treads, risers, rail.
DOORS AND WINDOWS A. Doors	Wood	Stock 1 3/4" single panel fir: installed, with hardware.
B. Windows	A. Steel Casement	Standard steel casements: complete with hardware, glazed and installed.
	B. Wood D-H Sash	Stock wood D-H sash: glazed, installed, with hardware.
INSULATION	A. Exterior Walls and Roof 1. Rock Wool	4" mineral wool bats: all exterior walls and roof.
	2. Lath	**Aluminum-backed metal lath (for insulation against radiant heat).
	B. Weather-stripping 1. Doors	Weather-stripping and bronze threshold: installed.
	2. D-H Wood Sash	Standard weather-stripping on all sash.
MILLWORK	Trim, Base, etc.	Stock pine trim, base, closet equipment: installed.
PAINTING		3-coat lead-and-oil job on exterior and interior trim, sash, doors, etc.: exterior stained: i painted with cold-water cement paint.
TOTAL COST	Structure only.	

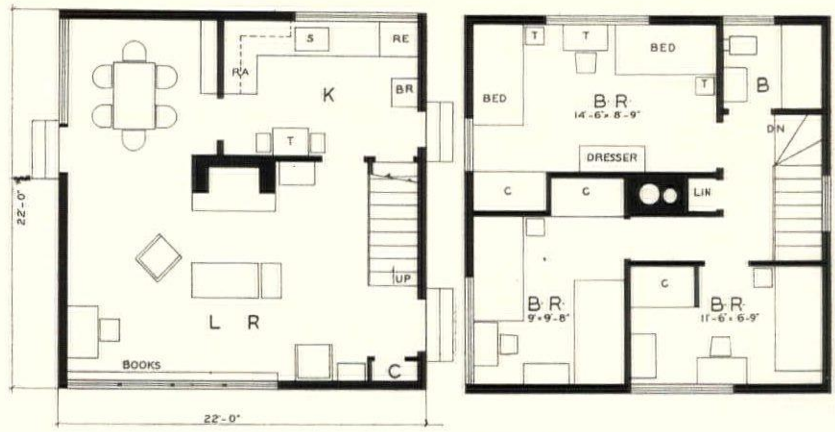
* Prices based on FK-type cellular steel as manufactured by H. H. Robertson, Inc. Labor included.

** Prices based on Reynolds Metallated Ecod Fabric Lath York area, labor included.

FAMILY OF FOUR

ase 2	Alternate "A"	Alternate "B"
$93.00		
73.40		
3.00		
18.00		
177.50		
30.15		
	+ $114.00	
		+ $125.60
200.05		
15.00		
	+ 35.85	
238.00		
92.08		
82.22		
	+ 174.30	
34.00		
		+ 260.10
143.80		
	+ 12.30	
205.50		
249.00		
		+ 586.00
	+ 81.00	
49.56		
226.68		
	+ 95.46	+ 111.26
118.00		
91.04		
50.00		
75.00		
159.00		
120.00		
	+ 33.00	
180.00		
100.00		
18.00		
	+ 30.00	
115.00		
150.00		
,806.93		

. All cost items include labor at union wages for
ew York area.



Plan of house for which construction costs were obtained.

The present study is an attempt to present the possibilities of building, in the immediate present, a house for the average American family of four persons: to demonstrate that within certain minimums in terms of comfort, utility, and sanitation this house can be built and equipped for $4,000.

To facilitate this analysis costs were broken down into the following categories:

1. Structure.
2. Mechanical equipment.
3. Electrical system.
4. Furnishings.

The structure was then broken down into its component elements and each of these elements analyzed on the basis of (1) conformity to structural criteria and (2) cost. To achieve the cost data it was necessary to definitely locate the house in the New York area; bids were secured on the above plans and these bids were then analyzed and tabulated. The resulting base price and alternates are classified *solely on a basis of cost.* On this basis it was possible to demonstrate factually the materials and methods available to the individual builder of the low-cost house.

It should be borne in mind that these prices are only quoted because of the premises of this survey: a $4,000 house for a family of four. The consideration of various materials and construction methods has been conditioned by price, not mechanical value. It has thus been necessary to exclude many, indeed most, of the market's newest and best developments. And it should be remembered that these prices are valuable only as *ratios,* both in relation to each other and in relation to similar projects elsewhere in the country. For the cost of this identical structure will vary widely on two counts:

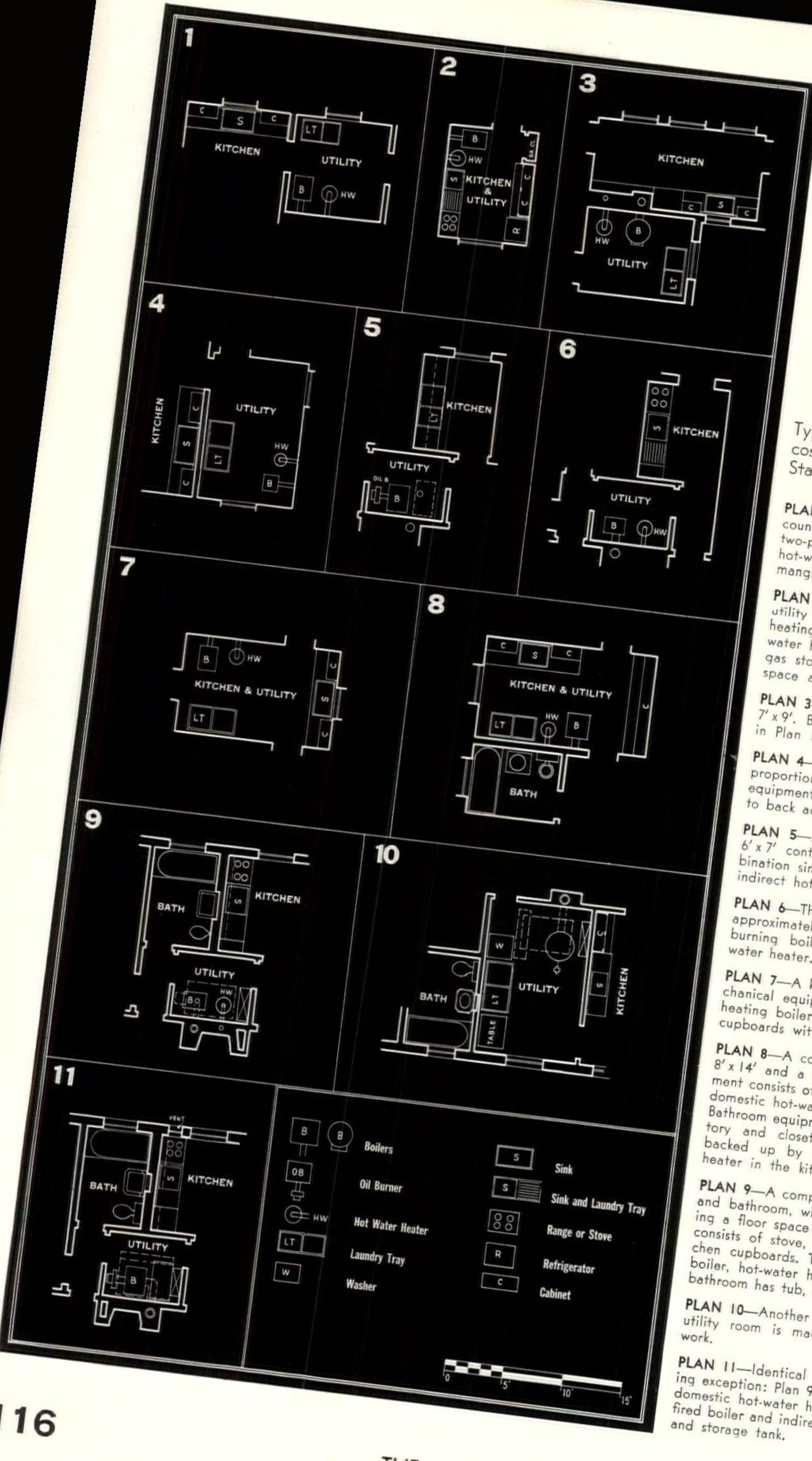
1. Differentials in labor and material prices.
2. Differentials in structural and mechanical requirements for the various regions.

A study of the cost figures of this house clearly reveals that traditional structural methods remain the cheapest, and wood the cheapest structural material.

It is perhaps even more important to notice how closely fireproof—and, in some cases, preassembled—elements are pressing upon traditional nonfireproof construction. Thus, for $255 additional, exterior wall construction could be changed from 6" frame to 4" cinder concrete with cement stucco finish backed up by 4" wood construction with mineral wool insulation: and for wood framing on the first and second floors cellular steel construction could be substituted. The resulting structure would thus be much more permanent, highly fire- and termite-proof.

Again, in warm climates, where soil conditions are even and topography level, a reinforced concrete mat of sufficient rigidity to insure movement of entire structure *would reduce the base price* $302.05! (This economy, of course, comes from the omission of excavations, footings, foundations and first floor construction.)

There are, of course, many further economies to be had from such minor elements as door and window units complete with frame, trim and hardware; prefabricated closets, and rationalization of finished carpentry, painting, etc. But the use of most of these devices is not yet general enough to permit cost studies.



SPACE-SA
ARRANGEM

FOR KITCHEN, BA
AND UTILITY ROO

Typical plans suggested for th
cost house by American Radi
Standard Sanitary Corp.

PLAN 1—A small kitchen with flat rim,
counter top sink and a utility room 8' x
two-part laundry tray, heating boiler, d
hot-water heater and space for washing m
mangle, and the like.

PLAN 2—A complete combination kitche
utility room 7'6" x 9'. The equipment consi
heating boiler, air conditioning unit, domesti
water heater, combination sink and laundry
gas stove, gas or electric refrigerator, cupb
space and broom closet.

PLAN 3—A long narrow kitchen with utility r
7' x 9'. Both rooms contain the same equipmen
in Plan 1.

PLAN 4—Kitchen and utility rooms of diffe
proportions than those already described; sa
equipment with the laundry tray connected ba
to back against the sink.

PLAN 5—A kitchen 7' x 8' and a utility roo
6' x 7' containing the following equipment: co
bination sink and laundry tray, oil-burning boile
indirect hot-water heater and storage tank.

PLAN 6—The same arrangement of equipment
approximately the same size rooms, showing a ga
burning boiler and a gas-burning storage ho
water heater.

PLAN 7—A kitchen 8' x 13' with all necessary m
chanical equipment, including sink, laundry tray
heating boiler, domestic hot-water heater, kitch
cupboards with space for refrigerator and stov

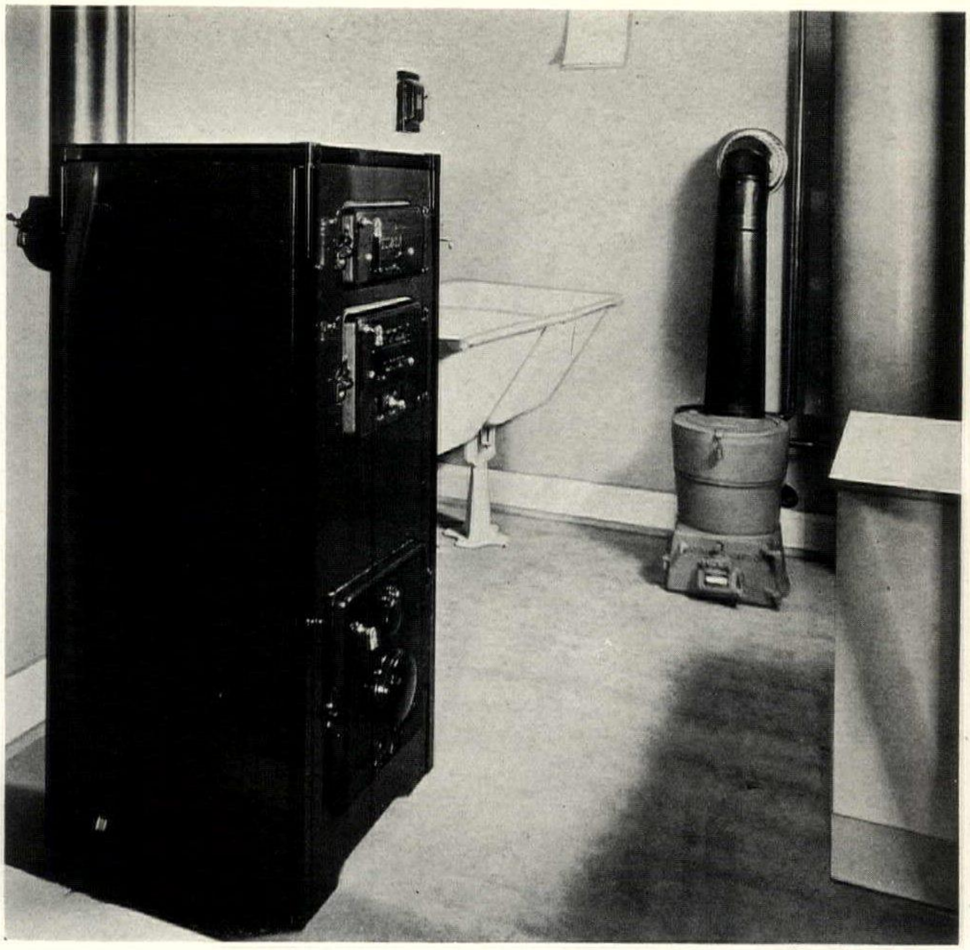
PLAN 8—A combination kitchen and utility roo
8' x 14' and a bathroom 5' x 7'4". Kitchen equi
ment consists of sink, laundry trays, heating boile
domestic hot-water heater, cupboards, and so o
Bathroom equipment consists of recessed tub, lav
tory and closet combination. The bathroom
backed up by the laundry tray and hot-wat
heater in the kitchen and utility room.

PLAN 9—A complete plan of kitchen, utility roo
and bathroom, with complete equipment occup
ing a floor space of 14' x 13'. Kitchen equipme
consists of stove, sink and laundry tray, and k
chen cupboards. The utility room has a heati
boiler, hot-water heater and air conditioner. T
bathroom has tub, lavatory and toilet.

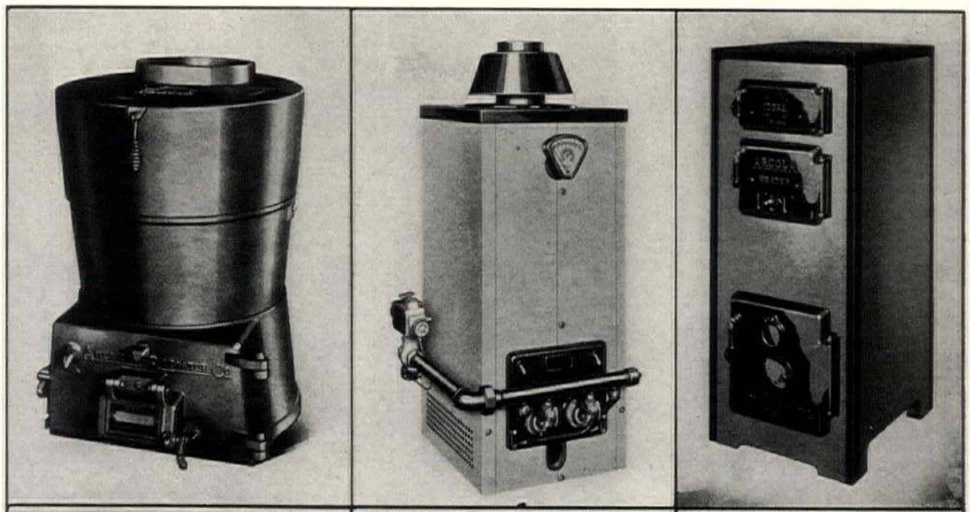
PLAN 10—Another arrangement of Plan 9. T
utility room is made large enough for laund
work.

PLAN 11—Identical with Plan 9 with the follo
ing exception: Plan 9 is for a gas-fired boiler a
domestic hot-water heater; Plan 11 is for an o
fired boiler and indirect domestic hot-water heat
and storage tank.

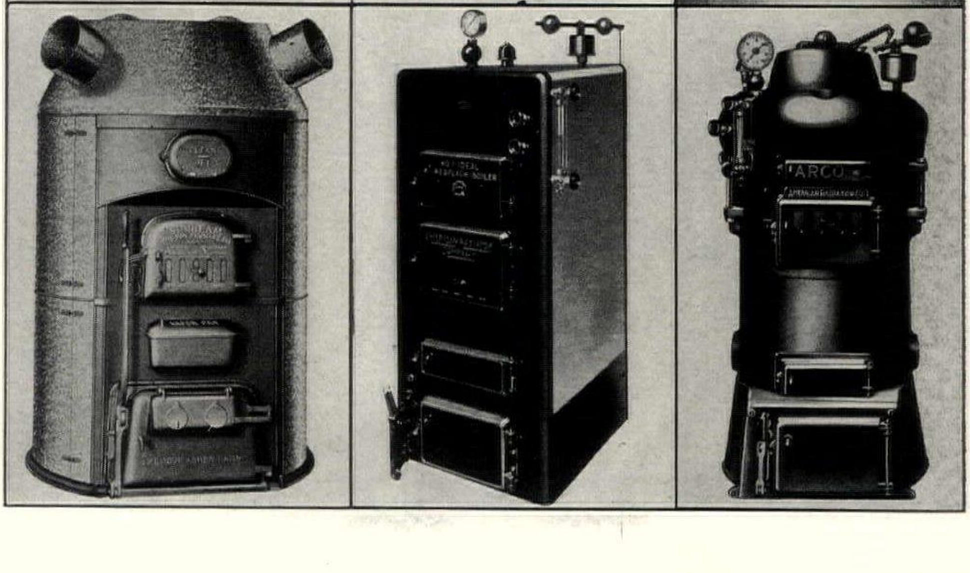
UTILITY ROOM EQUIPMENT



 specially designed boiler for a hot-ater radiator heating system for provi-on of central heating; can be installed a one-floor home without basement. All equipment shown on this page pro-uced by American Radiator & Standard anitary Corp.)

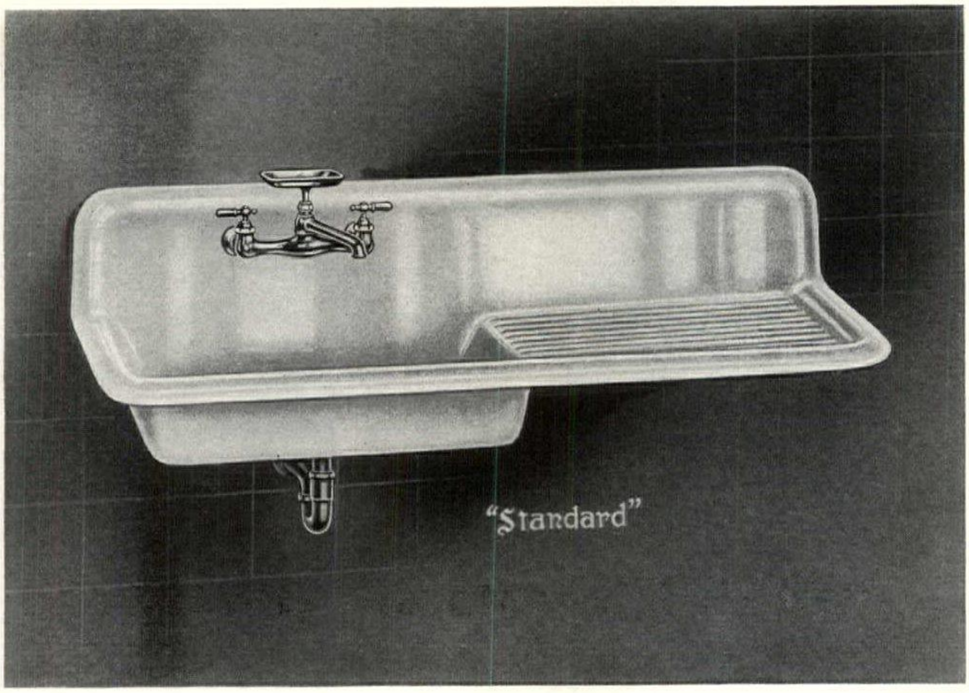


Scuttle-A-Day" hot-water supply heater, esigned to provide a hot-water supply th low fuel cost; can also be used to eat the house with a warm-water radia-r heating system if less than 150 square et of radiation are required. . . . A gas odel boiler for the one-floor warm-water diator heating system. . . . A specially esigned boiler for a hot-water radiator ating system.



 low-cost warm-air furnace for the small use with a basement. . . . A low-cost iler for radiator heating. . . . Another w-cost boiler for radiator heating.

KITCHEN EQUIPMENT



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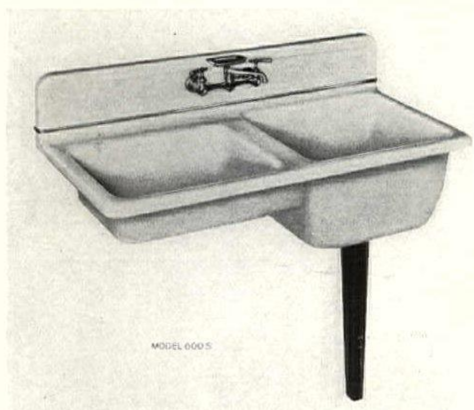
2



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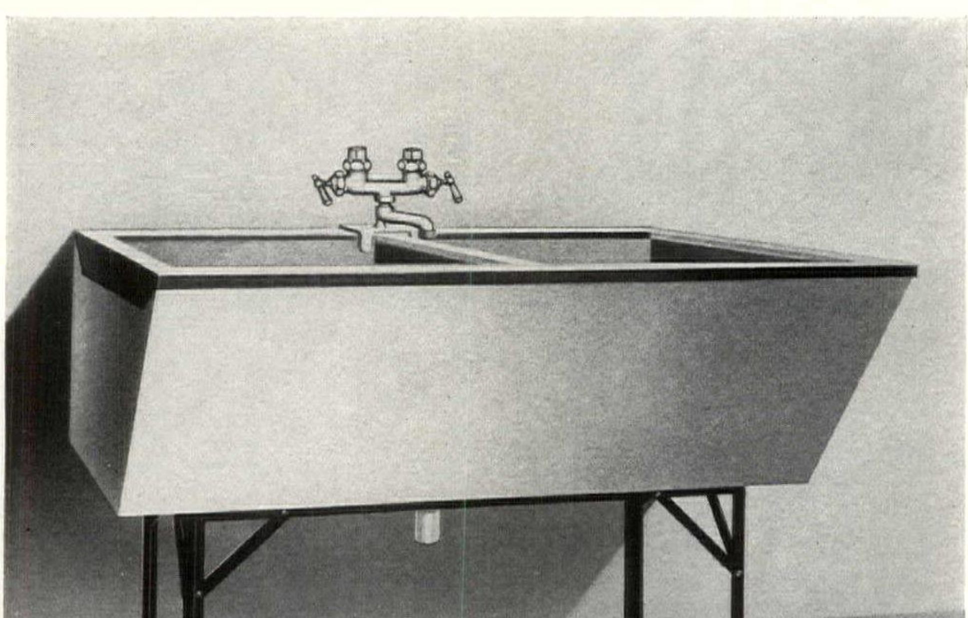
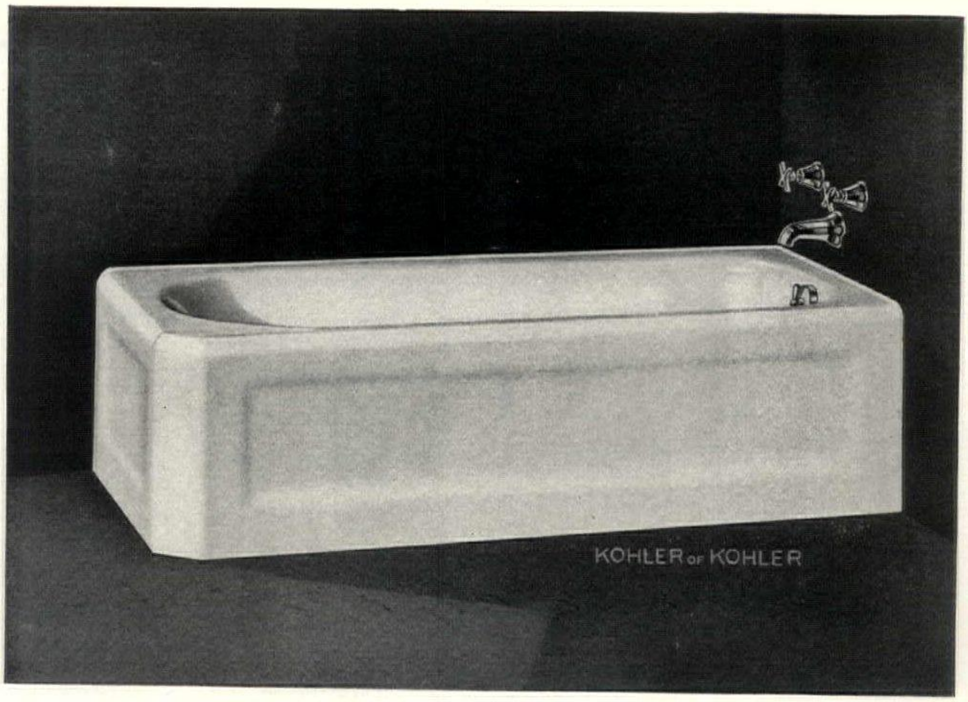


(1) Simple drain board sink. (2) Kitch cabinet sink (Briggs Mfg. Co.). (3) S and tray combination (Briggs Mfg. C (4) Double compartment cement laun tray supported on angle-iron frame. S 42" x 24" ($19).

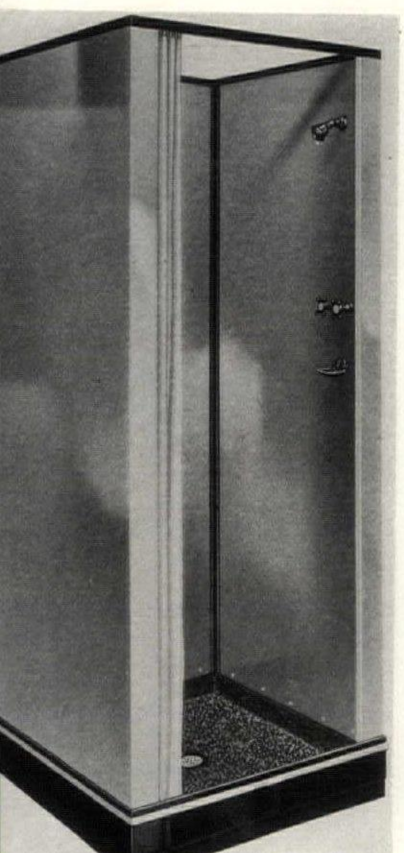
BATHROOM EQUIPMENT



1

) Bathtub with $1/2''$ valves, over-rim supy, pop-up drain ($59.75). (2) Weisway ower cabinet, size 30" x 30". Painted eel walls, non-slip receptor surface. astel green or other colors. Price, fully quipped, $43.50, plus transportation and stallation charges. (Henry Weis Mfg. o., Elkhart, Ind.). (3) Lavatory with comession faucets, $3/8''$ supply pipes, drain ug, $1^1/4''$ P-trap ($13.50). (4) Specially iced lavatory for a "$90 bathroom." China syphon jet closet ($18) and cess bath enameled white porcelain inle, painted outside ($36).

2



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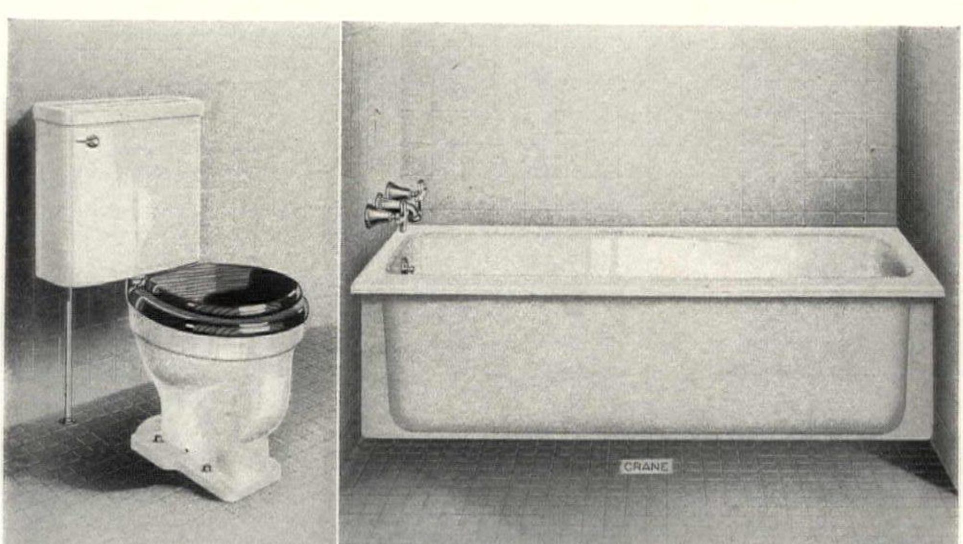
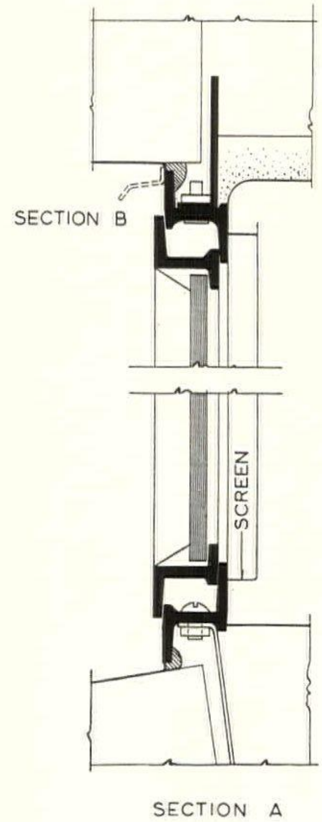
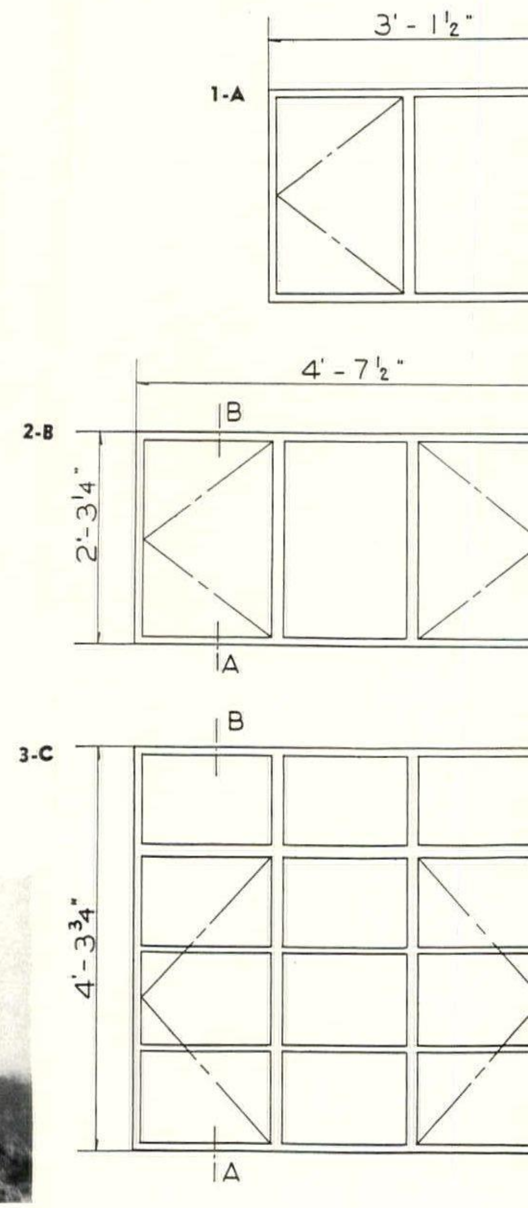


5

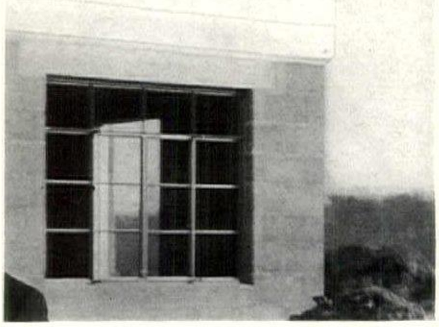
WINDOWS





STEEL CASEMENTS

Steel casement windows cost slightly more than wood windows of double-hung or casement type. Their installation cost is somewhat less. Steel casements come equipped with hardware. Windows 1, 2 and 3 are quoted, delivered without screens in New York City, as follows: (1) A two-light window, \$5.98; (2) a three-light window, \$10.48; (3) three-light high, three units wide, \$12.59. Windows vented as indicated. These windows are standard for almost all steel window manufacturers. Three two-light windows of A type, plus five three-light windows of B type, plus two windows as shown on C type, would cost, in total, \$95.52. These windows are adequate for a house of five rooms. The additional cost for screening all vented windows is \$19.75. Where an order for steel sash for fifty houses is entered at the same time, there is a cost reduction for sash of approximately 20 per cent.



ELECTRIFICATION FOR THE LOW-INCOME HOUSE

HENRY L. LOGAN,
nsulting Electrical Engineer

Considering the total floor area of 1,000 square feet in the low-income house, the proposed electrical system is of a quality and capacity in excess of existing inadequate standards. It meets the minimum requirements of the scientifically electrified home based on proper provision for illumination, work, health, and entertainment (see pages 448-457 of the May 1934 issue). The author believes it is sufficiently ample to protect the owner against electrical obsolescence, and consequently against rapid loss in sales value of the property during the period of the mortgage.

See page 90, this issue.

REQUIRED LIGHTS

		GROUP (1)	GROUP (2)	GROUP (3)	
FRONT DOOR:	Lantern	1	1	1	60 watt
COMBINATION DINING-LIVING ROOM:	Modernized "dome"	1			200 watt
	or Conventional fixture		3		60 watt each
	or Flush ceiling light			1	150 watt
KITCHEN:	Modern kitchen light	1	1		100 watt
	or Flush ceiling light			1	100 watt
STAIRWELL or HALL:	Conventional fixture	1	1		50 watt
	or Flush ceiling light			1	75 watt
BATHROOM:	Bracket	1	1		40 watt
	or Flush ceiling light			1	60 watt
UTILITY ROOM:	Porcelain rosette	1	1	1	40 watt
3 BEDROOMS:	Bracket	3	3		40 watt each
	or Flush ceiling light			3	100 watt each

		Totaling
(1) CONVENTIONAL FIXTURES	9	610 watts
(2) CONVENTIONAL FIXTURES	11	590 watts
(3) FLUSH CEILING FIXTURES	9	785 watts

PORTABLES (See note under "Connected Load: Illumination.")

OUTLETS

CONVENIENCE (Duplex):	
Combination dining-living room	3
Kitchen	1
Bedrooms	3
Bathroom	1
CLOCK:	
Combination dining-living room	1
WALL SWITCHES:	
Front door light	1
Stairwell light (if two stories: otherwise omit)	2
PUSH BUTTON:	
Front door	1

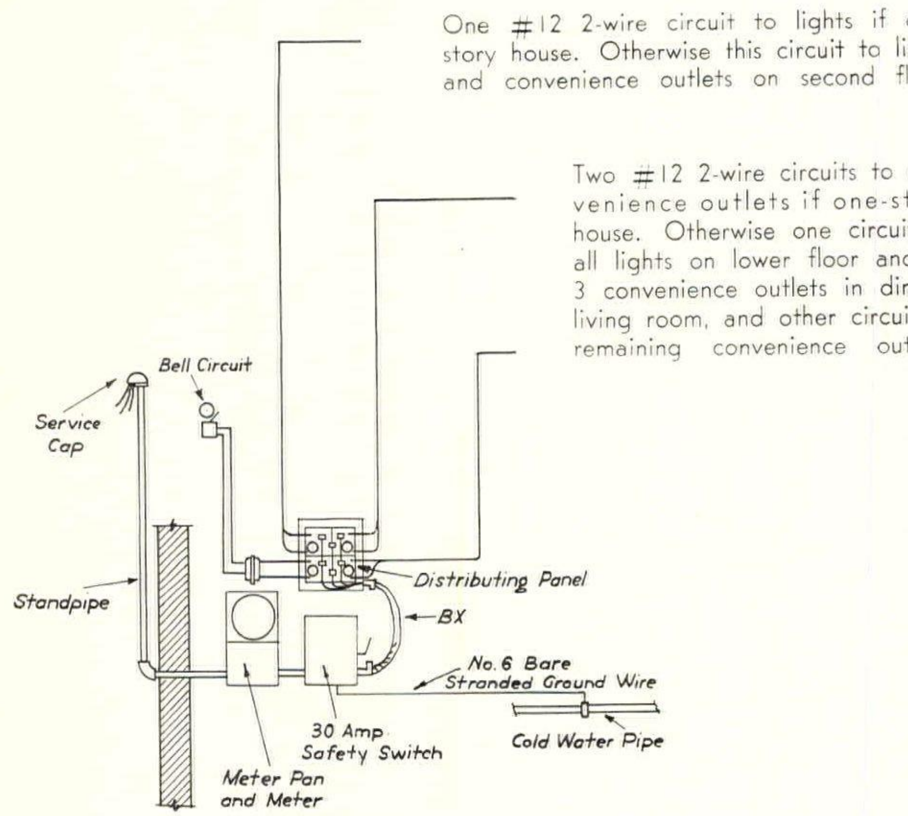
EQUIPMENT

KITCHEN:	Bell
	Refrigerator
	Toaster
	Coffee maker
	Vacuum cleaner
UTILITY ROOM:	Washing machine
	Flatiron
BEDROOM:	Warming pad
LIVING ROOM:	Clock
	Radio

DISTRIBUTION OF ELECTRICAL OUTLETS BY TYPE

CEILING OUTLETS:	4, 5 or 8, depending on fixture group selected.
BRACKET OUTLETS:	5, 4 or 1, accordingly.
CONVENIENCE OUTLETS:	8
BELL:	1
WALL SWITCHES	
(Two-way):	1
(Three-way):	2 (omit if not two stories)
CLOCK:	1
	—
	22 (if two stories: otherwise 20)

ELECTRICAL DIAGRAM



CONNECTED LOAD

ILLUMINATION:	For floor area of 1,000 square feet, allowing 2 watts a square foot, total		.... 2 K
	Fixed lights	590-785 watts	
	6 portables @ 200 watts each	1,200 "	
WORK:	Washing machine	150 watts	
	Flatiron	660 "	
	Vacuum cleaner	50 "	
	Toaster	500 "	
	Coffee maker	550 "	
	Refrigerator	75 "	.... 2 K
HEALTH:	Warming pad	75 watts	
	Bell		
	Clock	2 "	
ENTERTAINMENT:	Radio	100 watts	.... 0.2
		TOTAL	...... 4.2

WIRING COSTS
$77.15 to $84.95

Estimates are based on meeting requirements of the National Electric Code with union labor. In some localities reductions of about 10% can be made by using present standard materials. New cable assemblies and wiring devices are expected to be available shortly that will reduce the quoted costs by approximately $8.60.
Add $9.60 to each column of figures for two 3-way switches required for hall light in two-story house.

	FIXTURE GROUP (1)	FIXTURE GROUP (2)	FIXTURE GROUP (3)
Ceiling outlets:	4—$ 6.60	5—$ 8.25	*8—$23.70
Bracket Outlets:	5— 12.75	4— 10.20	1— 2.55
Duplex convenience outlets:	20.40	20.40	20.40
Bell circuit complete:	4.85	4.85	4.85
Clock outlet:	2.55	2.55	2.55
1 single-pole switch:	2.55	2.55	2.55
Distribution panel:	7.35	7.35	7.35
Service (mounting board, switch, meter pan, standpipe):	21.00	21.00	21.00
	$78.05	$77.15	$84.95

FIXTURE COSTS
$30.70 to $34.70

FRONT DOOR—Lantern:	$ 5.00	$ 5.00	$ 5.00
COMBINATION DINING-LIVING ROOM—			
Conventional fixture:	11.00	....	....
Modernized "dome":	....	7.00	....
Flush ceiling light:	....	....	4.00
KITCHEN—			
Modern kitchen light:	2.00	2.00	....
Flush ceiling light:	....	....	3.50
STAIRWELL or HALL—			
Conventional fixture:	5.50	5.50	....
Flush ceiling light:	....	....	3.50
BATHROOM—			
Bracket or ceiling light:	2.00	2.00	3.00
UTILITY ROOM—	.25	.25	.25
BEDROOMS—			
Brackets (3):	8.95	8.95	8.95
Flush ceiling lights:	....	....	12.00
(1) **CONVENTIONAL FIXTURES THROUGHOUT**	$34.70		
(2) **CONVENTIONAL FIXTURES and "DOME"**		$30.70	
(3) **BUILT-IN FLUSH LIGHTING**			$31.25

INSTALLATION COSTS

(1) Hanging conventional fixtures	$9.00		
(2) Hanging conventional fixtures and dining-room "dome"		$9.00	
(3) Installing flush fixtures			$12.20

COMPLETE ELECTRICAL COSTS

Scheme (1)	$121.75		
Scheme (2)		$116.85	
Scheme (3)			$128.40

* This price is based on using the flush lighting system which requires large work boxes in lieu of standard outlet boxes.

PECIFICATIONS

VICE ENTRANCE MATERIALS: Comply requirements of local utility.

VICE: Overhead.

NDPIPE: 1-inch electrical metallic tubing, anized on outside and enameled on inside, service cap and all necessary fittings.

CTRIC CLOCK OUTLET: G.E. electric clock hanger outlet.

TER BOARD: Wood—to take meter pan, n line switch, distribution panel and bell sformer.

SYSTEM: 2-wire, single phase, 110 volt A.C.

SERVICE SWITCH: 20-ampere safety switch similar to No. 1055, Metropolitan Device Corp., Brooklyn, N. Y.

CONVENIENCE OUTLETS: "Spartan" type duplex with bakelite double-edged cover plates.

OUTLET BOXES: G.E. octagonal boxes of suitable size, with lugs, mounted on suitable hangers, including rigidly fastened 3/8" male fixture stud. (No outlet boxes required for flush ceiling fixtures; the housing serves as a box.)

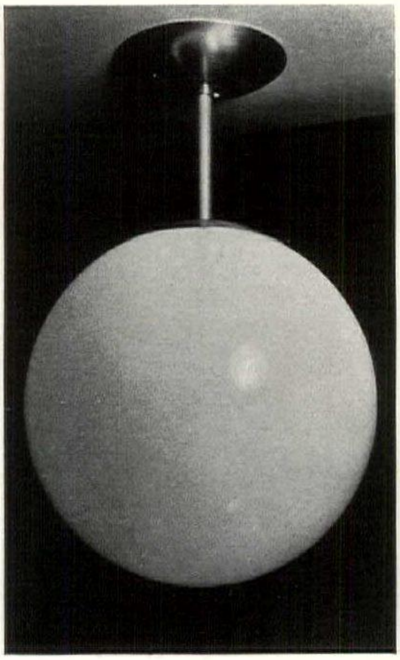
SWITCHES: G.E. single-pole flush tumbler switch and, where required, G.E. three-way flush tumbler switches, with textolite plates.

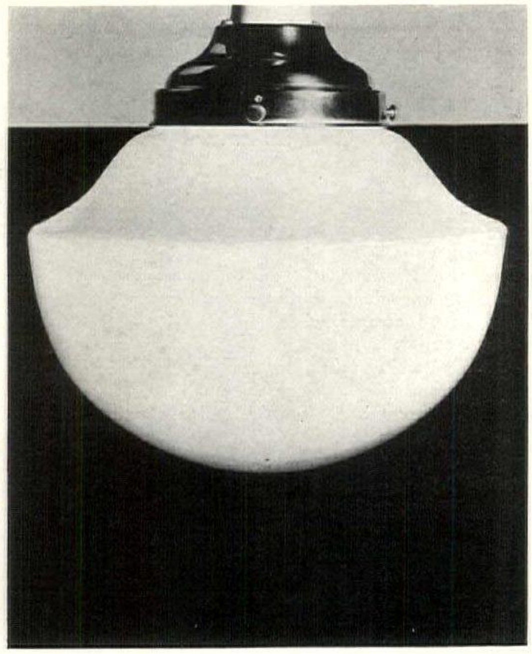
CONDUCTORS: G.E. code grade rubber-covered wire, No. 12 B. & S. gauge, in BX flexible cable; all runs concealed.

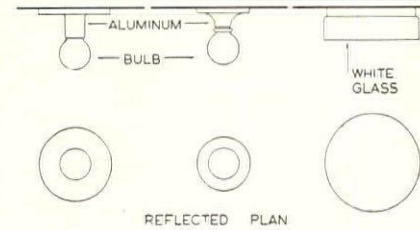
DISTRIBUTION PANEL: 4 - circuit type, equipped with 15-ampere cartridge fuses and 25 spares.

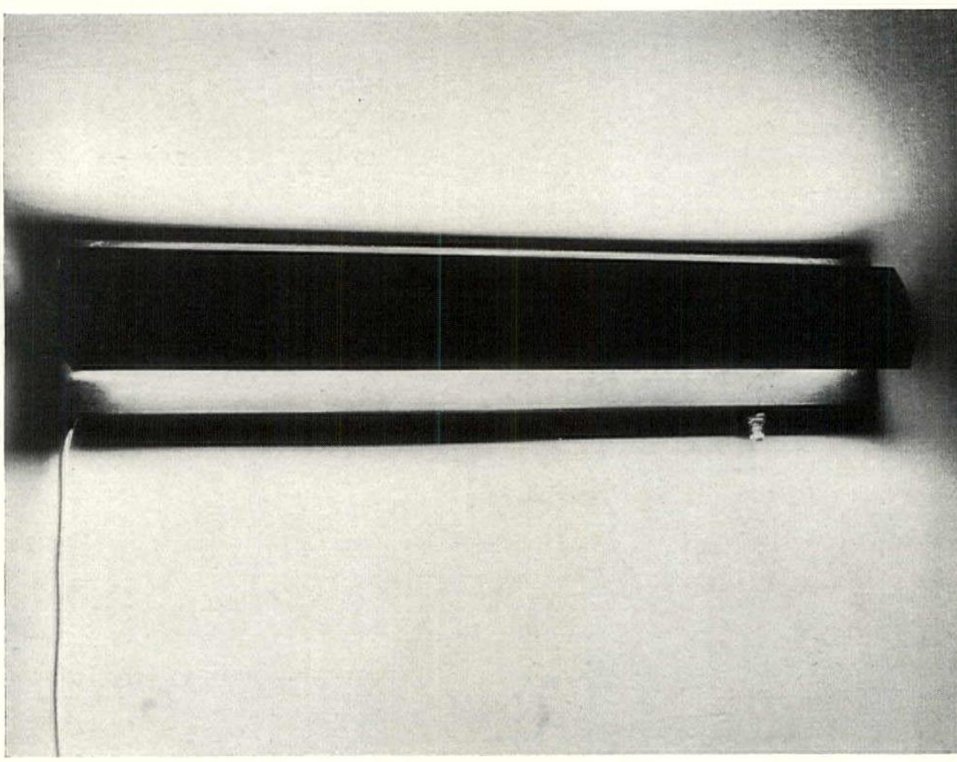
BELL CIRCUIT: G.E. rubber-covered fixture wire; Edwards & Co. bell; G.E. transformer, with push button.

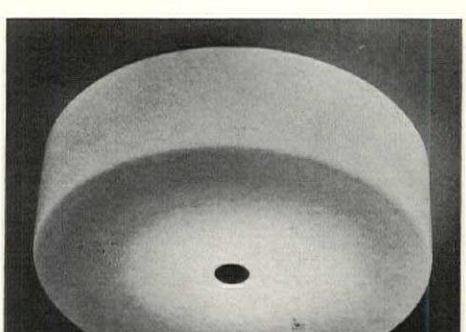
LIGHTING

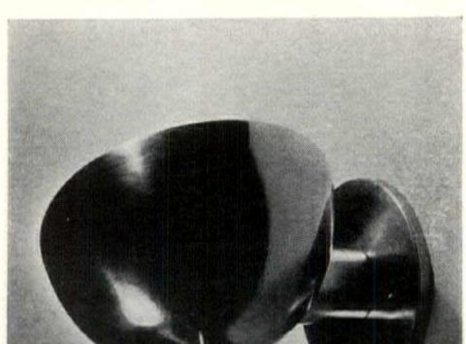












Top:

Left: Hanging fixture (#120) of polis aluminum finish, opaque glass bowl f 4" to 16" in diameter. Price, $4 Renaissance Metal Works, New York C Right: Ceiling fixture, chromium-pla metal, opaque glass, 10" in diame Price, $1.10. Mail order house.

Center:

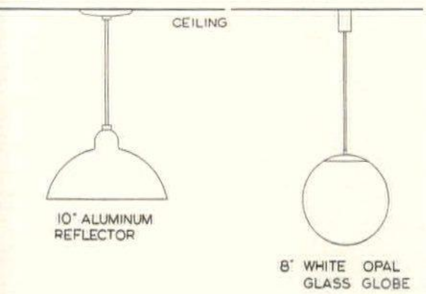
Wall light, dull chromium-finish, ad able shade 18" in length. Price, $9 including Lumiline lamp. Egli Comp New York City.

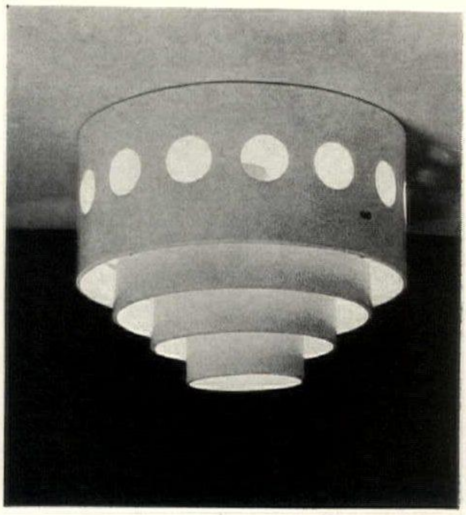
Bottom:

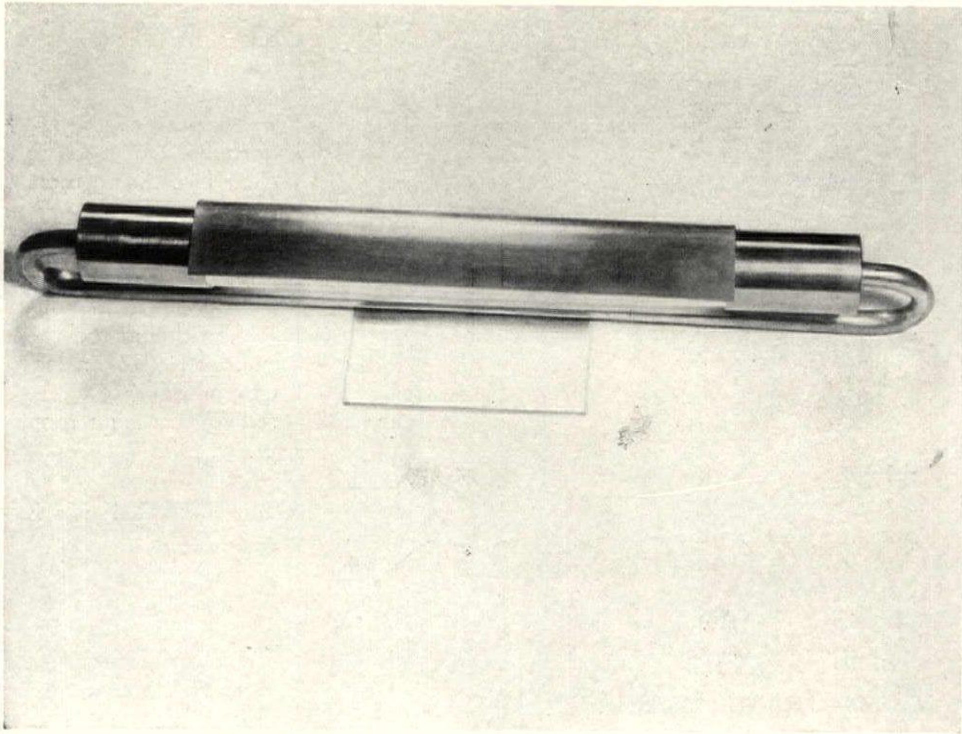
Left: Hanging fixture (#125). Polis aluminum finish, opaque glass. P $6.50. Renaissance Metal Works, York City.

Right: Wall fixture (#122), polished minum. Reflector adjustable. Price, Renaissance Metal Works, New City.

FIXTURES







awings at the tops of these pages are designs by Kurt Versen for the house of moderate cost.

p:

eiling fixture, enameled finish, 12" out-de diameter. Price, $6.80. Egli Com-any, New York City.

enter:

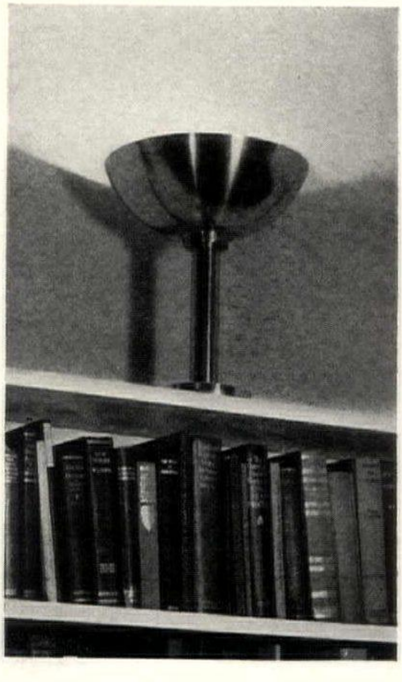
'all fixture (#124), polished aluminum ish. Price, $7.50. Renaissance Metal 'orks, New York City.

ttom:

ft: Adjustable desk lamp, black finish. flector, adjustable, 13" in length, tak-g 12" Lumiline lamp. Price, $6.50. li Company, New York City.

ght: Indirect shelf lamp of polished uminum, 14" bowl. Price, $11.40. Egli ompany, New York City.

Photographs by Zimmerman



HOW ECONOMICALLY CAN I FURNISH A LOW-COST HOUSE?

The following list was prepared by Helen S. Holbrook, Household Equipment Specialist, U. S. Bureau of Home Economics, as a suggested list of furniture and furnishings for the different rooms of a 5-room house: at a cost of $250.

LIVING-DINING ROOM FURNITURE

1 studio couch with 3 pillows (guest bed in case of need)
1 bookcase
1 table desk
1 desk chair
2 comfortable chairs
1 floor lamp
1 table lamp
1 waste basket
1 card table
1 rug, 9 x 12
5 pr. curtains
1 dining table
4 straight chairs (unfinished; varnish for finishing same)

KITCHEN

2 pr. curtains
1 gas stove
1 ice refrigerator
1 stepladder stool
1 waste basket
1 garbage can
1 chair (like dining room chairs)

UTILITY ROOM

1 table
1 ironing board (if not built in)
1 folding drying rack
1 laundry basket on legs
1 copper boiler
1 chair (like dining room chairs)
2 pr. curtains

PARENTS' BEDROOM

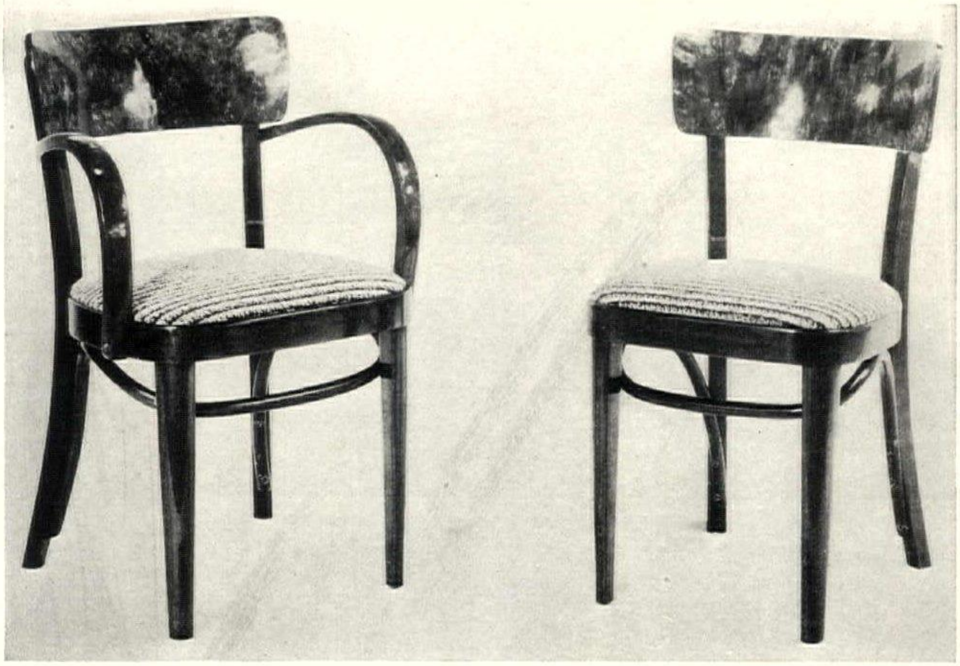
2 pr. curtains
1 double bed
1 mattress for bed, 54" wide
2 pillows
1 arm chair (straight)
1 comfortable chair (unfinished and varnished at home)
1 dresser with mirror
1 waste basket
4 rag rugs

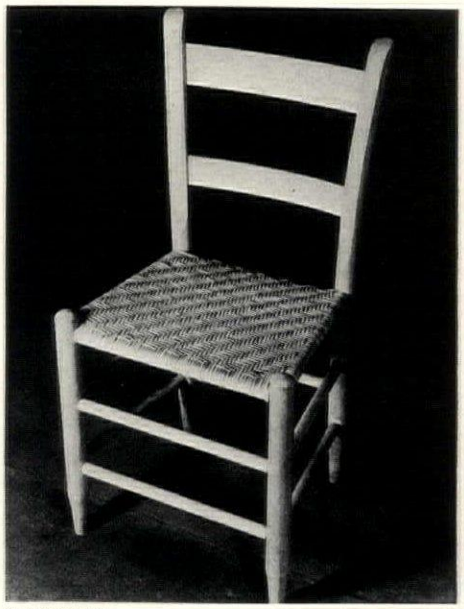
DAUGHTER'S ROOM

1 pr. curtains
1 army cot, 30" wide
1 mattress with inner springs
1 pillow
1 dresser with mirror
1 comfortable chair (as in parents' room)
1 rag rug
1 waste basket

SON'S BEDROOM

1 pr. curtains
1 army cot, 30" wide
1 mattress, 30" wide
1 pillow
1 chest of drawers
1 mirror
1 straight chair (like dining room chairs)
1 rag rug
1 waste basket





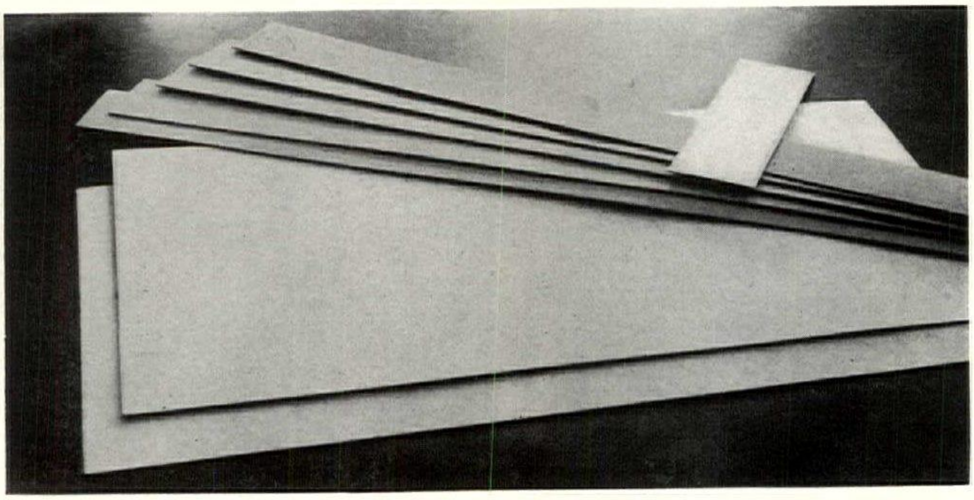
ZIMMERMAN

Left—Armchair (No. 524F). Hard-
finish, upholstered seat. Price,
0. Thonet Brothers, Inc., New York
Right—Side chair (No. 524). Simi-
nish and upholstery. Price, $9. Thonet
ers, Inc., New York City. **Center:**
—Side chair (No. 462). Fabrikoid seat.
$6.25. Thonet Brothers, Inc., New
City. Right—Utility chair, unfinished.
$2. Department store. **Bottom:**
vood side chairs (No. 18-253). Cane
$4.50. Wood seat (No. 18-254), $4.
et Brothers, Inc., New York City.

ure and fabrics illustrated in this issue were
d by John R. Weber, designer.

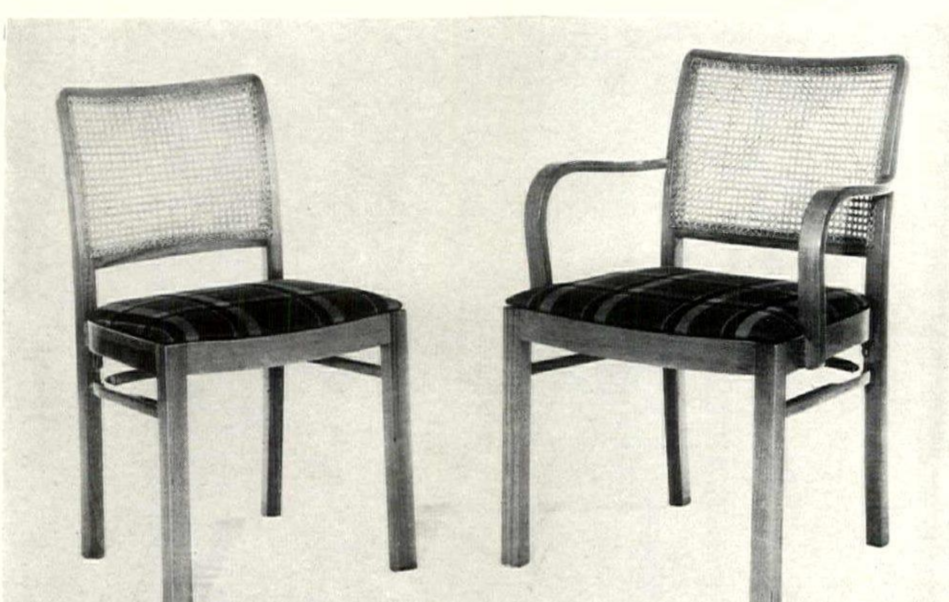
rices for furniture illustrated in this portfolio
tail or list prices based on the purchase of
le item.

LOW-COS



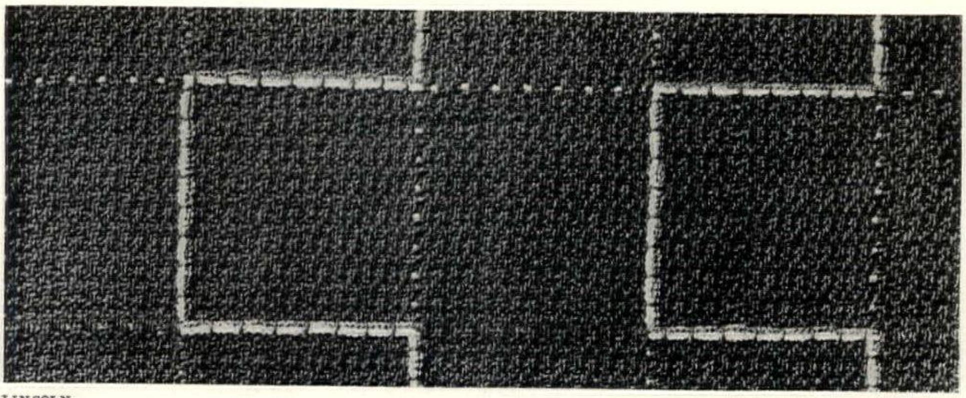
ZIMMERMAN

ZIMMERMAN



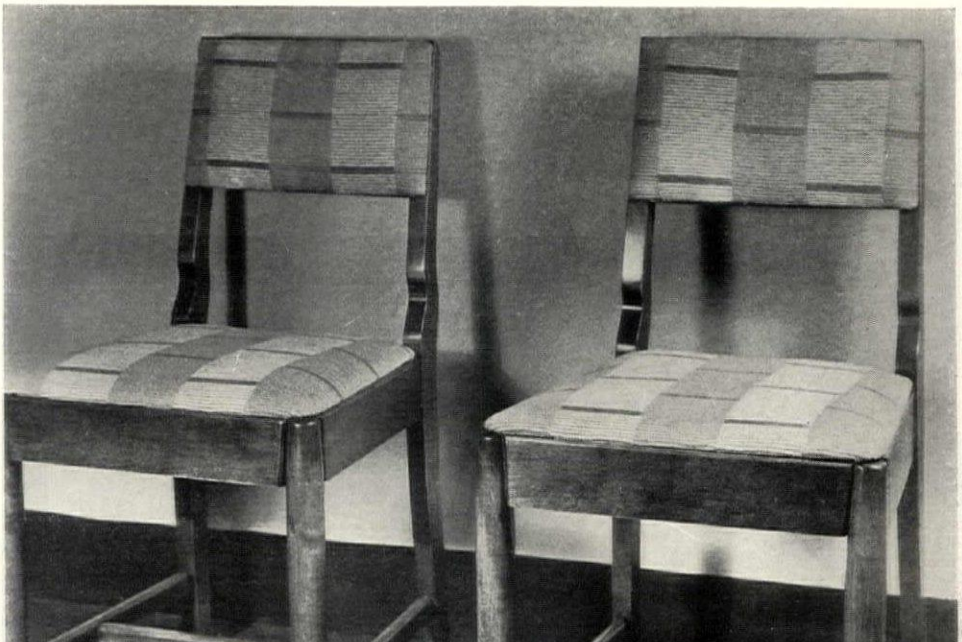
CENTER: Left—Side chair. Width depth, 18"; over-all height, 34". frame, Fabrikoid covering in blue o colors; also cotton fabrics. Price, A. Bronson, New York City. Right- chair. Width, 30"; depth, 20"; height, 34". Wood frame, Fabriko ering in blue and other colors. Also able in other fabrics. Price, $9. A son, New York City. **BOTTOM:** Side chair (No. 368). Cane back, tered seat, hardwood finish. Price, Thonet Brothers, Inc., New York Right: Armchair (No. 668). Slightly size. Price, $16.50. Thonet Brother New York City.

URNITURE



LINCOLN

ZIMMERMAN



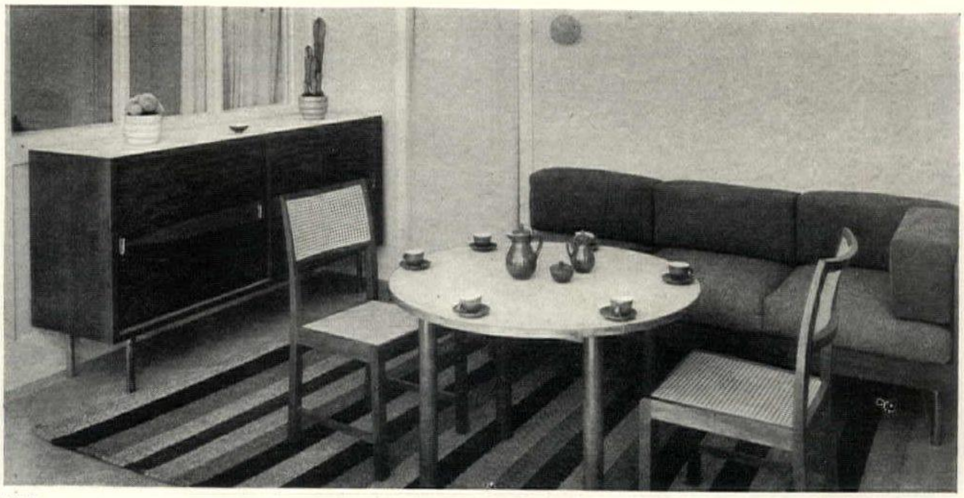
: Upholstery material for chairs (de- No. 84871), cotton weave, 50″ wide. rust ground, white and brown design. , $1.50 per yard. F. Schumacher & pany, New York City. **CENTER:** Left rm chair (No. 4061). Walnut finish, c covering. Price, $6.50. Statesville r Company, Statesville, N. C. Right— oy arm chair (No. 474-38). Width, ″; depth, 21″; height over-all, 34″. nut finish, fabric covering. Price, 50. Phoenix Chair Company, Sheboy- Wisconsin. **BOTTOM:** Dinette chairs 2315). Maple finish, chenille uphols- Price, $7.50. Brown Brothers, Gard- Mass.

LOW-COST

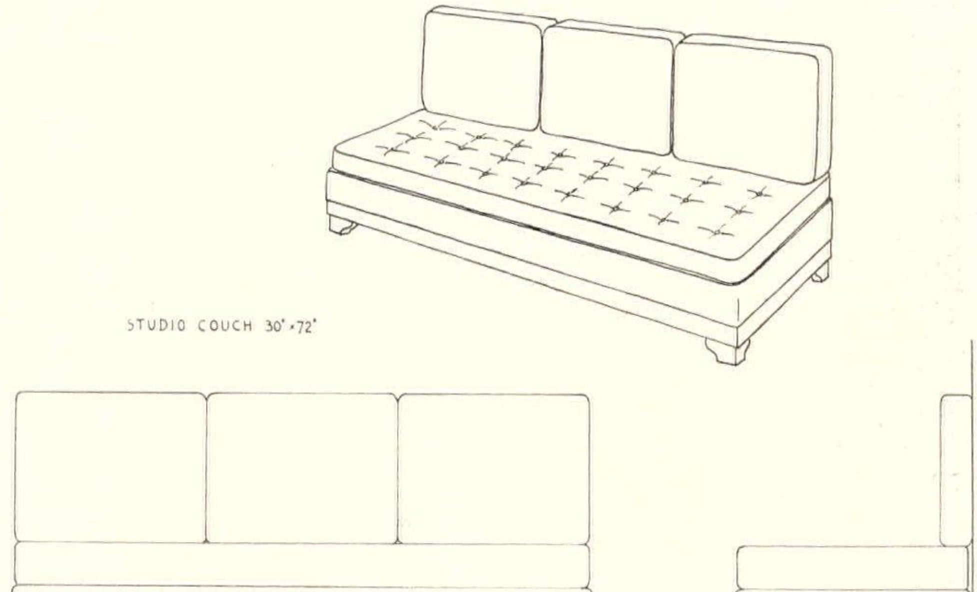
LINCOLN

Top: Dining table and chairs. Chi
Workshops, Inc. **Bottom:** Folding
table and folding chairs. Waterproo
holstery. Price, $8. Samson Brothers
troit, Michigan. Rug, woven cotton, c
in 6' widths. Size shown, approxim
12 x 15.

FURNITURE

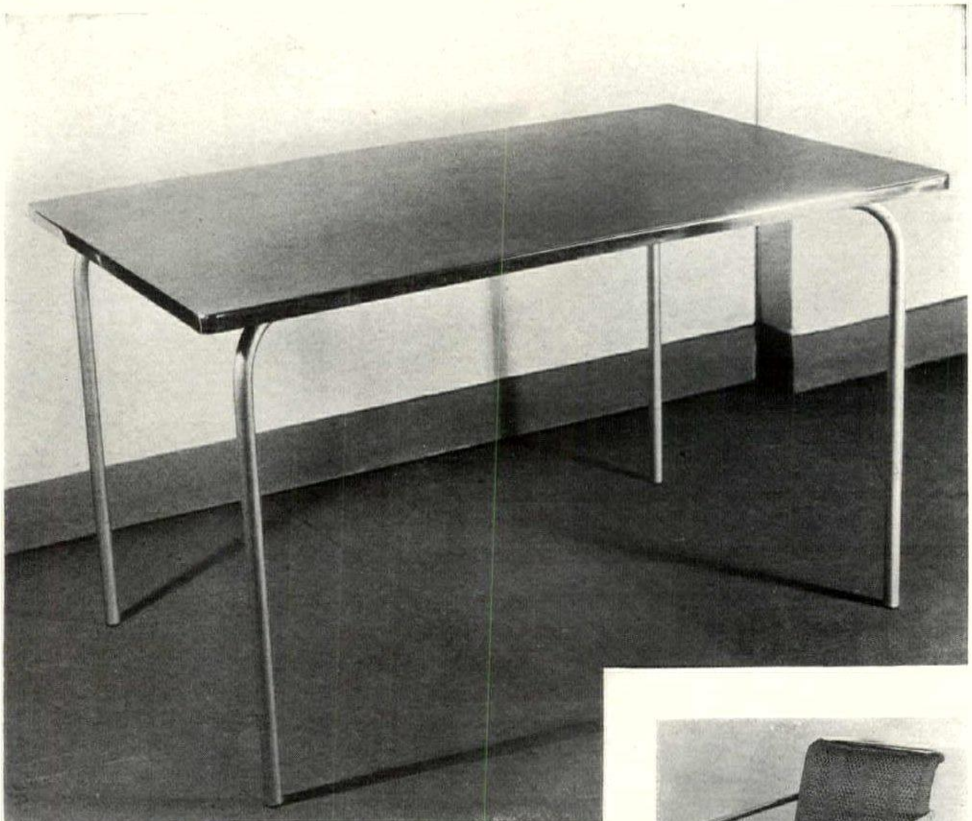


SEWARD



: Dining alcove in living room of a
cost house. Leonie Pilewski, designer.
ter: Studio couch (double bed), maple
, steel skeleton. Plaid covering in
vn, rust or green. Width, 30"; length,
Price, $27.50. Mail Order House.
om: Arrangement of living room with
erate-cost furniture. Chicago Work-
s, Inc.

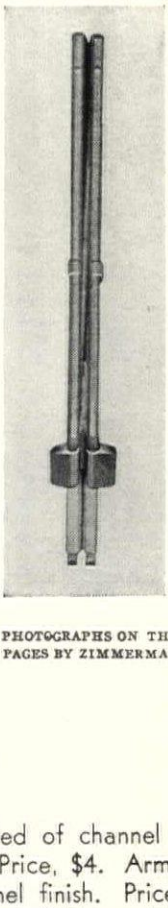
LOW-COS



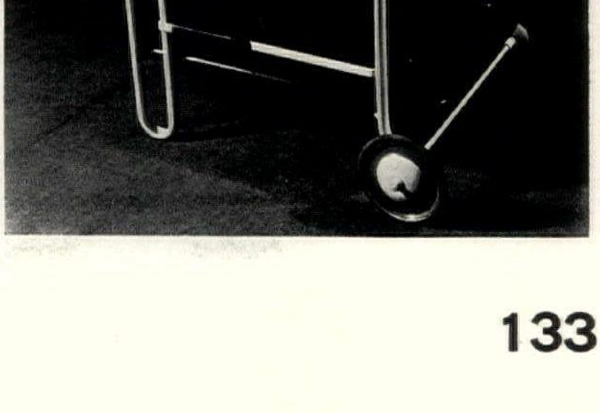
FOR LIVING-DINING ROOM

Top: Living room or dining table (No
Width, 30"; length, 48". Black Permit
(alcohol- and burn-proof), chrome
Price, $28. Silver-finished base, $24.
Sunshade Company, Troy, Ohio. **C**
Arm chair (No. 1508). Fiber or fabric
ering. Chrome finish, $16; enamel
$12. Hampden Specialty Products,
Springfield, Mass. **Bottom:** Spring
armchair (No. 84). Width, 20½"; c
19". Chromium-finished base, imi
leather covering. Price, $23. Troy
shade Company, Troy, Ohio.

URNITURE



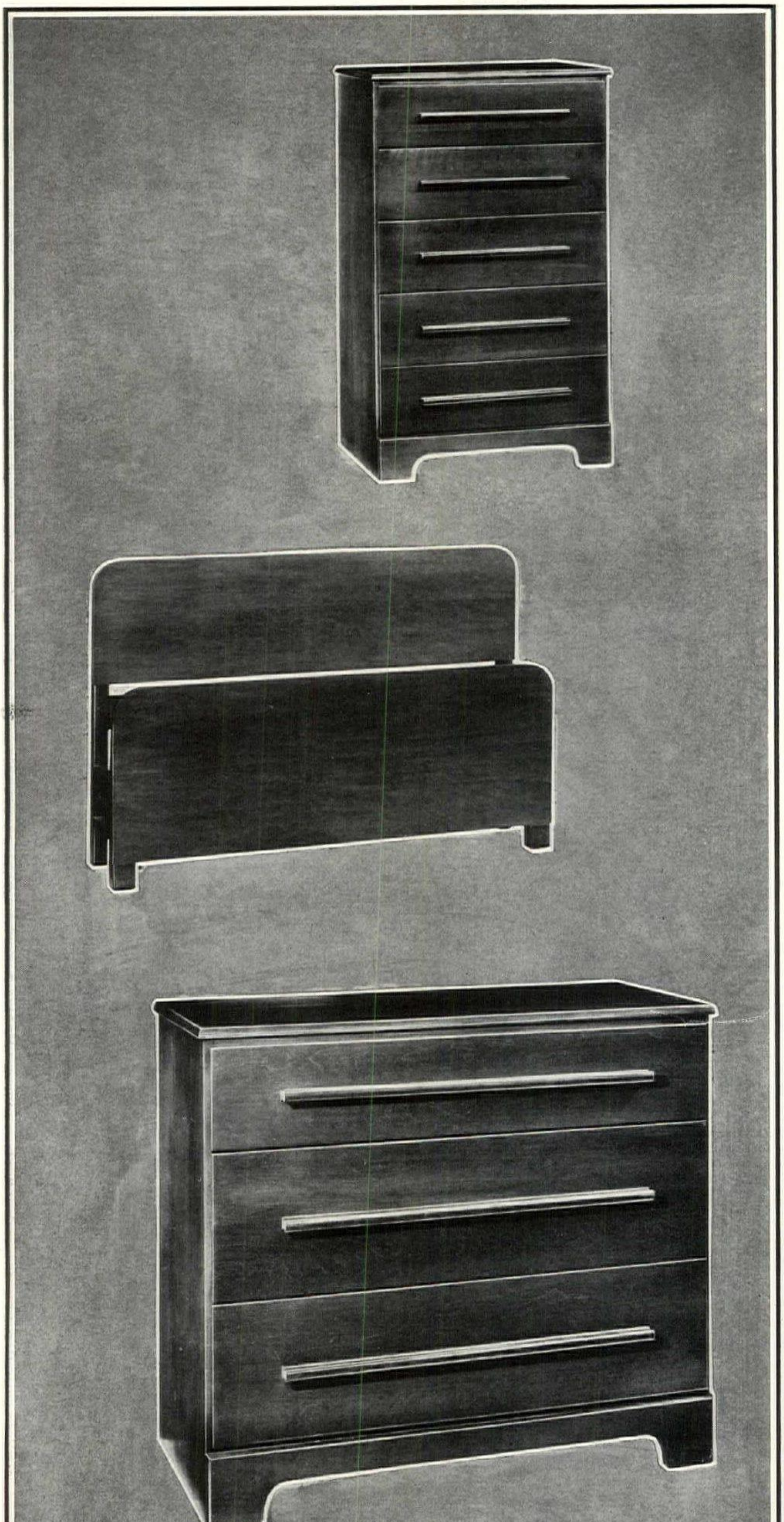
PHOTOGRAPHS ON THESE PAGES BY ZIMMERMAN



TERRACE AND GARDEN

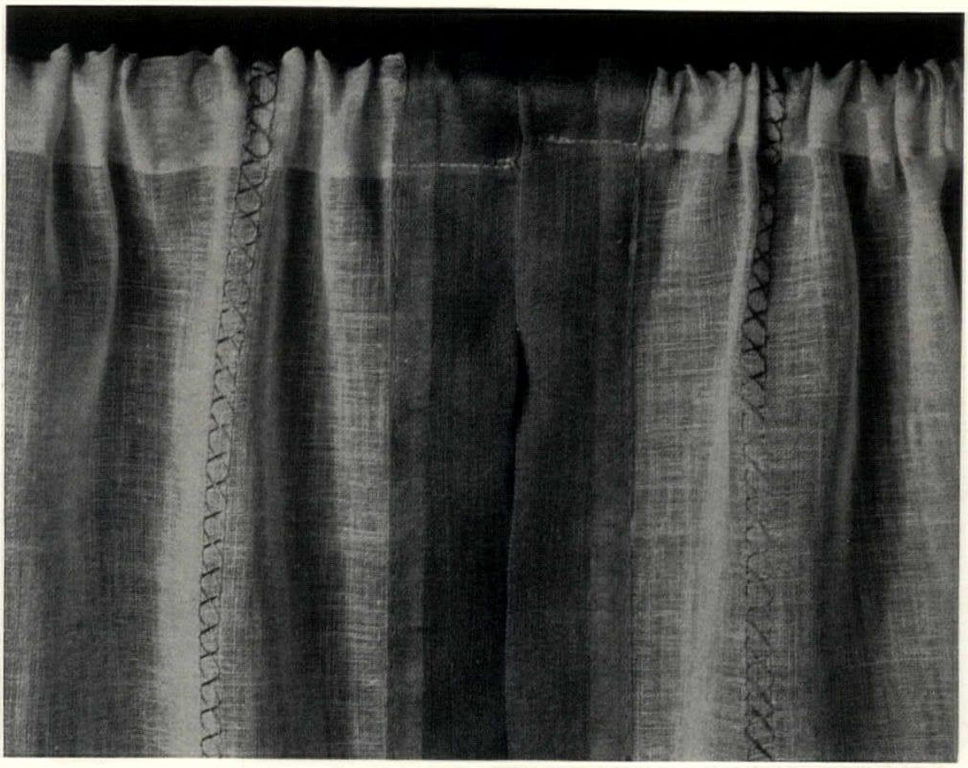
Folding club chair (No. 622). Constructed of channel steel, d enamel finish. Wide fabric selection. Price, $4. Armchair, rated metal seat and back, baked enamel finish. Price, $8. g lounge chair (No. 530). Constructed from oil tempered steel. d cotton seat and head cushion. Price, $10. Tray table (No. Enameled finish. Price, $4. **Center:** Left: Detail of folding club Compact one motion fold-up. Right: Spring lounge chair 543). Canvas seat, baked enamel finish. Price, $9. "Two-r" settee (No. 545-2). Perforated seat and back, enameled Price, $15.75. Tray table (No. 617). May be folded. Price, **Bottom:** Tea table (No. 614), enameled finish, removable tray, r wheels. Price, $5. Wood arm rests on all chairs. All furni-n this page from the Howell Company, Geneva, Illinois.

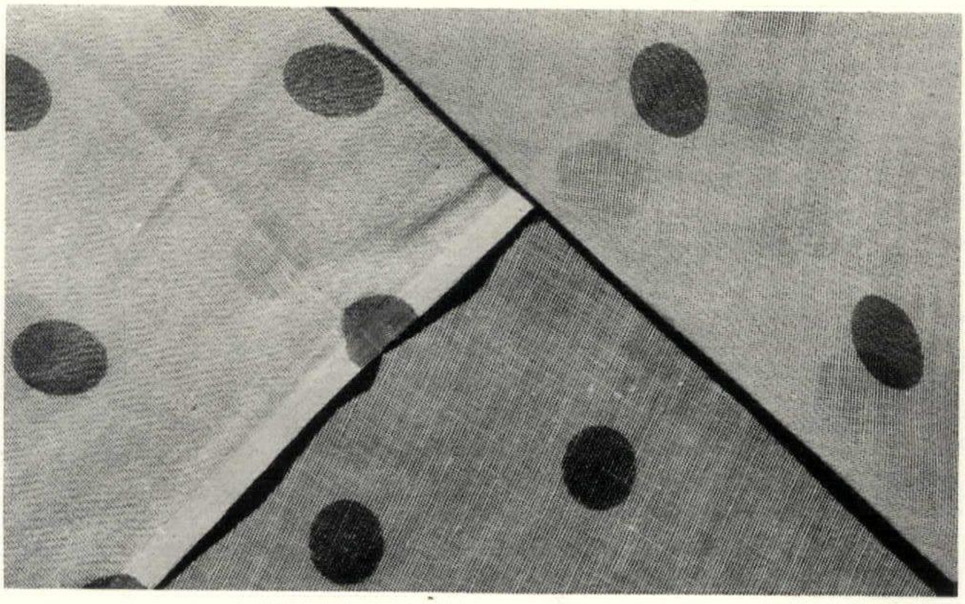
FURNITUR

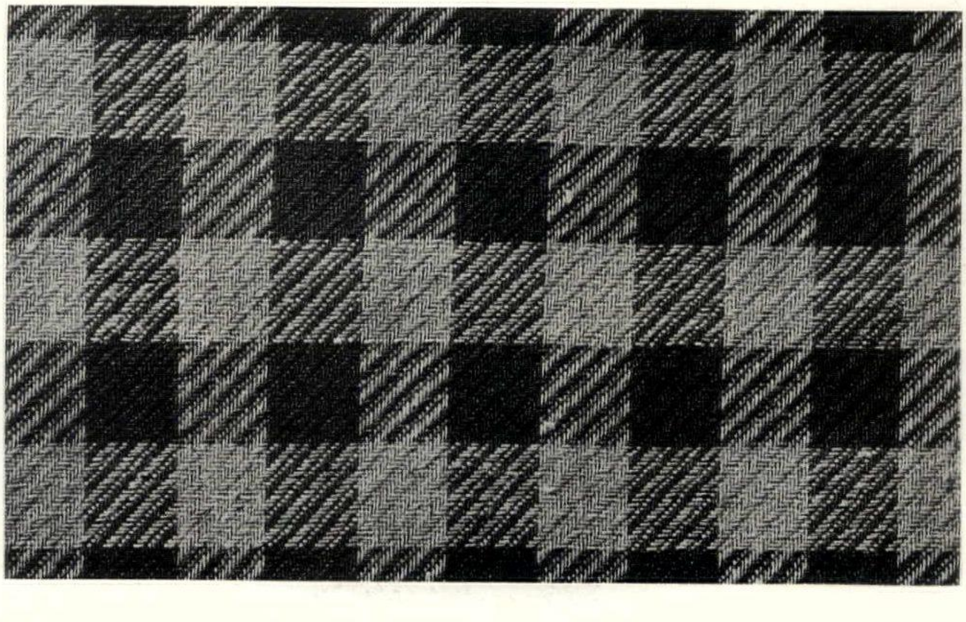


Bedroom suite consisting of dresse
541), bedstead (No. 543) and ch
drawers (No. 542). Retail price,
Emerson Manufacturing Company,
sett, N. H.

CURTAINS



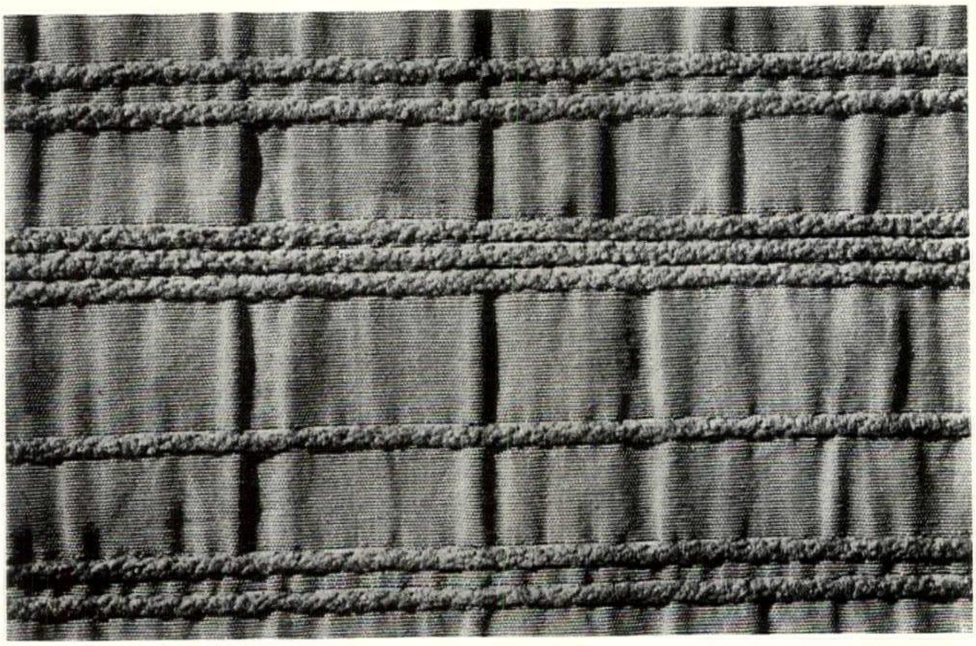


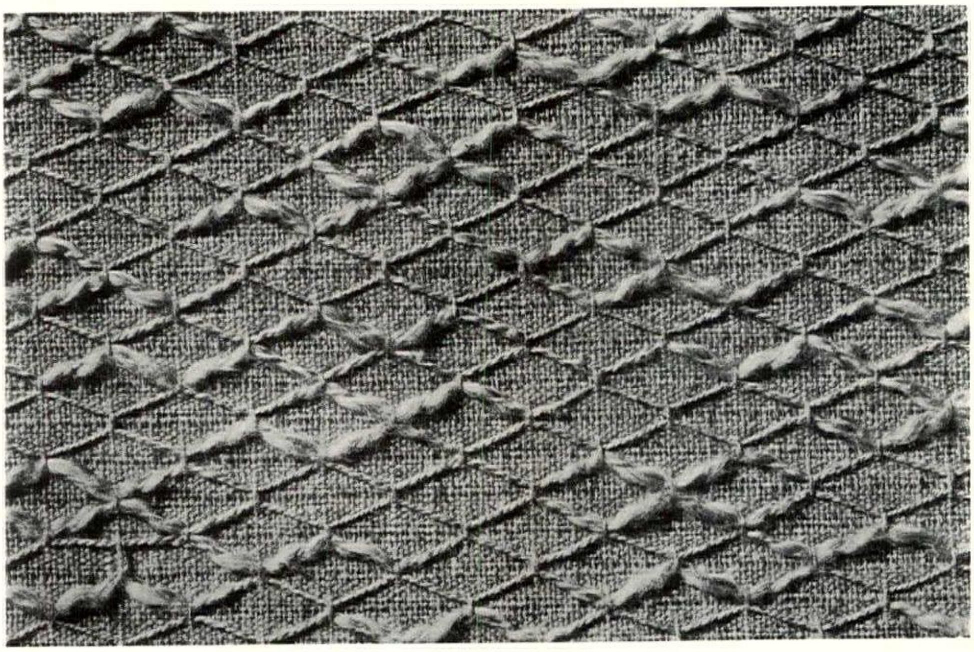


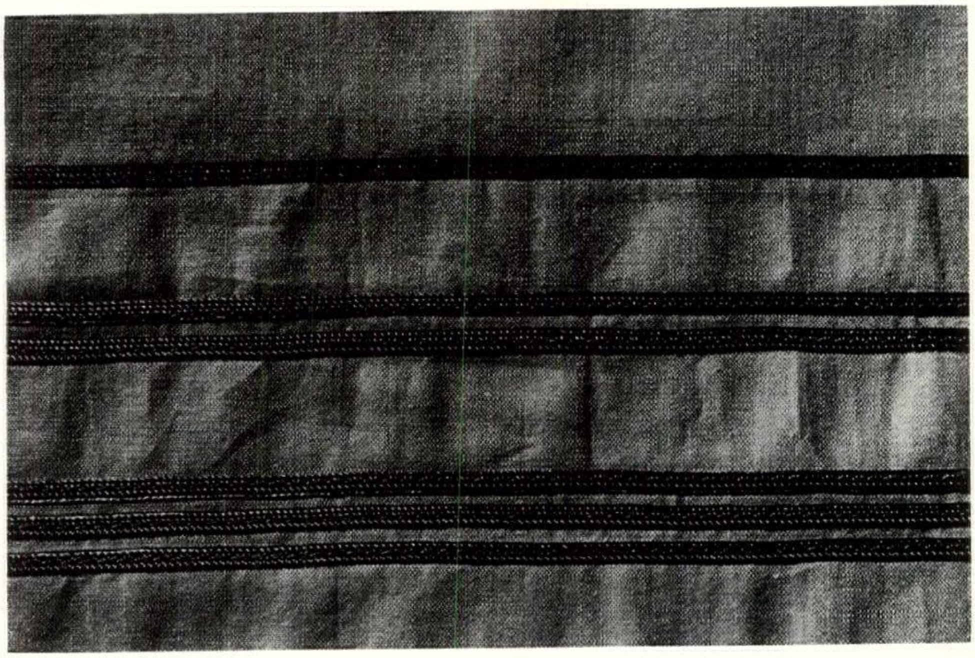
er: White cotton voile curtains with
n, blue or gold stitching. These cur-
are completely made up and ready
ang. Each side, 18″ wide by 35″ long.
, 15c per pair. Mail Order House.
er: Cotton voile in selection of colors.
th, 39″. Price, 8½c per yard. Mail
r House. **Lower:** Plaid wool and cot-
weave. Dark and light blue and gold.
th, 36″. Price, 35c per yard. Mail
r House.

graphs by F. S. Lincoln

CURTAI

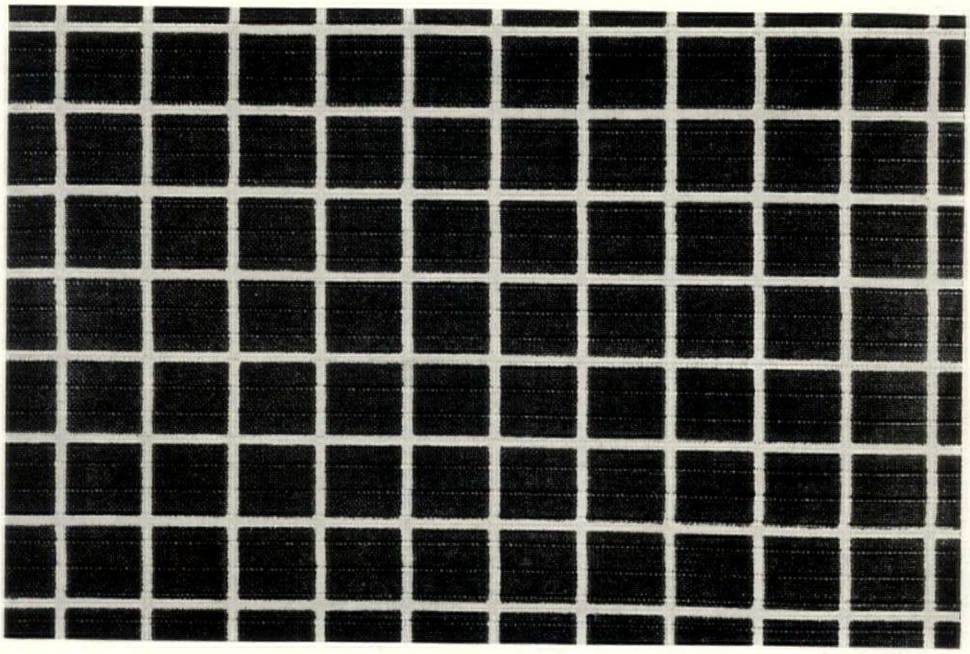






Upper: Chenille for side draperies 280290). Colors: green, gold, plum, shell, blue, red, brown. Width, 39". $1.50 per yard. F. Schumacher and pany, New York. **Center:** Cotton draperies (No. 84029). Colors: ecru eggshell. Width, 48". Price, $1.20 yard. F. Schumacher and Company, York. **Lower:** Chintz with applied b Lemon yellow ground, red braids 245091). Width, 36". Price, $1.35 yard. F. Schumacher and Company, York. Plain glazed chintzes in all may be obtained at 50c per yard. lite, similar to chintz in surface but tre with phenolic resin for waterproofing, 75c per yard. Width, 36".

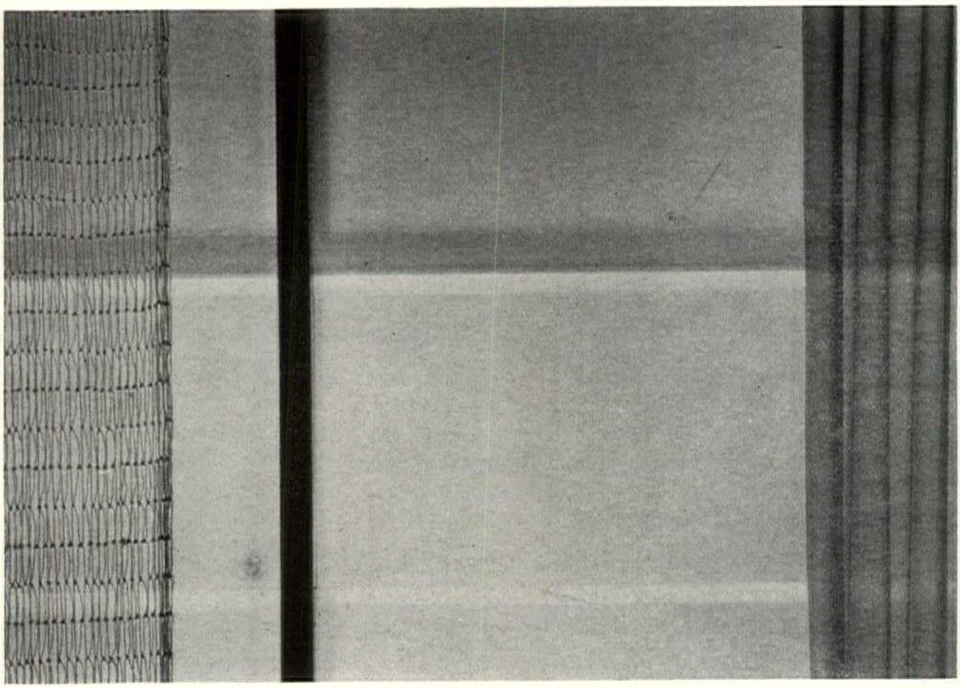
IATERIALS

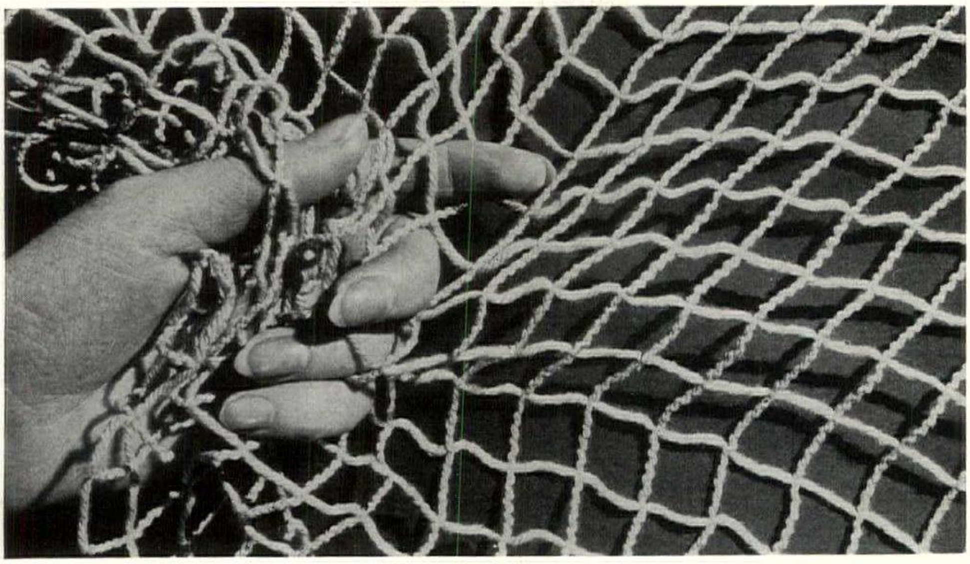


er: Cotton print sash curtains. Red white stripes, black and white res. Width, 36". Price, 12½c per . Mail Order House. Good quality hams may be obtained for 15c and per yard. **Center:** Print on cotton e. Brown and white. Width, 36". , 25c per yard. Mail Order House. er: Glazed chintz, brown and white 213851)—Waverly Fabrics. Width, Price, 55c per yard. F. Schumacher Company, New York.

raphs by F. S. Lincoln

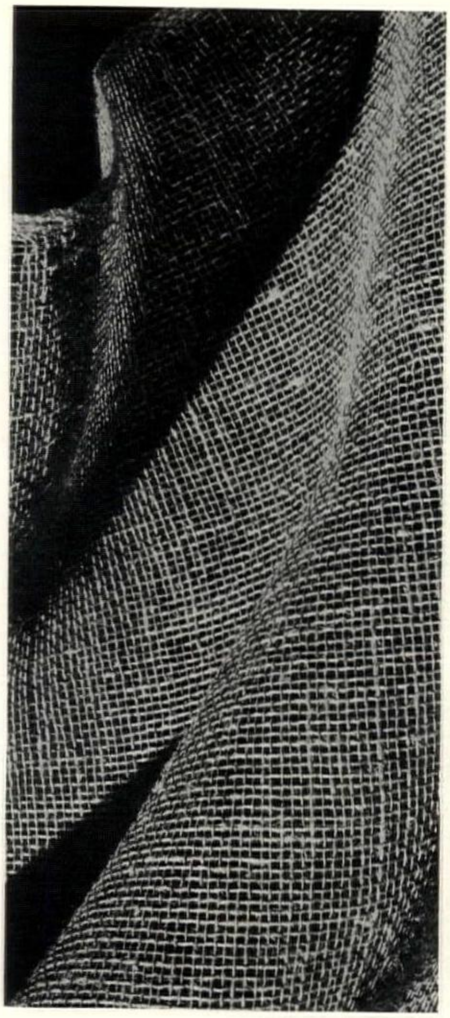
CURTAI

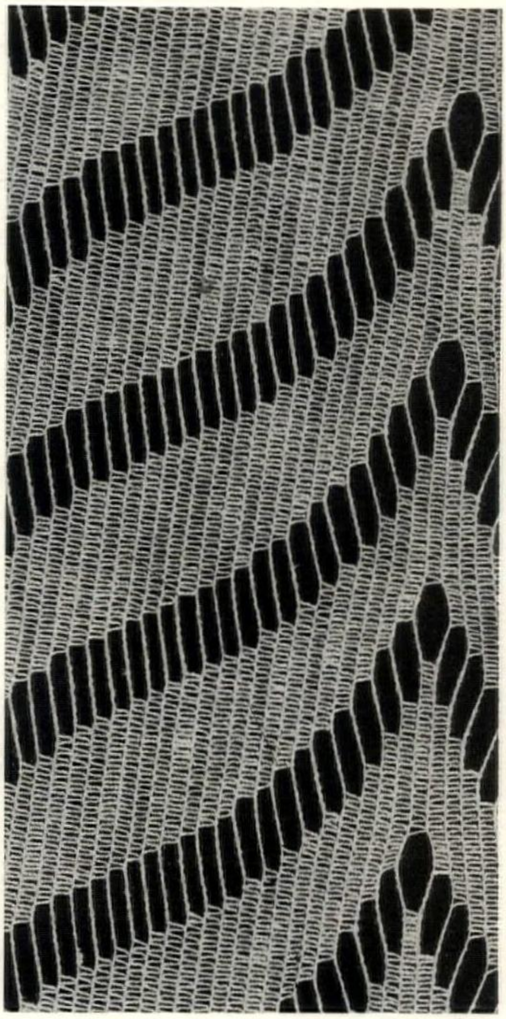


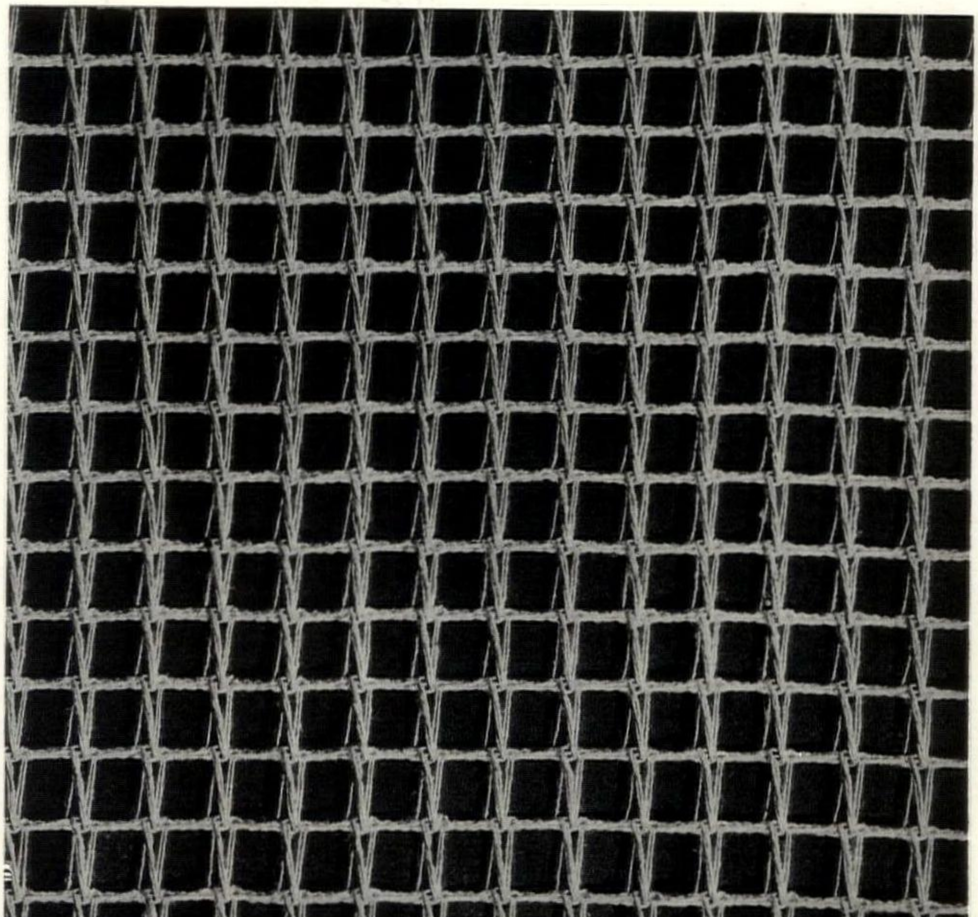


Upper: Window with large square r
sash drapery and oil silk or plain
as side drapery. **Center:** Square r
for sash draperies. May be had in
peach, yellow and other colors. Y
36". Price, 60c per yard. **Lower:**
silk, transparent, (No. 280525).
blue, green and natural. Width
Price, 90c per yard. F. Schumache
Company, New York.

ATERIALS



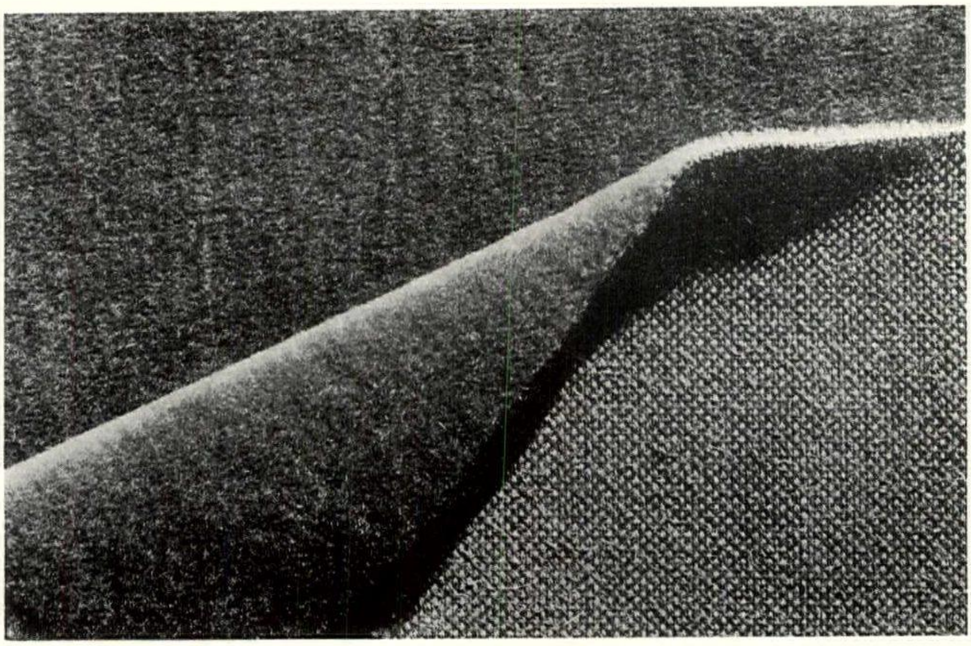


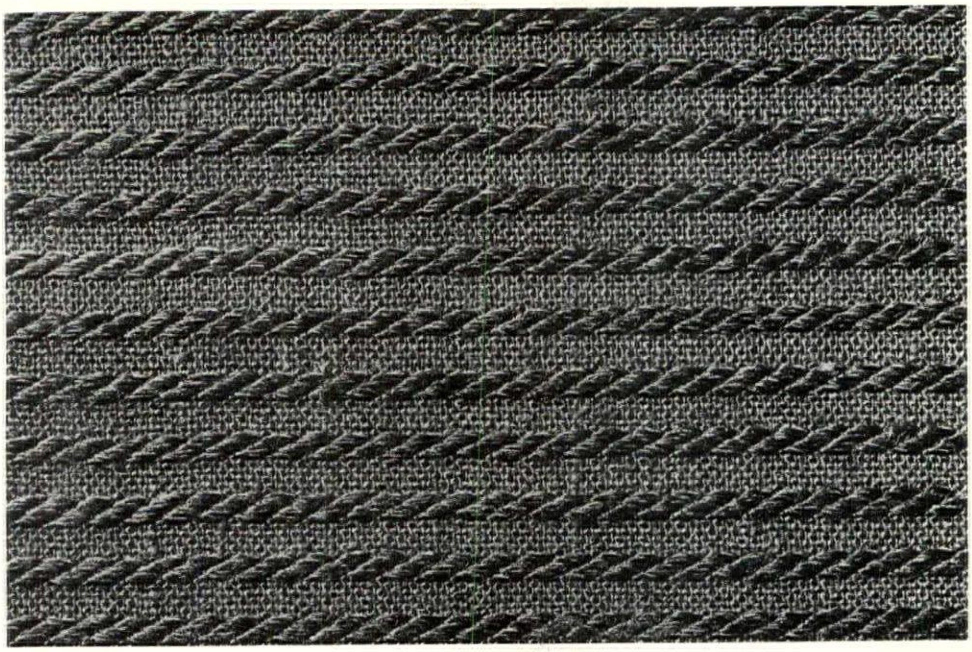


r: Left. Linen theatrical gauze for curtains or side draperies. Wide va- of colors. Width, 36". Price: nat- 15c per yard; in colors, 17c per yard. Order House. **Upper Right:** French sash curtain (No. 46520), completely up. Length, adjustable; width, 36"; num length, 2¼ yards. Price, $3.90 pair; 90c per yard. Scranton Lace pany, New York. **Lower:** Ecru sash ng (No. 8028). Price, 50c per yard. nton Lace Company, New York.

raphs by F. S. Lincoln

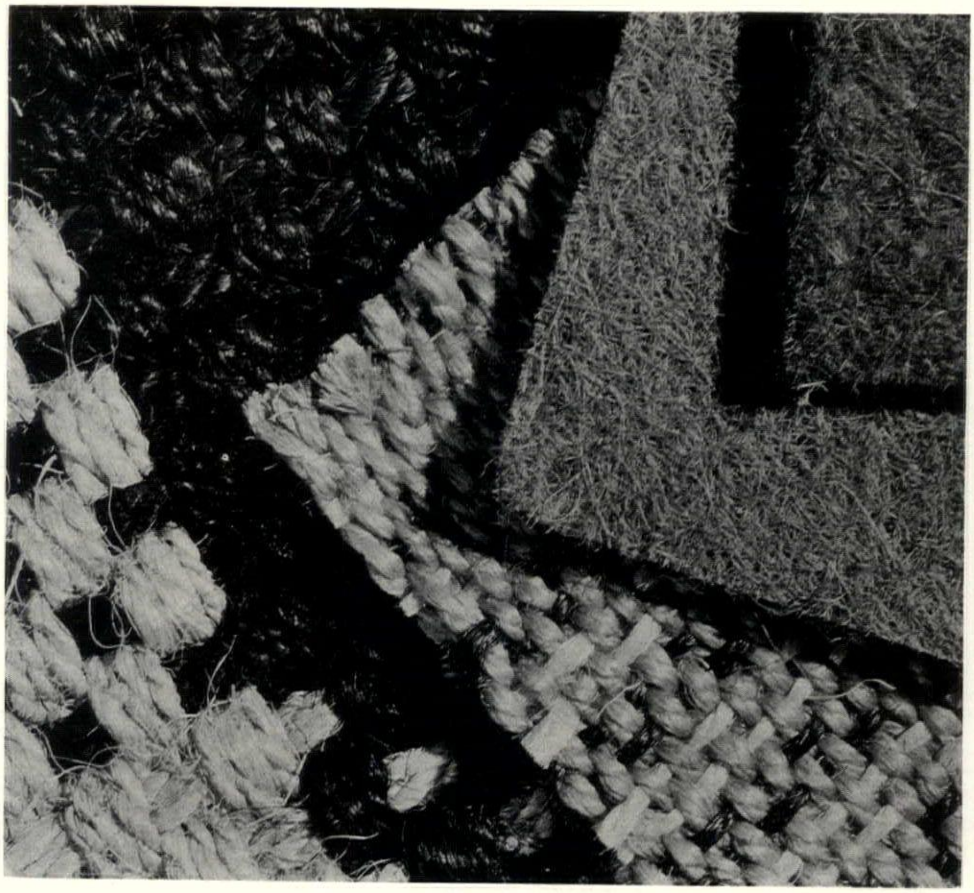
UPHOLSTER

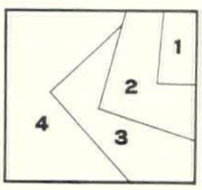


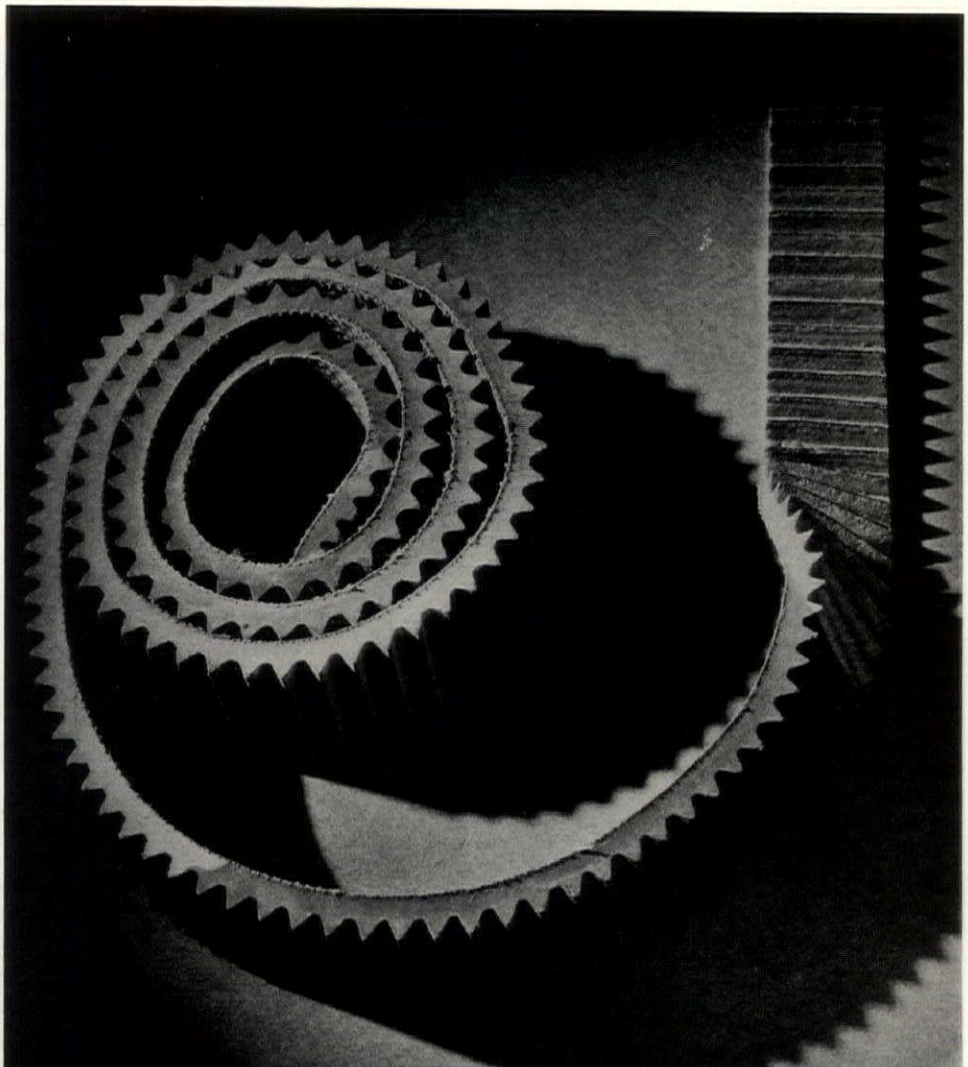


Upper: Mohair pile fabric, rubber waterproofed. Suitable for chair holstery. Originated for automobil holstery. Best wearing textile known. Colors: browns, rusts, Width, 54". Price, $3.50 per L. C. Chase Company, New **Center:** Mohair of wool weave (# A very strong and durable f Colors: brown and other colors. W 50". Price, $3.25 per yard. L. C. Company, New York. **Lower:** M pile fabric (#9676)—"Kingston." and other colors. Width, 54". $3.75 per yard. L. C. Chase Com New York.

ND RUGS







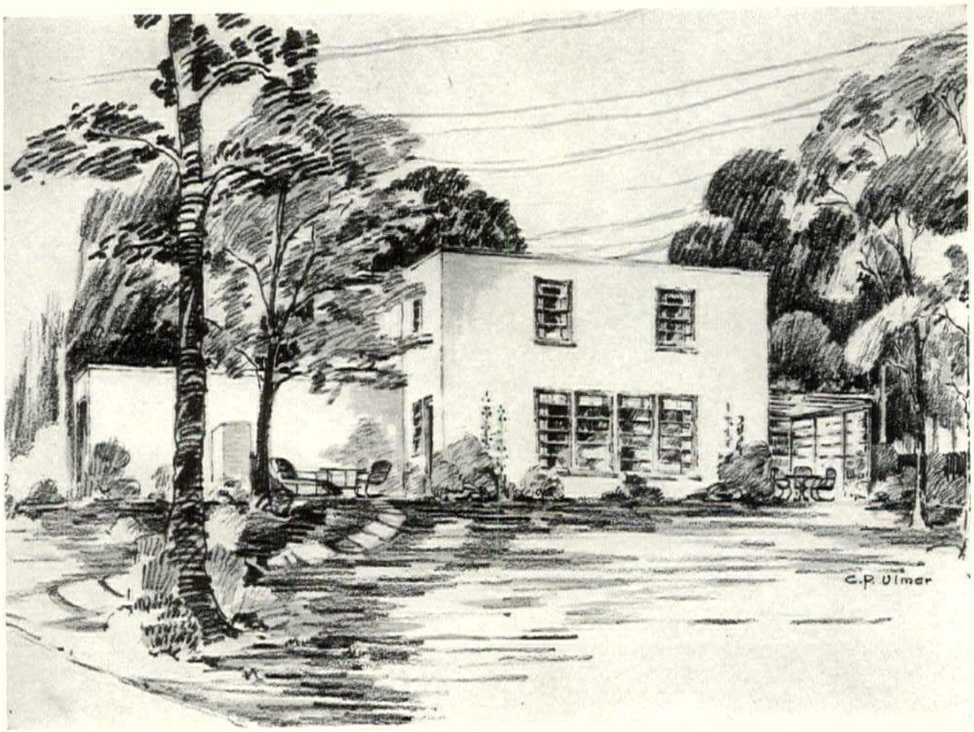
er: (1) Sisal rug, 9 x 12. Extremely
ole. In powder blue, green, red rust,
taupe, rose taupe, tangerine—all
darker border bands. Rug complete,
or $1.20 per square yard. (2) Jute
9 x 12. Colors: blue, rose, green,
e, rust, with darker border bands.
complete, $16.50, or $1.40 per square
. (3) Holland Sisal rug, 9 x 12, de-
d with woven stripes. Rug complete,
or $1.75 per square yard. (4) Cocoa
9 x 12, plain design. Rug complete,
50, or $1.30 per square yard. Plain
a matting in widths from 18" to 72",
) per square yard. **Lower:** Corru-
d rubber for door mats, in standard

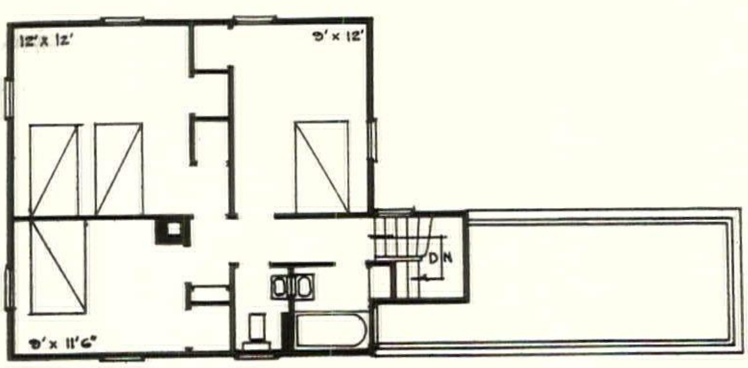
raphs by F. S. Lincoln

LOW-COST HOUSING RESEARCH AT PURDUE UNIVERSIT

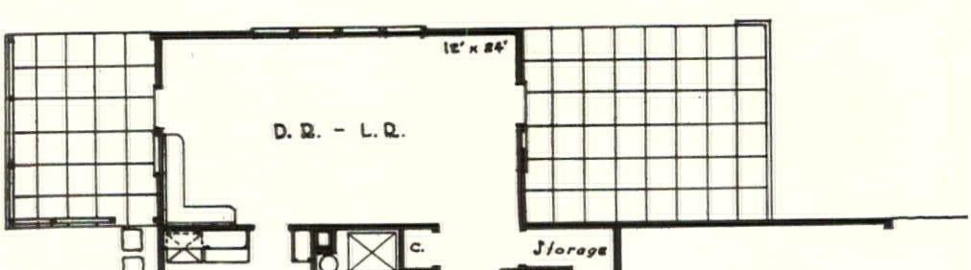
HOUSE NO. I Cost, $

J. André Fouilhoux - - Arch





SECOND FLOOR



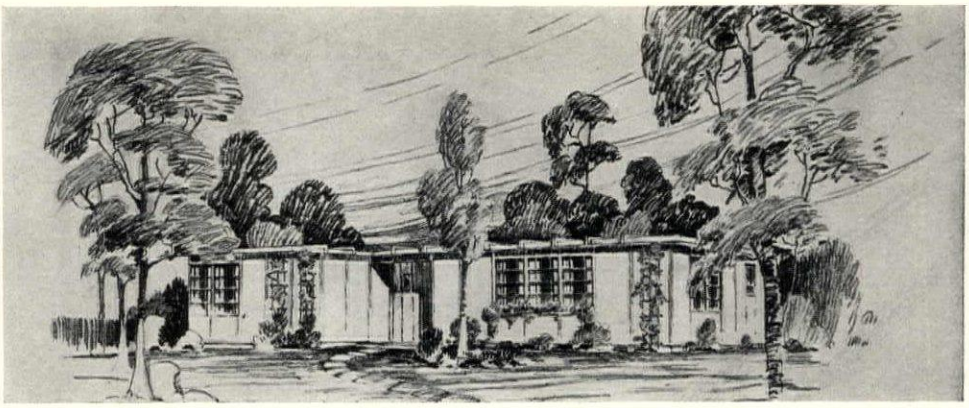
FIRST FLOOR

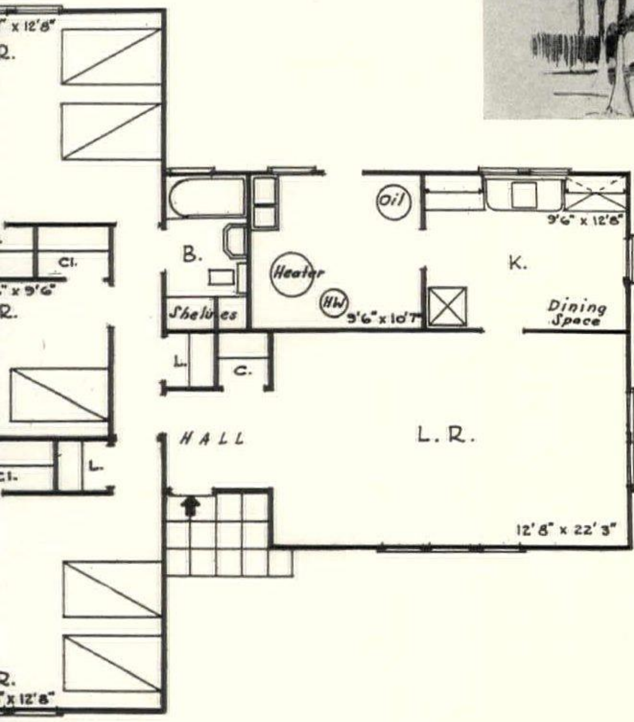
Outline Specifications: Foundations
crete; terraces and walks, poured
crete. Floors: first floor, fill, 4" ta
gravel, slab, 3" concrete; insulatio
cold storage type; finish, hard
blocks laid in mastic; kitchen, lino
second floor, framing, 2" x 8" joist
1" x 8" T & G sub-floor; finish, hard
strip flooring; bathroom, linol
Garage floor and drive, gravel.
and ceilings: framing, 2" x 4" stud
western type; insulation, mineral
bats; exterior finish, cement stuc
paper-backed metal lath; part
2" x 4" and 2" x 3" studding; in
finish, 1/4" fir plywood; ceiling
1/4" fir plywood. Roof: framing, 2
joists with 1" x 8" T & G sheathin
sulation, mineral wool; roofing, 10
built-up roof; flashing, #24-gaug
vanized iron, painted. Trim: yellow
trim for windows, doors, base
picture mold, etc. Painting, lead
oil. Windows: wood, casement
screens. Doors, wood. Wiring
cable. Plumbing: enameled iron
tures; piping, copper tubing;
heater, 20-gallon boiler, automatic
Heating: forced warm air; automa
ly regulated; automatic flash typ
burner. Hardware: bronze and p

USE NO. 2 Cost, $4,625

ard T. Fisher, Architect;

John A. Pruyn, Associate Architect



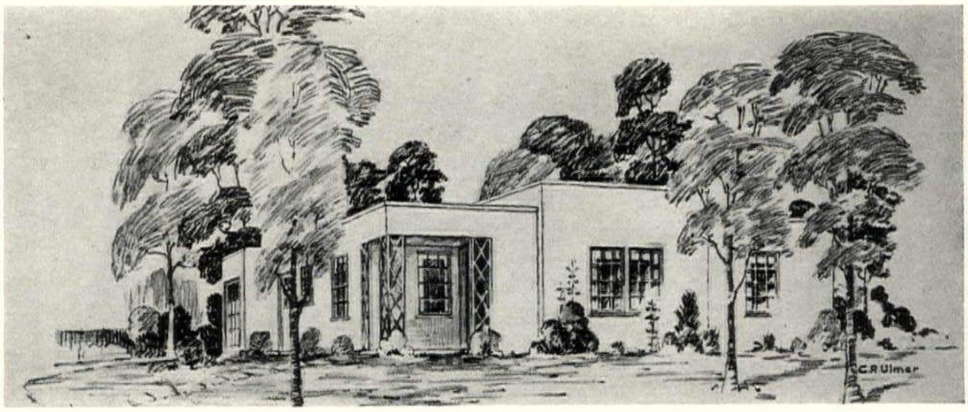


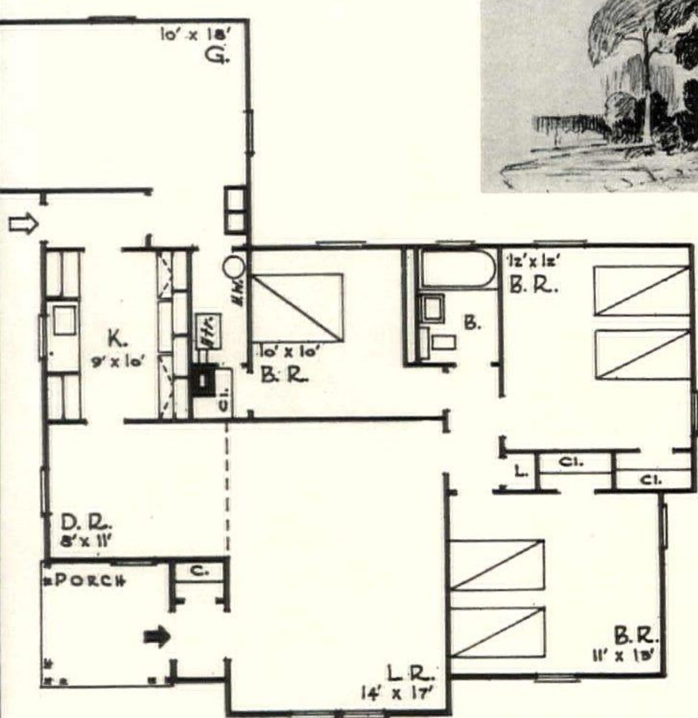
Outline Specifications: Foundations: piers, 10″ diameter, reinforced concrete; sills, reinforced concrete, pier to pier. Floor: 6″ tamped cinder fill; building paper laid over cinder; 4″ concrete slab, steel mesh reinforcing; monolithic troweled finish; painted. Frame: #16 gauge, copper-bearing steel; studs and joists at panel point. Wall panels: built-up wood frame with stiffeners; exterior covering, 1/4″ asbestos cement board; interior covering, 1/4″ regular fir plywood, painted. Roof panels: built-up wood frame with stiffeners; ceiling plywood, 1/4″ fir; roof plywood, 3/8″ fir; roofing, #24-gauge galvanized copper-bearing steel; flashing, #26-gauge galvanized copper-bearing steel. Insulation: two separated sheets of aluminum foil in each panel. Trim: doors, windows, base, of steel. Windows: steel, outswinging casements; steel frames; screens, aluminum. Doors, wood. Hardware: windows, bronze; general, brass finish. Kitchen cases, steel. Painting, lead and oil. Plumbing: piping, galvanized steel and cast iron; fixtures, enameled iron. Wiring, BX cable. Heating: forced warm air automatically controlled; automatic oil-fired.

USE NO. 4

ated Steel Construction Co.,

Designers





Outline Specifications: Foundations, concrete. Floors: concrete, 1:2:4, troweled finish 1:2 on fill; 13/16″ hardwood laid on 2″ x 4″ creosoted sleepers; kitchen and bathroom, linoleum. Walls: frameless steel sections, painted; sections filled with insulating material; walls and ceilings, plastic paint finish. Roof: cellular steel construction; 1″ rigid insulation board; roofing, standard type built-up roof; flashing, #26-gauge iron. Exterior trim, cypress. Windows: wood, double-hung. Doors, wood. Cases, wood. Wiring, BX cable. Plumbing: pipe, cast iron, galvanized iron, black iron; water heater, 30-gallon range boiler with thermostat; fixtures, enameled iron. Heating: forced warm air, gas-fired furnace automatically regulated.

PURDUE HOUSING RESEARCH PROJEC

The Purdue Housing Research Project was first publicly announced at a meeting of interested members of industry held at Purdue University on June 1, 1935.

In the development of the details of the housing research program since that time every effort has been made to conform to the expressed wish of the members of industry there assembled to engage in research and study of a basically practical nature.

Nine houses are now in actual construction as a practical study of cost items. These houses are each of a different basic construction and represent the important materials and methods now available. Leading architects of the country have given freely of their time in designing the houses. Industry has been consulted on the proper use of the several materials employed.

Each house is designed to accommodate an average family of parents and one or more children of each sex. A garage is also listed as a necessity. This specification fits the mass of the prospective home-owning public. The specifications also state that the house must be erected under ordinary conditions at a cost not to exceed $5,000. It is recognized that this requirement does not fit the mass of prospective home owners. Those in charge of the Project were directly cognizant of this fact. The general income level of the country will not support an extensive housing development even in the $5,000 price class.

The Quality of Houses Which Be Produced in This Price Cla

It has been generally necessary to eliminate dining rooms. Motor-driven oil burners and automatic stokers could not be included. Those in direct charge of the project, as well as the architects and industrial engineers who assisted in the planning, were of the opinion that no compromises in the basic soundness of construction should be made in favor of such items.

Results of Actual Bidding on the Houses

In order to parallel as nearly as possible the situation which confronts prospective home owners, bids on the houses have been obtained from separate contractors, and no special price concessions from material suppliers have been permitted. The results of the bidding indicate prices of all of the houses will be very close to the established $5,000 maximum limit.

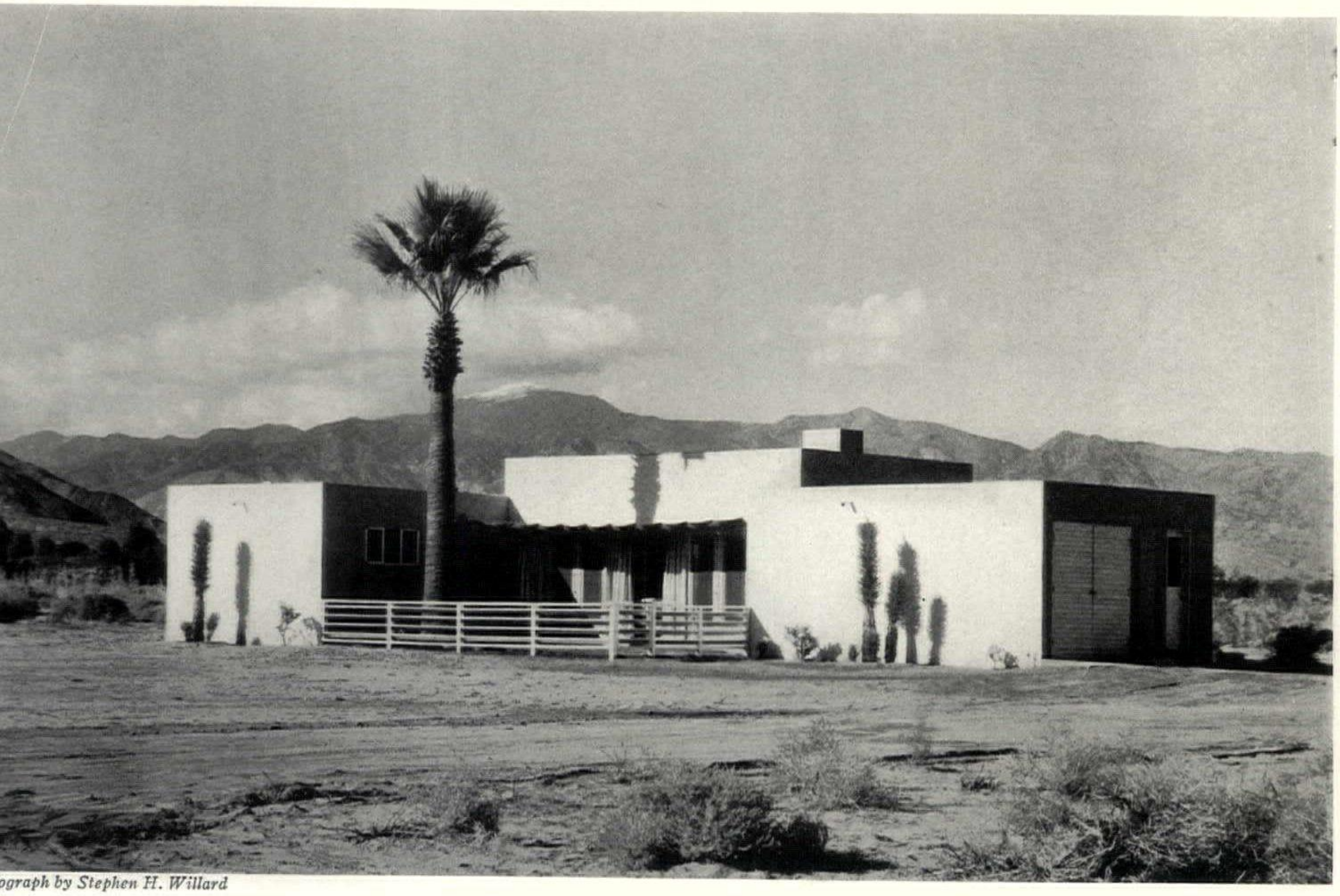
Cost Reduction Possibilities

Preliminary surveys have been made in the various fields in which cost reductions might be effected. When construction of the houses is completed and detailed cost information of their component parts has been obtained, a more thorough study will be possible.

These preliminary studies indicated no great practical possibilities in cost reduction. In materials a great share, or what might be termed a disproportionate share, of cost appears in the distribution charges from original producer to ultimate consumer. Inasmuch as no one in this chain may be regarded as making too much profit, it follows that the only point of attack must be against the system as a whole. Such approach may produce savings in theory but the practical possibilities of making readjustments on the basis of any other distribution system looms as only a remote possibility. Experience has shown that the present system is apparently essential to the satisfactory merchandising of materials. No change seems possible short of a complete revolution engineered through the combined efforts of the entire building industry.

Reduction of manufacturing costs in anticipation of increased volume appears as another possibility but again it presents practical difficulties. Margins of profit are now slender in many lines. A ten per cent reduction in factory prices may wipe out profits for a considerable period and produce only a small saving to the home owner because of intervening distribution mark-ups.*

*Extract from Report prepared by Frank J. Watson.



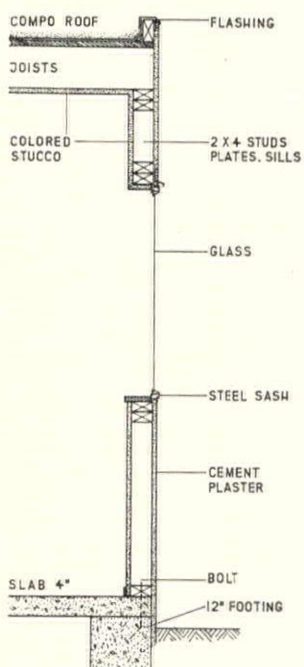
ograph by Stephen H. Willard

UTHRIE HOUSE PALM SPRINGS, CALIFORNIA
AN PELT AND LIND, ARCHITECTS

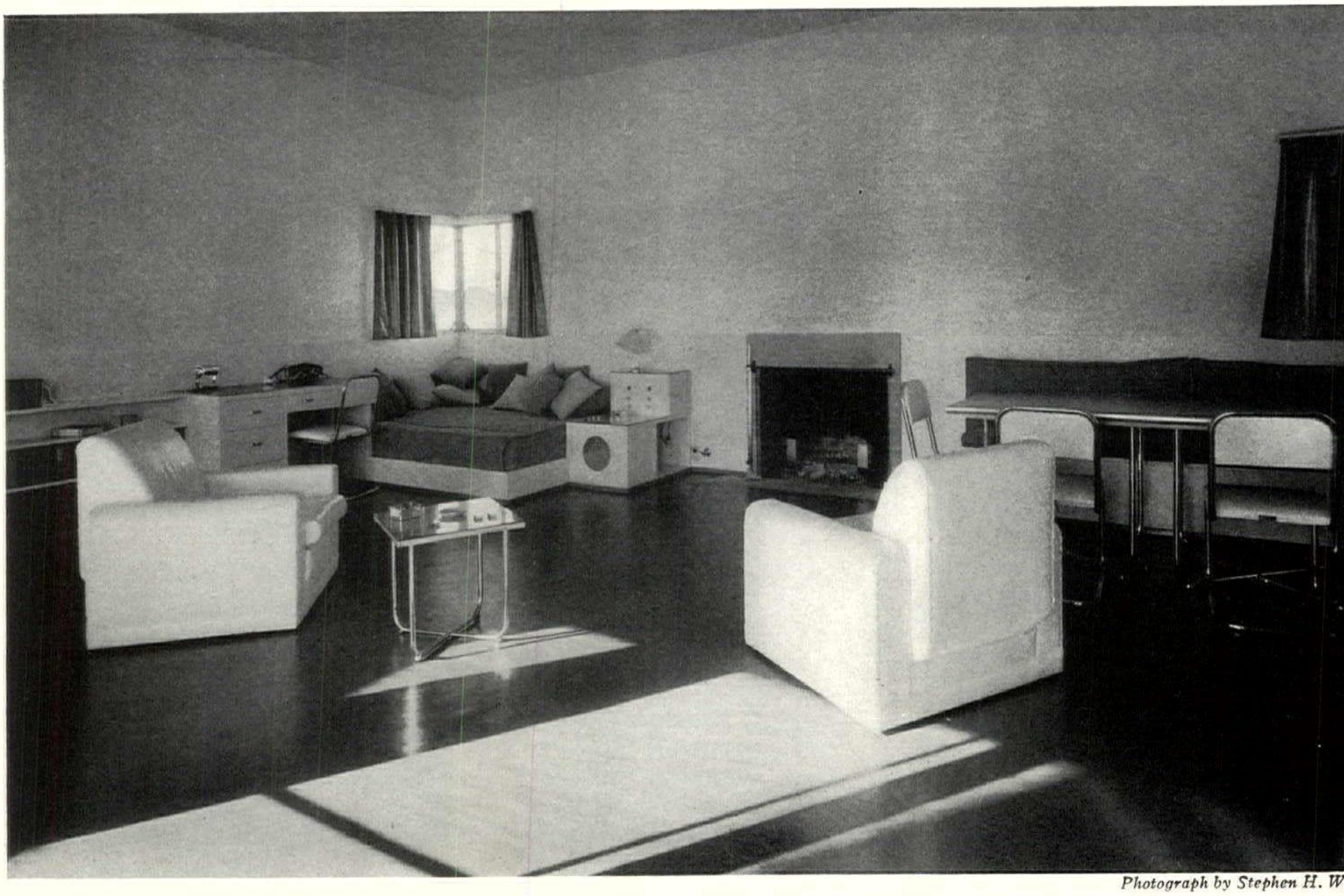
house is of frame construction and stucco, facing south. The end walls of pro-
ring wings are windowless for privacy. A carefully devised color scheme of sage
en walls in the patio (to avoid glare) and warm white elsewhere (for heat-reflection)
ps to tie the building into the landscape. The south wall of the living room is
irely glass, amply protected by sliding awnings and aluminum-faced curtains.

terials and construction.

tings: concrete, 12-in. deep (soil dry sand). Floors: cement, linoleum-covered in
g room and kitchen. Amhaco broadfelt in bedrooms. Frame: wood, 2 x 4, 16″
ceilings, 2 x 6 kitchen, 2 x 8 bedrooms, 2 x 10 living room, all 16″ o.c., bridging
ry 6 feet. Wall finishes: exterior, cement plaster over waterproof paper and
ken wire; sand finish, cold water paint. Interior, integrally colored stucco over
sterboard; smooth trowel finish, ceilings same. Roof: 3-ply built-up with gravel,
vanized iron flashing at copings; slight roof pitch toward drains. Windows: steel
ements with operators, bronze screens, no muntins. Exterior doors: white pine,
nbination doors with screened sash insert; weather-stripped aluminum thresholds.
nbing: soil, cast-iron; water and gas pipe, galvanized iron. Crane fixtures. Light-
wiring, BX cable; flush ceiling fixtures; exposed Lumiline tubes over mirrors.
ating: Payne vented gas console-heaters in rooms exposed, white eggshell finish.
dware: Schlage dull chromium finish; chromium polished in kitchen and bathroom.
oinet work: white pine, 3/8″ plywood flush in 1-in. frames. Fireplace: sides and
rth firebrick, lintel concrete; chimney, concrete blocks. Cost (built in fall 1935:)
per sq. ft. for all work in general contract, including built-in cabinets, but without
r coverings, gardening, and architects' fee.



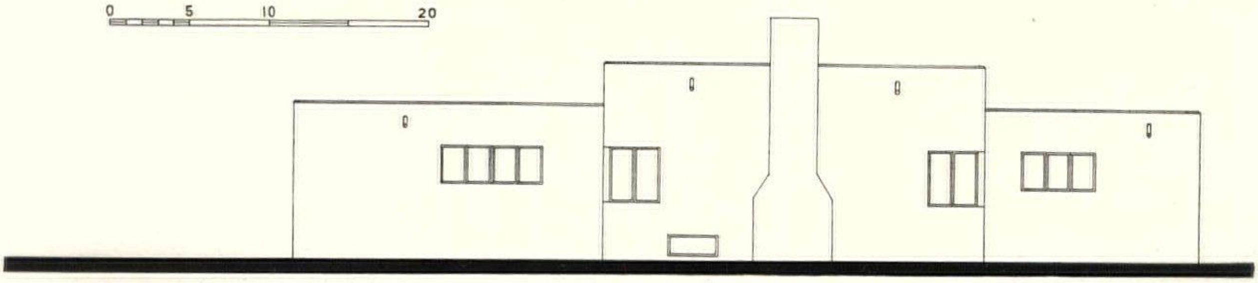
TYPICAL WALL SECTION



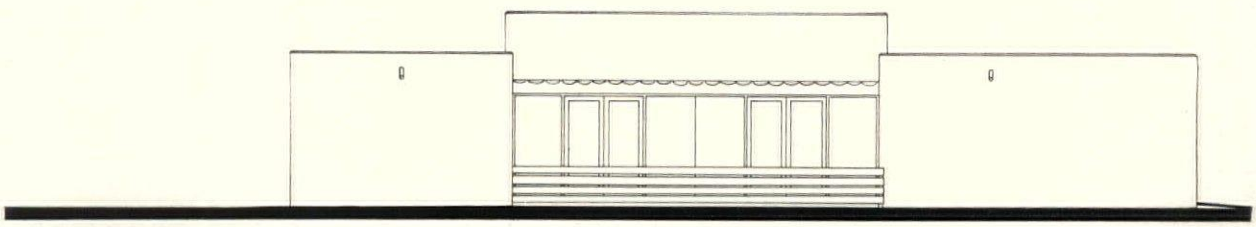
Photograph by Stephen H. W

THE LIVING ROOM

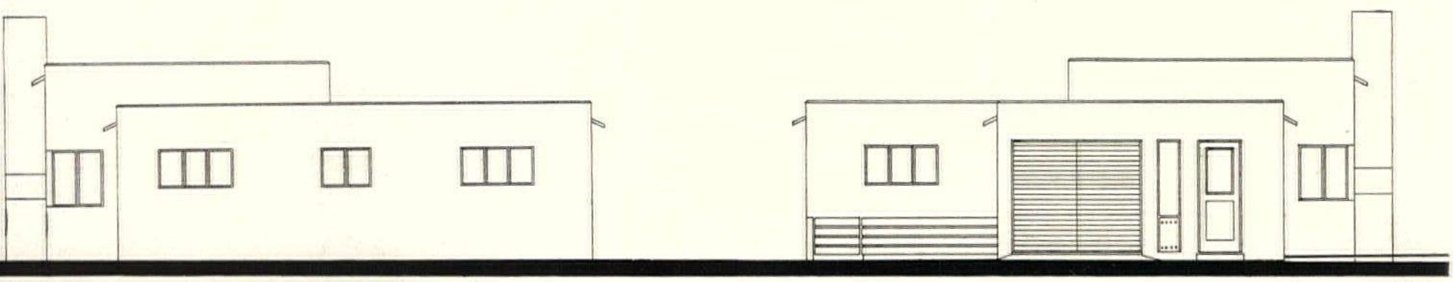
By a careful analysis of function, this room is so designed that traffic does not conflict with the living area. By centering the fireplace on the north wall, with dining furniture to one side and couch, desk, and radio to the other, this separation is carried even further. Floor is blue linoleum, walls and ceiling light yellow, woodwork and built-in furniture eggshell, chairs white Fabrikoid, curtains and cushions blue.



TH ELEVATION

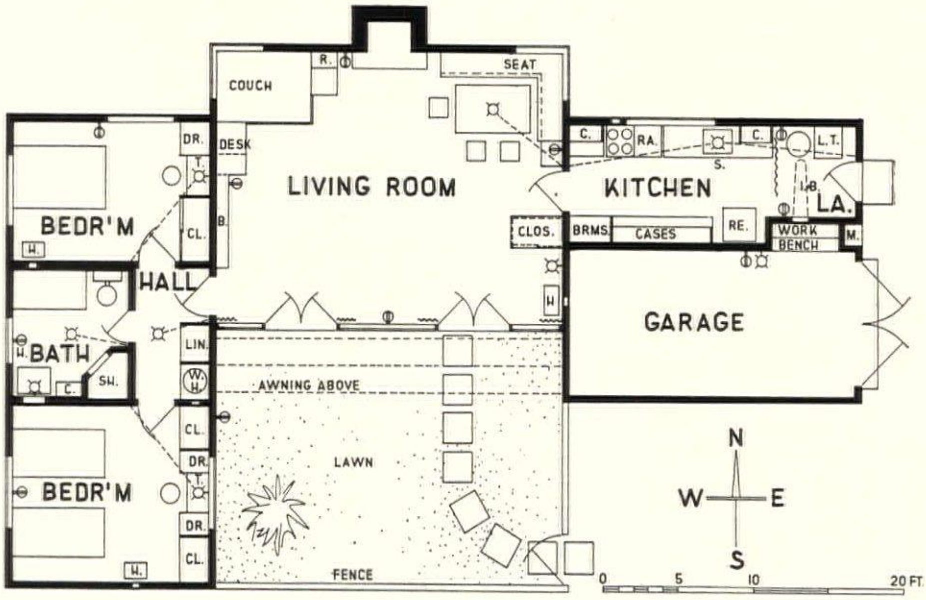


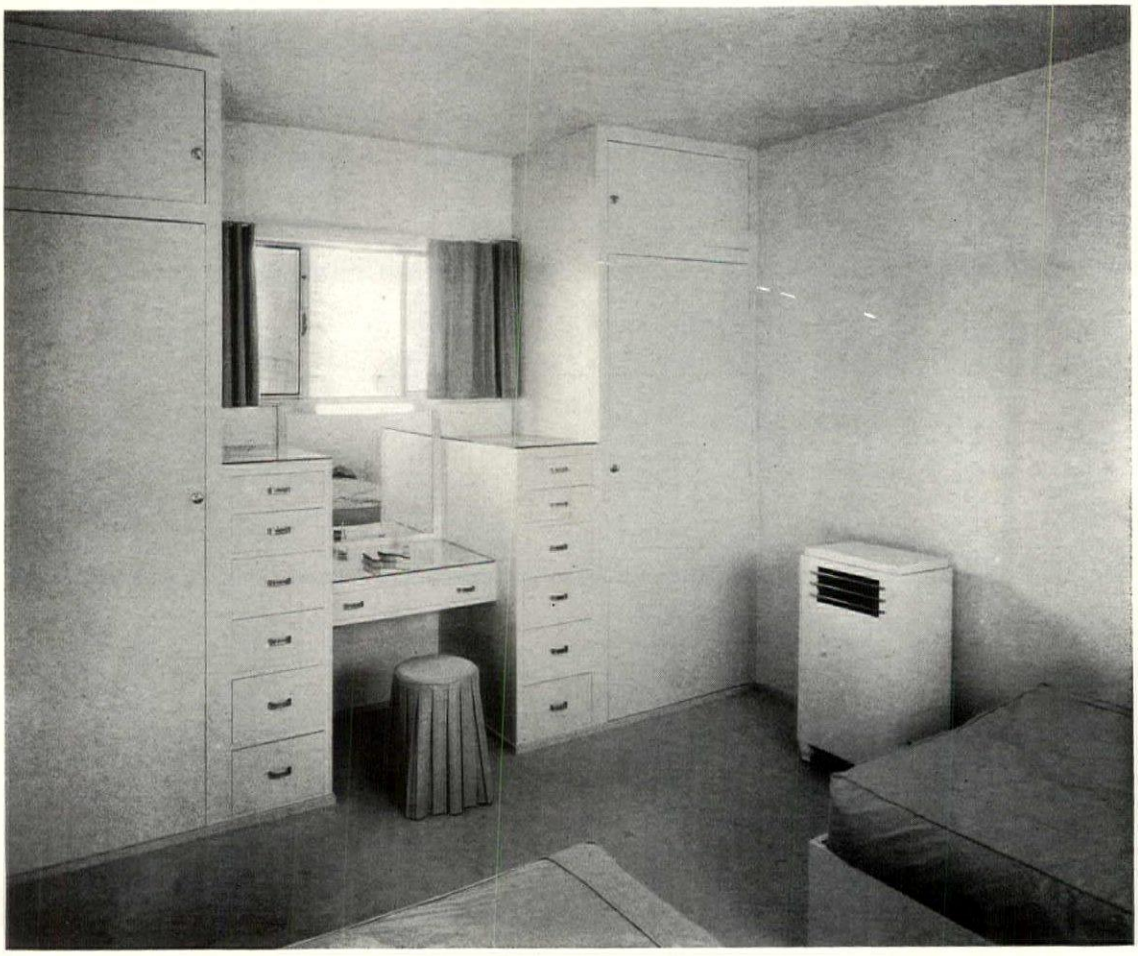
TH ELEVATION



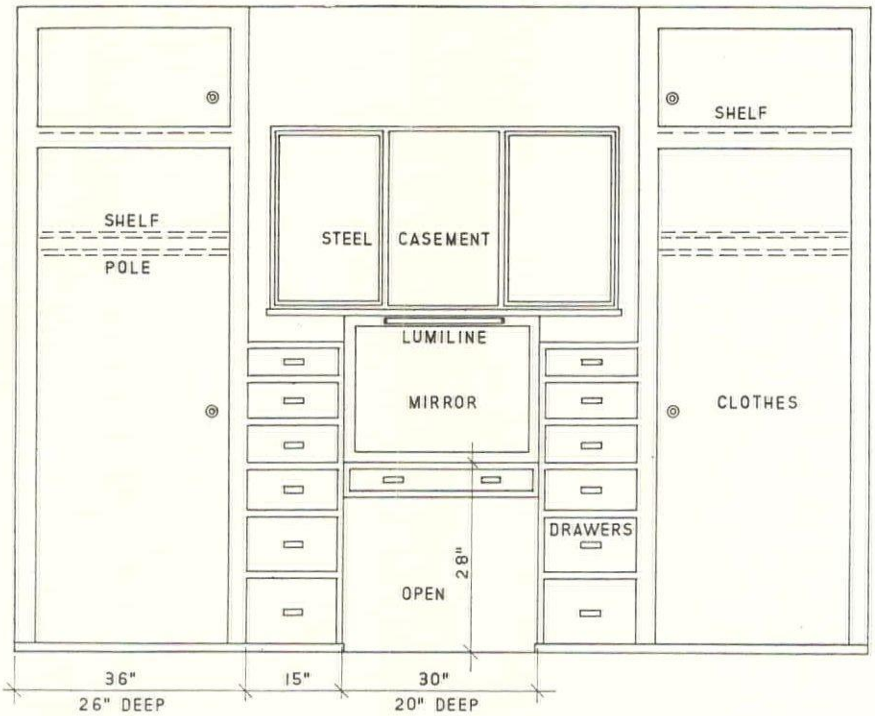
WEST ELEVATION EAST ELEVATION

plan is worthy of study for its
dling of the H-type. Garage,
hen and laundry in the right
; living and dining in center;
ping and bath in left wing. All
omplished with minimum cor-
r space and no sacrifice to
-room traffic.





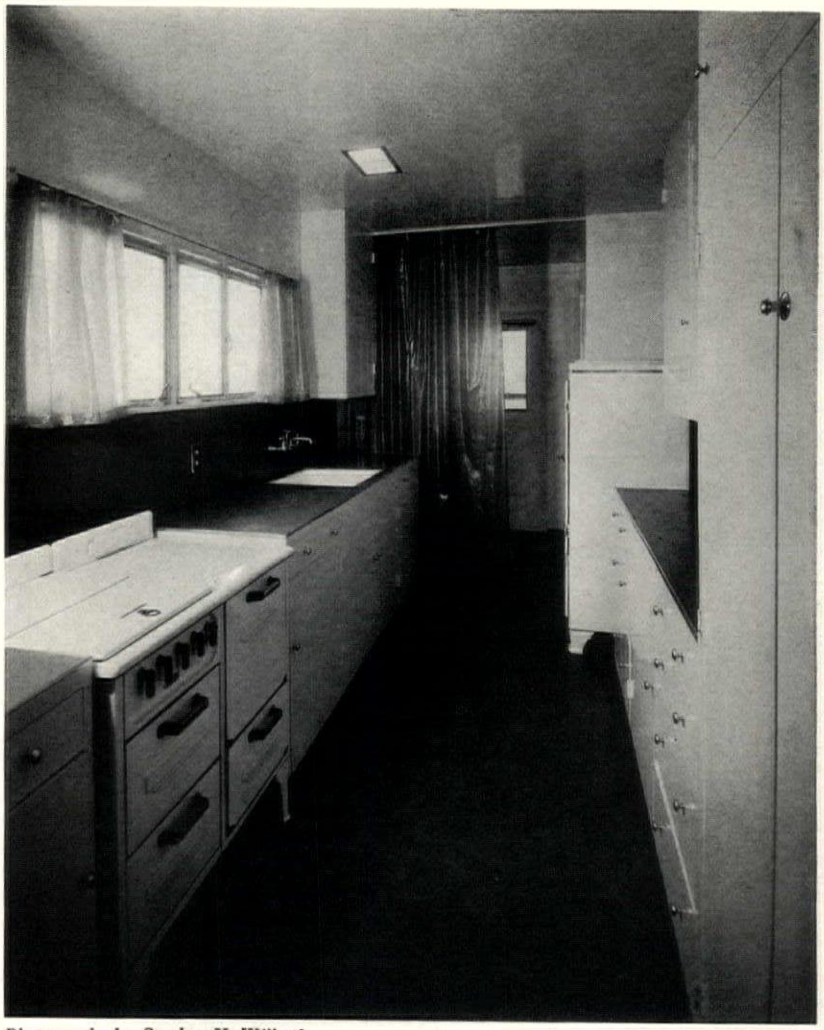
MASTER BEDROOM



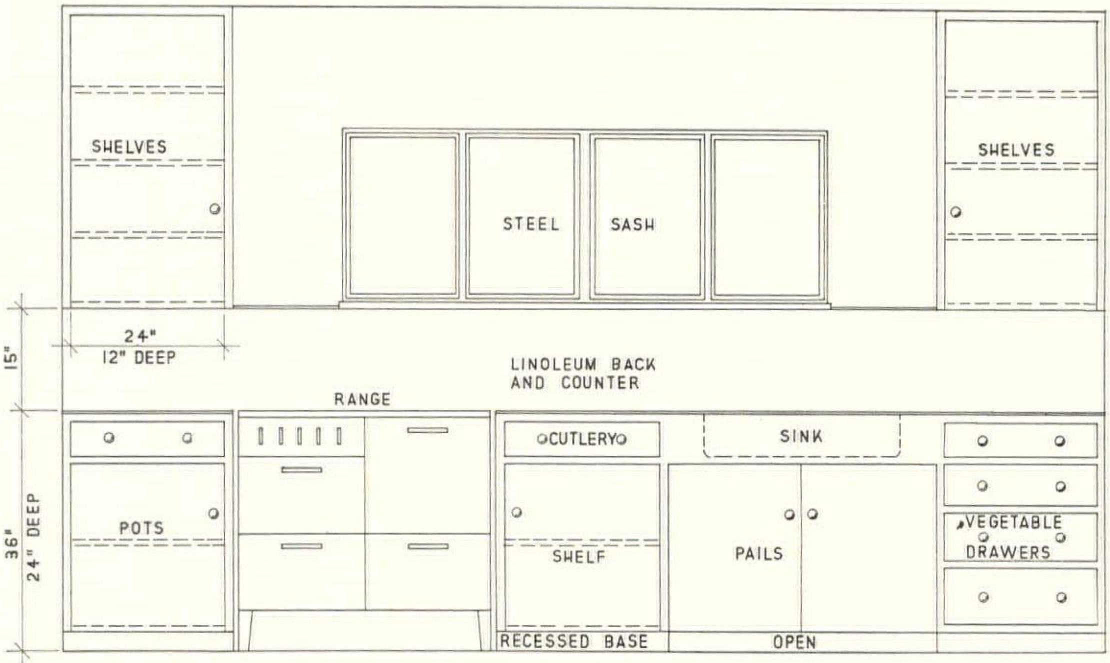
ELEVATION: CLOTHES, LINEN, AND DRESSING CASES

Carefully-studied provisions for clothing-storage and dressing characterize both bedrooms. In the master bedroom storage space for two people, along with well-lighted and compact dressing table, is provided. Floor covering is white "Broadfelt," walls, ceilings and bedspreads blue, furniture and cases eggshell.

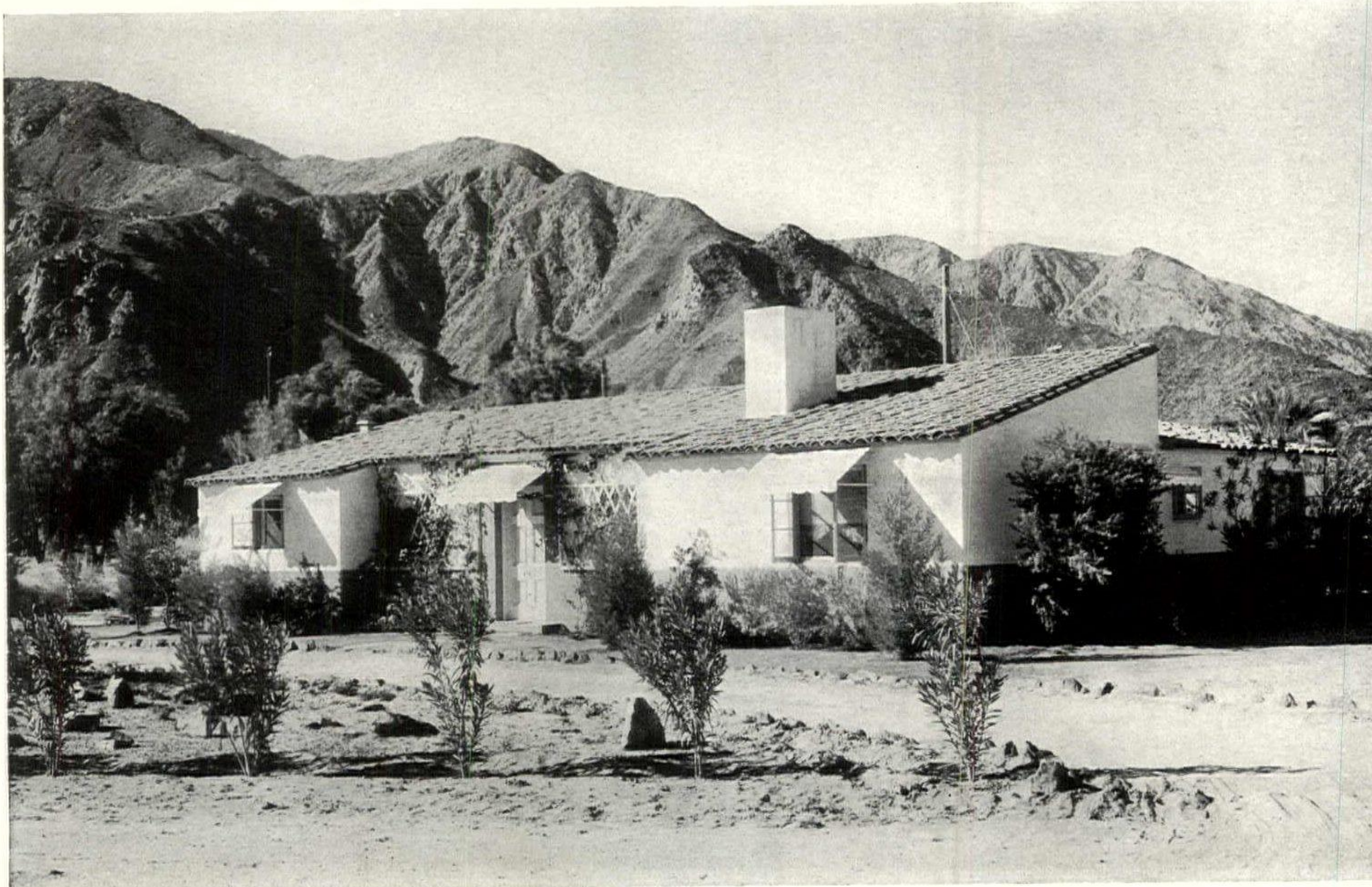
Grouping of kitchen and laundry equipment is so arranged that functions of preparing and serving food are distinct from laundry work, yet both are confined to one area of house.



Photographs by Stephen H. Willard



NORTH WALL KITCHEN CASES



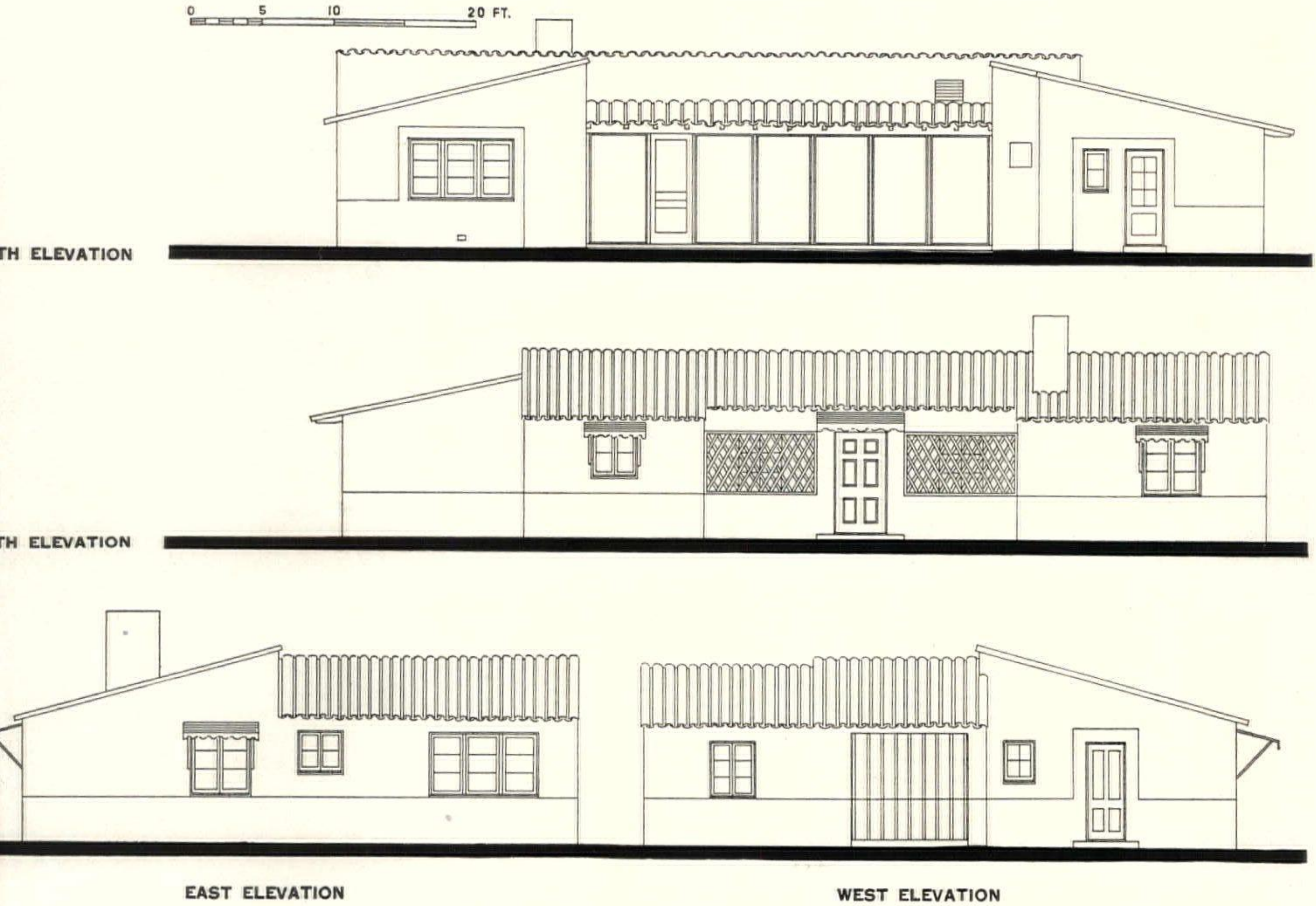
Photograph by Stephen H. Willara

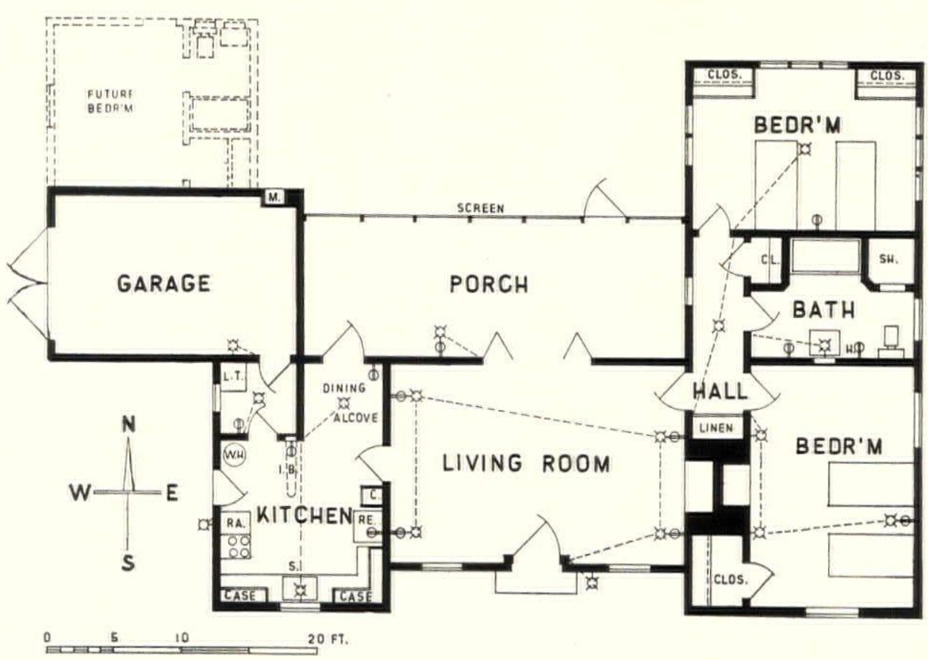
VIEW FROM THE SOUTHEAST

The house is frame construction and stucco. The large screened living porch reduces the living room area. Fireplaces in living room and master bedroom furnish only heat. Exterior color scheme: sage green wainscot, oyster white walls, tile roof in natural colors, chartreuse yellow doors and wood casement sash.

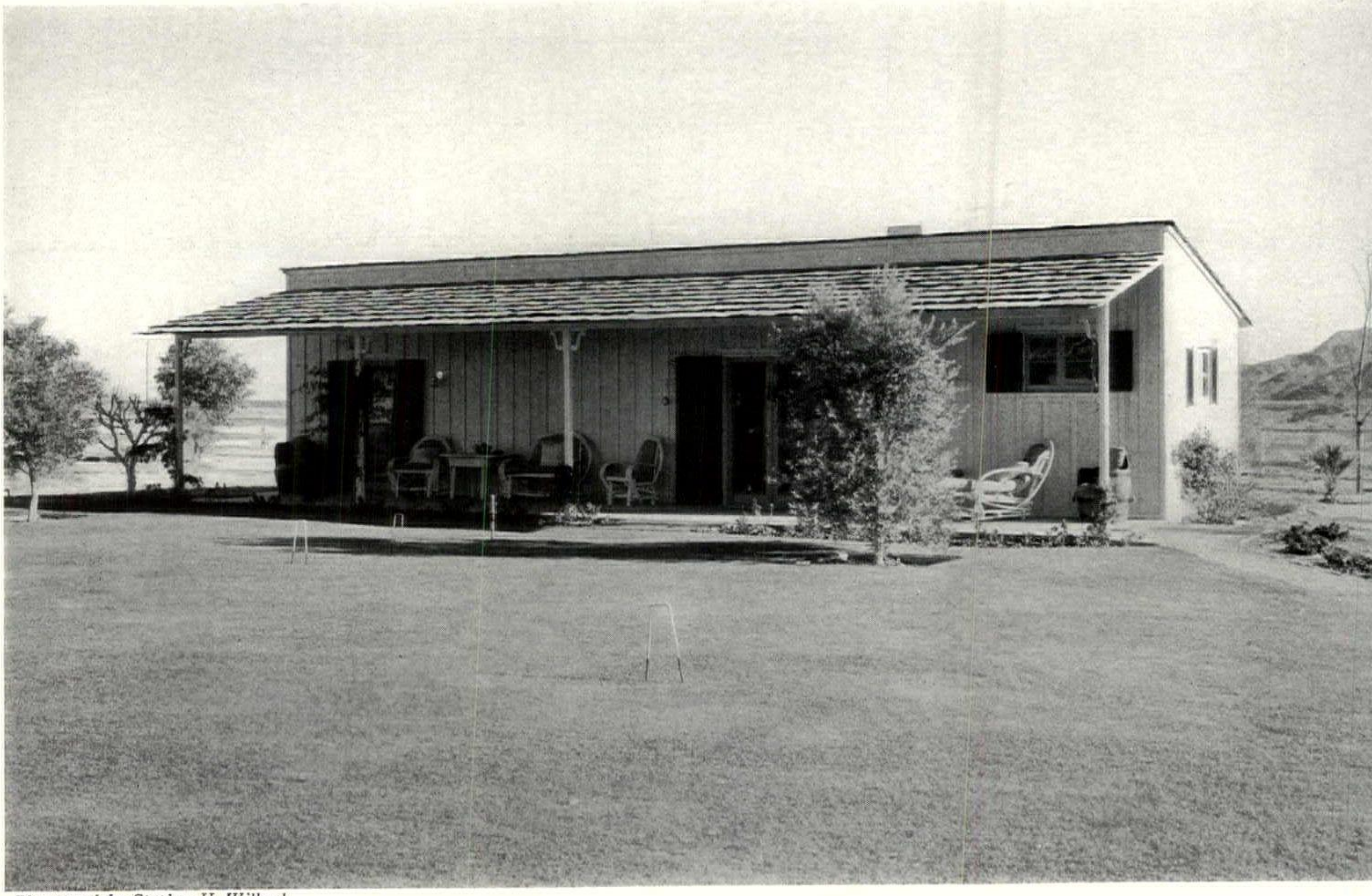
Materials and construction.

Floors: cement, color in top dressing; floors and footings poured at same time for economy. Walls: 2 x 4 studs, 16" o.c., plastered both sides. Roof: wood rafters and solid sheathing; all roofs "shed type," simplified framing. Roof tile: red tile sprayed with color "slip" baked on. Windows: stock wood casements. Doors: stock four-panel, sugar pine. Paint: interior and exterior walls and ceilings, cold water paint. Finished woodwork, exterior zinc and lead paint; bathroom and kitchen walls, washable wall paint. Interior woodwork, eggshell enamel. Interior tile: kitchen counter, shower floor and base, Pomona tile. Plumbing: all fixtures Crane; double kitchen sink with removable clean-out strainers. Fireplace: two-flue chimney; perforated gas pipe lighters at hearth to eliminate kindling wood. Awnings: Kinney "shutter" awnings. Cost (built in 1934): $2.70 per sq. ft., not including decorating, landscaping, or architects' fee.





ouse is set diagonally on 120-foot square lot to give maximum distance to property and to permit best expanses and views. dion doors open living room on to porch. ving room is kept small so that it may be d by the only heat source, the fireplace.

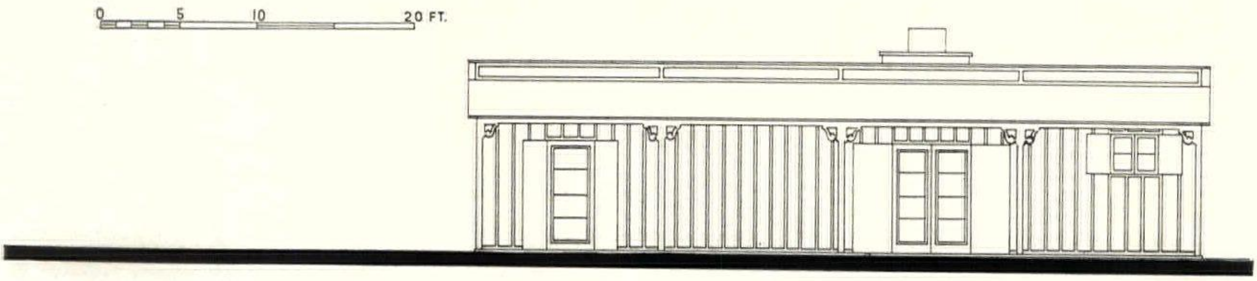


Photograph by Stephen H. Willard

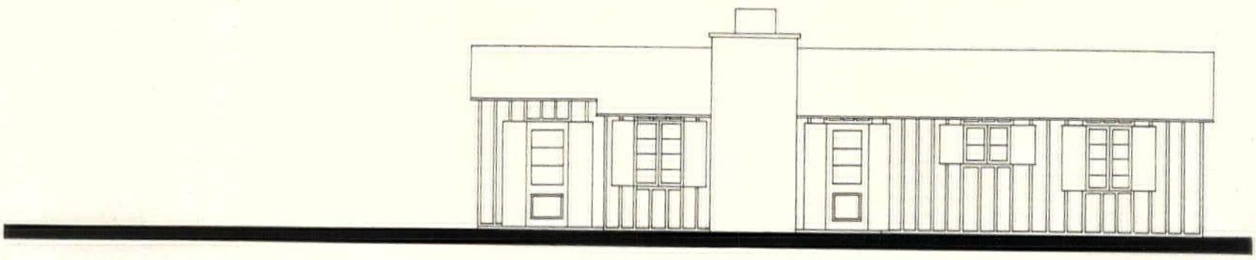
A compact and straightforward handling of plan results in a simple and pleasing structure. Of frame construction, with redwood board-and-batten walls, the house is painted an off-white, with dark blue shutters and yellow doors and windows. The roof is of redwood "shakes" in natural color.

Materials and construction.

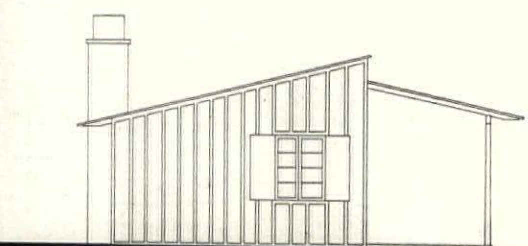
Floors: cement, integrally colored top dressing; color tan, waxed. Walls: 2 x 4 studs, 16" o.c. Roof: exposed rafters, shed type. Finishes: exterior, redwood boards and battens; roof, 1 x 36 split cedar shakes. Interior, living room California knotty pine; other rooms plaster. Paint: exterior, "National Lead" paint. Interior, living room walls bleached and polished with white wax; ceilings and other walls cold water paint; bathroom and kitchen enamel. Heating: Payne vented gas console-heaters, eliminating basement for furnace. Cost (built in 1934): $3 per sq. ft. for items in general contract.



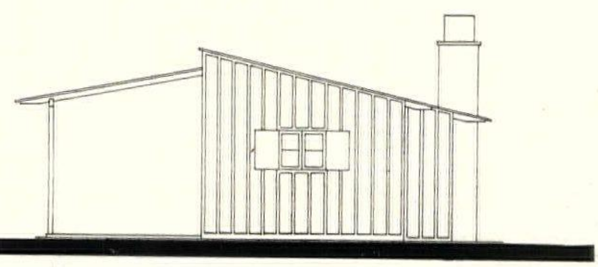
TH ELEVATION



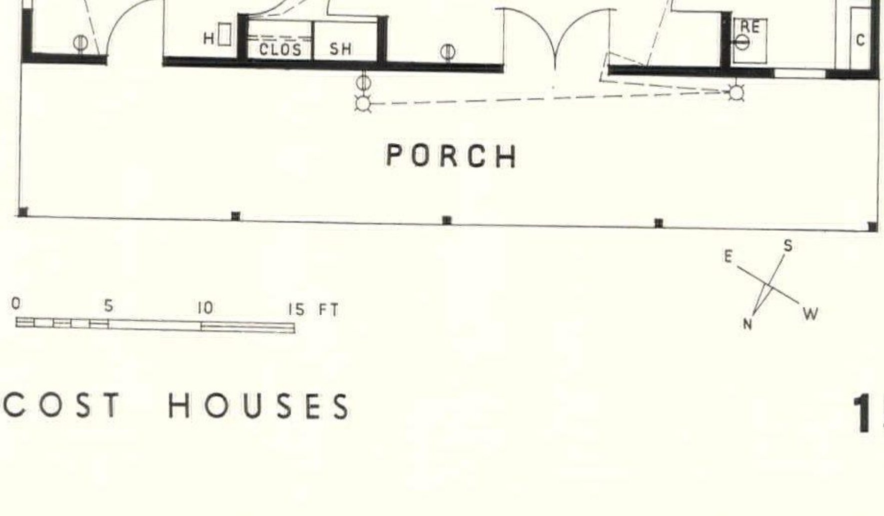
TH ELEVATION



EAST ELEVATION

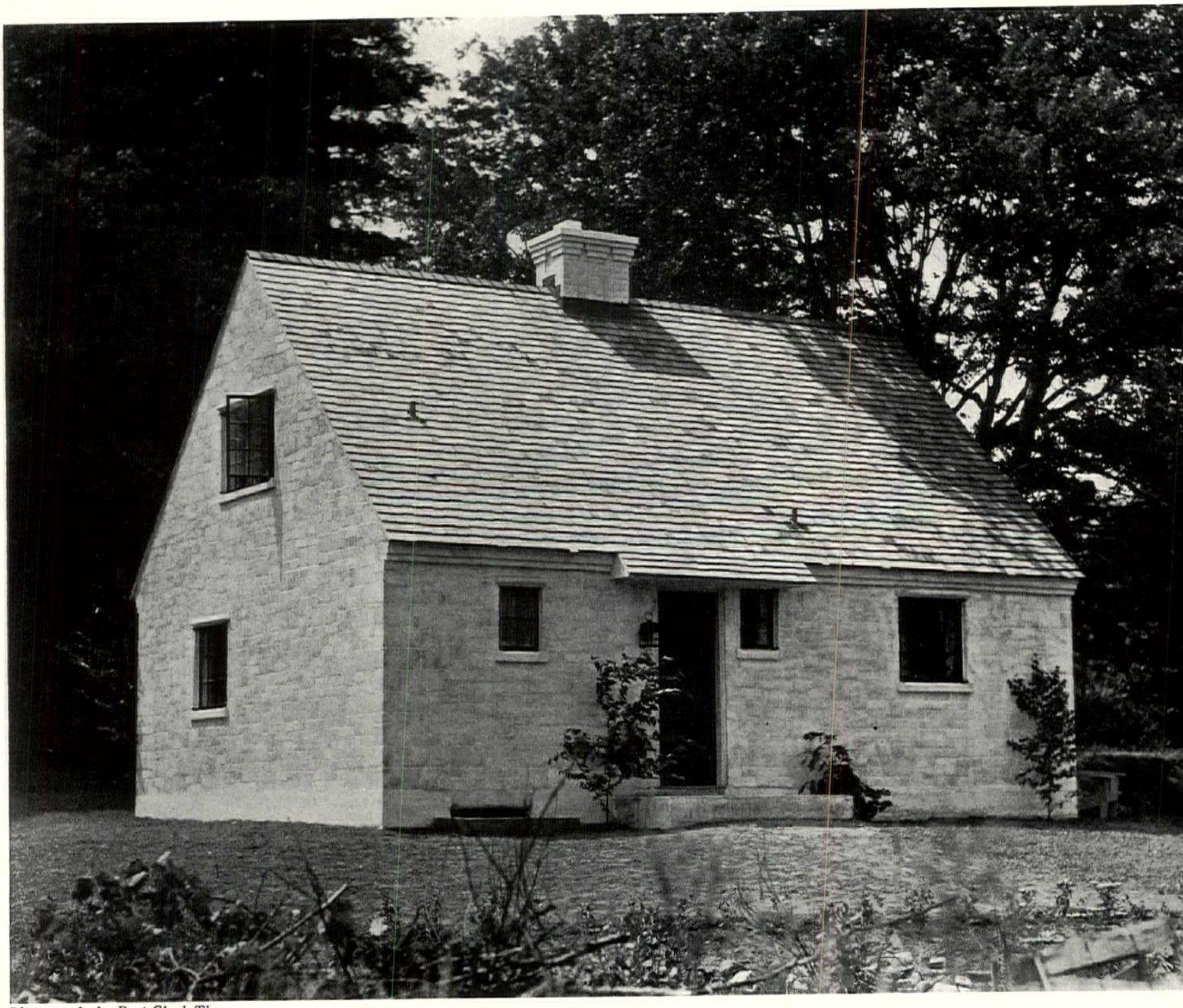


WEST ELEVATION



lan represents the smallest house-unit with ete equipment. It is suited to use as a guest or week-end house. It is the first stage of rangement to which other rooms may be . The plan affords maximum exposure to ms.

HOUSE FOR MISS MARTHA PEABODY WESTPO



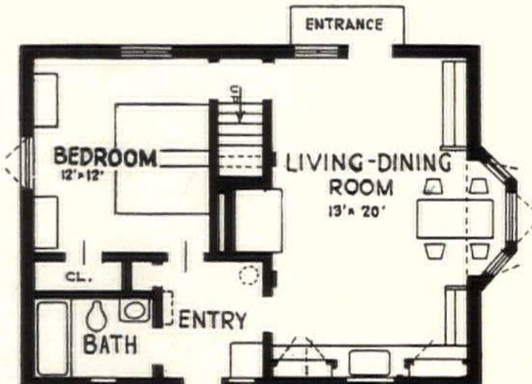
Photographs by Bert Clark Thayer

A small house (three bedrooms) having a combination heating unit, cooking element and water heater. Construction: concrete footings and first floor, wood second floor and roof construction, concrete blocks walls, steel sash, copper metalwork.

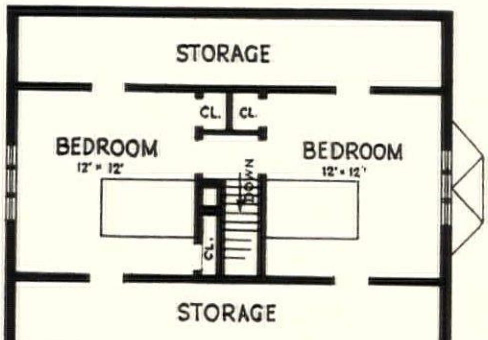
Construction costs (all prices include materials and labor at union wage scales):

Excavating, masonry and carpentry, lumber, electric wiring and painting	$2,100
Rough plumbing, 200 feet copper flashing	255
Plumbing fixtures	100
Septic tank	50
"Heaterange"	175
Hardware	26
Electric fixtures	35
Screens	60
Total cost	$2,801

COMBINED LIVING-DINING ROOM AND KITCHEN



FIRST FLOOR PLAN

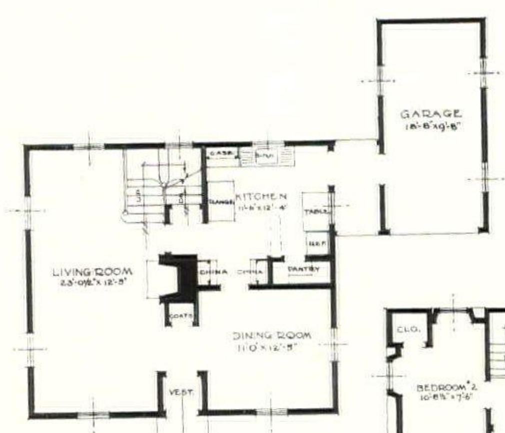


SECOND FLOOR PLAN

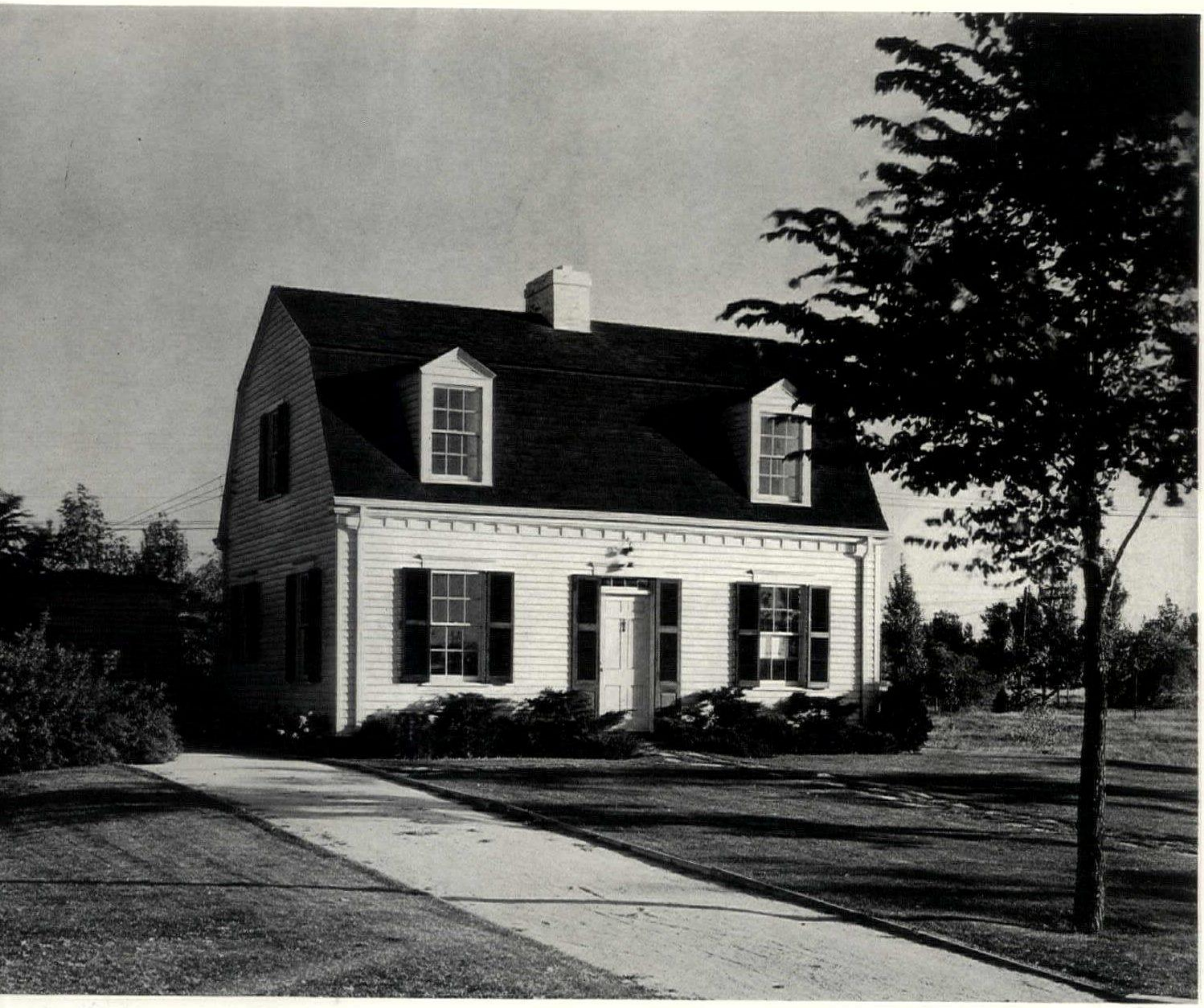
Photographs by Hedrich-Blessing Studio

WHITE AND WEBER, ARCHITECTS

JOHN BELL, LANDSCAPE ARCHIT

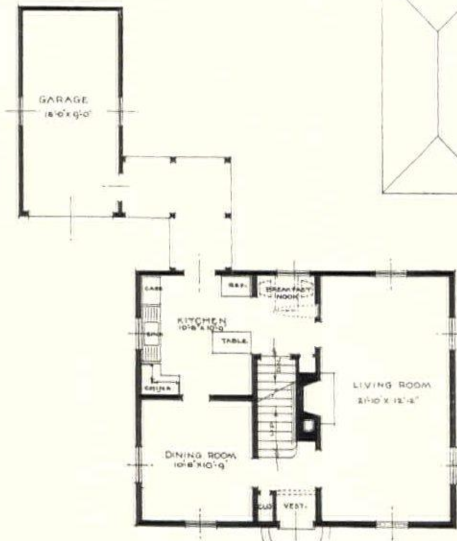


One of a group of 20 houses in a development sponsored by the Jewel Tea Company for its employees. This house, of wood frame construction with concrete foundations, is insulated with a 1/2" blanket-type woven wire lath. Economy is achieved by the compact plan, simple roof framing, minimum lineal feet of wall. Heating system: gravity-feed hot air system. Exterior color scheme: white walls, gray trim, blue-gray wood shingles.

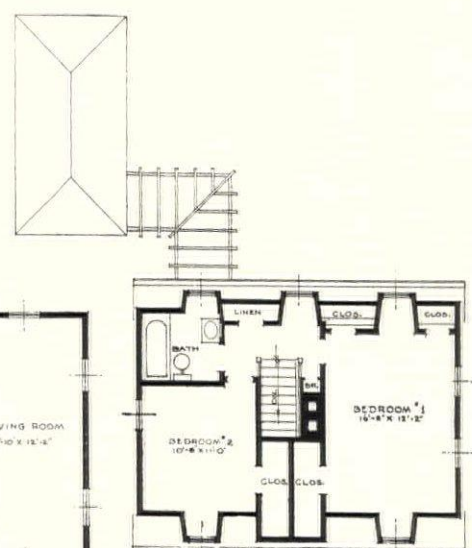


TE AND WEBER, ARCHITECTS

Another house in the same group. Of similar construction and design, this house is somewhat smaller. The same economy of plan is to be observed. Exterior color scheme: white walls, blue-green shutters, black shingle roof.



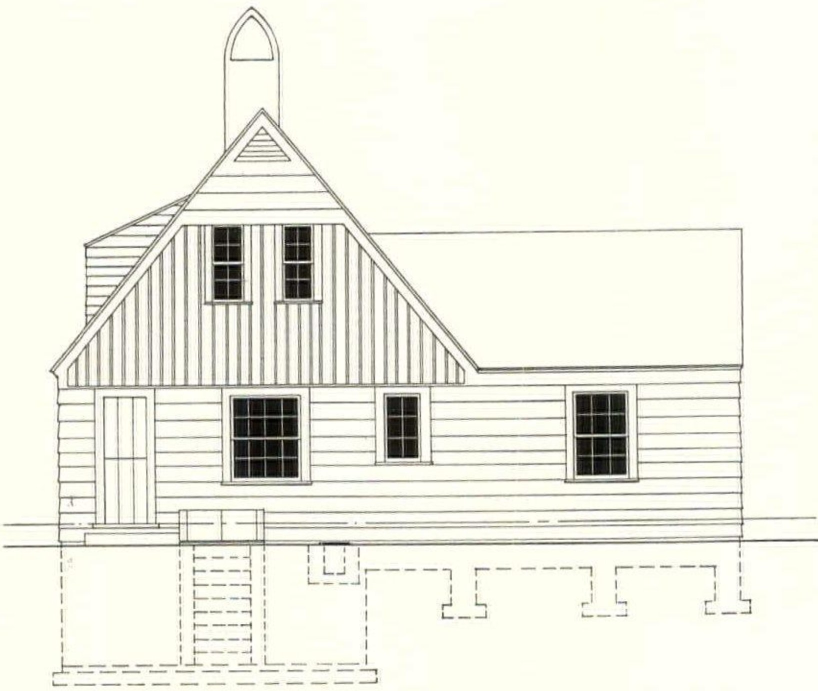
FIRST FLOOR PLAN

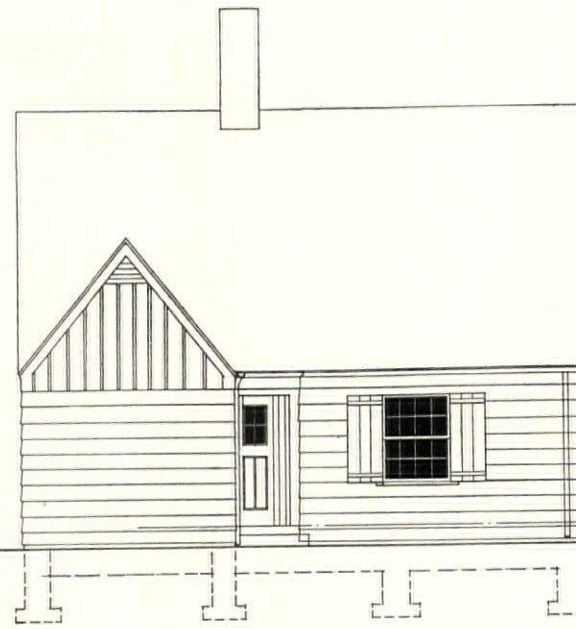


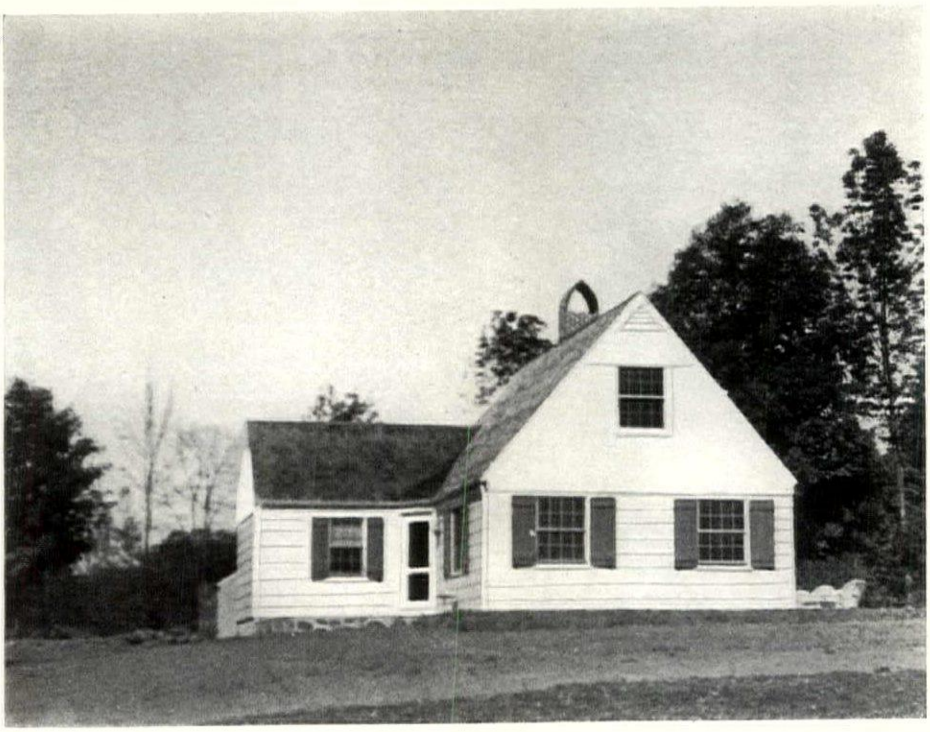
SECOND FLOOR PLAN

COTTAGE FOR MR. H. B. COOK

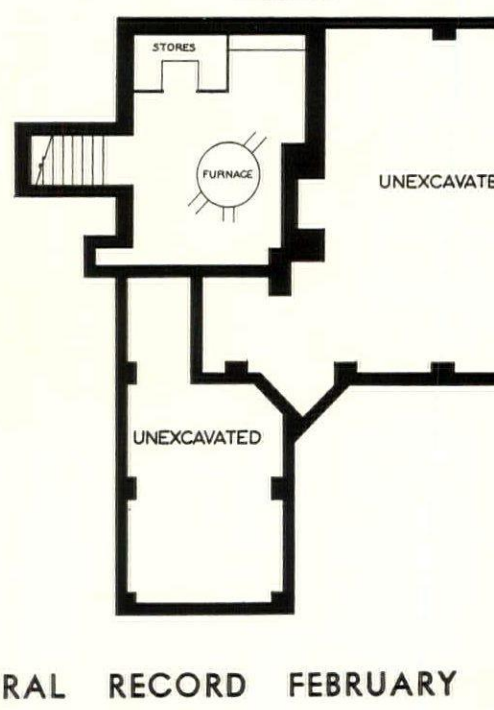
NORWA

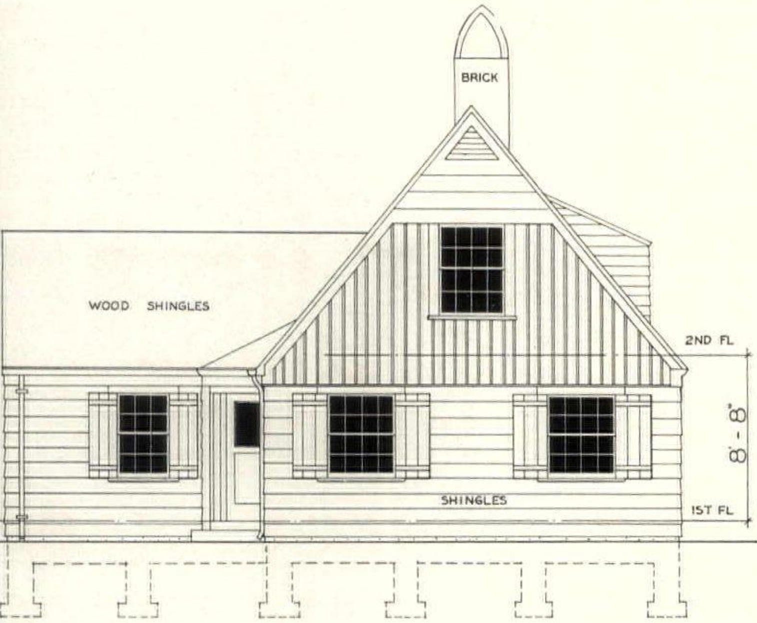




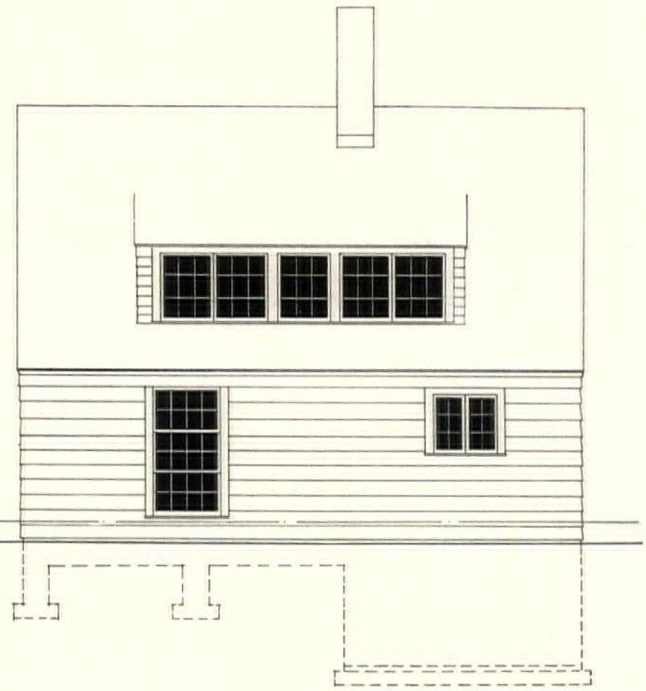


A small house to serve as a background for a fine collection of French Provincial furniture. The use of brick and slate for the main floor, pine-faced walls and rough hardware contribute at once to economy and desired appearance.





NORTH ELEVATION

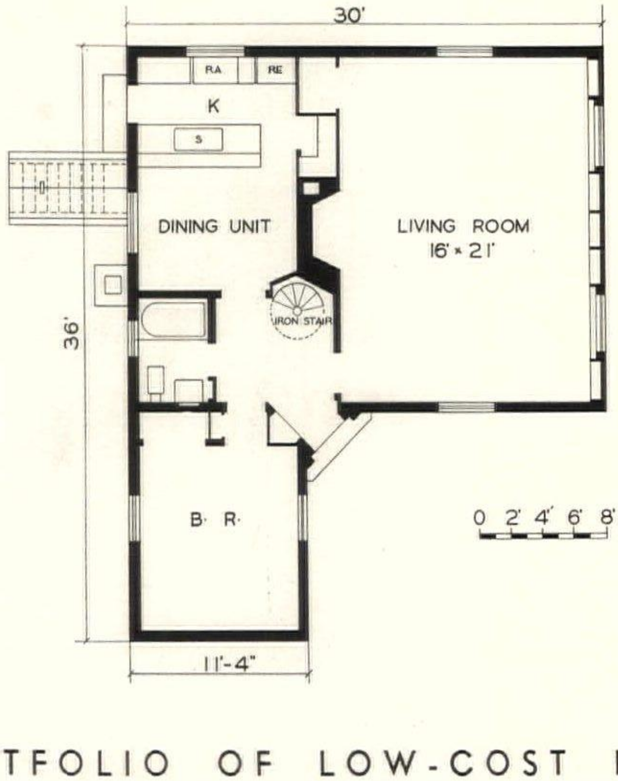


WEST ELEVATION

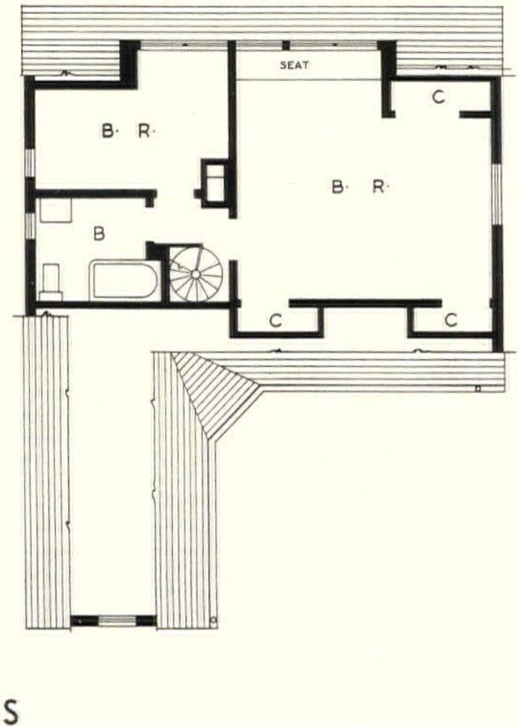
Materials and construction.

Concrete block foundations, native stone above grade, no waterproofing; wood frame walls and roof, wood shingle facing; first floor concrete slab with slate, brick, and linoleum finish, second floor wood. Interior finish: painted board walls and ceilings except plaster ceiling in living room; no trim, doors being directly on studs; living room floor slate, entry floor brick, kitchen and bathroom linoleum. Exterior finish: shingle walls white, shutters blue-green, roof shingles natural.

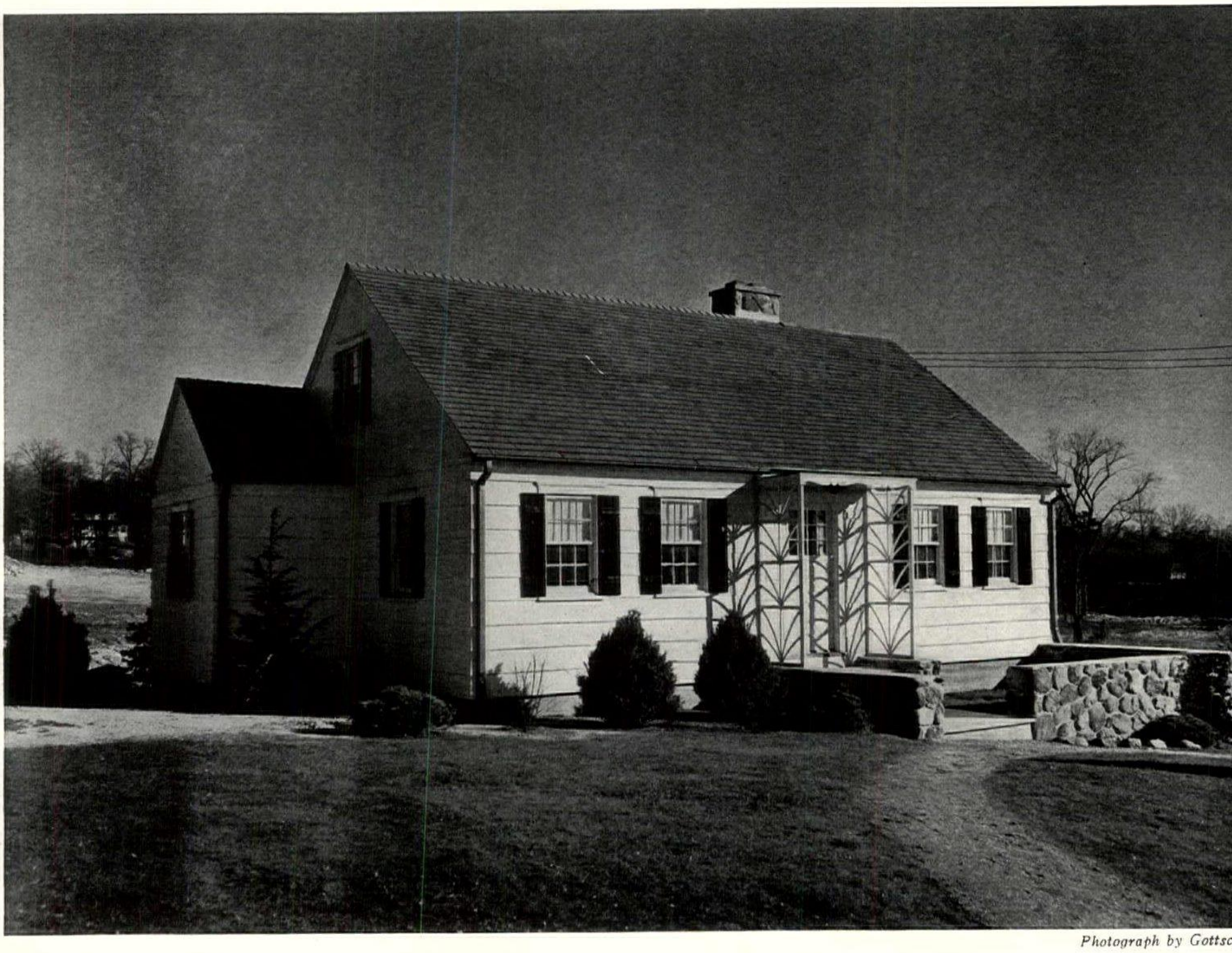
FIRST FLOOR



SECOND FLOOR



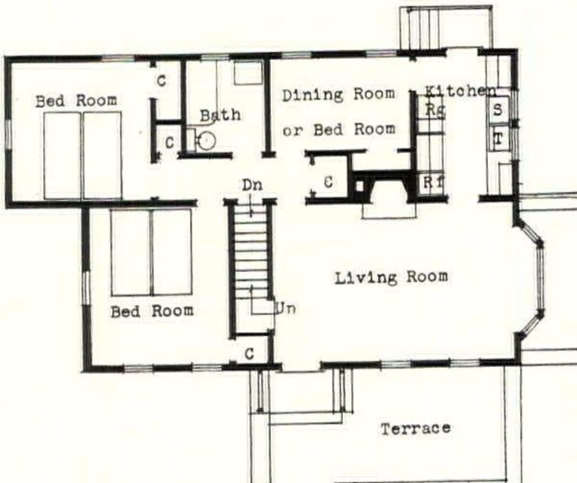
HOUSE OF WILLIAM P. VARIAN GLENBROOK, CONNECTICU



Photograph by Gottsc

WALTER B. KIRBY, ARCHITECT

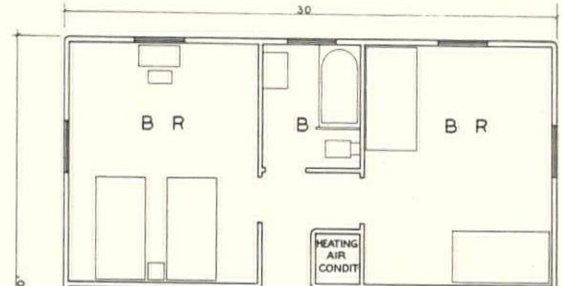
Concrete foundations, wood frame wall, shingle facing. Wall finishes consist of pine paneling in living room, hard plaster in kitchen; other rooms, plaster and paper. Rock wool insulation. Heating is by steam, oil burner; Taco hot water heater. Exterior of house is white; roof, gray; shutters, black.



FLOOR PLAN

OBART HOUSE OF STEEL PANEL CONSTRUCTION

ERAL VIEW



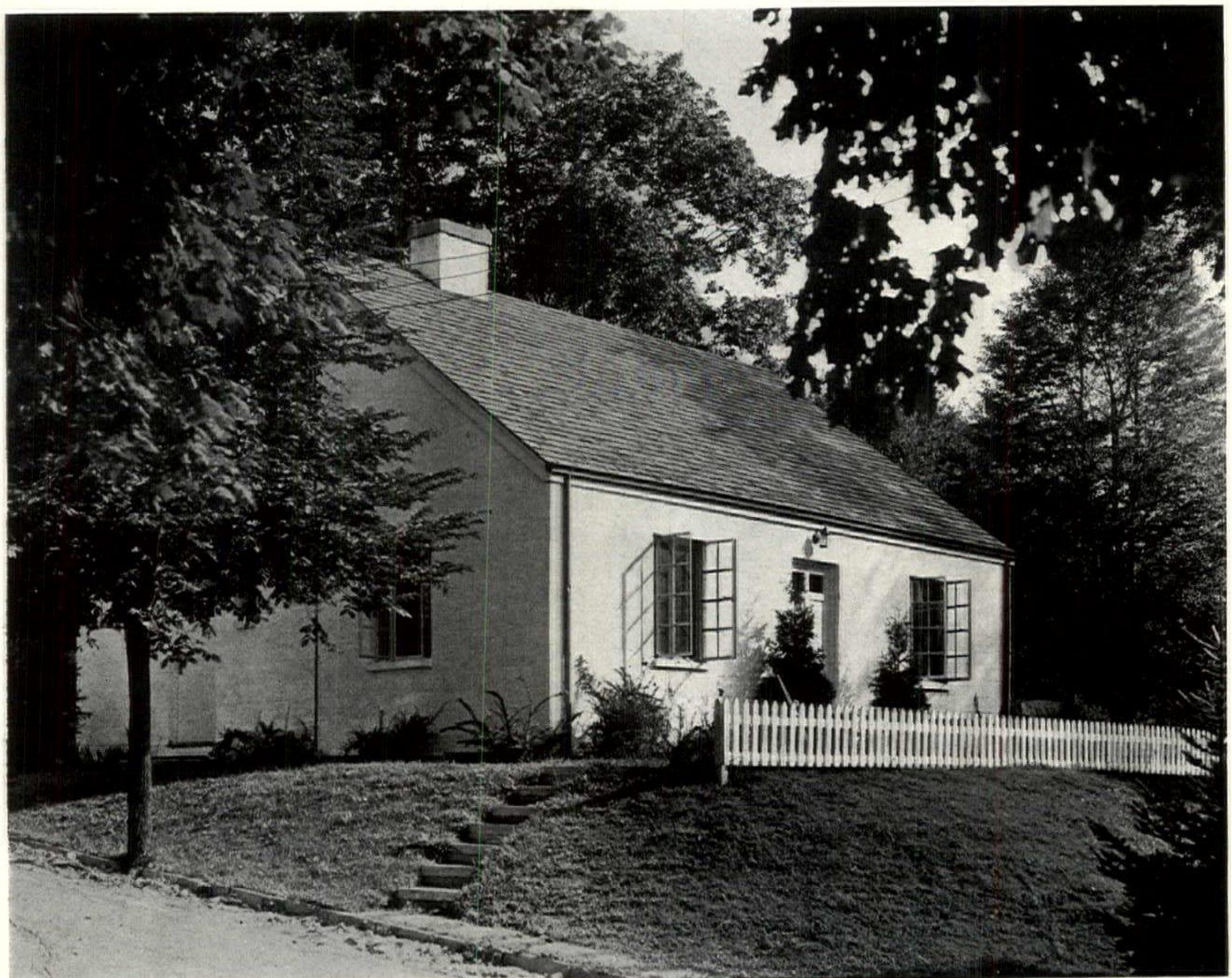
FLOOR PLAN

This house, developed by Hobart Brothers, manufacturers of Troy, Ohio, is of steel panel construction. Each wall unit consists of two 4′ x 9′ steel sheets welded together with a 4″ space between the sheets for insulation and strength. Angle girders are used in the wall units, spaced 1′ apart. Also on each wall panel assembly the top, bottom and sides are offset ¾″ to allow for slip-fit of the adjoining panel. #18-gauge sheet steel is used on the roof with ⅛″ x 1½″ x 2″ steel angles for reinforcing.

The house shown has concrete floors with "Ozite" felt carpeting cemented on carpet felt, direct to the concrete.

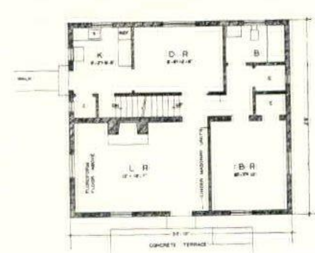
Quoted price: $3,500 to $4,000, including materials, foundations, heating, plumbing, wiring, painting, and erection.

HOUSE OF DORIS L. BURBANK BEDFORD HILLS, NEW YOR

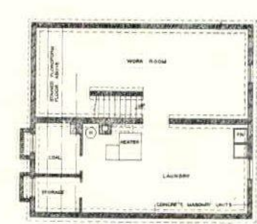


Photograph by John Gass

DESIGNED BY C. EVERETT BURBANK



GROUND FLOOR



BASEMENT

Construction Costs:

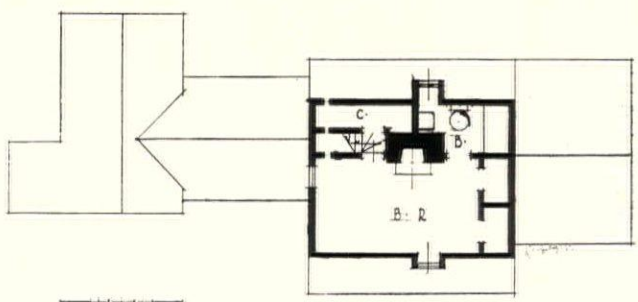
Cellar excavation	$ 86.80
Cellar footings	79.93
Cellar walls, stairs, partitions, and floor	443.72
First and second Floroform floors	603.87
Chimney and fireplace	48.85
Walls, partitions, stairs	788.36
Steel sash, screens, painting	216.13
Cleaning, pointing, painting	206.76
Roof	382.65
Gutters and leaders, copper	46.50
Doors, trim, hardware	188.67
Plumbing (brass)	379.07
Wiring and fixtures	175.20
Heating	353.70
Water connection	26.25
Septic tank and field	80.24
Electric range and wiring	100.90
Total cost	$4,207.60

IOUSE OF G. CASS LIGHTNER STAMFORD, CONNECTICUT

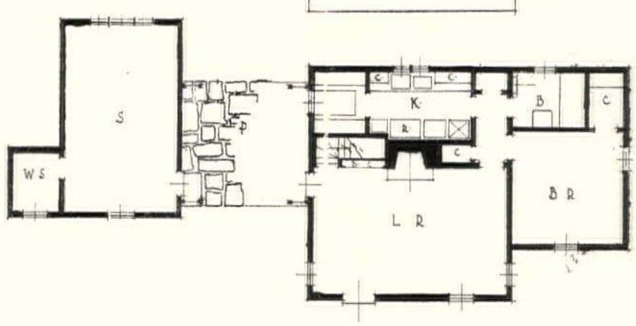
Photograph by Glasgow

COGGINS AND HEDLANDER
ARCHITECTS

SECOND FLOOR



FIRST FLOOR



:ost: $4,700, complete.

"THE AMSTERDAM" CHATHAM, NEW JERSE

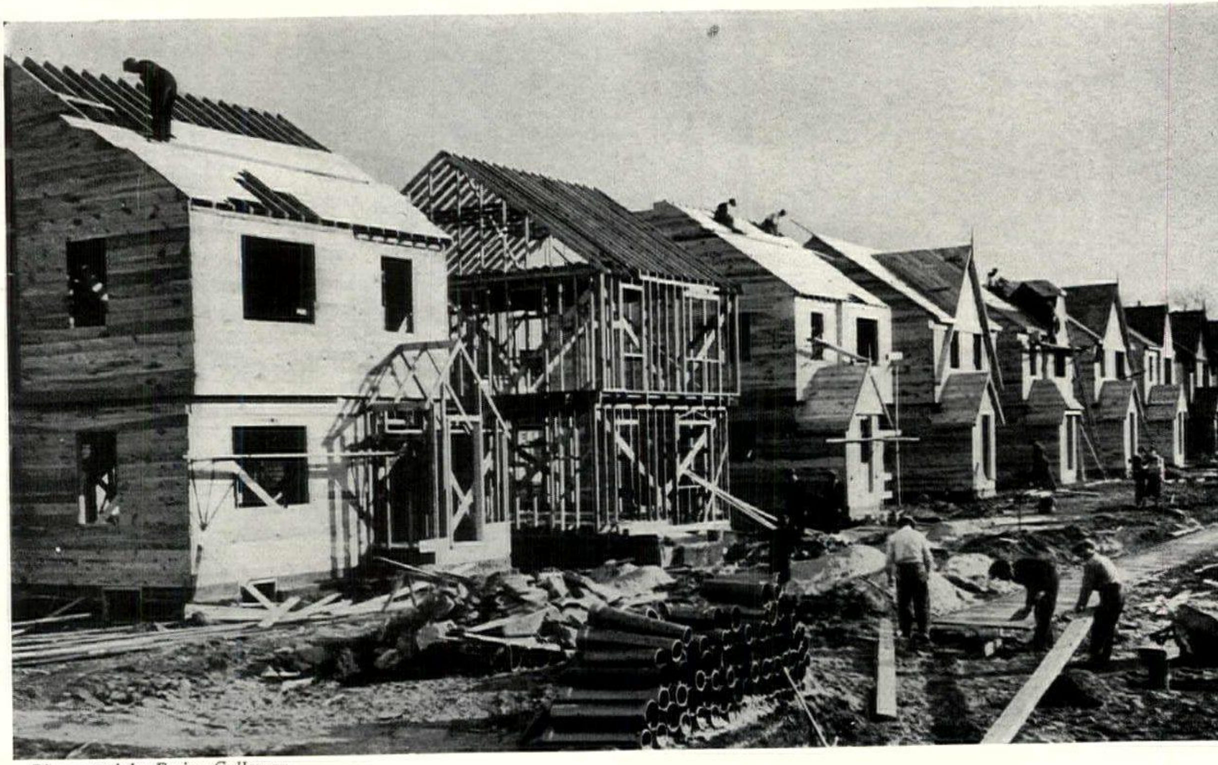
Photographs by Anderson

RANDOLPH EVANS, ARCHITECT

Concrete basement with concrete blocks in unexcavated portion. House frame is of wood with shingle facing; shingle roof. Interior walls are plastered; tile walls in bathrooms. Red oak floors; concrete floors in basement and garage. Insulation of Cabot's Quilt. There is an American Radiator boiler utilizing coal as fuel. Color scheme of the exterior: white walls, green roof and blinds. Double-hung sash of wood; screens, aluminum.

RANDOLPH EVANS, ARCHITECT

Foundations, poured concrete and concrete blocks in unexcavated portion. Walls are wood frame with siding as facing. Cabot's Quilt flexible blanket type insulation applied to second floor ceiling. Heating is by steam with ABC oil burner. Wiring, BX cable. Color scheme of exterior is as follows: white walls, gray roof, gray-blue blinds. Sash are double-hung and of wood; screens, aluminum.



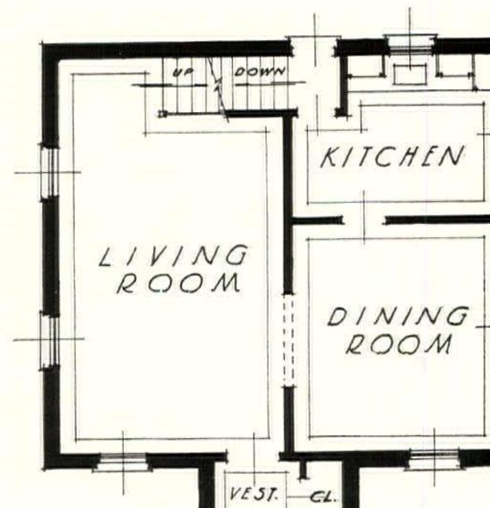
Photograph by Ewing Galloway

Two-Story, Six-Room Houses

Cost: $4,940, including land

An operative-built development on Long Island by Gross-Morton Corporation, builders of Bayside Hills; Arthur E. Allen, architect. A practical demonstration of the possibility of building and selling a house and plot (40′ x 100′) for an amount within the $5,000 limits of the study that appears in this issue.

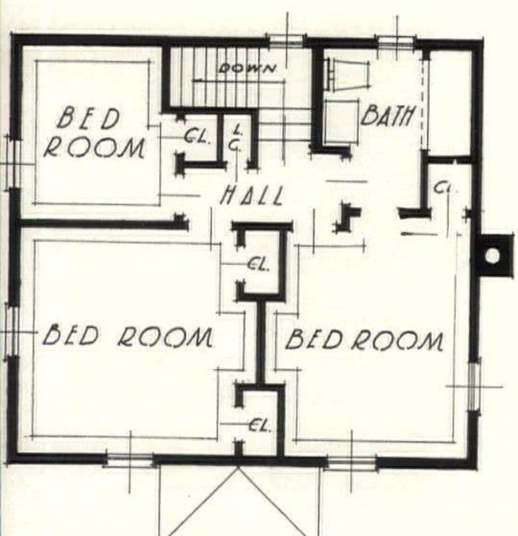
Specifications: Slate roof, inlaid linoleum in kitchen, enamel-faced, insulated gas range with table top, kitchen cabinets with baked Duco finish, welded-on-steel drainboard with stainless steel bindings, built-in ironing board, tile bathroom, chromium-plated plumbing fittings, built-in colored bathroom fixtures, shower, steel medicine cabinet, brass plumbing throughout, jacketed steam boiler, porcelain laundry tubs, three coats plaster, copper leaders and gutters, 12″ poured concrete foundation, double floors, 7/8″ oak throughout, metal weatherstripping on all windows, reinforced concrete streets in and paid for, cement sidewalks and curbs in and paid for, fire-stop construction, city sewers.



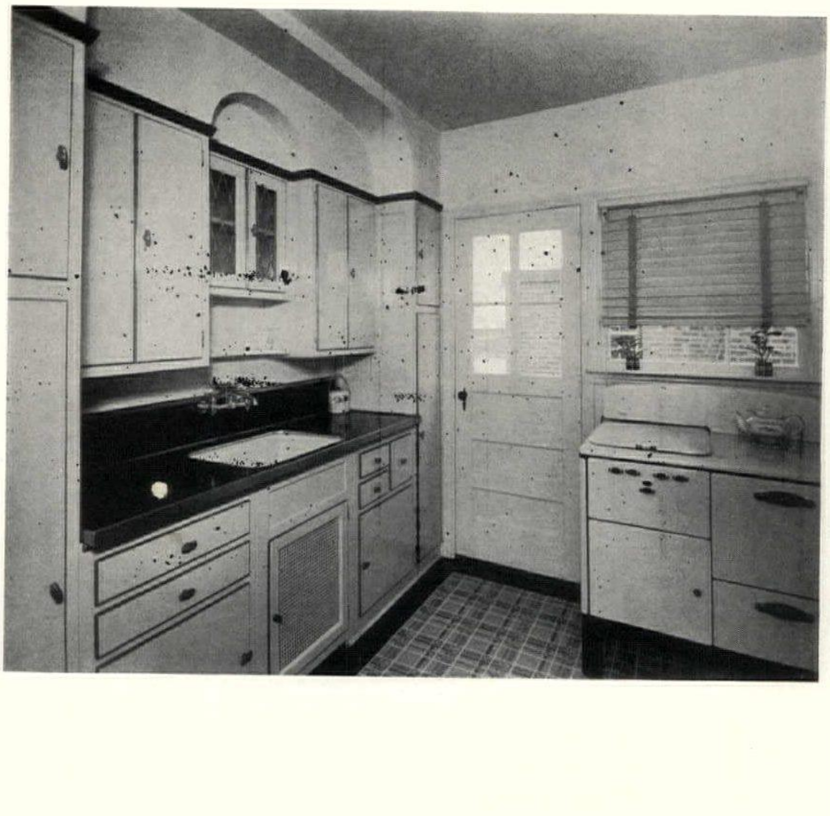
FIRST FLOO

Photographs by C. J. Dubrey

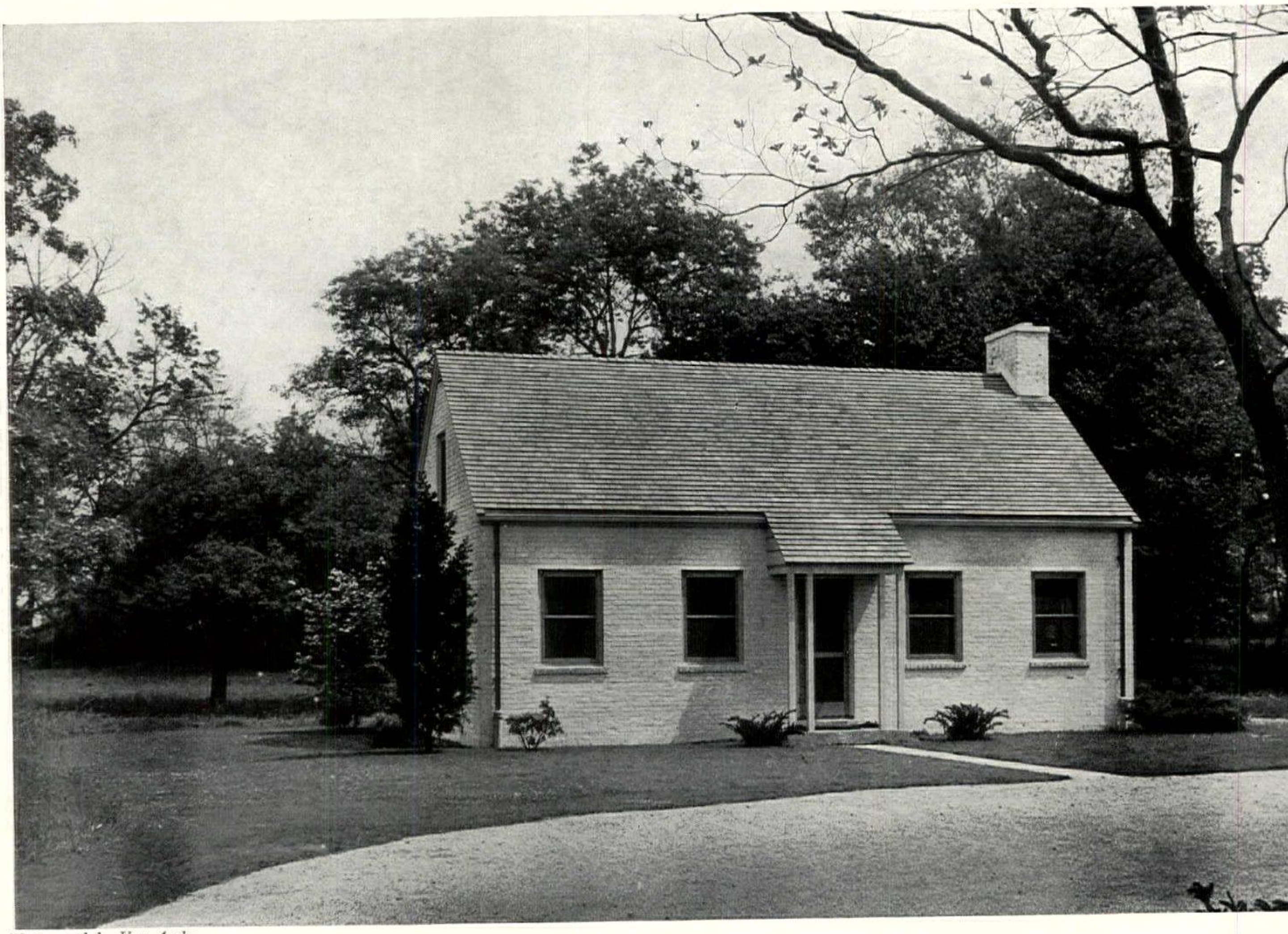
HOUSES WITH 40' x 100' PLOT PRICED AT $4,940.



VIEW OF TYPICAL KITCHEN



LOCKWOOD DeFOREST GUEST HOUSE

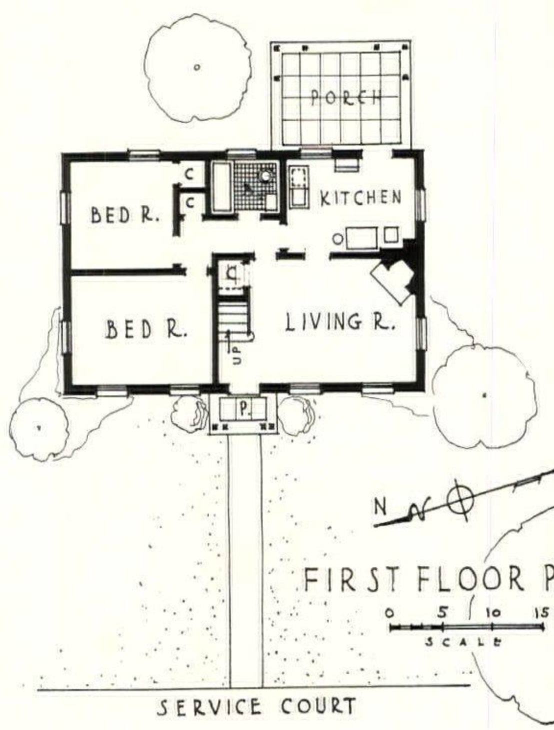


Photograph by Van Anda

COLD SPRING HARBOR, LONG ISLAND, N

W. STUART THOMPSON, ARCHITECT

A small house built at $29\frac{1}{2}$¢ per cu. ft.
Materials and construction: Concrete foundations; brick veneer exterior walls; wood floor and roof construction; wood shingle roof; oak floors (linoleum in kitchen, tile in bathroom); plaster walls.

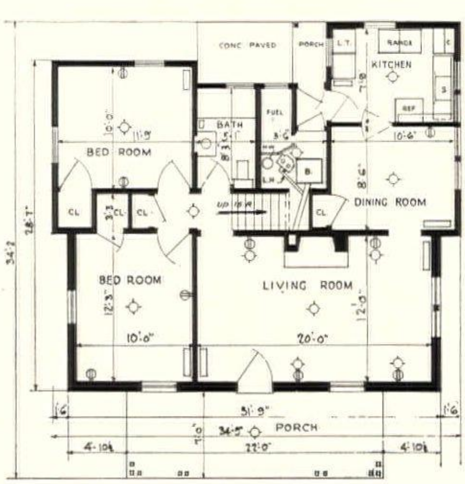


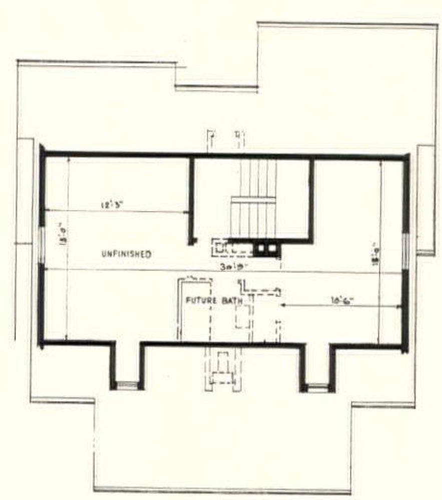
HOUSE FOR MR. & MRS. F. J. PLATT HYBLA VALLEY FARMS, VIRGINIA

tograph by F. S. Lincoln

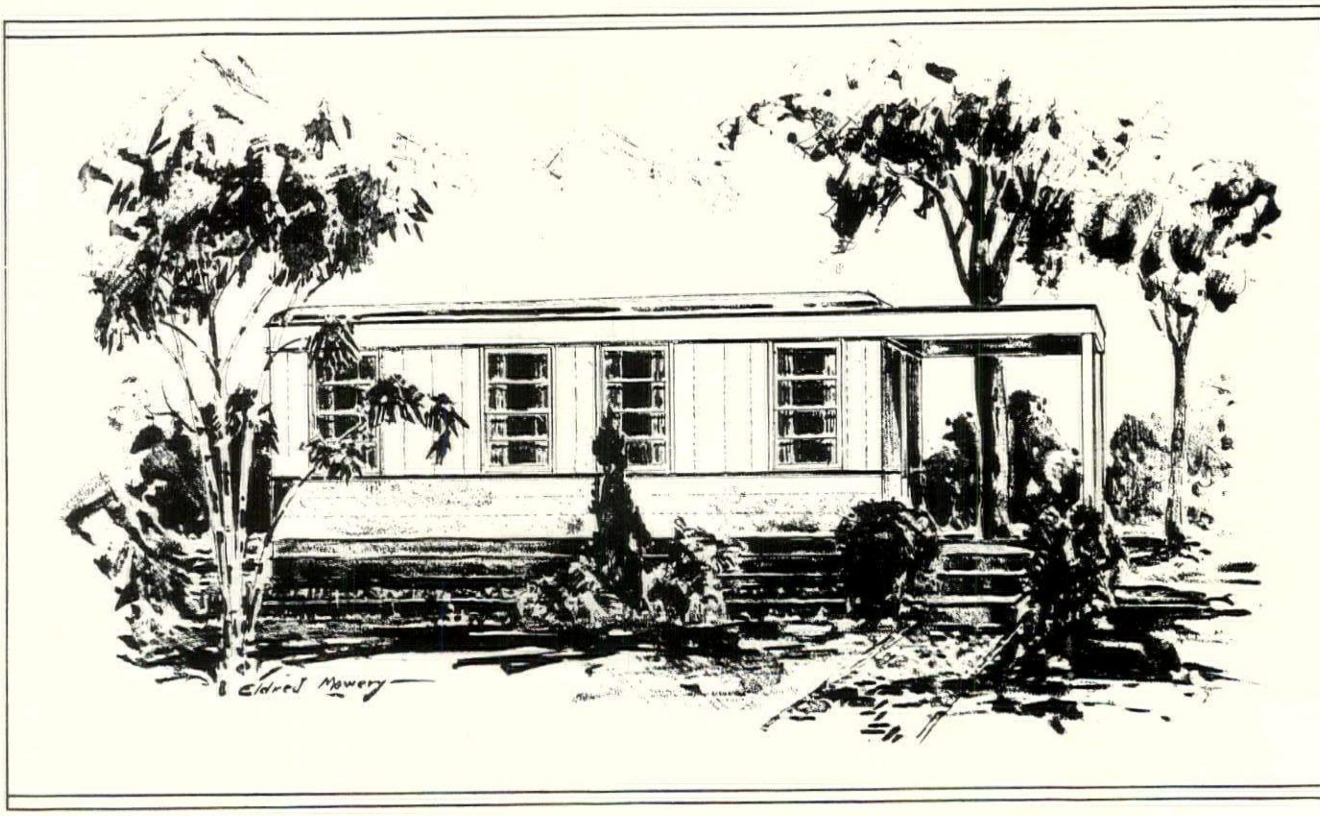
This house indicates the possibility of home construction under the FHA. The house is of brick-veneer construction, with unfinished attic space convertible into two extra bedrooms and bath. A sales price of $5,500 includes improved lot and all mechanical equipment—furnace, hot water heater, electric range and refrigerator, sewage disposal system, drilled well with electric pump. Contractor's allowance and sales-promotional expense are included in sales price.

ROLL F. MORRISON,
CONSULTING ENGINEER



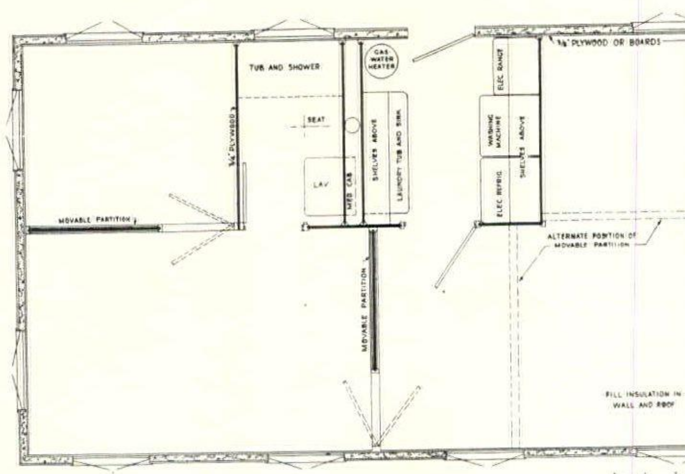


NATIONAL LUMBER MANUFACTURERS' ASSOCIATION

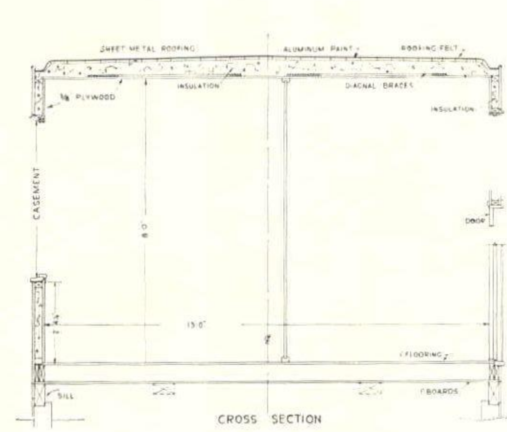


PORTABLE HOUSE: PLAN NO. 5

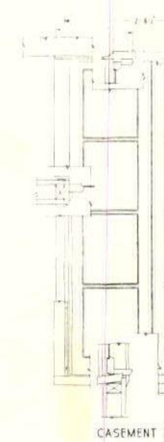
(Copyrighted)



FLOOR PLAN



CROSS SECTION



CASEMENT DE

An interesting partly prefabricated house of lumber products designed to accommodate two adults and one child. The size is such that it may be moved on a truck.

Construction: Foundations: two longitudinal stringers resting on concrete piers. Exterior walls: prefabricated units, board exterior, plywood interior finish, insulated core. Floors: hardwood in living and bedrooms, linoleum in kitchen and bathroom. Roof: sheet metal finish, insulated core. Porches are detachable. Cost, estimated for Washington, D. C., $1,240; with electric range, washing machine and refrigerator, screens, flagged walk, landscaping, $1,600.

VOL · 79 NUMBER 3

1 9 3 3 6

M A R C H

T H E

ARCHITECTURAL RECORD

EXHIBITION OF THE ARCHITECTURAL LEAGUE OF NEW YORK

FEBRUARY 18 TO 29

By Edgar I. Williams

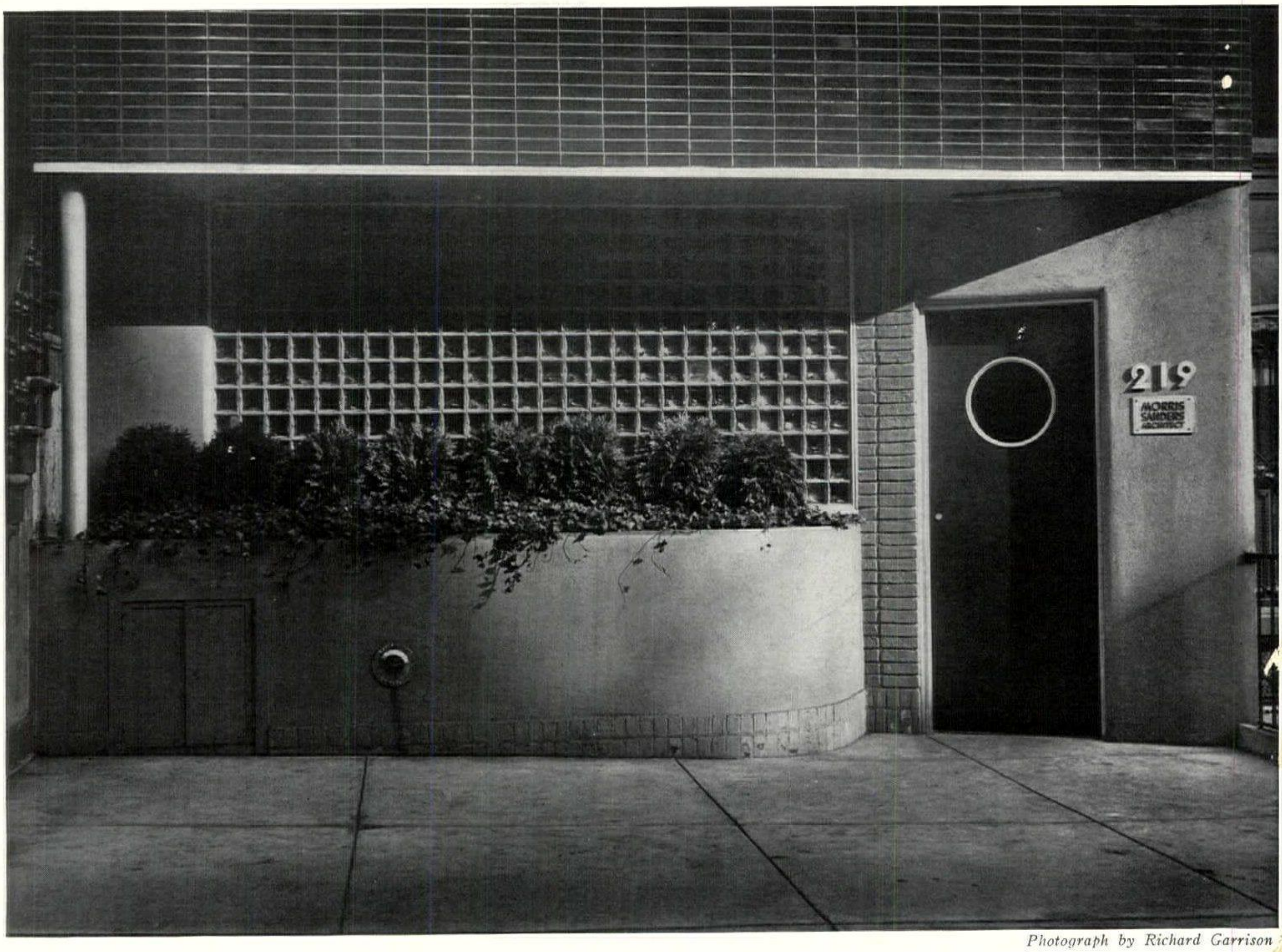
In 1886 a group of architects initiated the first architectural exhibition in New York. This event was the starting point of the existing Architectural League, which is an organization of architects, painters, sculptors, landscape architects, and craftsmen.

Since 1886 an annual exhibition of architecture and the allied arts has become a traditional event of the League.

The exhibitions show current work done not only by League members but by practitioners from all parts of the United States and elsewhere. Some exhibitions have been of a distinctly international character. Attempts have been made at times to portray a trend of design by the selection of exhibits to tell a certain story. In one or two recent exhibitions the galleries themselves were arranged to create a harmonious and interesting spectacle and the exhibits were culled and so selected as to best fit into the composition of the galleries.

While an orderly arrangement of the galleries is essential, the presentation of the exhibits themselves was the principal objective of this year's show. An attempt has been made to separate the various branches of the arts in the interest of clarity, thus avoiding as much as possible the juxtaposition of features of violent difference in scale, such as a large piece of sculpture and an object of fine metal craftsmanship.

Collaboration of all the arts revolving about architecture being the base of the League's activity, an invitation was extended to the recently formed American Institute of Decora-



Photograph by Richard Garrison

OFFICE AND APARTMENT OF MORRIS B. SANDERS, NEW YORK CITY

MORRIS B. SANDERS, ARCHITECT

AWARDED SILVER MEDAL IN DOMESTIC ARCHITECTURE

tors to join with the League in this, the Fiftieth Exhibition. The South Gallery was put at the disposal of the Institute of Decorators. As a compliment to the League's half century of endeavor, one room of the period of 1886 and one illustrating the standard of design of 1936 were set up. The spaces surrounding these rooms were hung with photographs and drawings of work of the Institute members. A number of models of rooms also help to illustrate recent achievements of members of the Institute.

As the League is a private club, it was deemed unfair to try to use the submissions to tell any particular story of stylistic expression. The only criterion of judgment by the various committees was excellence in achievement of the exhibitors' aims. Because of lack of space, far less than half of the exhibits submitted were accepted.

Apropos the matter of stylistic expression, of the architectural exhibits particularly, the Committee on Architecture made special efforts to obtain work in the so-called modern style. This was done with a view to presenting a fair comparison of these works with those of accepted styles. Certain works of the 1886 period were gathered from old publications to illustrate the changes that have come about in fifty years. It was thought that these exhibits would lend spice to the show.

Participation of the Federal Government and

Photograph by Robert MacLean Glasgow

HOUSE OF MARGARET OWEN
BEDFORD FOUR CORNERS, NEW YORK

VERNA COOK SALOMONSKY,
ARCHITECT

Photograph by Drix Duryea, Inc.

HOUSE OF MRS. F. B. LEFFERTS
WILTON, CONNECTICUT

EVANS, MOORE AND WOODBRIDGE,
ARCHITECTS

Photograph by Gerecke

MIAMI AIRPORT, MIAMI, FLORIDA
DELANO & ALDRICH, ARCHITECTS

Municipal Governments in the practice of architecture is a characteristic of our immediate time. This is not new but its scope and proportion are new. It was thought that the results of this activity would not only date the 1936 Exhibition but should be presented to the New York public.

In view of the forthcoming 1937 Paris Exposition and the New York one of 1939, it was thought that an exhibit of the French project would be stimulating to us. Such an exhibit was sent by the French authorities.

No especial deviation from the usual rule of selecting the best available material characterized the display of landscape architecture, painting, sculpture, and craftsmanship.

Criticism of the exhibition and of the individual exhibits is anyone's business. The Exhibition Committee has done its best to present a picture of reality without prejudice. My own comment, as Chairman of the Exhibition Committee, is that while a sober good taste is generally exhibited, particularly in comparison to the 1886 exhibits, there is a lack of freshness and conviction in the works shown. Whether one is a right or a left winger, I think there is one point upon which even these warring factions will agree, i. e., that character, which comes of sincerity and which must have invention, is essential to the progress of art. This is, to a large extent, disappointingly lacking in the 1936 exhibition.

PORTFOLIO

RAILROAD STATION, VALLEY STREAM, LONG ISLAND. EDGAR I. WILLIAMS, ARCHITECT.

UNIVERSAL HOUSE, LONDON, ENGLAND. JOSEPH EMBERTON, ARCHITECT.

UNITY HOUSE, FOREST PARK, PENNSYLVANIA. WILLIAM LESCAZE, ARCHITECT.

HALL OF RECORDS, ANNAPOLIS, MARYLAND. LAURENCE H. FOWLER, ARCHITECT.

TENNIS SHELTER BUILT FOR SHERMAN PRATT. JOHN WALTER WOOD, ARCHITECT.

MARKET STREET STATION, NEWARK, NEW JERSEY. McKIM, MEAD & WHITE, ARCHITECTS.

BOY SCOUT THEATER INTERIOR, FOREST OF SPALA.

BATHING CENTER AND WEEK-END RESORT AT INGIERSTRAND, OSLO, NORWAY. EYVIND MOESTUE AND OLE LIND SCHISTAD, ARCHITECTS.

DOUBLEDAY DORAN BOOKSHOP, CHICAGO, ILLINOIS. DESIGNED BY MORRIS LAPIDUS, ARCHITECT FOR ROSS-FRANKEL, INC.

REMODELED HOUSE OF MARY SACHS, HARRISBURG, PENNSYLVANIA. ELEANOR LEMAIRE, INTERIOR ARCHITECT.

CENTRAL HEATING PLANT, WASHINGTON, D. C. UNITED ENGINEERS AND CONTRACTORS, ARCHITECTS AND ENGINEERS; PAUL P. CRET, CONSULTING ARCHITECT.

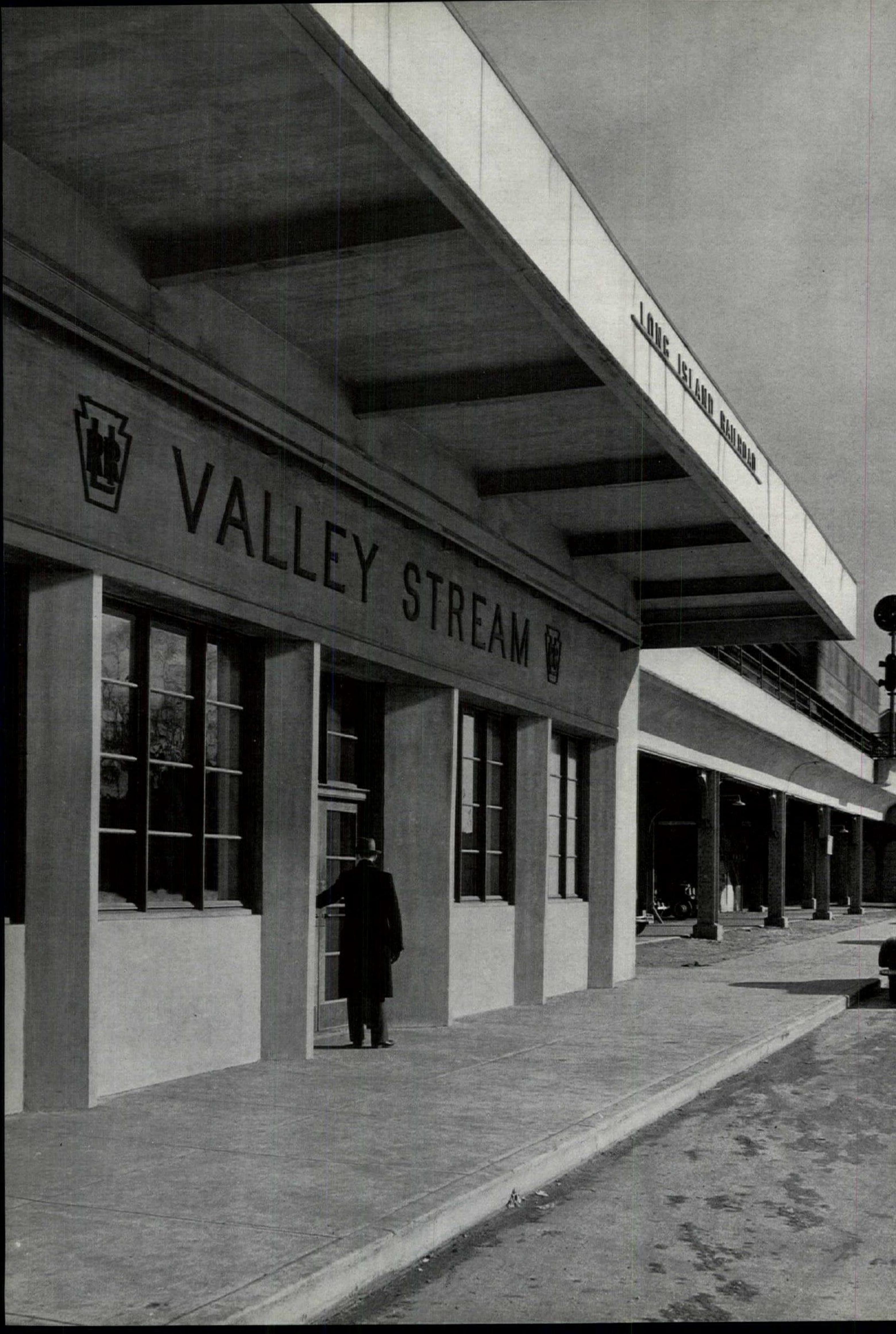
THE HARRIS BUILDING AND LOAN BUILDING, HARRISBURG, PENNSYLVANIA. EDMUND GEORGE GOOD, JR., ARCHITECT.

THE SOUTHEASTERN OPTICAL BUILDING, RICHMOND, VIRGINIA. LEE, BALLOU & VANDERVOORT, INC., ARCHITECTS.

CAFE LARUE, NEW YORK CITY. SCOTT AND TEEGEN, ARCHITECTS.

MINNEAPOLIS ARMORY BUILDING, MINNEAPOLIS, MINNESOTA. MAJOR P. C. BETTENBURG, ARCHITECT; WALTER H. WHEELER, CONSULTING ARCHITECT AND ENGINEER.

SPECIAL BUILDING TYPES


VALLEY STREAM
LONG ISLAND RAILROAD

Photographs by Gottscho

RAILROAD STATION, VALLEY STREAM, LONG ISLAND

EDGAR I. WILLIAMS
ARCHITECT

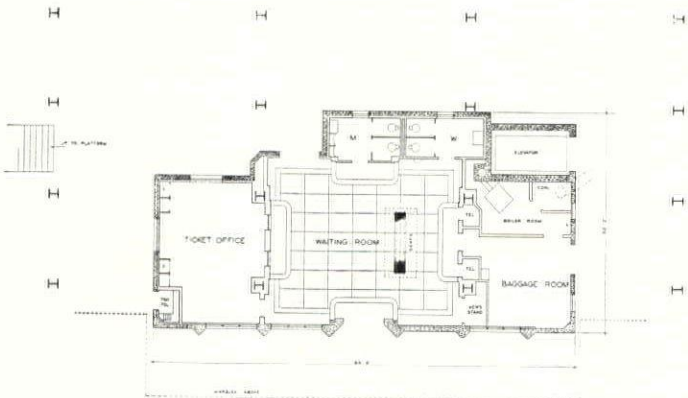
The problem was to relate a station architecturally to the raised track of the Long Island Railroad. Another feature was to keep it free from the track structure so as to avoid vibration. The building is of reinforced concrete to conform with the track structure. It will have the same constant attention that the rail roadway receives. The exterior has natural concrete color — portland cement and Cow Bay sand; the interior is a slightly blue tinted oil emulsion base finish above a bright blue tile wainscot.

Photograph by Gottscho

RAILROAD STATION, VALLEY STREAM, LONG ISLAND

EDGAR I. WILLIAMS

ARCHITECT

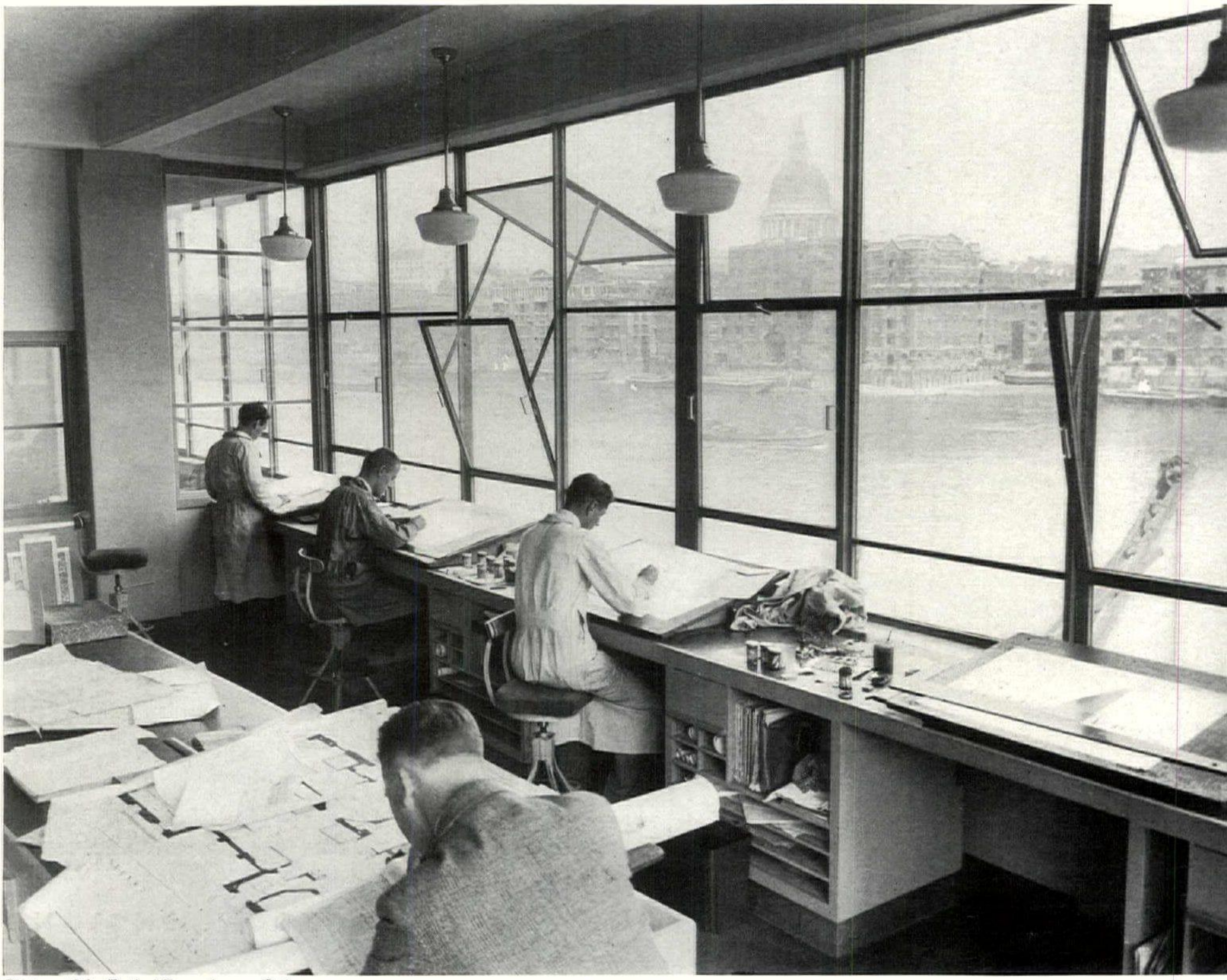


Photograph by A. Percival & Co.

UNIVERSAL HOUSE — LONDON, ENGLAND

JOSEPH EMBERTON
ARCHITECT

The firm of Beck & Pollitzer, Ltd., wharfingers, occupies only a part of this building; the remaining store and loft space is rented to individuals who require a river location. This building replaces an old two-story warehouse and is constructed with strict regard for economy. The building frame is steel, having outer walls cantilevered so as to remove the pile foundations as far as possible from the adjoining bridge footings. The exterior face of the building is of glass (Vitrolite) applied to concrete which, in turn, is lined with cork for insulation. The selection of glass for wall facing was due to the proximity of a railway station and to the dirty atmosphere of the neighborhood. There are continuous windows so as to supply maximum daylighting. Some of these open and are of hospital type.


Photograph by Topical Press Agency, Ltd.

UNIVERSAL HOUSE **LONDON, ENGLAND**

JOSEPH EMBERTON
ARCHITECT

Drafting room overlooking the Thames. Large continuous windows were adopted so as to give maximum daylighting. Alternate windows operate so as to give ventilation without drafts. The building construction is of steel frame and concrete. Outer walls are of concrete, backed with cork, and faced with Vitrolite. This glass surface is self-cleaning. Floors are of hollow tile.

hotograph by A. Percival & Co.

STAIRWAY FROM LOBBY

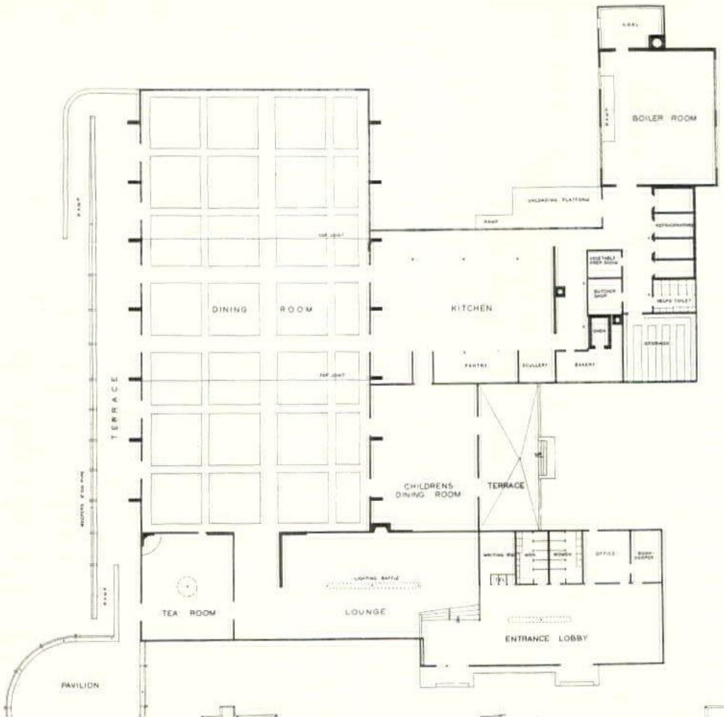
UNIVERSAL HOUSE, LONDON, ENGLAND

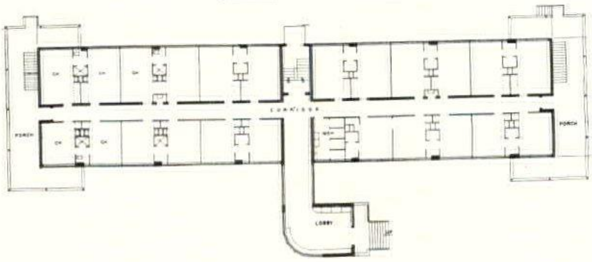
UNITY HOUSE

FOREST PARK, PENNSYLVANIA

WILLIAM LESCAZE
ARCHITECT

Unity House is the summer camp of the International Ladies' Garment Workers Union. Begun as a vacation camp in the Catskills for New York Local Union No. 25, the present site was acquired in 1919. Located in the heart of the Pocono Mountains, the tract consists of 750 acres of wooded land, together with a two-mile lake. The tract had on it an old resort hotel which, in 1920, was rebuilt to convert the buildings to convenient vacation usage. The capacity was then 300 persons. The increasing popularity of the resort led to need of increased facilities. William Lescaze, architect, was engaged to work out plans for expansion to accommodate 1,000 persons. The buildings shown are the first to be completed under the new plan.



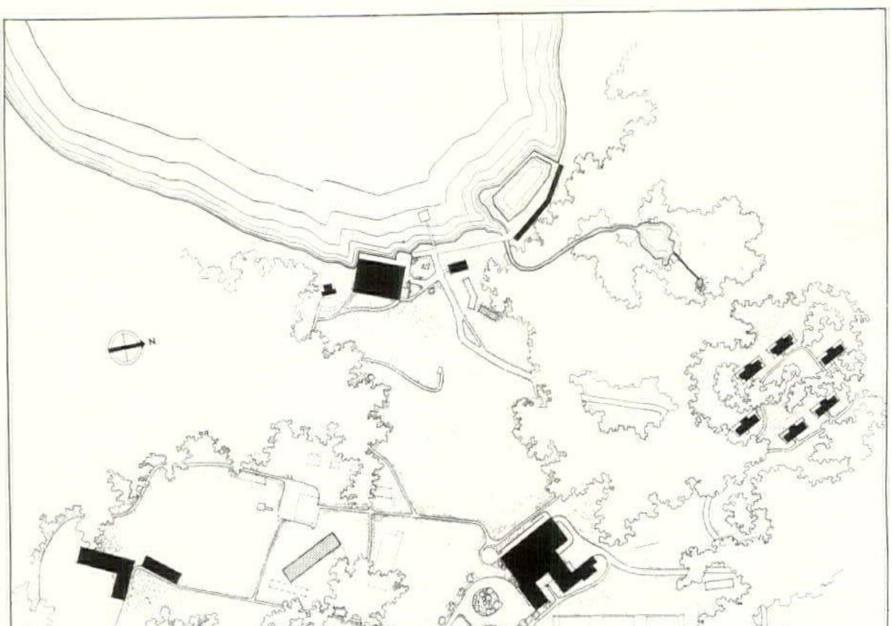


UNITY HOUSE

FOREST PARK, PENNSYLVANIA

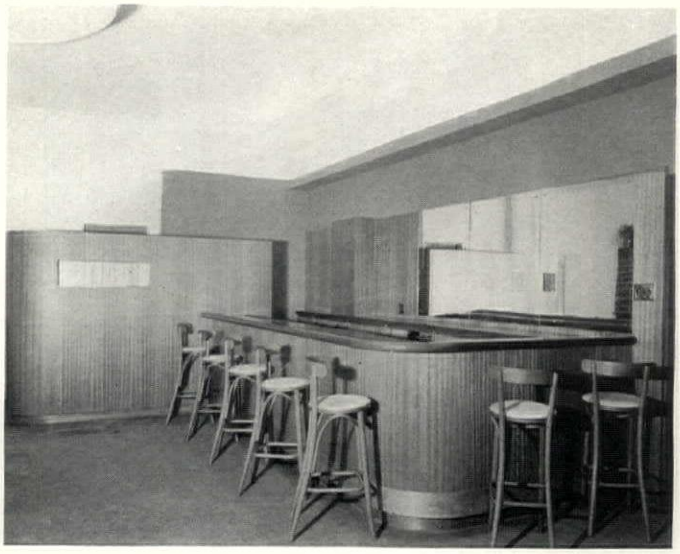
Main Building: Correct analysis of function resulted in correct plan; notice location and interrelation of tea room, main dining room, and children's dining room. Similar separation of lobby and lounge confines arriving and departing guests, and transaction of business, to lobby space, leaving lounge free from such interruption.

Dormitory: First unit of series of six. The lobby has again been isolated from rest of structure.

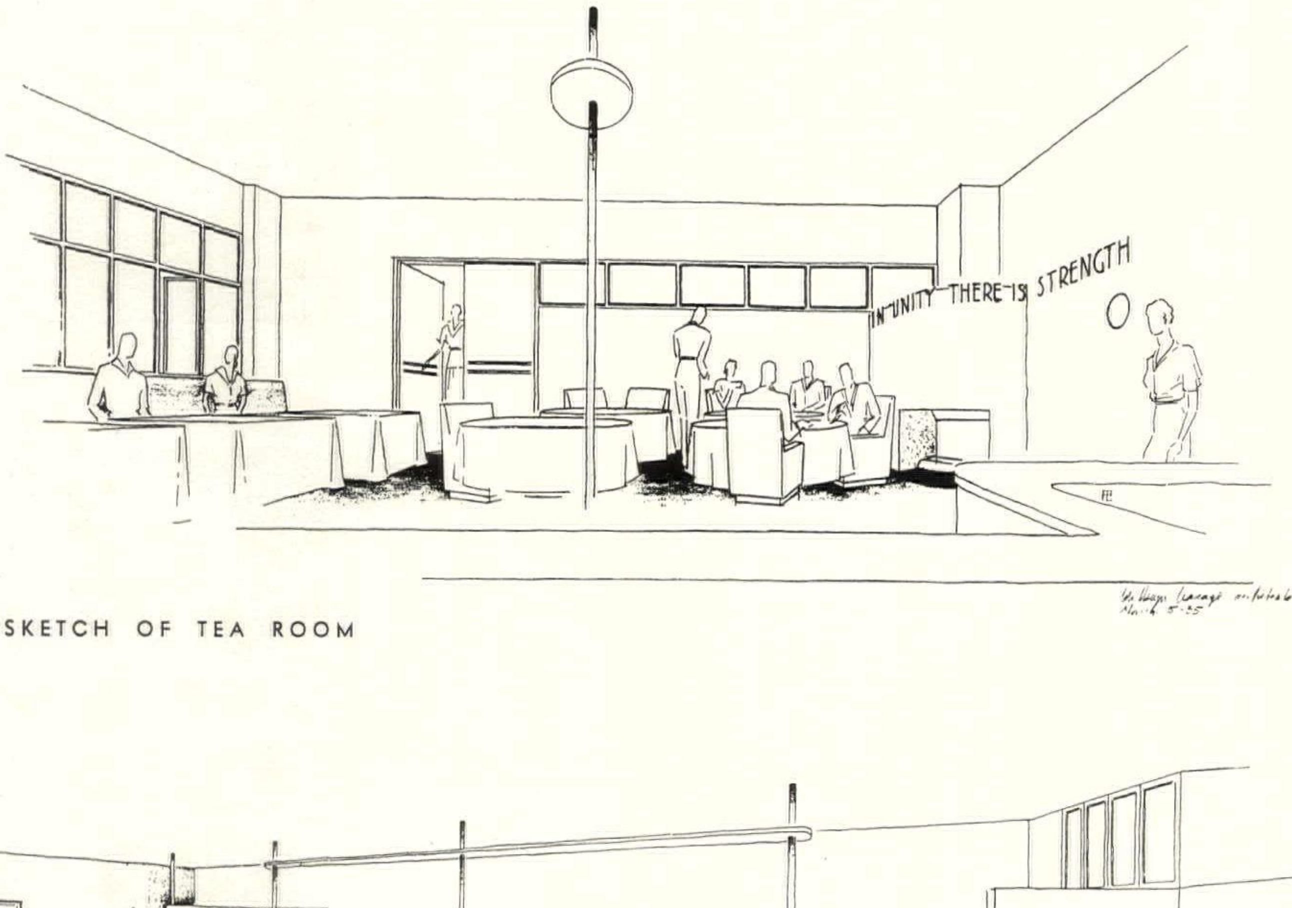


Plot Plan: Structures in solid block to remain in finished development; gray indicates structures planned, dotted lines those to be wrecked. The new buildings are all oriented to take full advantage of view and exposure. The resort has two handball courts, nine tennis courts, two basketball courts. Water sports of all types are provided for in the large lake on the premises.

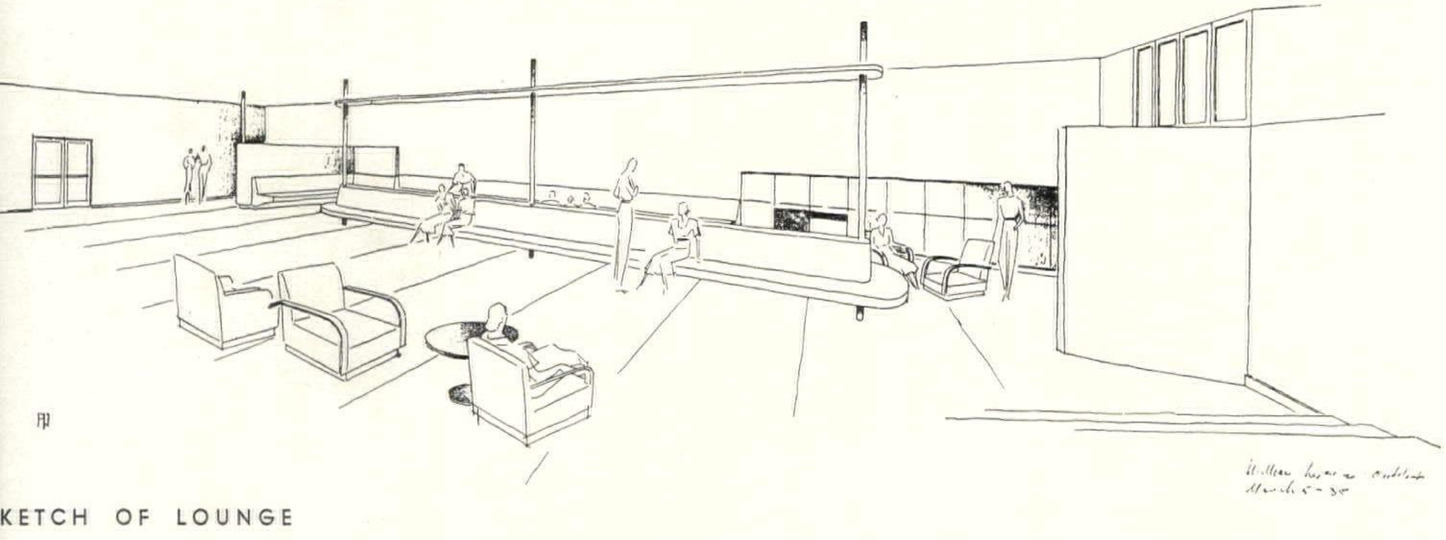
The interiors at Unity House reflect the general character of the development — spacious, informal, comfortable. Shown here are the bar, tea room, and lounge; located in the main building, they are designed to accommodate the large crowds that gather in this building which is the social center of the development.



THE BAR



SKETCH OF TEA ROOM



KETCH OF LOUNGE

UNITY HOUSE

FOREST PARK, PENNSYLVANIA

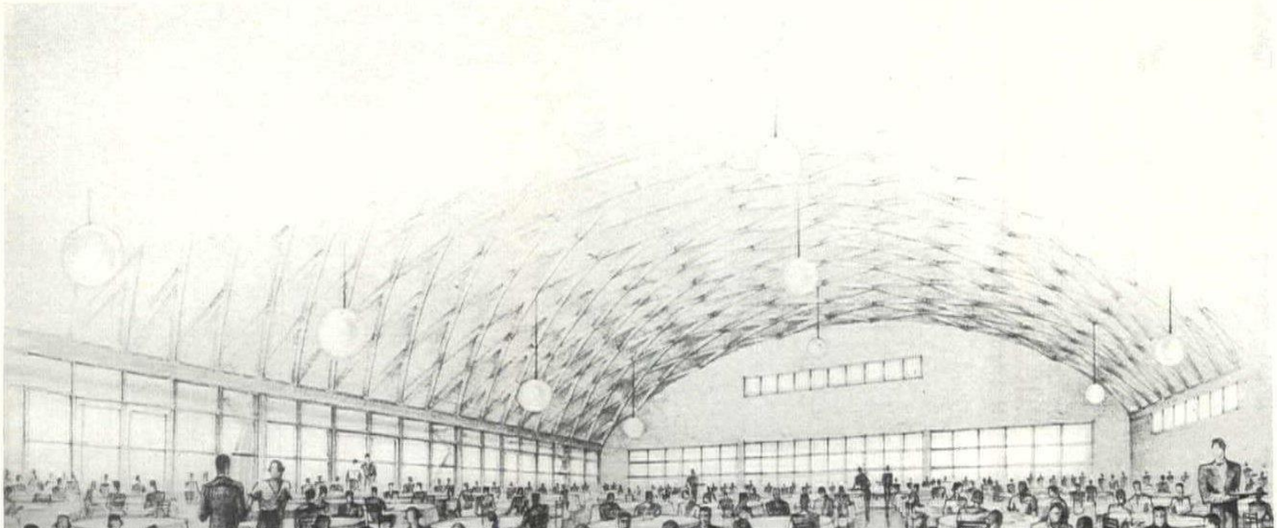
A large membership demands various types of accommodation: both dormitory and cottages are used in the new plan. The new dormitory, shown on this and opposite pages, is the first of a contemplated series. Of semi-fireproof construction with a large glass area, the new building is interesting for the disposition of lobby space. Being literally a dormitory—i.e., rooms, baths, and necessary corridors—a small lobby space was required. By detaching it, the architect succeeded in isolating it from the dormitory proper; disturbance is thereby minimized and the small size discourages lounging.

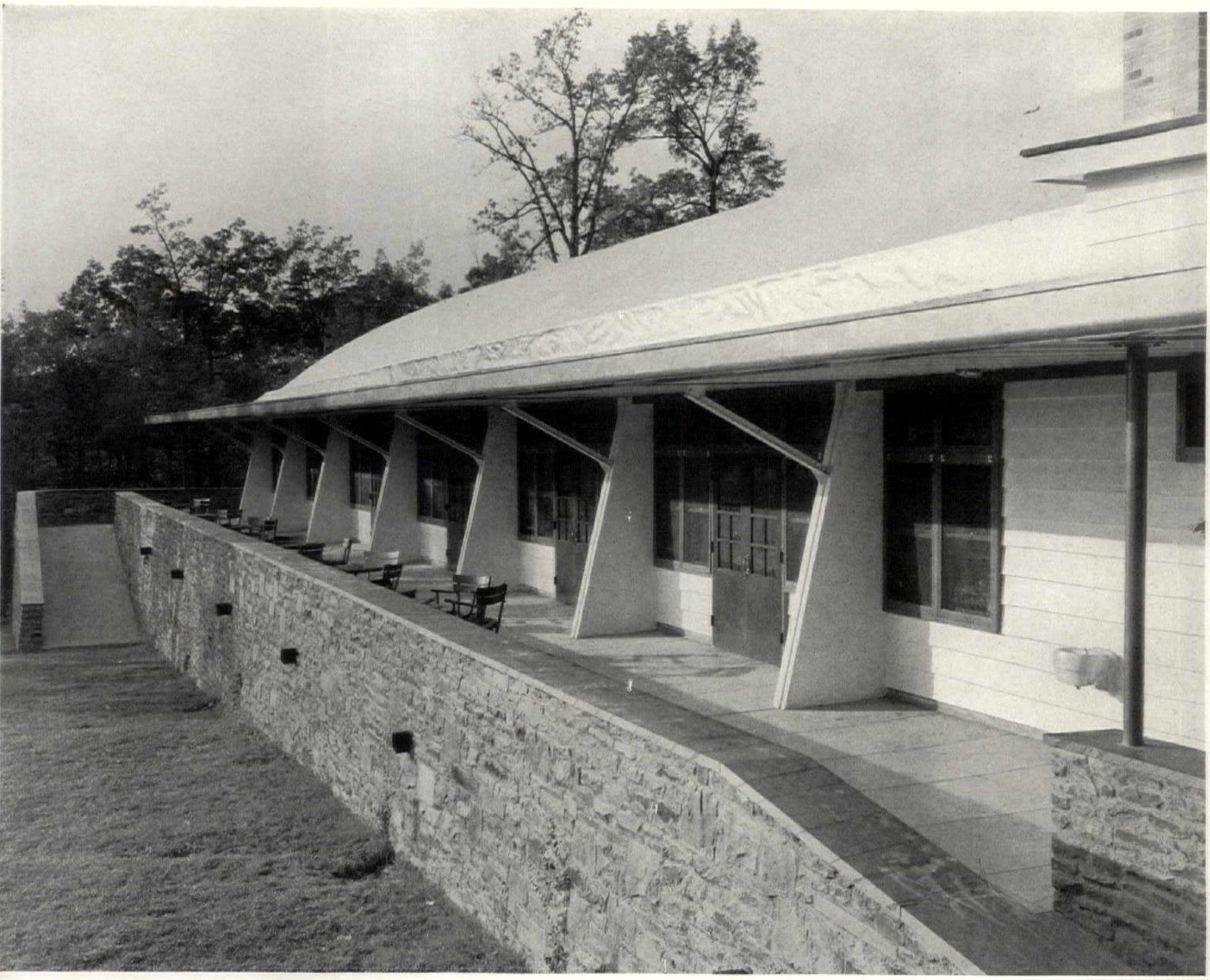
WILLIAM LESCAZE, ARCHITECT

The new buildings are notable for freedom from conventional style and use of various simple materials—the main building of frame and field-stone, the dormitory of brick, the cottages of frame.

MAIN BUILDING, UNITY HOUSE

FOREST PARK



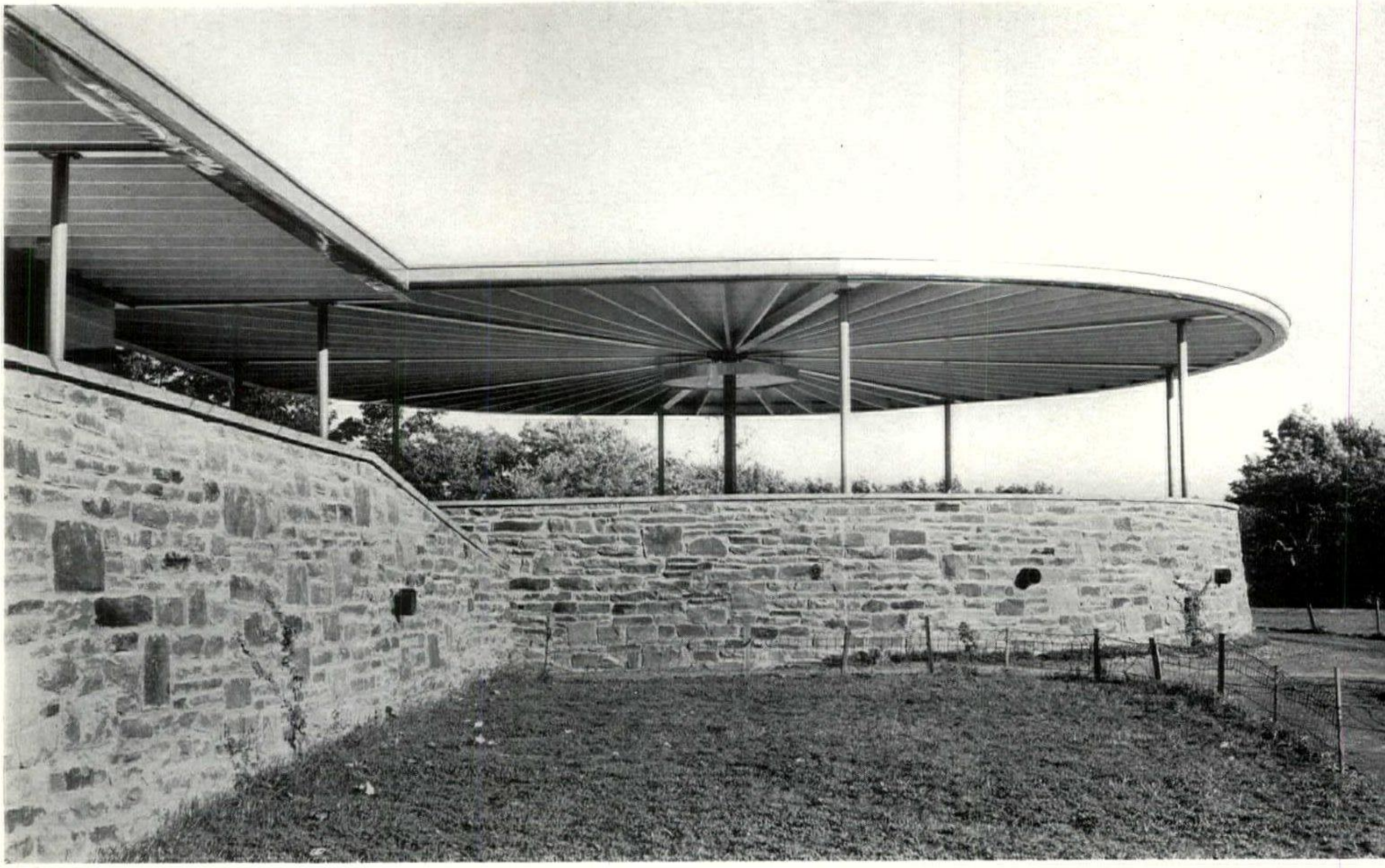


PENNSYLVANIA WILLIAM LESCAZE, ARCHITECT

WILLIAM LESCAZE

ARCHITECT

The Main Building is designed to serve as the focus of all social activities. Of particular interest is the construction of the main dining room (see opposite page) which, opening onto the long terrace, serves for large parties, dances, and so on.



TWO VIEWS

PAVILION, MAIN BUILDING

UNITY HOUSE FOREST PARK, PENNSYLVANIA

WILLIAM LESCAZE
ARCHITECT

One of six cottages erected for married couples. Of these six, four are six-room and two are eight-room cottages. Rooms or suites of rooms have private entranceways to porches.

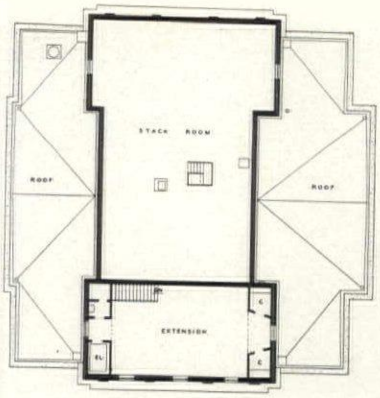
HALL OF RECORDS

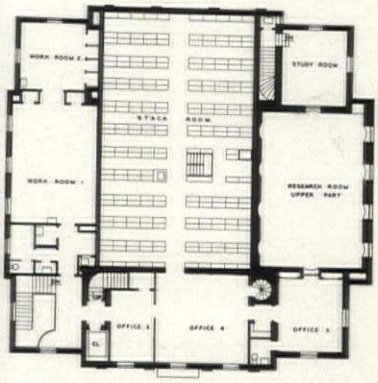
ANNAPOLIS, MARYLANI

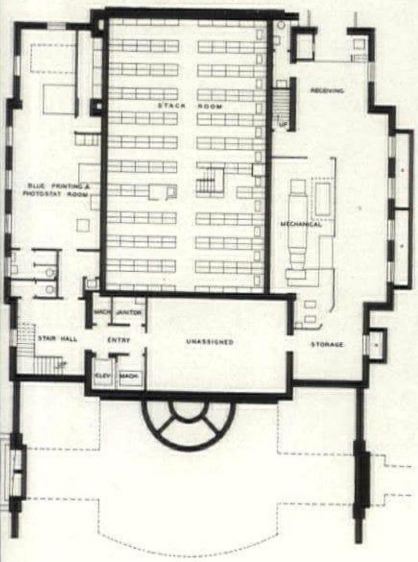
LAURENCE H. FOWLER
ARCHITECT

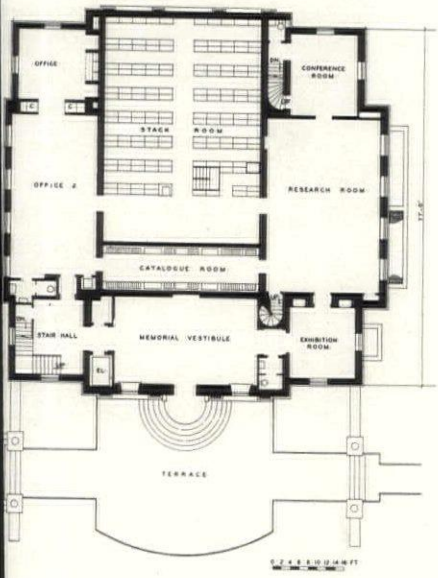
The Hall of Records at Annapolis was erected by the State of Maryland to commemorate th three hundredth anniversary of the founding of the province. Two hundred thousand dollars ha been appropriated by the legislature for the construction and equipment of a building to hous and make available for research, all surviving documents pertaining to the history of the stat and a site had been provided at the southwest end of the campus of St. John's College.

This site, by its very nature, offered a number of problems. The campus, a tree-shaded gre measuring 250′ x 800′, is bordered on one of its long sides by a street—College Avenue—and o the other by a row of five brick buildings dating roughly from the middle of the 18th century t the middle of the 19th, the central building (the oldest and largest) having a hip roof crowne by a cupola. At right angles to this row, closing one end of the college campus, stands th dignified little college library, designed in the Georgian manner by T. Henry Randall thirty-fiv years ago. The site designated for the Hall of Records, at the other end of the college campu naturally called for a structure somewhat similar in size and position, to take its place as one o the college group and, indeed, a condition actually attached to the use of the site required tha the building to be erected there should have its principal façade and entrance facing the campu While the sloping grade of the site made this condition somewhat troublesome, a greater difficul was caused by the fact that the building, being for state rather than for college use, had to b readily accessible to the general public. Therefore the main approach, a brick walk, had to com from College Avenue at the side, instead of from the campus in front. However, greatest of a









the problems presented by the site was that of size. The minimum requirements for the Hall of Records called for a building having a cubic content considerably greater than that of any other building on the campus. It became necessary, therefore, to arrive at some design which should be large enough to meet these minimum requirements, while still appearing small enough to take its proper place among the other less extensive buildings of the group. In its final form, the mass of the structure was largely determined by the necessity for it to appear as small as possible; it was therefore given a flat roof, in this respect following an English rather than the American precedent.

The construction is fireproof: brick bearing walls, steel girders, and reinforced concrete floor and roof slabs. The specially hand-made face brick—a reproduction in size, color and texture of the Annapolis Colonial brick—is laid, with tight joints, in Flemish bond. The steps, and the coping and finials of the terrace walls, are of white marble. The cornices, window frames and sash, and the entrance door are of wood, while parts particularly subject to deterioration, such as copings, window sills, and the capitals and bases of the pilasters, are of limestone; but wood and limestone alike are finished to give a uniform white painted surface.

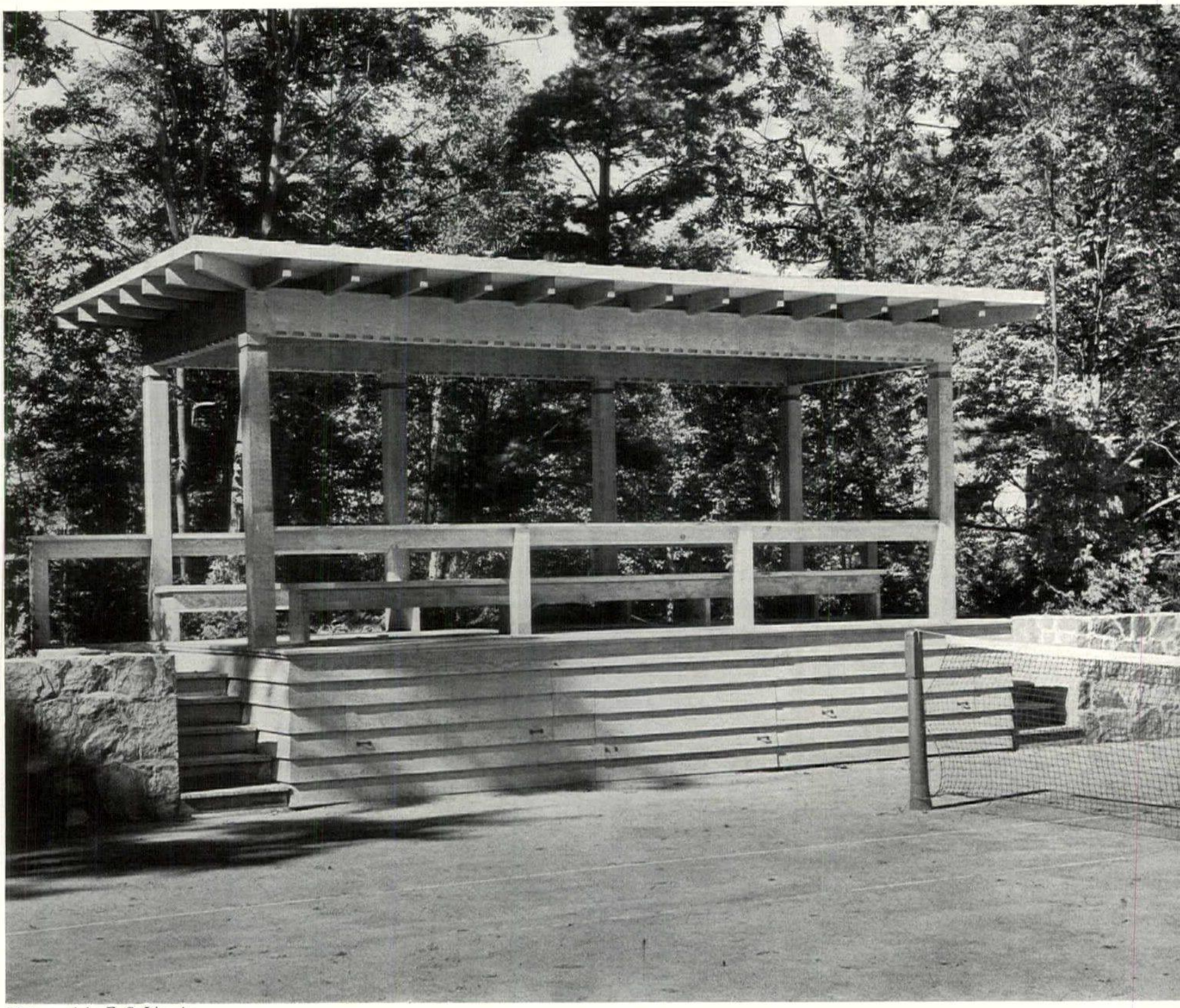
Exclusive of professional fees, the building cost 60 cents a cubic foot. This includes furniture and all equipment except the apparatus for photographic reproduction.

ALL OF RECORDS

NNAPOLIS, MARYLAND

LAURENCE H. FOWLER
ARCHITECT

pposite: Research room.
ight: Room for extension work.
elow: Memorial vestibule.

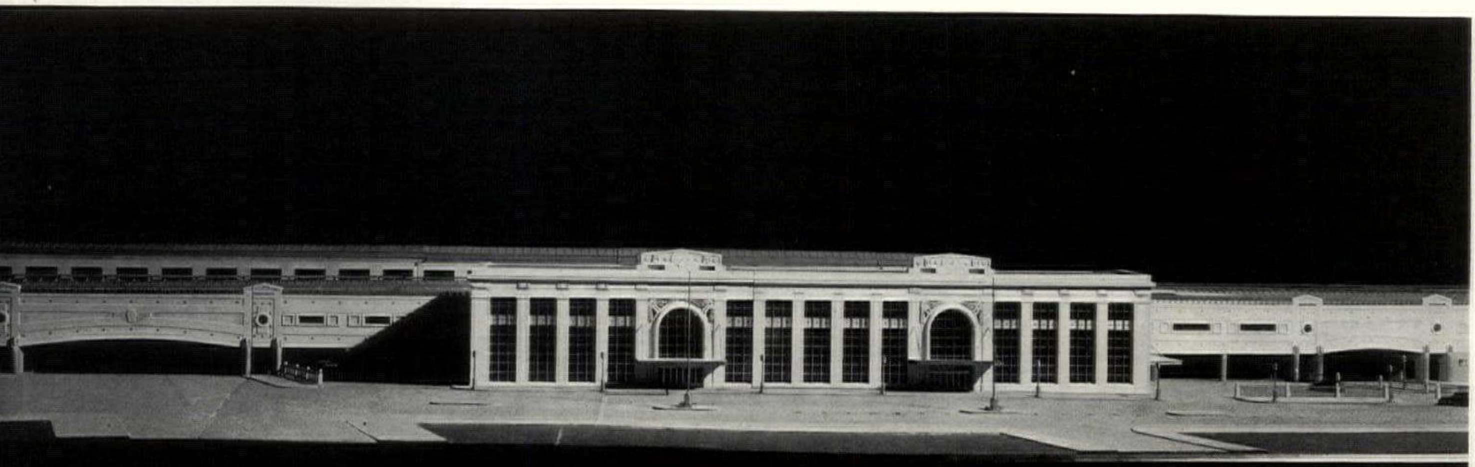


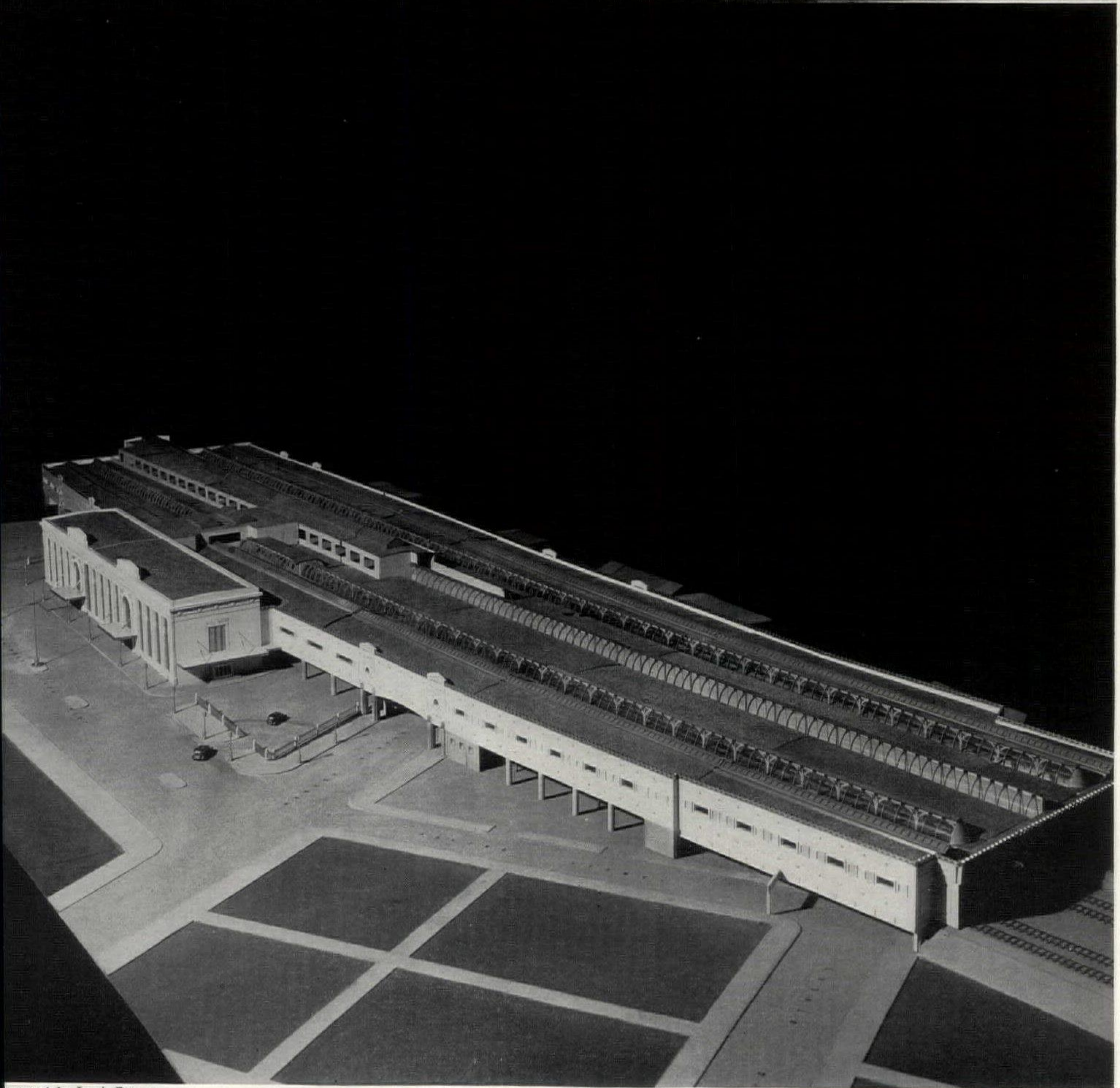
Photograph by F. S. Lincoln

TENNIS SHELTER **BUILT FOR SHERMAN PRAT**

JOHN WALTER WOOD

ARCHITECT





tograph by Louis Dreyer

Photograph by Gotts

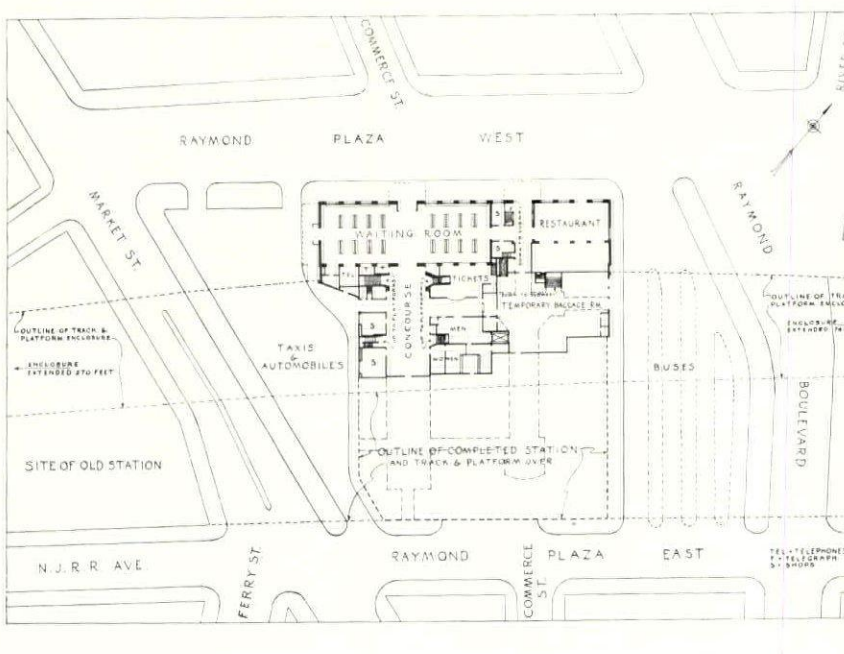
MARKET STREET STATION **NEWARK, NEW JERSE**

Photograph by Louis Dreyer

McKIM, MEAD & WHITE
ARCHITECTS

GIBBS & HILL, INC.
STRUCTURAL AND MECHANICAL
ENGINEERS

The station in its present form is but half completed. It is planned to accommodate several types of transportation facilities — the Pennsylvania Railroad, Rapid Transit, new City Subway, and several bus lines. These are handled on three levels—underground, surface, and elevated; the plan reflects this separation of function.




PENNSYLVANIA


Photograph by Gottscho

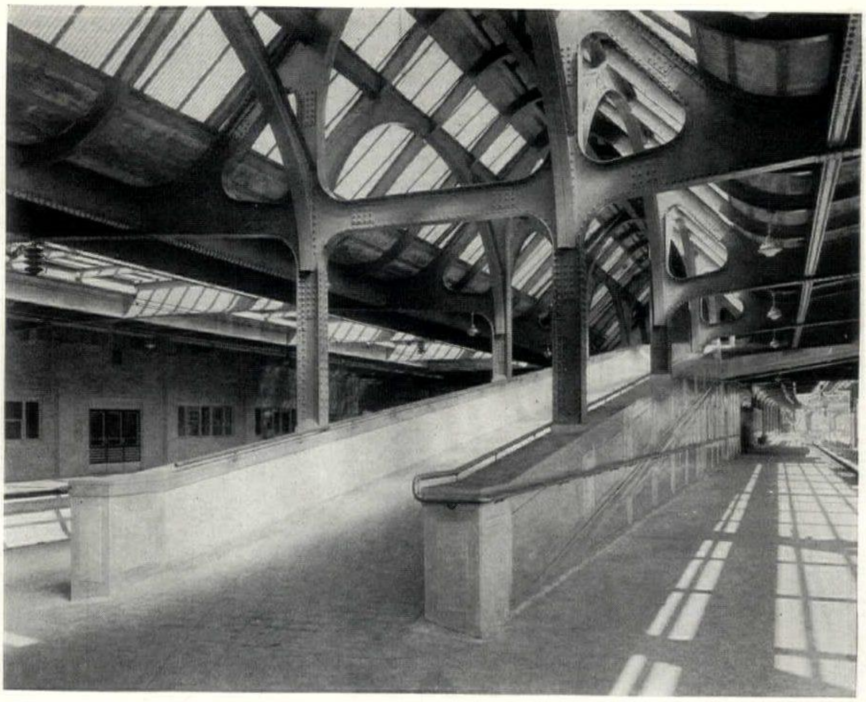
Above: A wide variety of material has been used in the various parts of the structure. The main building is of gray Indiana limestone; base and two large archways, rubbed pink granite; carved panels, limestone; windows and marquees, aluminum; doors, formica. **Opposite page:** The train sheds at the second level. Steel is used here simply and intelligently; good design results.

MARKET STREET STATION

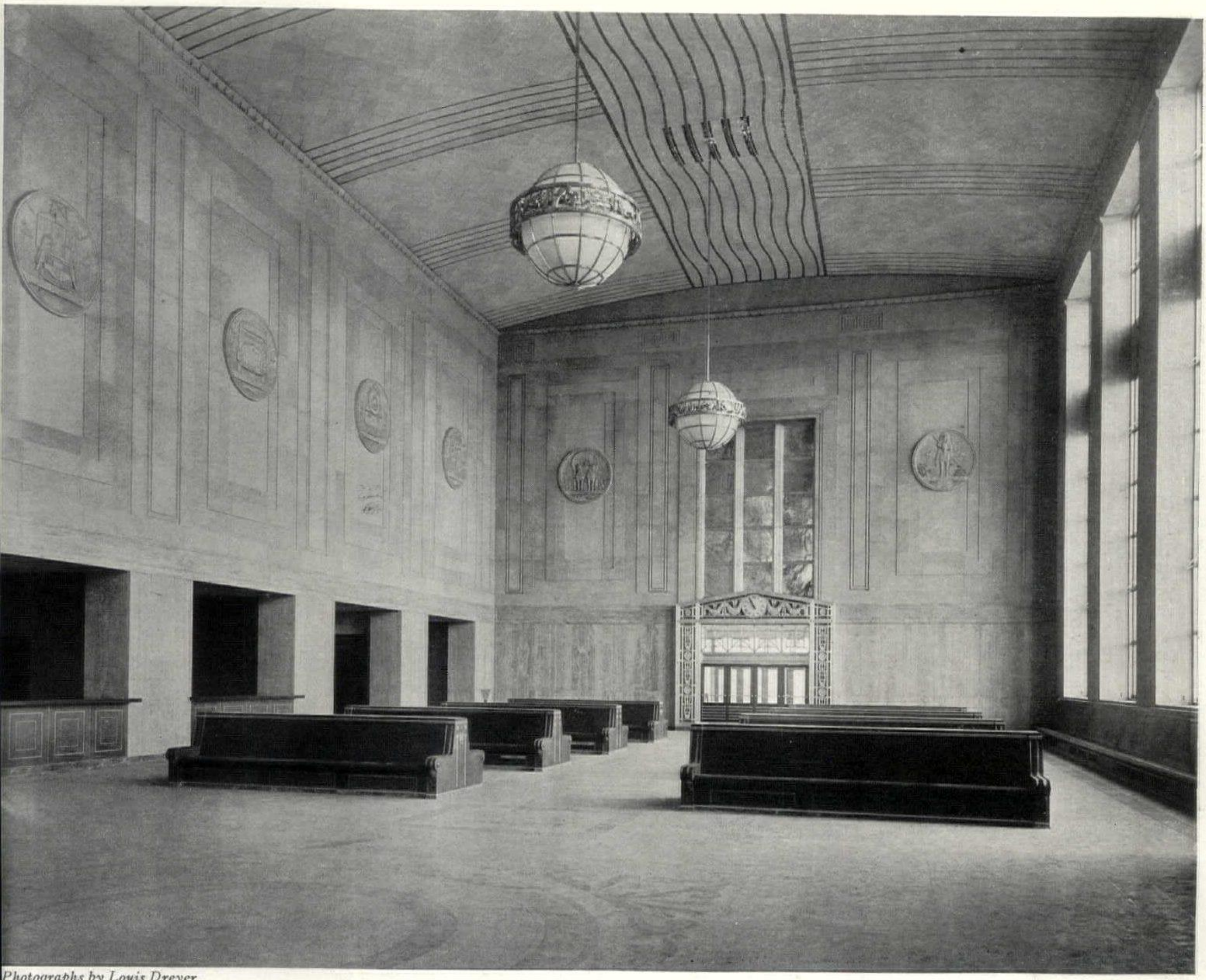
NEWARK, NEW JERSEY

McKIM, MEAD & WHITE

ARCHITECTS

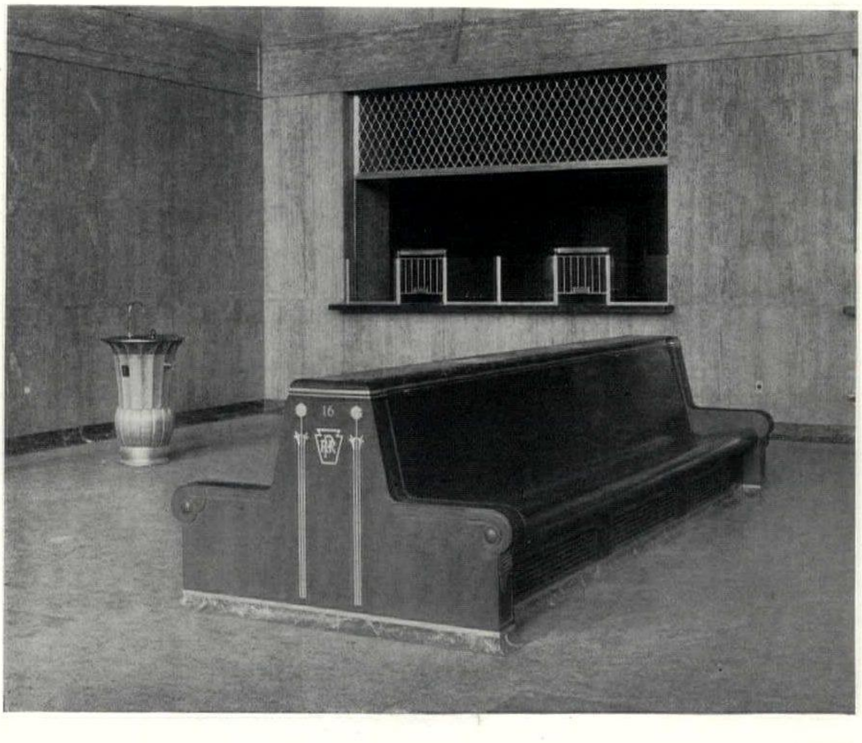


Photographs by Louis Dreyer



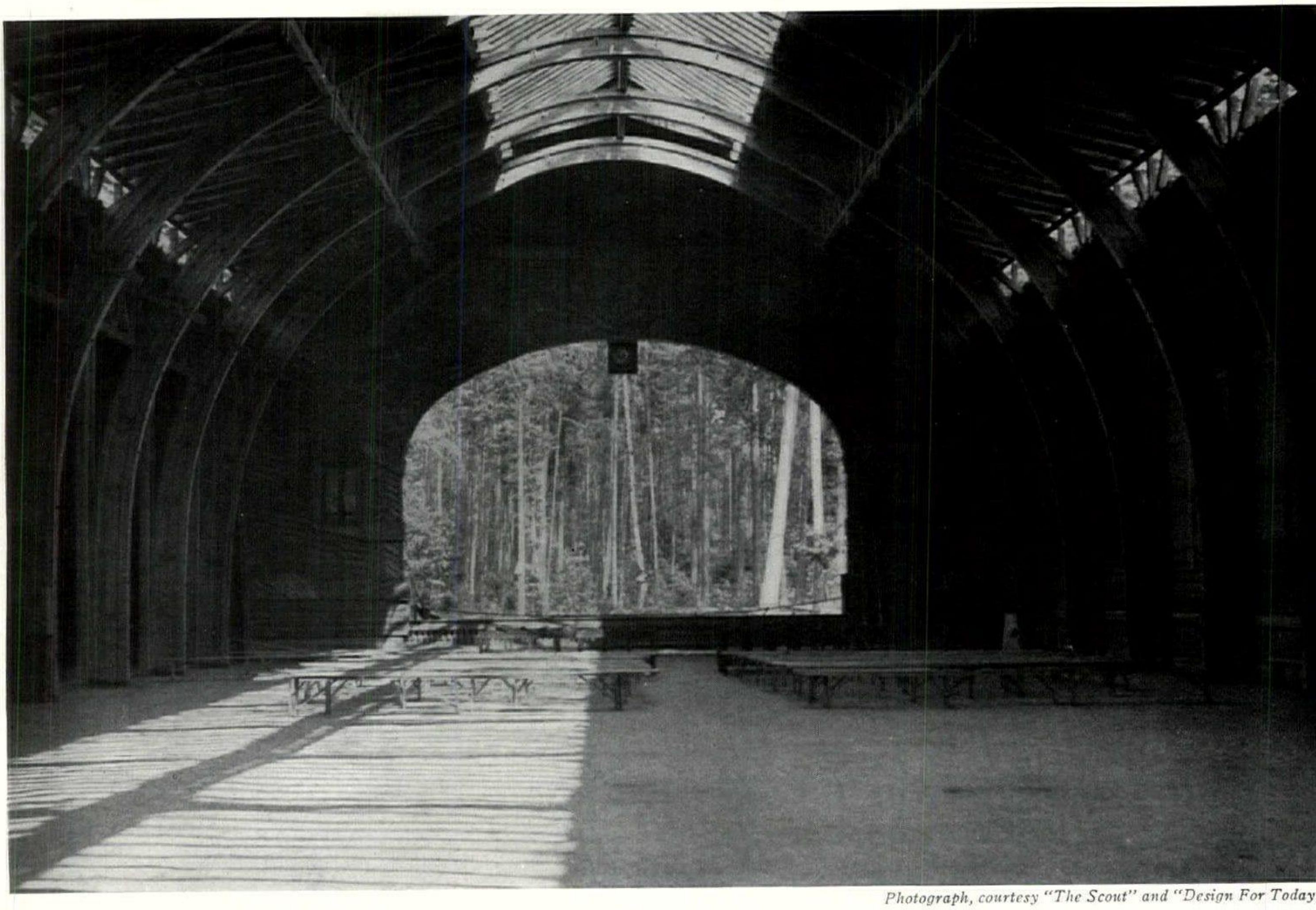
Photographs by Louis Dreyer

MARKET STREET STATION **NEWARK, NEW JERSEY**



McKIM, MEAD & WHITE
ARCHITECS

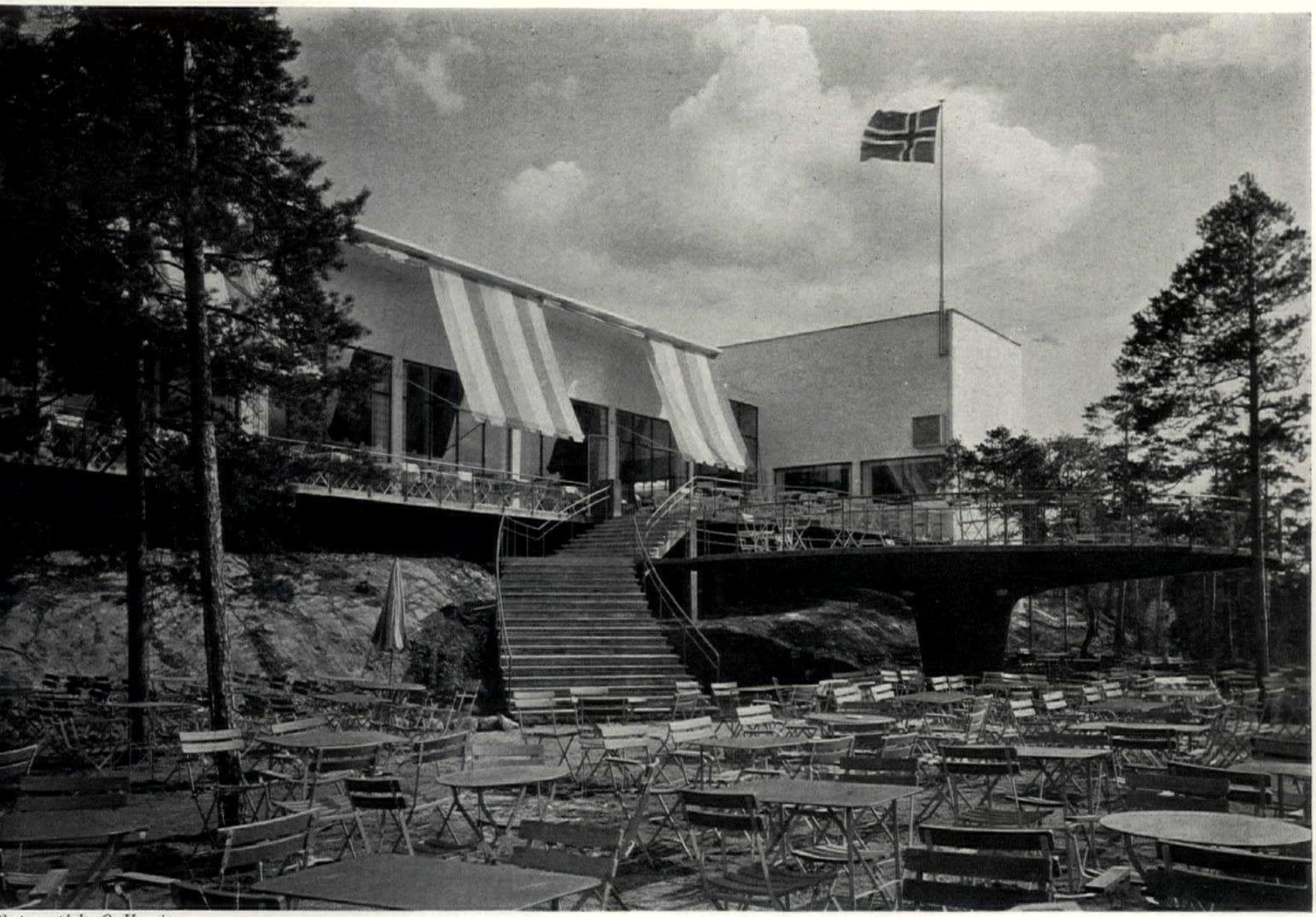
The main waiting room is 175 feet long, 18 feet wide, with a 46-foot ceiling. Floors are red terrazzo with black and yellow inlay; wainscot, rose yellow travertine; ceiling, acoustical material in blue with gold leaf decorations; benches, gray walnut inlaid with aluminum. A feature of the room is a large window at one end glazed with variegated marble panels.



Photograph, courtesy "The Scout" and "Design For Today

BOY SCOUT THEATER INTERIOR FOREST OF SPALA

This theater utilizes the adjoining forest as a back drop for the stage which is located outside the theater. It was built in the heart of the Forest of Spala by Polish Boy Scouts for their national assembly. It is constructed entirely of wood and receives its lighting from overhead. Floodlights are used to illuminate the stage at night.



Photograph by O. Vaering

WEEK-END RESORT AT INGIERSTRAND, OSLO, NORWAY

EYVIND MOESTUE AND OLE LIND SCHISTAD, ARCHITECTS

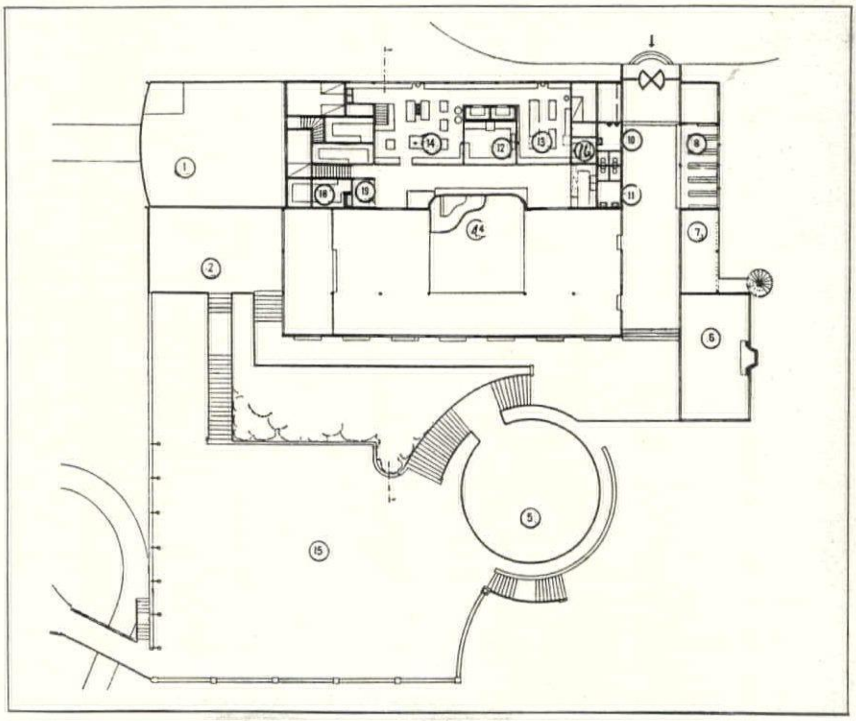
Ingierstrand is located about three miles from Oslo, Norway, and is its newest bathing center. It is located in a typical Norwegian setting on the edge of a fjord with a rugged surrounding of rock and pine. Full advantage has been taken of the slope of the ground to provide terraces and to locate the bathing pool. This establishment has also been adopted as a popular social center for summer use only. The character of the construction of the buildings, such as the restaurant and social hall, is suited to this summer use. There is ample provision for opening walls and for permitting maximum views. The major construction is of concrete without any attempt having been made to provide insulation or heating. The building project was initiated in February and completed before the end of May.

Photograph by O. Vaering

WEEK-END RESORT AT INGIERSTRAND — **OSLO, NORWAY**

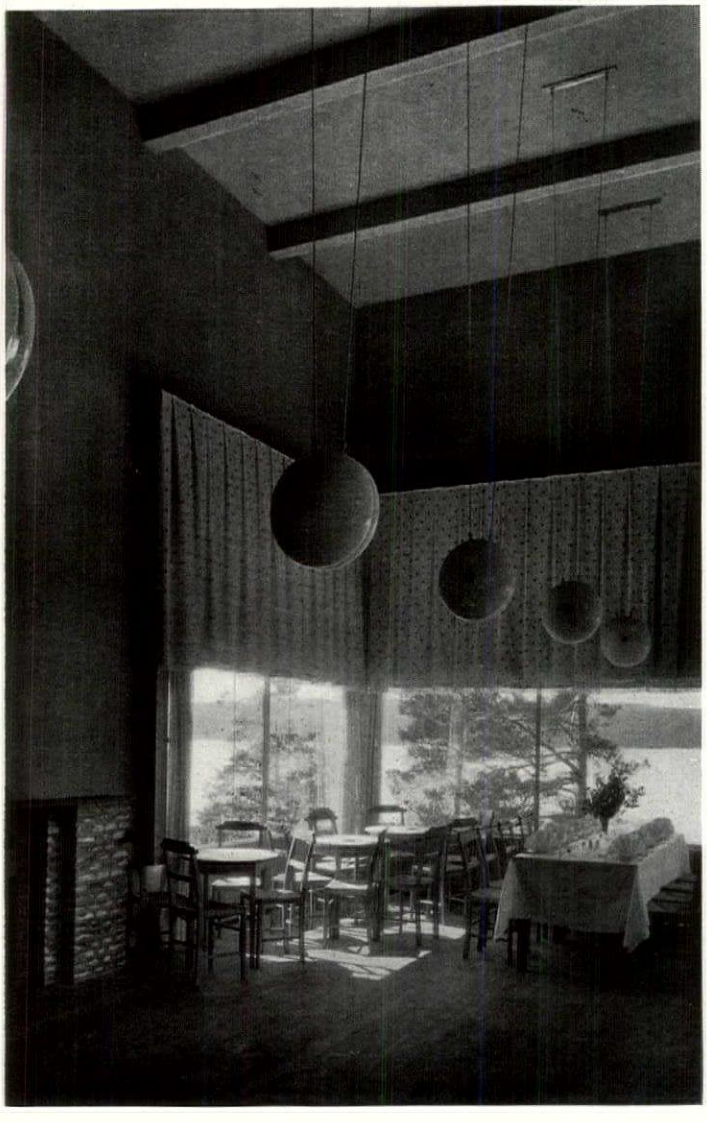
EYVIND MOESTUE AND OLE LIND SCHISTAD — ARCHITECTS

On this page . . . RESTAURANT TERRACE. The concrete mushroom platform is intended for dancing on the upper level in fair weather and below in inclement weather. **On the opposite page . . .** STAIR TOWER leading to a roof terrace overlooking the Fjord.



1 YARD
2 NORTH TERRACE
4 DANCE FLOOR
5 DANCE FLOOR
6 COFFEE ROOM
7 PERGOLA
8 CLOAKROOM
10 GENTLEMEN
11 LADIES
12 WASHING-UP
13 COLD KITCHEN
14 HOT KITCHEN
15 LOWER TERRACE
16 STORE
18 WINE
19 BEER

Photographs by O. Vaeri



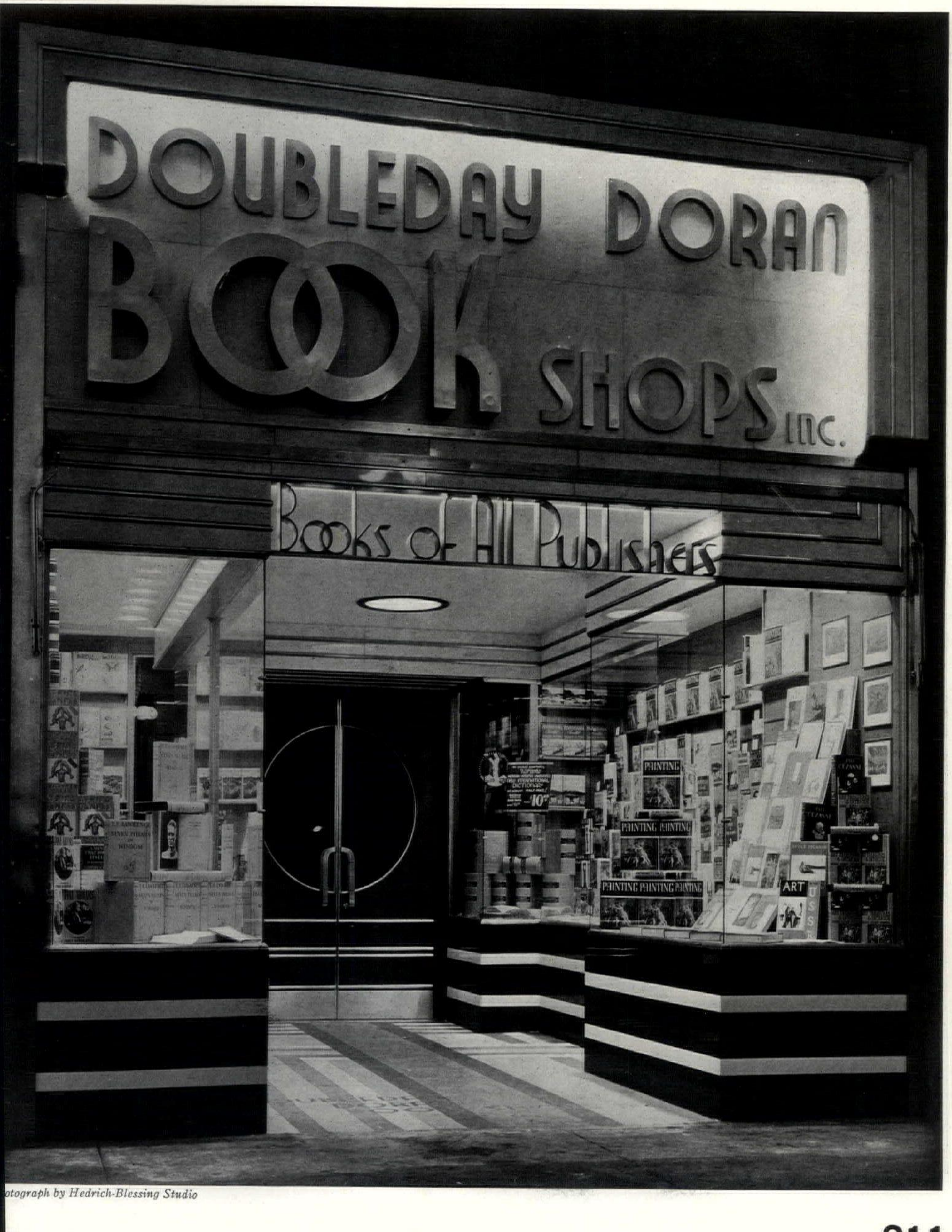
WEEK-END RESORT   OSLO, NORWA

EYVIND MOESTUE AND OLE LIND SCHISTAD

ARCHITECT

Interior view of dining room, above. The main windo group overlooks a fjord and surrounding rugged landscap At the height of the summer season a dining terrace su plements the dining inclosure. The view at left is a interior of the coffee room. Study of the plan will ind cate the social purposes of the resort. Major space given over to dining and dancing.

DESIGNED BY MORRIS LAPIDUS, ARCHITECT FOR ROSS-FRANKEL, INC

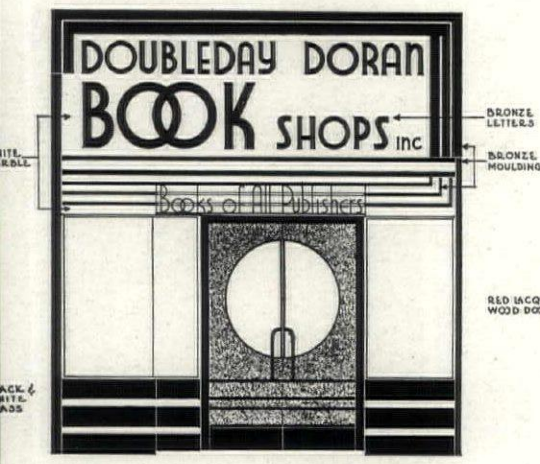


otograph by Hedrich-Blessing Studio


Europa
ROBERT BRIFFAULT
T. E. LAWRENCE
SEVEN PILLARS OF WISDOM
IT CAN'T HAPPEN HERE

he architect faced the problem of providing eparate departments for various types of books, ut for efficient operation the plan had to be kept imple. Using an irregular building, an intelligent olution has been evolved. Interior: All shelving, ounters, and storage space are of rift sawn oak n olive brown; linoleum floor in brown tan, burnt ienna and black; all counter surfaces in black noleum; walls in burnt sienna and brown. xterior: Facings in black and white glass, bronze rim and molds, red-lacquer doors, rift sawn oak how windows.

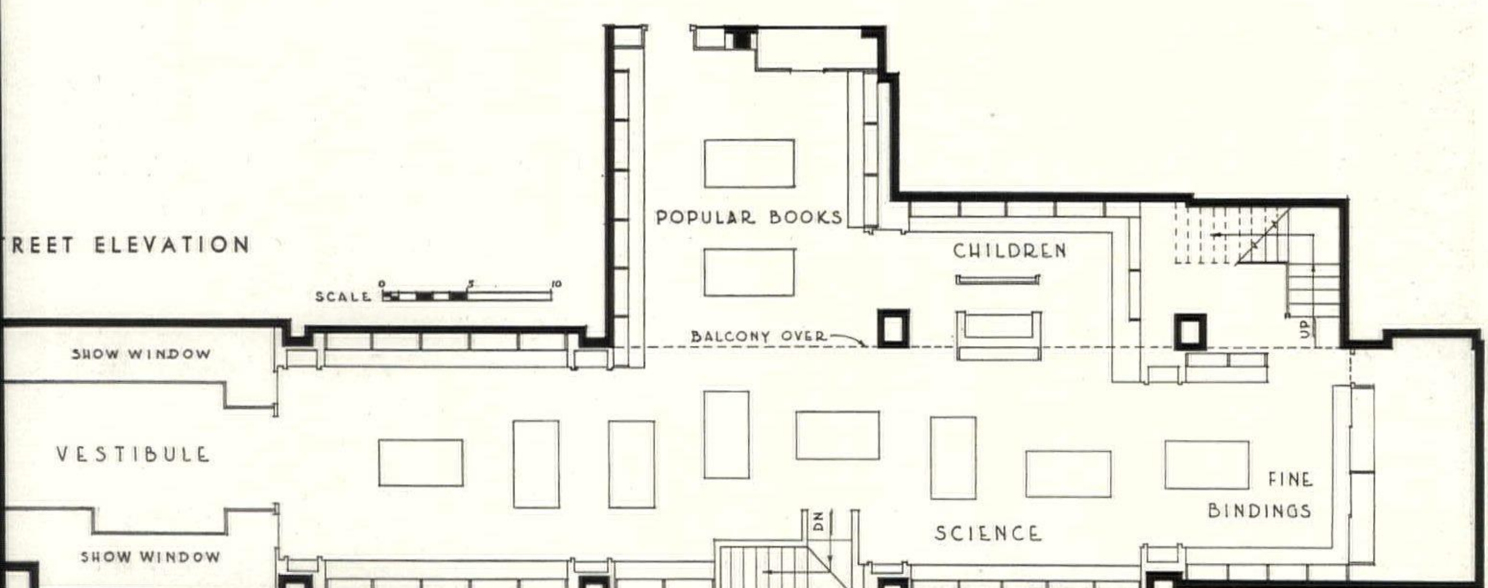
Photographs by Hedrich-Blessing Studio

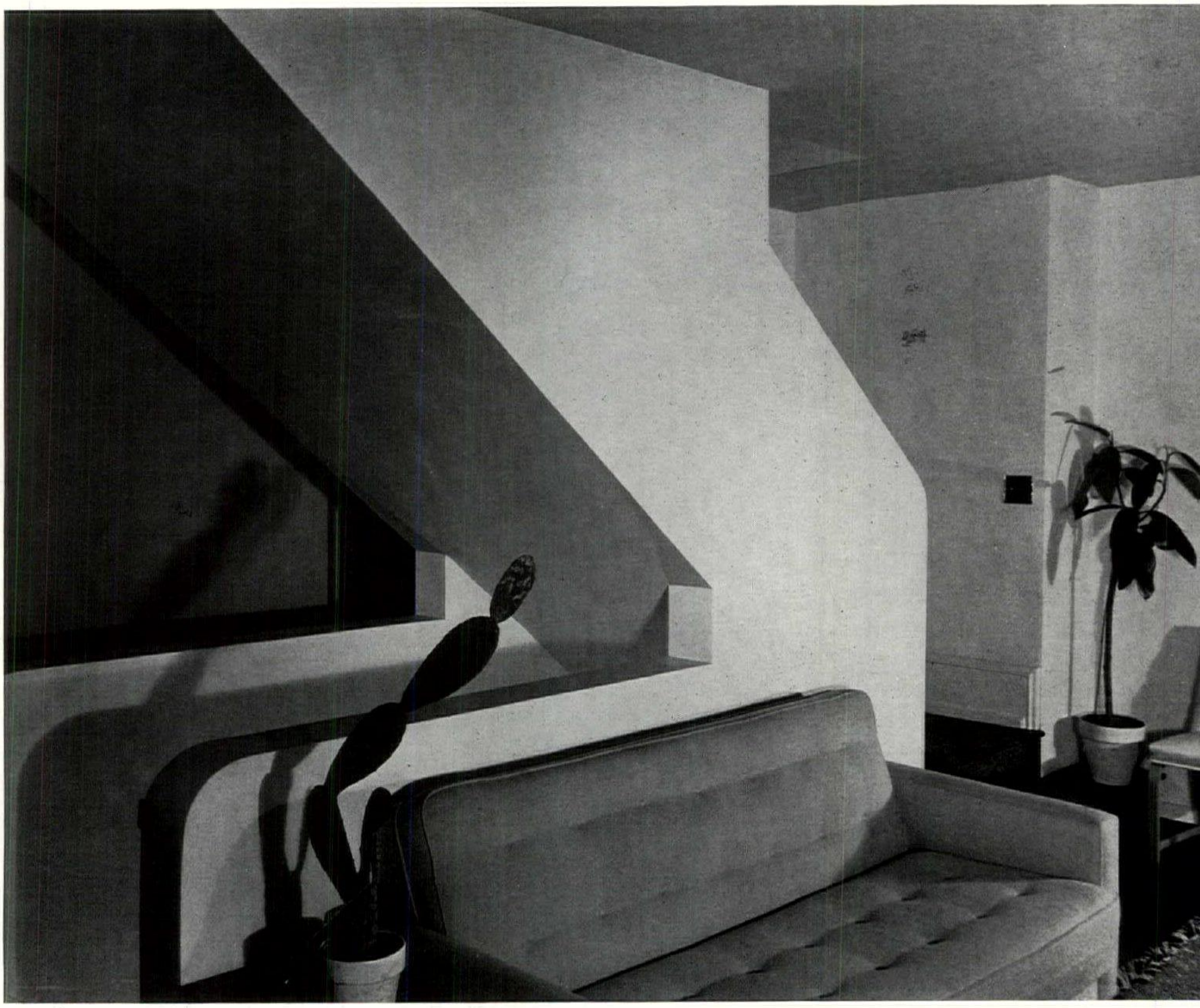


DOUBLEDAY DORAN BOOK SHOP, CHICAGO, ILLINOIS

Designed by MORRIS LAPIDUS, ARCHITECT for Ross - Frankel, Inc.

REET ELEVATION



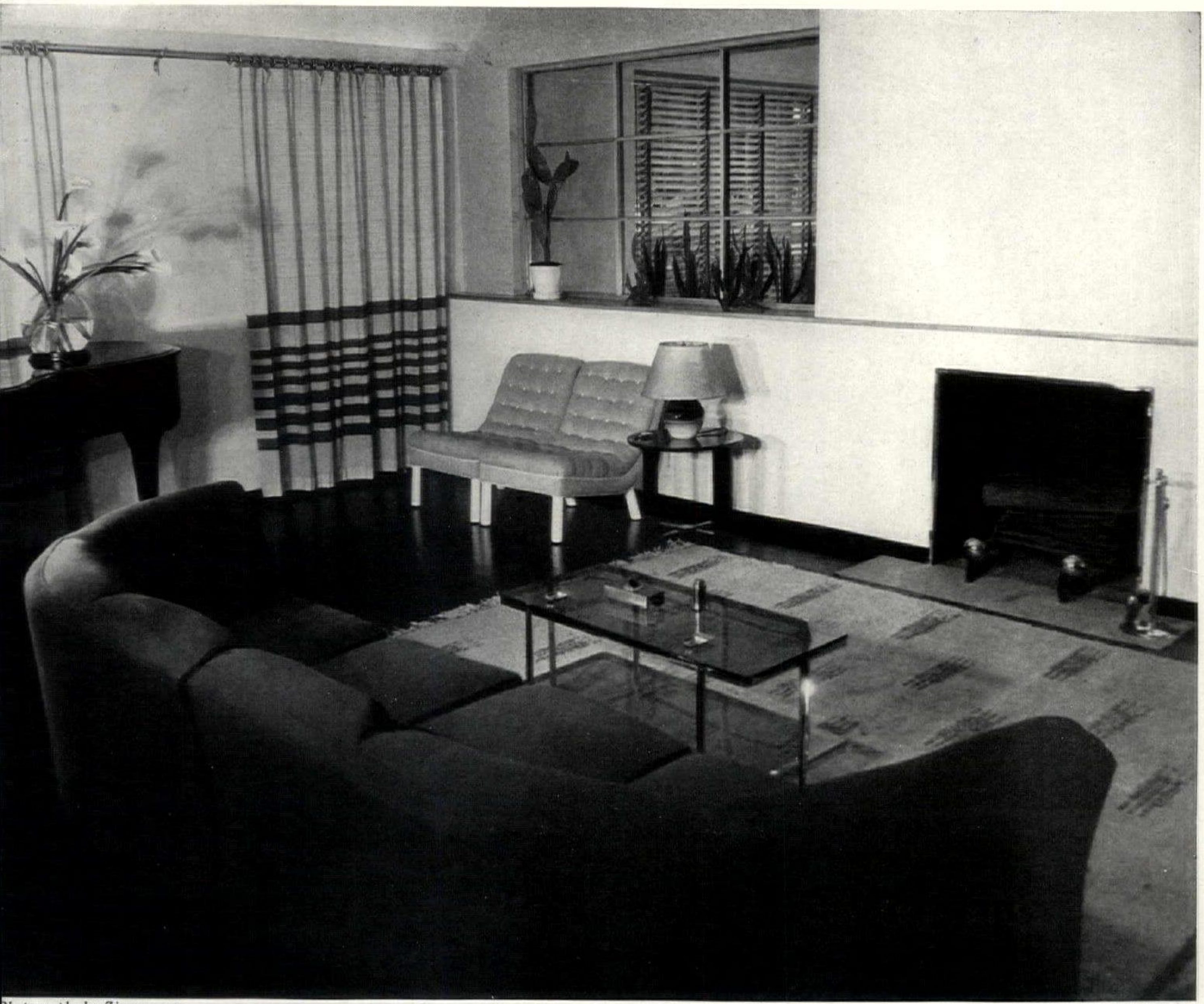


REMODELED HOUSE OF MARY SACHS **HARRISBURG, PENNSYLVANIA**

ELEANOR LEMAIRE
INTERIOR ARCHITECT

Practically all partitions on the main floor were removed. Steel girders were inserted to carry second floor joists. Two existing stairways were removed and one new stairway substituted. All window and door trim was removed. Fireplace in living room was remodeled and fireplace in solarium bricked up. One opening to solarium was enlarged, the other was closed up with blue glass window treatment. Lighting in living room and dining alcove comprises indirect lighting troughs on walls, recessed direct lights and suspended indirect fixtures on ceiling.

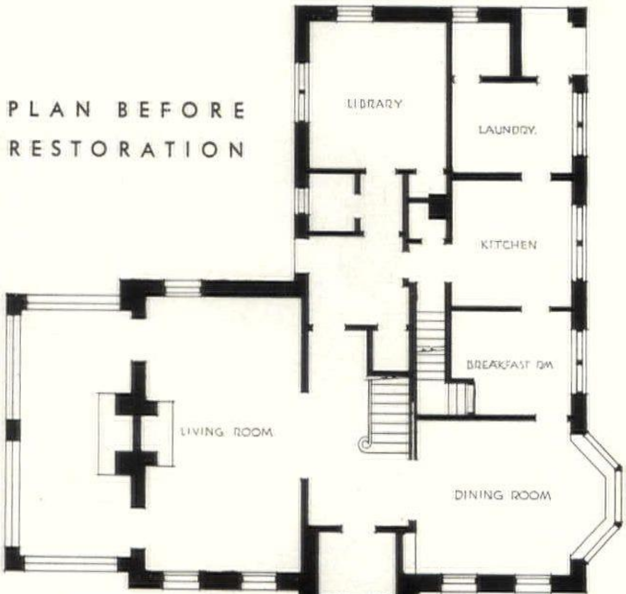
Living Room: Walls, white, yellow, gun metal blue; ceiling, white, yellow; curtains, handwoven material of citron yellow, white and gun metal blue; floor, black linoleum; furniture coverings, yellow, brown and blue.



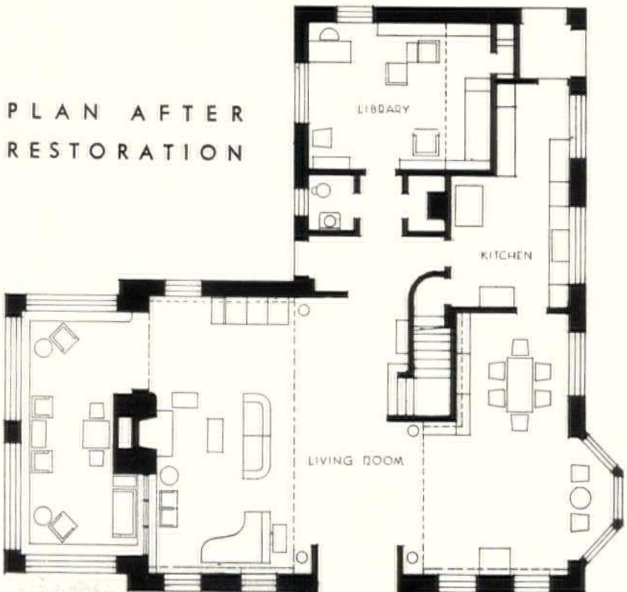
Photographs by Zimmerman

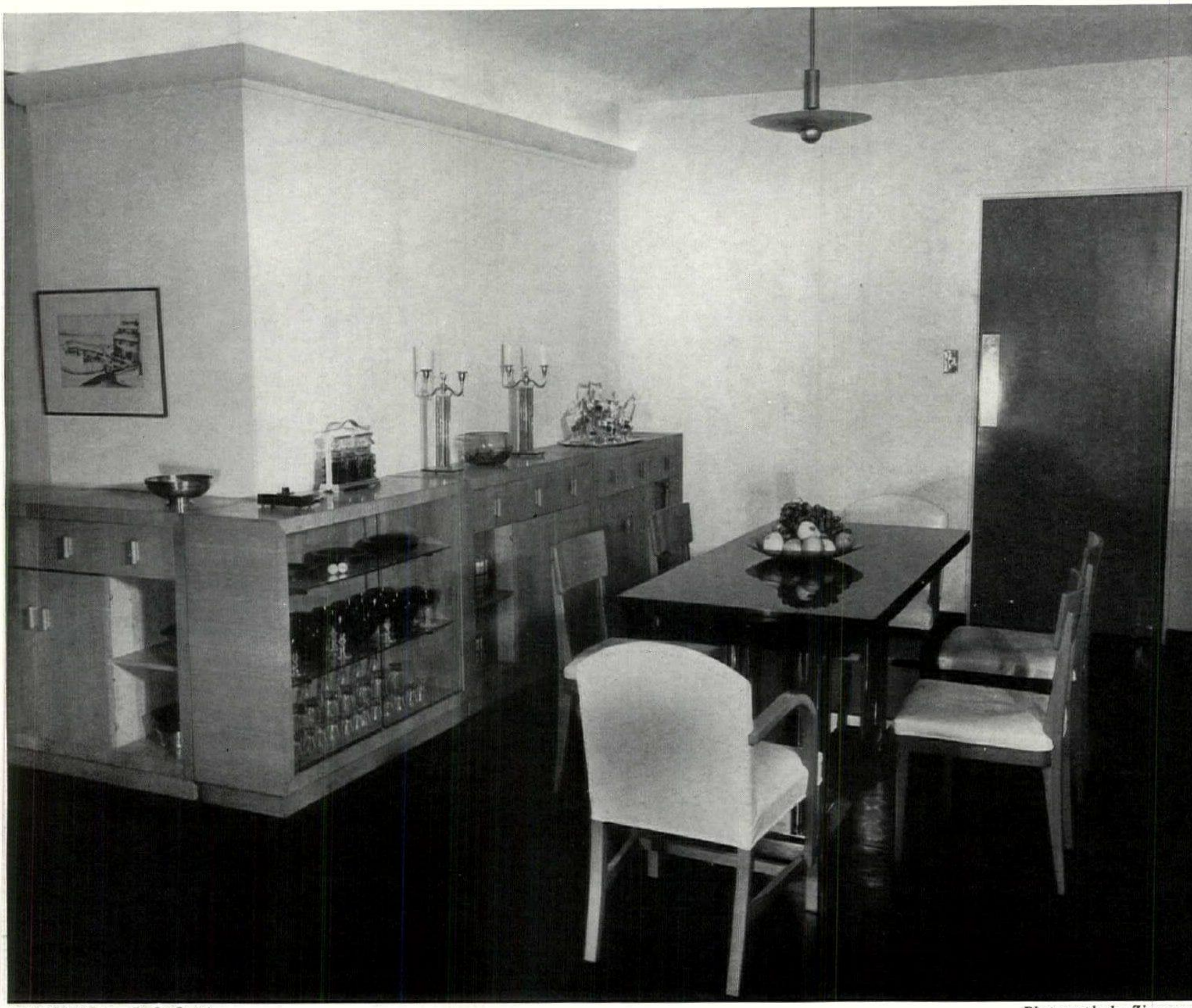
LIVING ROOM

PLAN BEFORE RESTORATION



PLAN AFTER RESTORATION





DINING ROOM

Photographs by Zimmerma

REMODELED HOUSE OF MARY SACHS **HARRISBURG, PENNSYLVANI**

ELEANOR LEMAIRE

INTERIOR ARCHITECT

Dining Room: Gun metal blue Venetian blinds in bay window. Curtains, yellow; gun metal blue and white at other windows; furniture upholstered in eggshell white and citron yellow leather, and gun metal blue material with red, white and turquoise stripes; floor, black linoleum; walls, white and yellow; gun metal door to kitchen.

Solarium: Walls and ceiling, white; floor, black; Venetian blinds, white with blue tapes; chairs, chromium with red and blue leather upholstery.


LIVING MY LIFE
LIVING MY LIFE

Library: Walls, brown and henna red; carpet, brown and henna red; curtains, brown-beige and henna, handwoven; furniture, walnut, upholstered in brown-beige, henna red on couch and chair; chairs, two-tone jade green leather upholstery.

ELEANOR LEMAIRE
INTERIOR ARCHITECT

Bedroom: Walls, pink-white and turquoise; ceiling, pink-white; floor, carpet in American Beauty red and platinum gray; curtains, handwoven of pink and American Beauty red; furniture, covered in two tones of pale and deep turquoise blue; bedspread, pink-white with deeper pink figure; furniture, Hollywood.

Photographs by Zimmerman

BEDROOM

Photographs by F. S. Lincoln

CENTRAL HEATING PLANT WASHINGTON, D. C

UNITED ENGINEERS AND CONTRACTORS

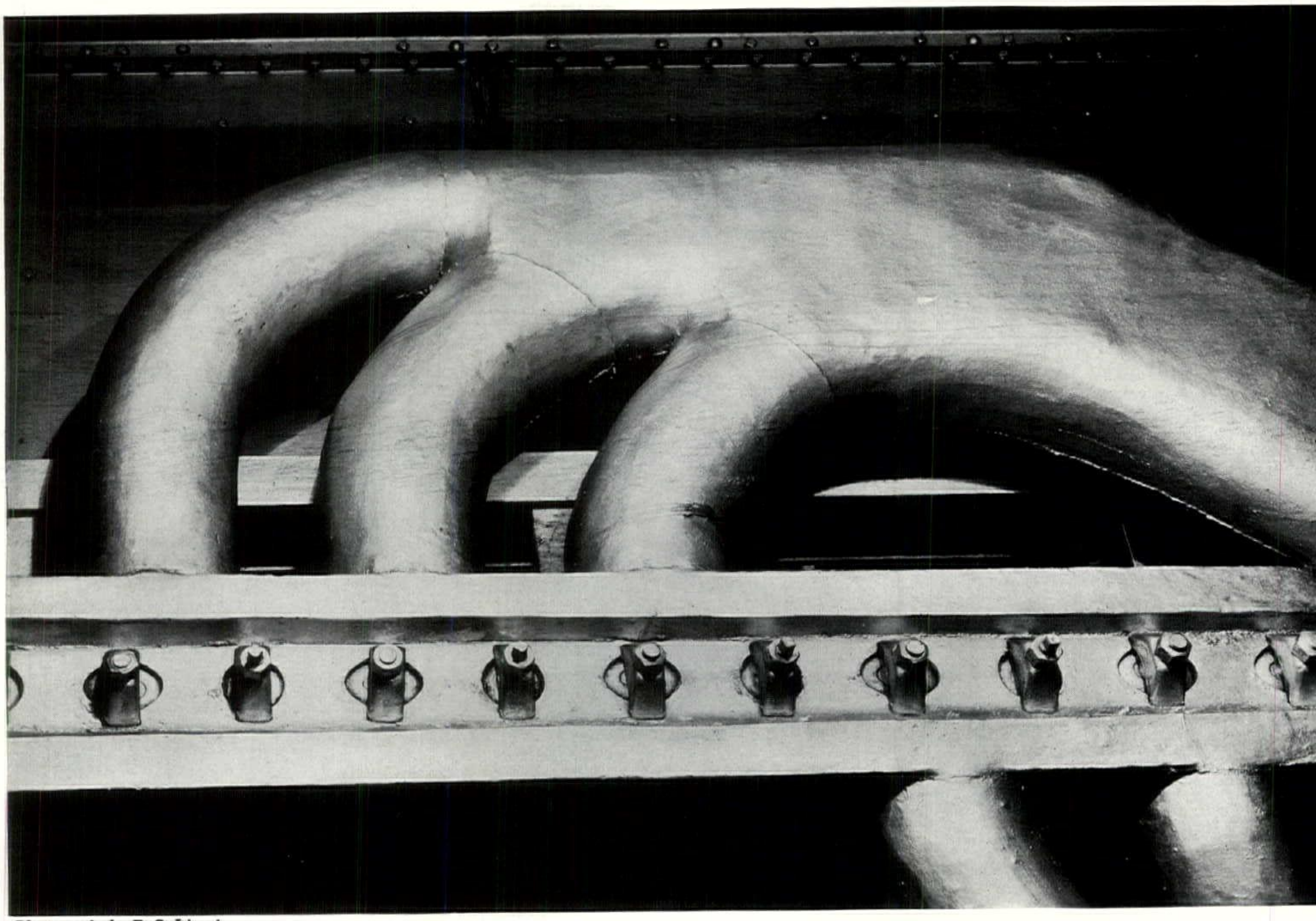
ARCHITECTS AND ENGINEERS

DETAIL OF
BRICKWORK

PAUL P. CRET

CONSULTING ARCHITECT

NTRANCE DETAIL

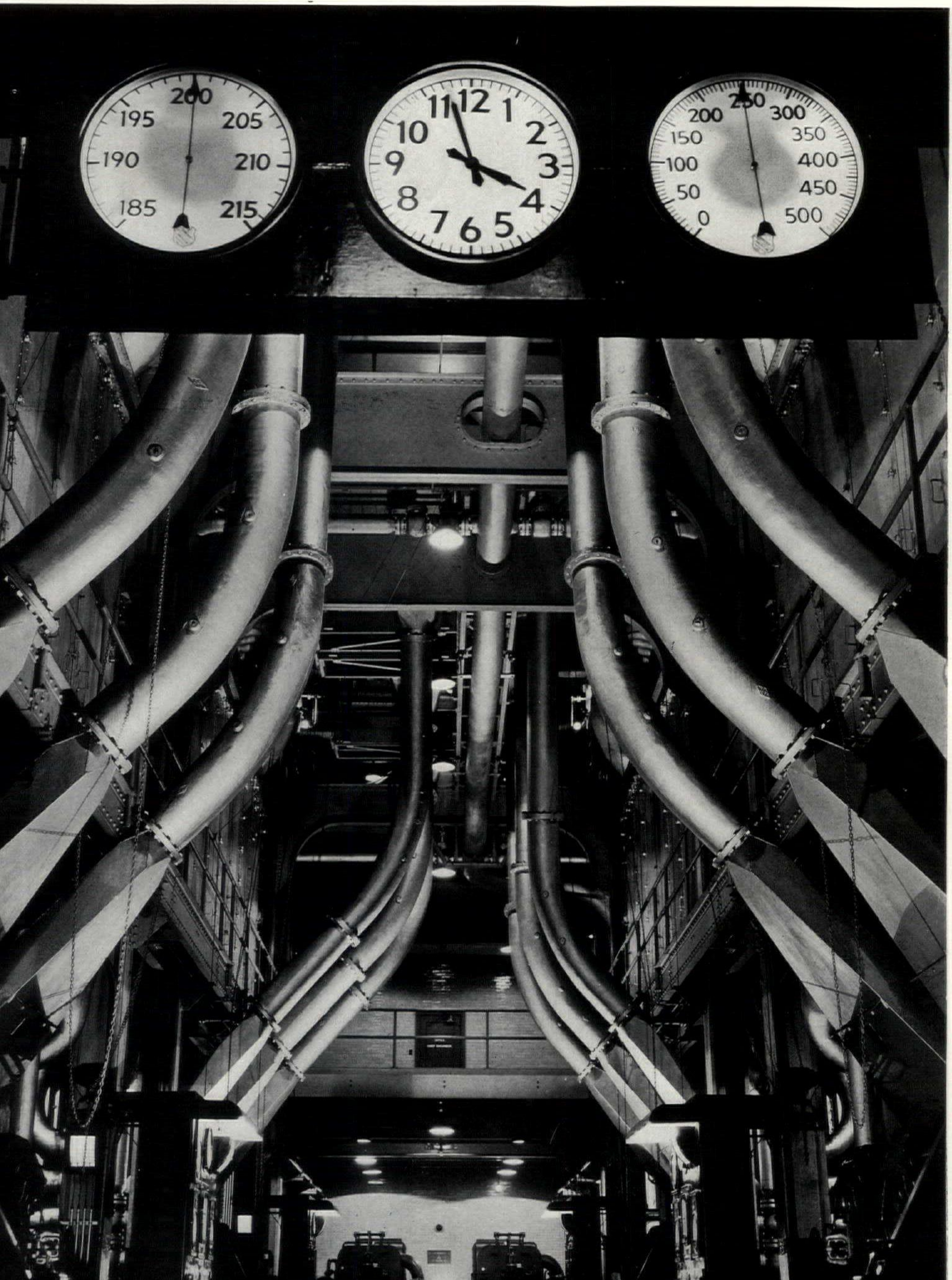


Photographs by F. S. Lincoln

CENTRAL HEATING PLANT WASHINGTON, D. C

UNITED ENGINEERS AND CONTRACTORS
ARCHITECTS AND ENGINEERS

PAUL P. CRET
CONSULTING ARCHITECT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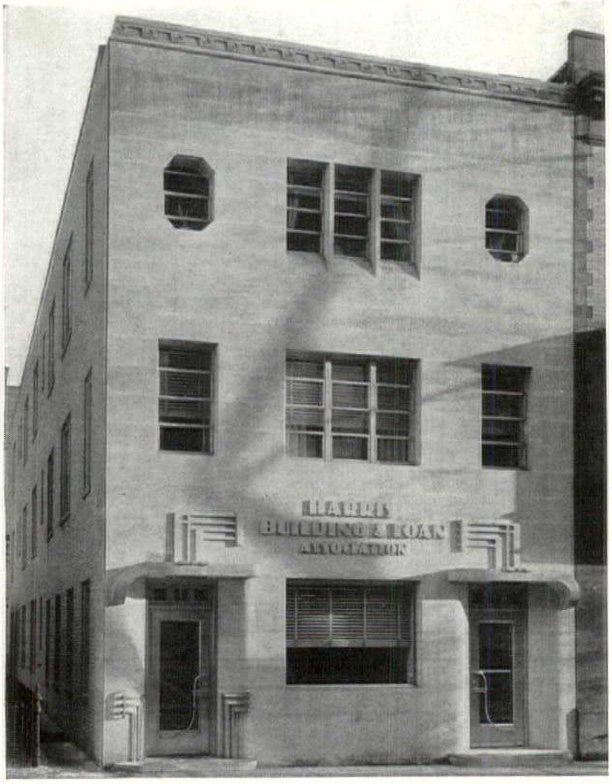
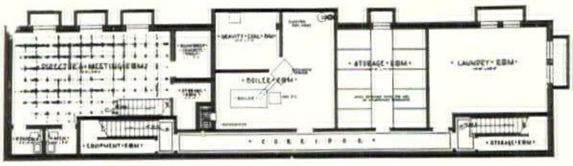
THE HARRIS BUILDING AND LOAN BUILDIN
HARRISBURG, PENNSYLVANIA

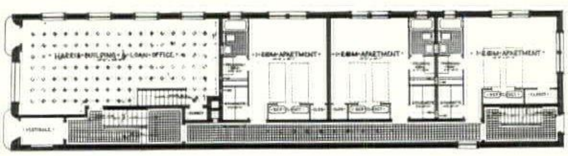
EDMUND GEORGE GOOD, JR.,

ARCHITEC

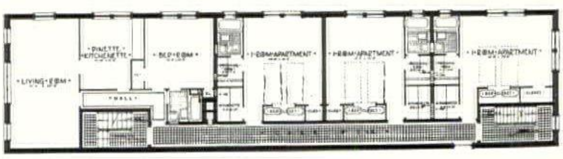




BASEMENT PLAN



FIRST FLOOR PLAN



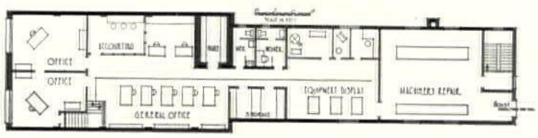
SECOND FLOOR PLAN
· THIRD · FLOOR · PLAN · SIMILIAR ·

The building site is 26'-5" by 105'-0". The building is intended house officers for a building and loan association. In addition, apa ments are provided for rental. These apartments have their o entrance. The basement contains a directors' room and space mechanical equipment. On the first floor there are offices and th apartments. The second and third floors are typical, each havi three "economy" apartments and one three-room apartment. T building is of fire-resisting construction with the exception the rear stairway. Exterior walls are of Indiana limestone and bri backed with cinder blocks. All partitions separating apa ments are 4" cinder blocks and, for soundproofing, are equipp with United States Gypsum spring clip sound insulation system plied on both sides. The spring clip system was also used on ceilings. All floors are of concrete, covered with linoleum, excepti the office floors, which are of terrazzo with white metal strips

THE SOUTHEASTERN OPTICAL BUILDING
RICHMOND, VIRGINIA

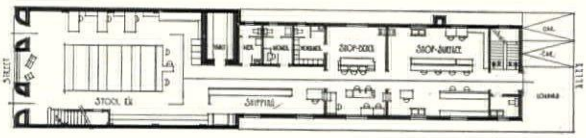
EE, BALLOU & VANDERVOORT, INC.
ARCHITECTS

ocation: The building is centrally located on one of the most nportant streets in the city; therefore, a factory type façade ould not be in keeping with the location.



SECOND FLOOR PLAN

urpose: Light manufacture; wholesale optical business.

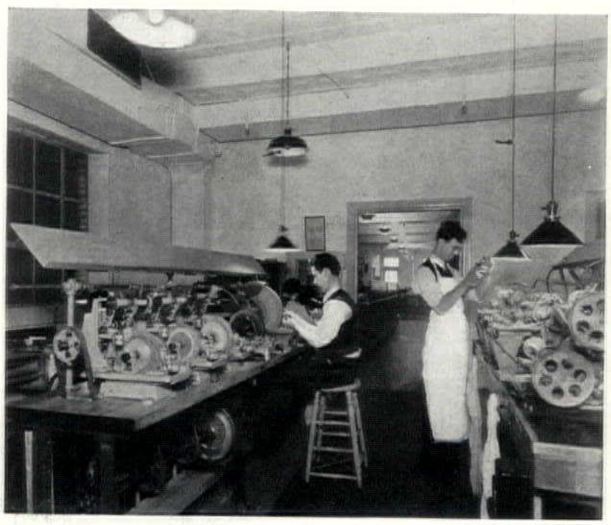


FIRST FLOOR PLAN

peration: In "Shop-Surface," surface or focus grinding is done specially designed machinery. In "Shop-Bench," lenses are cut d shaped to exact size and mounted in spectacles. The Stock Room used for storage and handling of all stock. All packages are rapped and addressed in Shipping Area.

e second floor is used entirely for business administration except r one optical display room and a room for repairing the optical achinery. A hoist in the rear handles all machinery and bulk ipments. Most delivery to retail stores and optometrists is done means of parcel post.

onstruction: First floor, concrete; second floor and roof (built-up -year), wood. Façade, light buff brick in bands with gray cast one trim, aluminum grilles and black brick. Building is air contioned; coal stoker. Basement in rear is just large enough for ating and air conditioning equipment. Walls, plaster; floors, ck maple. Insulation, 4" Rockwool over roof area. Courts on les of rear of building and windows on courts as required by ilding department. Most of the work is of such a nature as to quire artificial light; lighting is indirect, except in shops. The tire building is protected aganst fire by an automatic dry rinkler system.



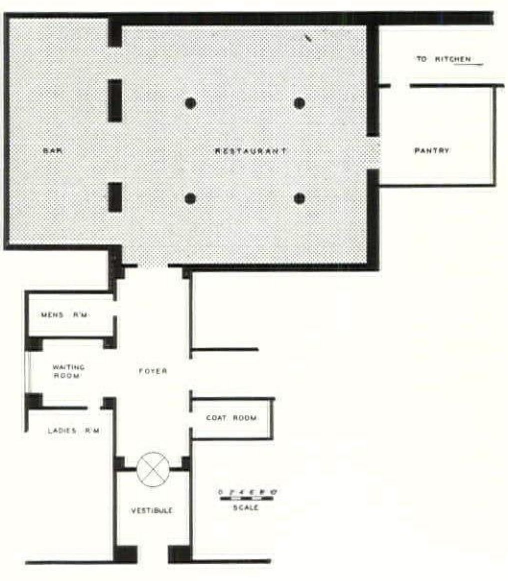
ost: About 25¢ per cubic foot, including all fees; machinery d office equipment not included.

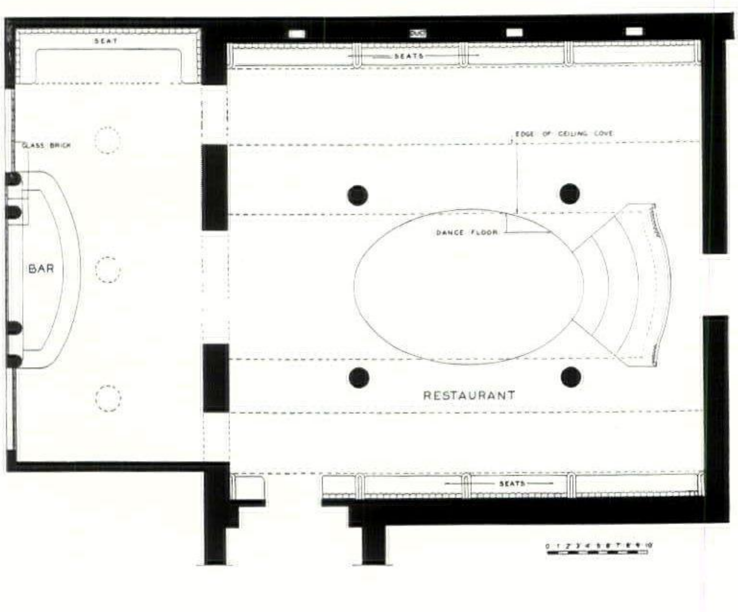
CAFE LARUE, NEW YORK CITY

SCOTT AND TEEGEN, ARCHITECTS

Photographs by Richard Garrison

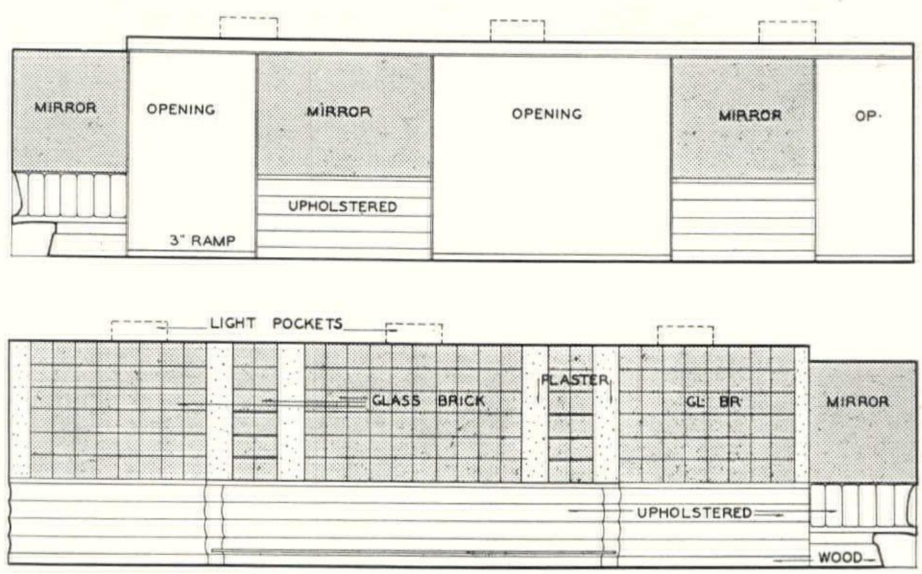
Divisions between "banquettes" are made o $\frac{1}{2}''$ etched glass set in wood frames and lighted by concealed lamps at the base. The wall decoration has red and blac plumed birds on a background of gol leaves and vines. Decoration on column and wall was designed by Lillian Gaertne Palmedo and is in gold and red with blac outlines in oil on white oilcloth. The bas of columns is in black linoleum. The ceilin consists of built-up coves which conceal th lights. The central part over the dance floo is painted white, the next level is yellow then orange, and the level directly over th benches is in blue. The background for th orchestra is in blue cellophane and cotto fabric. Wood chairs are painted white an have dark blue chenille upholstery, excep chairs around the dance floor which are o same pattern and material but are in orang color. The east end of room is faced entirel with mirrors.





THE BAR

This room was originally an open porch used for dining in summer only. The wall above the parapet height was built of Steuben glass block units. The piers that separate the glass panels are covered with white Fabrikoid, having horizontal metal bands. The front and back bars are old. The rounded ends were added and the outer face upholstered in red Fabrikoid with white welts. The mural at right was created by Gretl Urban. Table tops are of black Cafalite and have chrome metal bases. Curtains are white with red bands. The ceiling is painted Naples yellow, blending with yellow of mural. Ceiling lights are made up of two suspended circular sheets of glass. The light source is sunk in ceiling. A high wall of an adjoining building was painted yellow so that daylight reflects yellow light through the glass units.



ELEVATIONS

MINNEAPOLIS ARMORY BUILDING MINNEAPOLIS, MINNESOTA

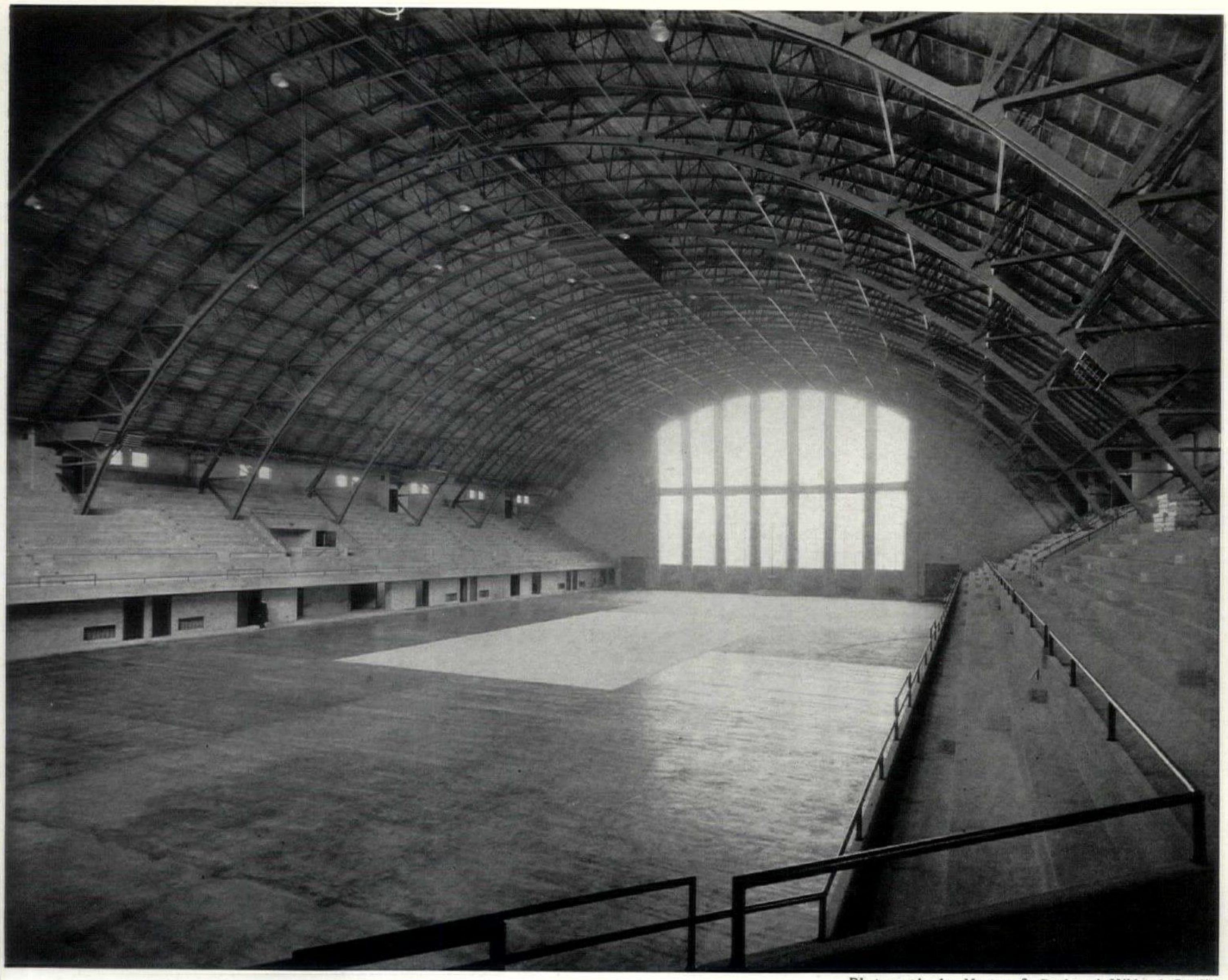

OFFICE INTERIOR

Sixth Street Elevation and Sixth Avenue Side. Entrance to the Headhouse and also the public entrances to the Drill Hall balconies are from Sixth Street. Entrance and exit to the Truck Garage in basement are by ramps from Fifth and Sixth Avenues. There are also exits from the balconies on these two sides.

Drill Hall showing the concrete floor finished integral as poured, with wood floor in center for basketball, tennis, dancing, etc. The balconies are reinforced concrete with expansion joints. All steelwork of the Drill Hall roof was assembled on the drill floor and erected with derricks set up on the floor. Steel erection began two weeks after the drill floor was poured and finished.

Typical Office Interior in the Headhouse or Office Building portion of the Armory. "Smooth Ceilings" System of all flat ceiling floor construction. No beams, drop panels or column caps. The columns are uniform diameter from floor to ceiling. Plywood forms were used, followed by light rubbing with carborundum. The ceilings are left in natural concrete. Floor slab, 6 inches.

Truck and Ordnance Garage under Drill Hall. "Smooth Ceilings" System of all flat slab construction, columns spaced 30 feet on centers. No beams, drop panels or concrete caps on columns. A steel frame or column head fully inclosed within the depth of the slab takes the place of the drop panel and concrete cap. The floor is designed for 150 lb. per square foot live load and the finished slab is $12\frac{1}{2}$ inches thick.



Photographs by Norton & Peel and Hibbard Studio

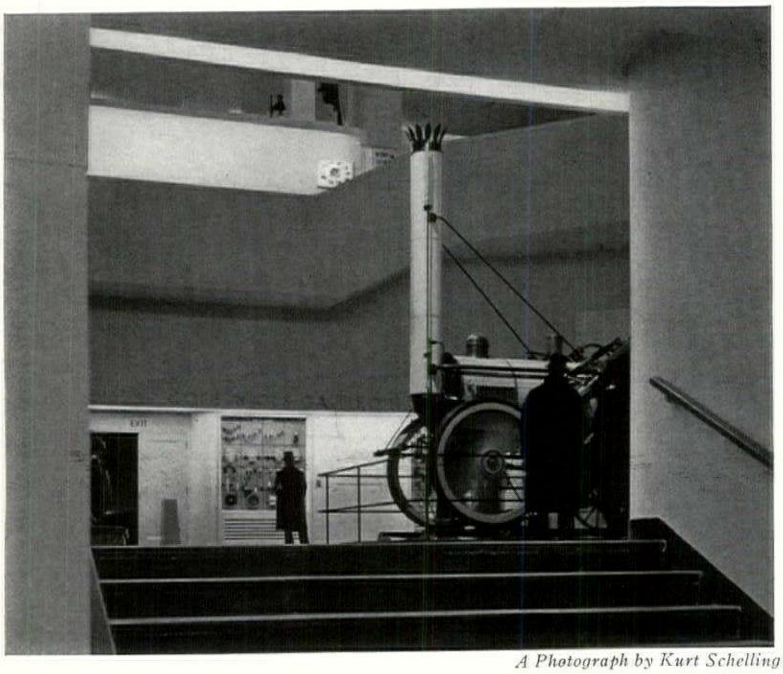
DRILL HALL

MAJOR P. C. BETTENBURG
ARCHITECT

WALTER H. WHEELER
CONSULTING ARCHITECT AND ENGINEER

ORDNANCE GARAGE

NEWS OF THE MONTH, MARCH 1936



A Photograph by Kurt Schelling

THE WHEELS GO ROUND AND AROUND

Opened to an invited group of Directors and their friends were the doors of the New York Museum of Science and Industry in its new home in Rockefeller Center. The museum, made possible by endowment of the late Henry R. Towne, represents a radical departure from traditional museum design. Here are no ancient exhibits gathering dust in dark halls, but a well-organized display of moving exhibits. Planned by Mr. Edward D. Stone, industrial designer, the new museum is arranged on varying levels. By careful disposition of the different elements, Mr. Stone has achieved an exhibit which flows together remarkably well. On the ground floor of the main hall is a series of moving models which illustrate all the essential principles of mechanics—piston, screw, ratchet, etc. These exhibits are brightly colored, and make their individual noises which blend into a busy and pleasant hum.

There is a wide use of moving pictures to illustrate static exhibits. In the department of electrodynamics a series of exhibits is arranged demonstrating basic principles of electricity, including many which may be operated by the visitor. Other sections are devoted to air, rail, and automobile-transport, communications, and to different manufacturing processes. Exhibits consist of two main classes: permanent and temporary.

SUPREME COURT RULES ON LIGHT VS. BEAUTY

Reflected light from the marble courtyards of the $11,000,000 Roman home of the Supreme Court gave several of the justices a headache. After a conference with the builders, heavy draperies were installed to reduce the glare. This left the court chamber too dark. A temporary ceiling of white cloth, indirectly lighted, now obscures the elaborate coffered ceiling and necessitated the removal of a magnificent chandelier. The ceiling will be redecorated in lighter colors during the summer recess. New bronze desk lamps have been installed; Justice Brandeis "dissenting," insisted on "an old black lamp with adjustable arm."

FORTHCOMING INDEX OF AMERICAN DESIGN

Hailed as the first effort to assemble a graphic history of native American arts, this Index of Design has been instigated by the Federal Art Project of WPA. Five hundred people will be required to cover basic source material in furniture, costume, textiles, floor coverings, glassware, silver, metalwork, ceramics, wood and stone carving, household utensils, etc.

In architecture, the project artists will study such building types as typical Colonial homes, small houses designed by "master-builder carpenters," schools and churches, commercial and public buildings, and miscellaneous buildings such as barns, mills, slave-houses.

The material will be reproduced in portfolio form, in black and white, in color, and by photography.

CENSUS OF CONSTRUCTION GETS UNDER WAY

Field work on the first Construction Census in this country began January 2. It is estimated that three months will be required to complete the field work: and the cooperation of contractors throughout the country is essential, according to G. J. Lawrence, Chief of the Census.

This Census will make available the basic data necessary to stabilize conditions in the industry. It will cover such data as the character of the establishments, types of work done by them, contracts received and work let, work performed (by type), employees and weekly pay roll, work performed in 1935 (by location), man-hours and pay roll at construction site.

BUT PRIMING CANNOT GO ON FOREVER

On January 31, five hundred members of the New York Building Congress sat down in Hotel Commodore's baroque ballroom to hear Senator Robert F. Wagner address them and the nation on "A National Policy on Public Housing." He defended his long advocacy of public housing as a primer of the business pump; "but priming cannot go on forever." Citing the usual statistics on "the shocking living conditions in this country," he mapped out an ambitious 10-year program of construction in which business and government would cooperate to build 10 million new homes. Constantly citing the English precedent, he recommended this division of the housing spoil:

25% TO GOVERNMENT

1. Low-cost housing for incomes of less than $1,500 a year. Government loans and subsidies to local authorities.

75% TO PRIVATE INDUSTRY

2. Relatively low-cost houses, owner- and operator-built, for the $1,500-$3,000 income class.
3. Moderate-priced multiple-family dwellings or large groups of individual houses for both sale or rental.

TO AID PRIVATE INDUSTRY HE SUGGESTED THE FOLLOWING:

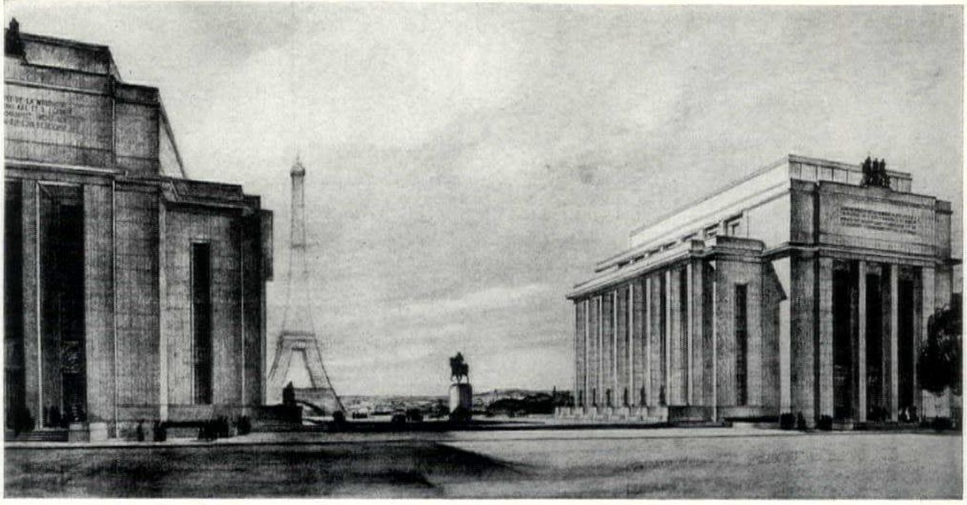
Widen area of Federal mortgage protection.

Small construction loans.

Expand National Mortgage Association ratio of debentures to capital funds from 12:1 to 24:1.

ENGINEERS CONVENE AT URBANA

Celebrating its 50th anniversary, the Illinois Society of Engineers convened at the University for a three-day session beginning January 29. Most of the papers presented celebrated the half-century of progress in the profession since the Society was formed — "Fifty Years of Water Works Progress," "Half a Century of Mechanical Filtration," "Five-Decade Review of Engineering Public Relations," etc.

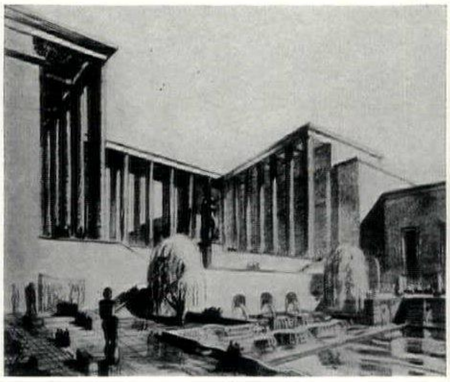


PARIS PLANS A NEW TYPE EXPOSITION

Modern large-scale expositions too often have no relation to the city plan. They seldom have any permanent value; and their increasing economic importance has never been sufficiently exploited. In 1937 Paris will open an International Exposition which promises to set new criteria in exposition planning. 156 acres on both banks of the Seine, in the heart of Paris, have been set aside as the site. Site preparation involves two types of improvement: (1) *Redemption of blighted areas* occupied by the Military Supply Depot, railroad yards, government warehouses, old buildings on Avenue Rapp. (2) *Permanent construction*—landscaping two-mile stretch of left bank, street and bridge widening, reconstruction of old Trocadero, construction of two new museums of modern art, and new auditorium to replace Trocadero.

The Exposition has many quite novel features. Exhibits will be selected purely on a basis of merit. No charge will be made for "commercial concessions," all general buildings being erected at the expense of the Exposition. Exhibitors will only be charged for special construction and for general charges of light, heat, insurance, etc.

It is apparent that a much greater degree of control can be exercised

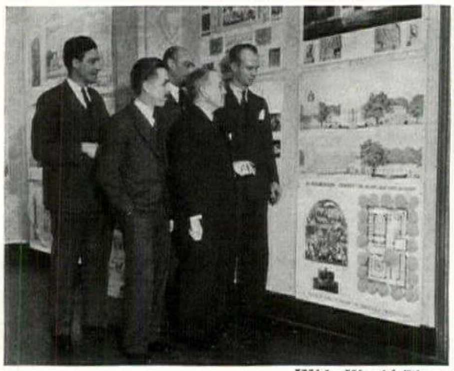


over the Exposition. In fact, the general exposition plan, evolved by 78 groups of French architects, has already been established. General arrangement, mass and silhouette of the various buildings being thus determined, the architects of individual buildings or exhibits can execute the individual plans. Light, advertising, even sound effects, are subject to rigid control.

The exhibits are so grouped as to make a visit to the fair physically easier than at former expositions. Buildings will be arranged so that direct access from the street is provided. All existing improvements (including trees and planting) will be carefully incorporated into the general plan.

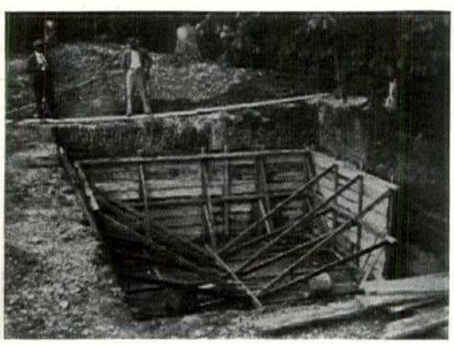
Fourteen main groups of exhibit material, subdivided into 75 classes, include: expression of thought, social problems, artistic and technical education, diffusion of artistic and technical knowledge (radio, newspapers, etc.), town planning and architecture, graphic and plastic arts, etc.

Julian Clarence Levi of New York is Chairman of the Committee on Foreign Relations, A. I. A., which is cooperating with the Exposition authorities.



Wide World Photo

First Prize in the Rome Collaborative Competition went to the College of Architecture at Cornell University. Seen with the prize winner, "A Recreation Center in Natchez, Mississippi," are the judges. Left to right: Michael Rapuano, Joseph Kiselewski, Edgar Williams, Berry Falkner and Francis Scott Bradford.



THE ARCHITECTURE OF FUNK EVOLVES

On his recent tour of America, the famous Frenchman, LeCorbusier, pointed out how completely his plans for rebuilding Paris recognized modern realities. Besides schools, playgrounds, natatoria and the like, his modern housing projects included bomb- and gas-proof cellars. Moreover, his plans were very open, which not only admitted plenty of air and sunlight but also made them expensive targets from the air and allowed poison-gas fumes to blow away with a minimum damage to plant and animal life.

Now from England comes this report of the latest modern convenience incorporated at a housing project in Ashford, Middlesex. "The walls will be of concrete, 2 feet thick, and the roof is to be of steel and concrete. The dugout will be reached by a sloping tunnel and a steel door. Already the popular press is talking about secret experiments by the authorities in making dwelling houses proof against gas. We shall soon be brought around to the happy prepared state of mind when practice gas attacks will be accepted as a normal state of affairs. Meanwhile the architecture of funk evolves. That's Progress, that was!"

ARCHITECTURE REORGANIZED AT HARVARD

With the fall term of 1936, the instruction in architecture at Harvard will be divided into two sections:

1. An *undergraduate course* of general preparatory nature:
   Sciences — physics, economics, sociology.
   History of art and architecture.
   Drawing.
   Introduction to theory and practice of design.
2. A *graduate professional* course:
   Design.
   Social requirements.
   Engineering.
   Mechanical equipment.
   Professional practice.

It is not the intention to offer an undergraduate professional course at Harvard. The intention is, rather, to make a distinction between that part of the curriculum which is wholly professional in character and that which is regarded as preparatory to professional study, and to work out a more logical and effective relationship among these. The Harvard School will remain a Graduate School.

COMPETITIONS AND SCHOLARSHIPS: 1936-1937

SYRACUSE UNIVERSITY, DEPARTMENT OF ARCHITECTURE

One $300 and four $150 scholarships to be granted by competition, which will be in two fields—*drawing* and *preparatory school record*. Contestants must submit (before July 6, 1936) portfolio containing not more than 20 examples of their work in freehand and mechanical drawing. High school records will constitute second part of submission. Further details, Dean H. L. Butler, College of Fine Arts, Syracuse, N. Y.

OLD WHITE ART COLONY

Three prizes — $200 with two weeks' study, $50 with one week's study, $25 with one week's study —are being offered by Old White Art Colony for the most striking picture of The Greenbrier Hotel and surrounding Estate. Open to anyone in the United States or Canada; material must be submitted by June 1, 1936. Further details from Robert B. Parker, Greenbrier Hotel, White Sulphur Springs, W. Va.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

A first prize of $100 and a second prize of $50 will be awarded to the student of engineering or of architecture submitting the best design for a grade elimination over-pass. Requirements: applicants must be students of recognized technical schools in the United States. Preliminary review will be held April 15, 1936; design award will be made May 13, 1936. Further information from American Institute of Steel Construction, 200 Madison Avenue, New York City.

CHICAGO ARCHITECTURAL CLUB

Practical course in architecture free to all club members, covering all phases of office work from preliminary sketches to finished working drawings. Opened February 10, 1936.

ROTCH TRAVELLING SCHOLARSHIP

Preliminary examinations for the Rotch Scholarship will be held April 13. Applicants must register on or before April 1. Further information from C. H. Blackall, Secretary, Boston, Mass.

A.I.A. ASKS BUILDING INDUSTRY TO AVERT "JUNGLE LAW"

With a plea to all architects, contractors, manufacturers and labor to pull together, the Committee on Industrial Relations issued a broadside at "cut-throat" competition and suggested instead "co-operative" competition.

To this end, the Committee suggests that a building congress or construction league be organized in every community; these in turn will be members of a Construction League of the United States, and this Construction League will then act as a self-ordained body to save the construction industry from the "jungle law" of open competition.

AWARDED

TO JOHN RUSSELL POPE: A $10,000,000 ART GALLERY

Selection of Mr. Pope as architect for the new $10,000,000 art gallery in the national Capital has been made by the A. W. Mellon Educational and Charitable Trust. The structure, which must be completed by mid-year 1941, will house the $40,000,000 Mellon collection of art. This collection, it is planned, will act as a nucleus for a national gallery of outstanding works of art.

TO CLEVELAND ARCHITECTS: GREAT LAKES EXPOSITION STRUCTURES

To Walker and Weeks: A $100,000 bridge to connect the upper and lower levels of the Great Lakes Exposition at Cleveland, to be held June 27 to October 4. The same firm has also been awarded the contract for underpass beneath East 9th Street, to connect amusement zone with main exposition grounds.

To Anthony Ciresi went first prize for the exposition's main entrance in a competition open to architects of Cuyahoga County. The award was the contract for the entrance job.

An Electrical Building, 540 feet by 180 feet, is being designed by Hays and Simpson. Antonio De Nardo is the designer of the Transportation Building; Warner and Mitchell of the Horticultural Building.

PERSONALS

Mr. Stephen F. Voorhees, President of the American Institute of Architects, and of the firm of Voorhees, Gmelin and Walker, architects, of New York, has accepted an appointment to the Committee for Economic Recovery.

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The United States Texas Centennial Commission has engaged E. H. Burdick, veteran exhibit planner of A Century of Progress and the California Pacific Exposition, to "harmonize the Government and Negro buildings into a comprehensive, educational and pleasing ensemble."

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Appointment of Prof. Leopold Arnaud as Acting Dean of the School of Architecture of Columbia University has been announced by President Nicholas Murray Butler. Beginning in 1927, in University Extension in Columbia, he joined the faculty of the School of Architecture as instructor in 1932 and in 1935 was appointed assistant professor. He replaces a committee which has administered the School since Joseph Hudnut resigned as Dean last year to go to Harvard.

OBITUARIES

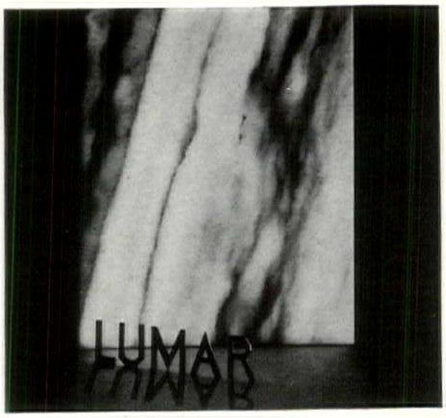
HARRY W. DYER, of New York City, died January 28 following an operation. Mr. Dyer, a graduate of M.I.T., was for 17 years a practicing architect. A number of successful inventions gradually drew him into the business world until, at his death, his patents covered a range from revolving doors and electric water coolers to automobile bumpers and children's wheeled toys. Always deeply interested in art, Mr. Dyer was a competent etcher. He was a member of the Architectural League of New York, the Art Students League, and the Salmagundi Club.

•

Widely known for his development of the "open-type plan" in school buildings, WILLIAM B. ITTNER, architect, of St. Louis, Mo., died January 26. Mr. Ittner had planned 430 buildings in 28 states, the majority of which were high school and college buildings. Long prominent in civic and professional circles, he was awarded an honorary degree by the University of Missouri in 1930.

•

Died, on December 9, JOHN PARKINSON, a prominent architect on the West Coast. Life member of the American Institute of Architects, former member of the Los Angeles Municipal Art Commission, Mr. Parkinson's death ended a 46-year career in architecture, during which he designed a large number of commercial and public structures. Especially notable was his reconstruction of the Los Angeles Coliseum, of which he was the original designer.



"LUMAR*"

A NEW MARBLE PRODUCT

CREATED BY SCIENTIFIC RESEARCH

Because marble is a naturally occurring material the main applications of modern science have been in its production. Methods have been improved and efficiencies increased so that now marble is relatively cheaper than ever before. The Vermont Marble Company, feeling that it was strictly up to date in production methods, began several years ago a scientific study of the product itself. Such research work was quite new in the marble industry. This condition has existed because marble has served its purpose very well in general through centuries of use. One aim of the research sustained by the Vermont Marble Company is to ascertain in minute detail the structure and properties of every well-known type of marble and thus to enable the recommendation of the very best type of stone for a specific purpose. All the tools of modern science are being utilized in this work. The finest details of the crystalline and subcrystalline structure are under scrutiny; the physical and chemical properties are being measured in exactness and in full.

Another objective in this research is to discover ways and means to bring out the natural beauty of marble to a maximum degree. Here "natural" should be emphasized. In the past the plainer marbles have been stained and colored in order to increase variation and interest. The Greeks used polychromy to a large extent and it satisfied their sculpture and architecture. But the tinting of marble is easily overdone and is likely to yield garish unnatural effects. As is well known, the beauty of marble comes from the leisurely but powerful art of nature. It is extremely difficult, if not impossible, for man to heighten or to supplement this natural effect in a truly artistic manner.

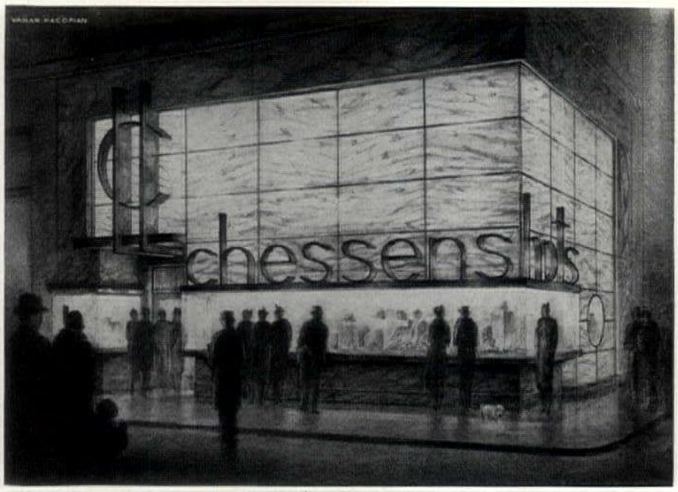
Marble is of course a solid material; it has length, breadth, and thickness. But only two dimensions are normally available to the beholder, and hence even the most beautiful stone has much of its attractiveness sealed within it. As a result of some of the research of the Vermont Marble Company, a method has been evolved for revealing the internal beauty of marble. In a very real sense the third dimension of the solid stone has been disclosed. This result has been accomplished in an entirely natural way; garish, artificial effects are impossible.

This accomplishment is possible because a major constituent of all true marbles is crystalline calcium carbonate, or calcite. Pure calcite occurs in clear pellucid crystals that transmit light with great ease. Large calcite crystals, as transparent as glass, are used in optical instruments and are frequently called Iceland spar. White marble is a rigid, interlocked assembly of such clear crystals. The light-transmitting properties of a single calcite crystal vary with the direction of the incident beam. With multicrystalline material, complete analysis is extremely involved and its better understanding is the scientific basis for this new product. Stones of certain crystal structure are especially adaptable to transmit light and are partially transparent or translucent in relatively thick sections. This scientifically selected and specially processed marble has been called "Lumar."

This luminous architectural element provides beauty and light in an entirely new form. The light provides a brilliant warmth and aesthetic appeal that exceeds that of glass or other luminous mediums. The internal coloring may be brought out in every degree from a dull warm glow to a brilliant radiance. At this time, when the trend is away from ornamentation and in favor of color, the natural beauty of "Lumar" has general appeal.

A wide range of colors and types of "Lumar"

* Trade mark "Lumar" copyrighted and patent applied for. The major portion of the scientific work of the Vermont Marble Company is being carried on by an Industrial Fellowship (R. C. Briant, incumbent) at Mellon Institute of Industrial Research, Pittsburgh, Pa. Mr. Briant has cooperated in the preparation of this article. Professor George W. Bain, of Amherst College, as consulting geologist for the Vermont Marble Company, has also cooperated in the scientific basis of "Lumar" development.



A

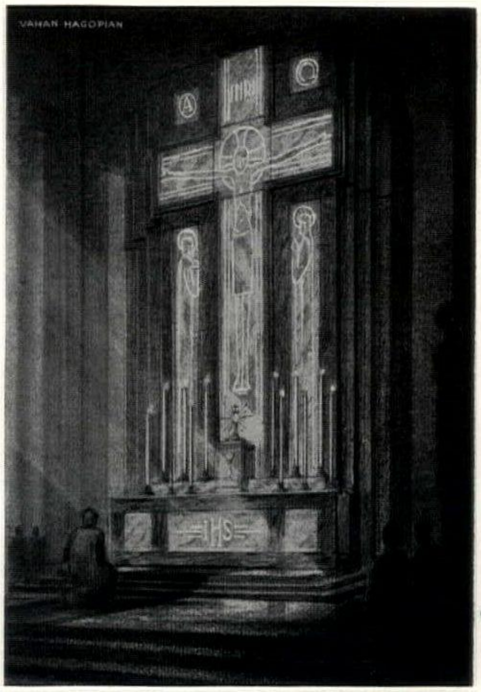
is available. Further possibilities of variation are offered through the use of colored lights and combinations of lights. "Lumar" has light diffusion characteristics equal to or superior to those of diffusing glasses. Spotty uneven illumination is virtually impossible, even with wide spacing of light sources.

For interior lighting installations, where extra brightness is required or where the average light intensity is high, thin one-fourth inch "Lumar" may be used. As it weighs only about three pounds per square foot, it is indicated where light weight is necessary. A range of translucencies are available in each type and color. Panels larger than two square feet total area or over two linear feet for one dimension are not recommended in one-fourth inch thickness. This particular thickness should find its greatest application in lighting fixtures of the panel, trough, or pan types, and flush illuminating areas for ceilings and walls. When used in indirect lighting installations, the highly efficient reflection qualities of "Lumar" are further enhanced by the beauty of the transmitted light.

Where medium-sized panels are needed, and where weight is unimportant, one-half inch thick "Lumar" is desirable. This marble is available in panels up to about four feet on a side or a total area of twelve square feet.

It must be emphasized that the glare commonly obtained with large illuminating units is absolutely absent; furthermore, aside from the markings in the stone, the surface density of the light is uniform. "Lumar" is characterized by extremely high light-diffusion factors.

For very large or exposed panels, where weight is unimportant and considerable strength is necessary, three-quarter inch thick "Lumar" is advised. It is also of utility where the general light intensity is low and high surface



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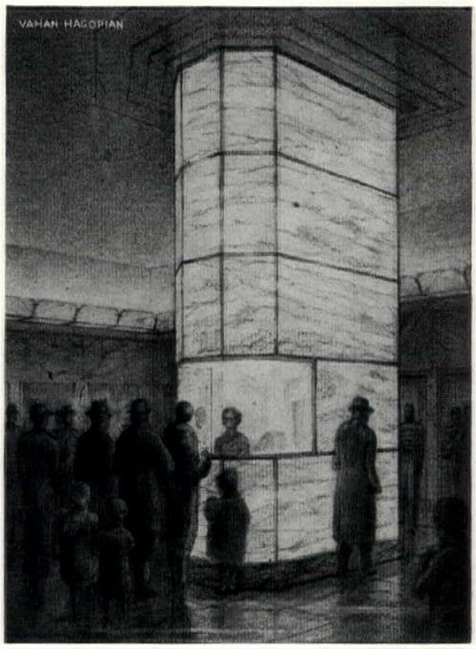
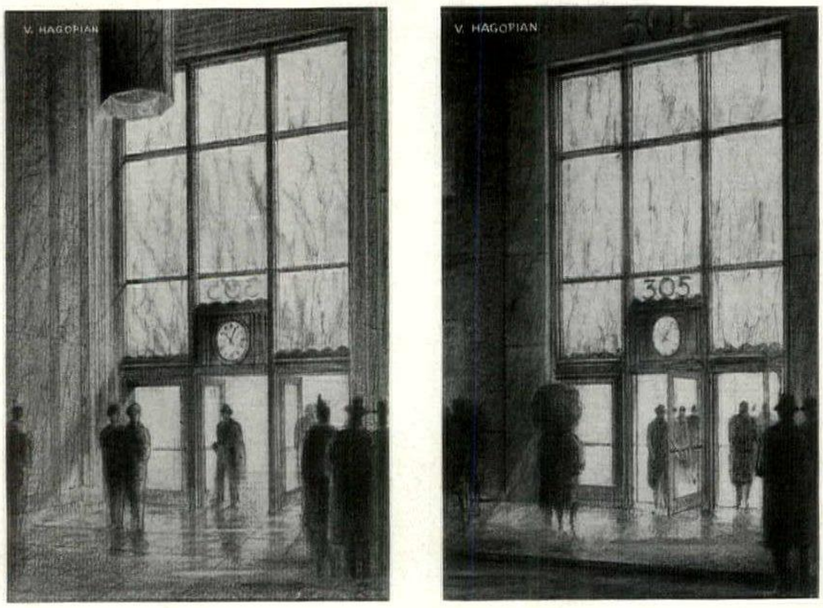


C

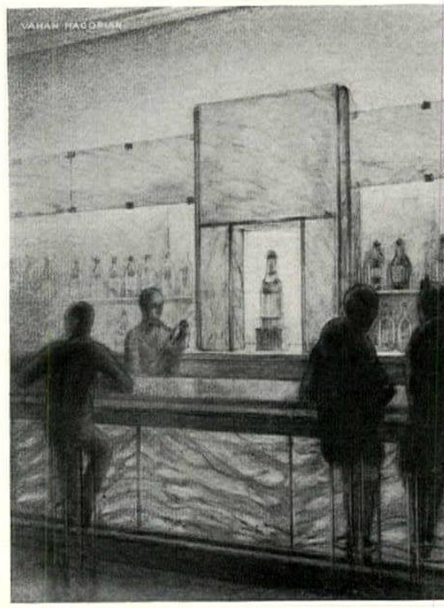
A SKETCH BY VAHAN HAGOPIAN SHOWING DECORATIVE USE OF LUMAR IN A STORE FRONT. The window height is lowered to its useful height, Lumar filling the space above. Its natural veining is a decoration at day, and its translucency illuminates the store interior. At night Lumar, lit from the leakage of the window reflectors, is an added feature to attract attention to the store.

B SKETCH BY VAHAN HAGOPIAN SHOWING USE OF LUMAR IN THE CONSTRUCTION OF A HIGH ALTAR. Lumar is used here for its translucent effect. The cross and the accompanying panels in the reredos are slabs of sand-engraved Lumar set up in the marble construction of the altar and reredos. Here it is suggested not to use regular low relief sculpture but to stylize the figures by using a drawing made with a sand-blasted groove.

C SKETCH BY VAHAN HAGOPIAN FOR LOBBY OF A MOTION PICTURE THEATER. Lumar is used here decoratively for the face of the ticket booth allowing it to glow and form a center motive of the composition. It is also used as a continuous cove lighting fixture, advantage being thus taken of the highly reflective quality of Lumar which here, in addition to acting as a reflector, allows this reflector to be luminous.



SKETCHES BY VAHAN HAGOPIAN FOR THE USE OF LUMAR IN INCLOSING THE OPENING ABOVE THE DOORS OF AN ENTRANCE LOBBY. LEFT: A view of the interior of the lobby illuminated by natural daylight through Lumar. RIGHT: The exterior by night when the translucent properties of Lumar transmit the artificial light of the interior and thus add to the decoration of the building.



SKETCH BY VAHAN HAGOPIAN FOR AN INTERIOR OF A BAR. Lumar is used here: A. For general illumination as a translucent shade for a continuous wall bracket. The light is allowed to escape freely and illuminate the walls which, in turn, indirectly light the room. B. Lumar is used decoratively only as a front to the bar itself, taking advantage of its translucent qualities.

brightness is not desired.

"Lumar" is available only in flat surfaces and hence it must be limited to paneled uses. It should find application as luminous pilasters, columns, posts, spandrels or frieze courses in theaters, banks, store fronts, restaurants, and a wide variety of commercial building exteriors. Suggested interior uses are radiant wall and ceiling panels, show cases, beams, and columns. In banks, drug stores, and bars, it will be used as free-standing screens, display table tops, window valances, and as bar panels, backs and tops.

Its fighting fixture possibilities are still more numerous. In theaters and churches it may serve in unusual trough, cove or cornice lights; in the home, as bathroom lighting panels, ceiling luminaires, lamp shades and lanterns. Its dignity is peculiarly adaptable to churches where it may be employed advantageously in windows and as warm altar and chancel panels.

Ordinary electric bulbs are used in "Lumar" installations, and the wattage depends upon what the designer considers necessary, varying from a dull glow to a brilliant light. The general illumination intensity is important, however, higher wattages being required if adjacent lighting is brilliant. "Lumar" does not depend upon brilliance or color to attract attention, this characteristic being easily obtained at low intensities.

The approximate finished weight of "Lumar" ready for installation, is

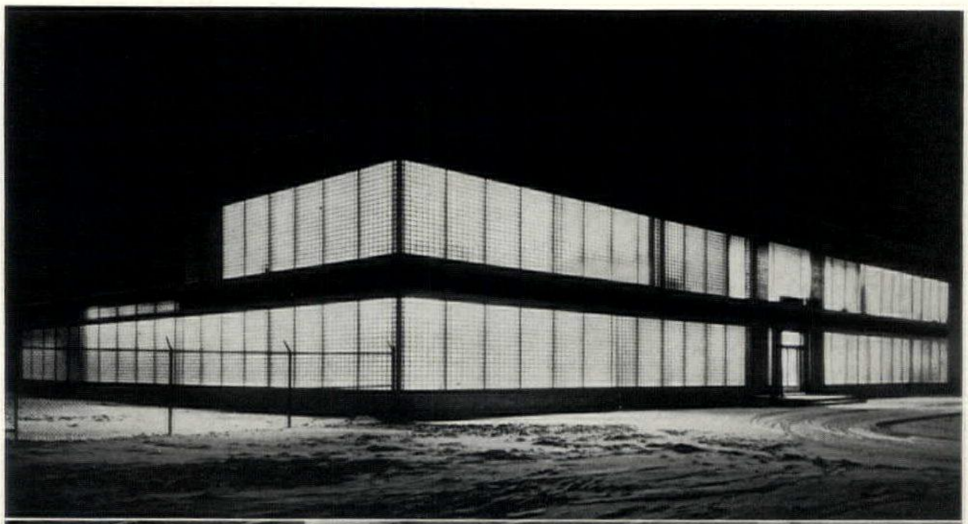
¼"—3½ lb. per square foot.
½"—7 lb. per square foot.
¾"—10½ lb. per square foot.

"Lumar" is usually supplied polished. Carved, lettered or ornamental features can be added to the ½" and ¾" product.

It is obvious that no hard and fast figures can be given for the amount of illumination required. On the basis of ½" "Lumar," the wattage indicated below will give adequate and pleasing results if adjacent lighting is somewhat subdued:

	PER SQUARE FOOT
"LUMAR YULE" (finely linea striations, golden brown markings)	3 watts
"LUMAR PAVONAZZO" (green clouds floating in a field of deep creamy yellow)	7 watts
"LUMAR GREEN VEIN" (Sunset colors, crossed by bands of soft green)	10 watts
"LUMAR BROCADILLO" (bands and bars of alternating green and yellow)	10 watts
"LUMAR ANTIQUE" (golden—combination of light and dark wavy effects with crystal clear areas of quartz)	15 watts
"LUMAR RED" (garnets and mandarin reds)	50 watts

TECHNICAL NEWS AND RESEARCH



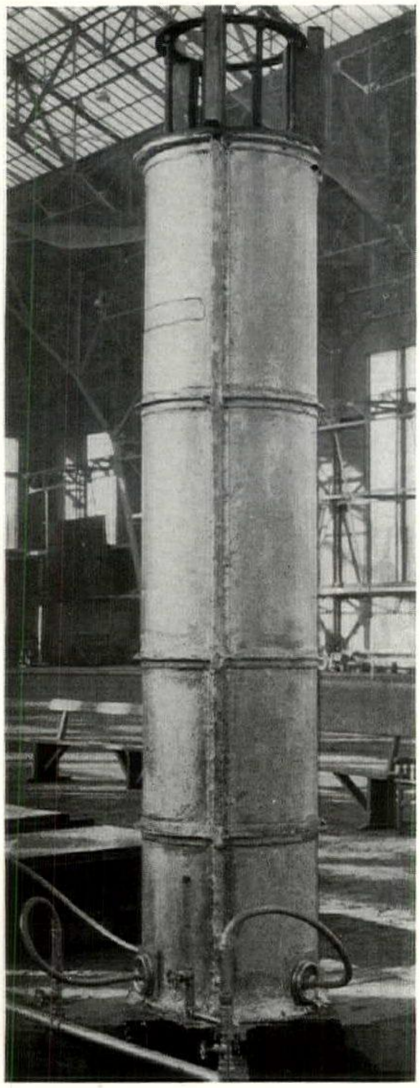
ALL-GLASS WINDOWLESS BUILDING FOR PACKAGING RESEARCH

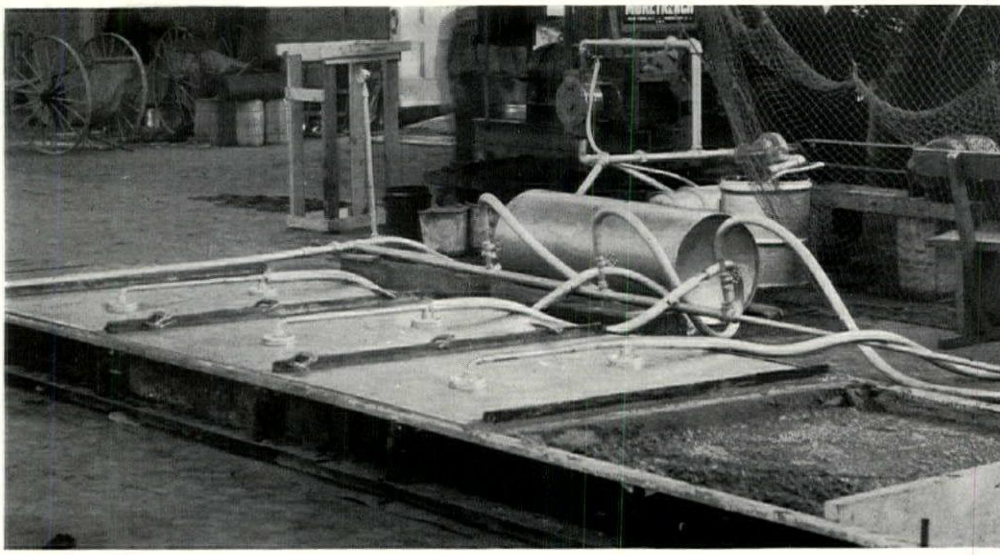
New laboratory of Owens-Illinois Glass Company, Packaging Research Division, in Toledo. Architects: Walker and Weeks.

This structure houses 5 laboratories, a large reference library, 7 private offices for research executives. Floor area: 20,000 square feet. Construction: 80,000 translucent Insulux hollow glass blocks laid by ordinary brick masons; total weight 150 tons. In compression tests made at Purdue University, the blocks withstood pressure of 72,500 pounds. (For additional information on Insulux, see Sweet's Catalog File 3/29.)

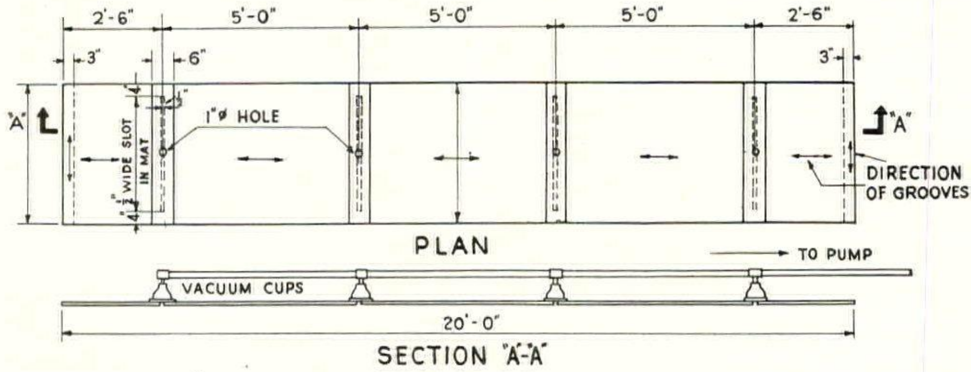
Atmospheric control: Being almost airtight, the building requires an air conditioning system capable of supplying completely the requirements of all occupants. Ordinary infiltration is entirely eliminated as a source of partial ventilation. Under maximum conditions the equipment furnishes 26,000 cubic feet of air a minute (12,000 fresh air, 14,000 recirculated). The flow of air comes through grilles at top of partitions and is returned at floor level without causing drafts; the air is cleaned of dust and foreign matter by passing through fibrous glass filters. Individual thermostat controls in each private office make possible a wide range of atmospheric conditions at any one time. . . . Solar heat penetration is 25% to 40% less through the partially vacuumized glass blocks, compared with equal areas of single-glazed steel sash for the mid-day period of 4 hours, according to the Purdue University tests. Ceilings are insulated with fibrous glass cotton, which also acts as a sound-deadener.

Light control: Although the building has no windows, exterior walls and interior partitions transmit as much as 86.5%, as little as 11.7%, of the light falling on outside surfaces, depending on selected block patterns. The light coming through partition in the centrally-located laboratory (shown above) is transmitted from the exterior through two other glass block walls.

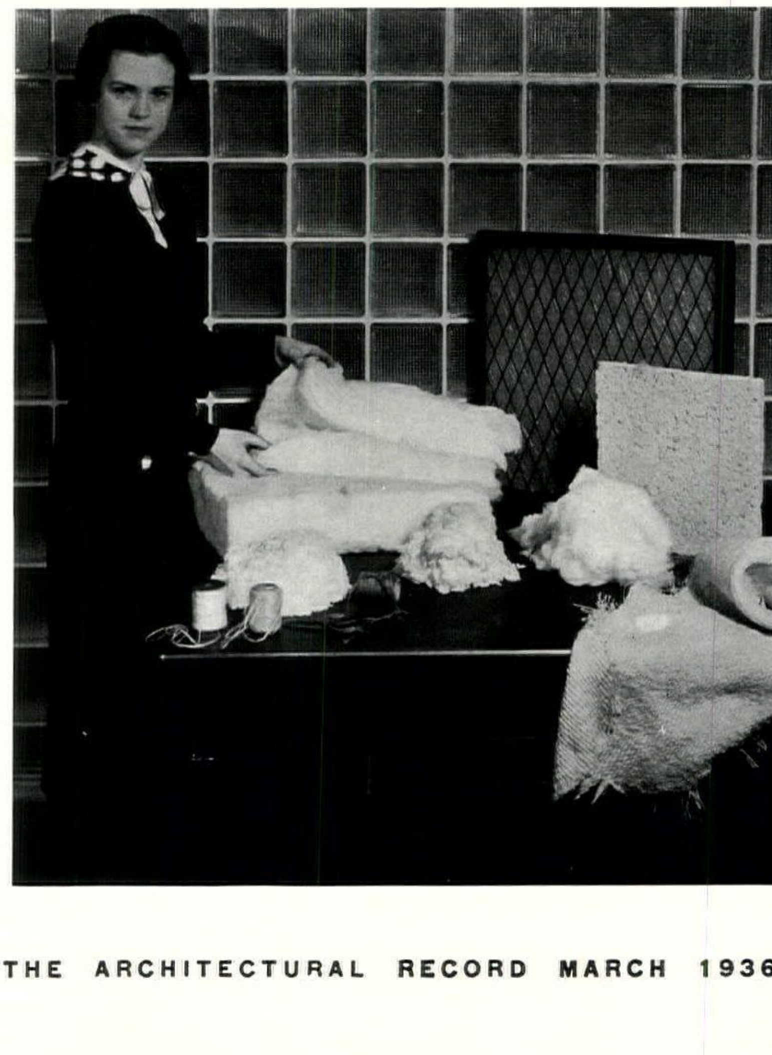


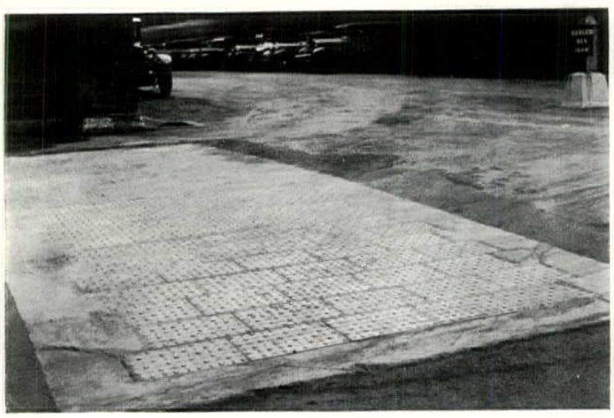


tests at Yale show that vacuumizing speeds up hardening of concrete columns and floors



bricks, wool, cotton, thread, yarn, fabrics . . . all are made of glass





steel protects concrete

VACUUM CONCRETE
promises speedier jobs, taller buildings

Process invented by Karl P. Billner, engineer (also developer of Aerocrete: see Sweet's Catalog File 3/58), 30 Rockefeller Plaza, New York. Company now being formed to lease equipment to contractors.

The weight of the atmosphere itself (about 14.7 pounds a square inch at sea level) is put to work in this new method which speeds up the hardening of concrete. Water required for a plastic mix is squeezed out, yielding a denser, stronger concrete than can be obtained with ordinary evaporation of the excess moisture not needed for hydration of the cement.

Method: Rubber or metal mats are placed over the slabs of freshly poured concrete. Pipes connect the mats at several points with a vacuum pump. As air and water are sucked out from under the mats, the internal pressure is decreased and the outside atmosphere begins to exert its force until a pressure of about 1,400 pounds a square foot is acting compressionally on the concrete. The concrete, still in a plastic state, is pressed into a solid composition, filling up all spaces from which the water is withdrawn. The compact molecular cohesion produced by the vacuum process gives increased strength to the concrete, which in turn reduces the likelihood of future shrinkage. . . . The more uniform internal structure thus obtained permits speedier construction. Vacuumizing is faster than the pouring, so the two processes are easily coordinated. Mats can be removed in 20 minutes and workman can walk over the newly laid concrete without leaving footmarks. Within two days roads can be used for passenger car traffic and within a week by heavy trucks.

Tests: According to the findings of Prof. Theodore Crane and Prof. Duff Abrams (Yale University), concrete treated by vacuum compression showed strengths 53% to 81% greater than those of untreated samples taken from the same batch of concrete. The increased density of the concrete minimizes the possibility of future shrinkage and consequent cracking, a major difficulty in concrete construction. . . . In the official tests, a reinforced concrete column, 25 inches in diameter and 10 feet in height, was demonstrated. A 1:2:4 mix, showing a slump of about 5 inches, was poured into forms and vacuumized; the forms were removed within one hour instead of the usual 24, and a column of satisfactory rigidity was revealed.

Finishes: Cement surfacings respond to vacuum drying even better than concrete; tests show that a stronger bond is obtained between the cement and the concrete. As soon as mats are removed the workmen have merely to smooth the surface of the cement mortar with steel trowels to obtain a glossy finish; they can do this without using knee-boards. Walls and ceilings can be similarly stuccoed or hand-finished.

Economies: Vacuum compression speeds up the construction of concrete buildings to the same rate at which steel structures are erected. The higher strength concrete permits designing engineers to use thinner floor slabs and columns of smaller cross-sectional area. Taller buildings become possible; according to the inventor, the practical limit for concrete construction may be raised from 15 stories to 20 stories. In road construction it is estimated that the present average cost will be lowered considerably through economy of materials; if the quantity of materials is not reduced, a road surface of much greater durability can be obtained.

GLASS FIBERS
for insulating, filtering, fireproofing

New process developed by Owens-Illinois Glass Company, Industrial Materials Division, at Newark, Ohio, plant. Manufacturing licenses issued to a glass factory in Dusseldorf, Germany, and to Corning Glass Works, Corning, N. Y.

A fibrous glass available in Europe has been produced by directing glass rods heated to a semi-liquid state onto revolving steel drums which draw the material into filaments by centrifugal force; speed of production has been limited and manufacturing costs have been high. By a secret process utilizing ordinary glass and steam, the Owens-Illinois technicians have succeeded in producing glass fibers at the rate of more than 260,000 feet a minute (3,000 miles an hour) in commercially practical quantities. . . . The American glass weighs only 1½ pounds a cubic foot, the European product 6 pounds. Three different forms are now available in integral fadeproof colors (white, blue, black, red).

Glass wool: A fluffy mass of fibers, 1 yard wide and 4 inches deep, emerges from furnaces on a conveyor and is cut to size by an automatic slicer. The packs, placed between walls and floors, form insulation that is fire, vermin and moisture proof and impervious to all acids except hydrofluoric.

Glass air filters: Fibers the size of broom straw are assembled into mats 2 inches thick and sprayed with a chemical adhesive. Properly encased, they are installed in warm air furnaces and ventilating system. (See "Dustop" in Sweet's Catalog File 26/44.)

Glass slivers: Fibers 20 times less in diameter than human hair are twisted into thread and yarn as insulation for electric wire and large cables. Stunts like knitted glass hats and woven glass rugs suggest the use of glass textiles to reduce fire hazards in theatres, restaurants, and ships at sea.

STEEL PAVING PLATES
for concrete floors, roads

Produced and marketed by Bethlehem Steel Co., Bethlehem, Pa.

Plates are designed for installation on the surface of concrete slabs to which they are anchored and with which they become an integral part.

Application: One type of plate is available for thoroughfares, such as tunnels and bridges, that carry extremely heavy continuous traffic. Another type finds use in warehouses, breweries, docks, and loading platforms where heavy goods are ordinarily conveyed on trucks with steel wheels of small diameter and small flange width, which are very hard on floor surfaces.

Installation: Both types are identical, except that the one for roadways is equipped with button-head studs, making it a non-skid plate. Sides are perpendicular to the surface, and crimped; additional anchorage is provided by studs which extend into the concrete. The fresh concrete fills slots in the top of the plate, providing additional bond between concrete and plate, at the same time increasing its non-skid surface. The floor-type plate has a smooth surface; long-shank anchorage studs, with flat heads, fasten through countersunk holes, making them flush with the top surface.

ENAMEL FINISH
resists acids, gas fumes

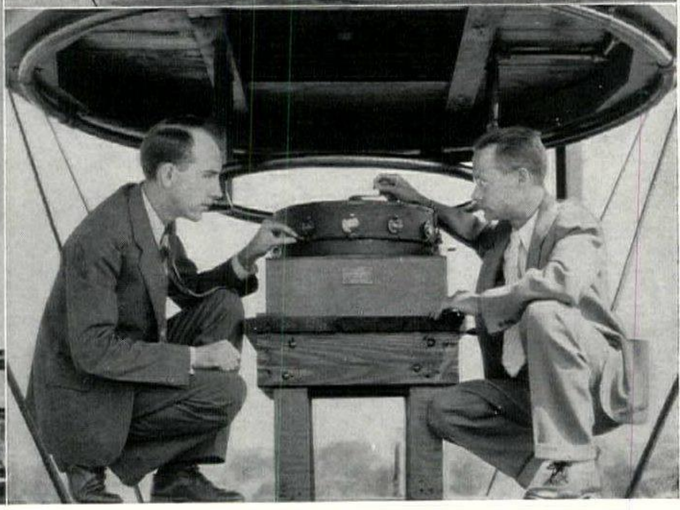
O'Brien Varnish Co., South Bend, Ind. (See Sweet's Catalog File 16/27.)

"Liquid Lite" is a quick-drying gloss enamel, which can be used as a coating for wood, concrete, brick, metal, plaster or wallboard. It is said to maintain its original color and luster much longer than ordinary enamels in the presence of deteriorating gases. It is intended for use in bakeries, dairies, ice cream plants and all industrial buildings where the presence of acid and fumes causes the premature breakdown or discoloration of paint.

MASTER ANTENNA SYSTEM
for multiple-set dwellings

Introduced by Technical Appliance Corp., 17 East 16 Street, New York. Installation by any experienced contractor or service man.

As many as 25 sets may be operated on a single aerial and downlead, taking the place of the usual jungle of individual aerials. The system comprises: (1) antenna unit connecting doublet antenna with (2) downlead transmission line, which in turn connects with individual (3) set coupler for each set to be operated on system.



behind steel and glass G-E engineers "shoot" power-disrupting lightning flashes

STRUCTURAL ANALYSIS . . . lightning, earthquakes, photo-elasticity

OBSERVATORY
built for study of lightning

General Electric Company, Pittsfield, Mass.

In this structure General Electric research engineers, directed by K. B. McEachron, expect to obtain new information on natural lightning, on the basis of which safeguards against lightning damage and interruption can be made in the transmission and distribution of light and power.

Observatory: The building is circular, 14 feet in diameter. It is constructed almost entirely of metal and glass, and is completely grounded to the steel framework of the building on which it stands. The exterior is painted an aluminum color, the interior surfaces a flat black to prevent reflections. . . . When a thunderstorm breaks in the vicinity the engineers step into a small room in the center of the observatory, made light-tight by dark curtains. They peer into the eyepiece of a 360-degree periscope which projects through the roof. Directly under the platform of the observatory is a specially designed high-speed camera with 12 lenses ready at a moment's notice to photograph the lighting strokes. The camera lenses, because of their necessary exposure, are protected against rain by a curtain of compressed air jets. . . . The photographs show C. J. Kettler, builder of camera, and W. L. Lloyd, Jr., lightning research engineer, preparing the apparatus for use.

Lightning studies: G-E research engineers have made many special investigations of natural and artificial lightning. Flashes of 10,000,000 volts have been artificially produced. Facts gathered during the past 12 years have been interpreted in the laboratory and translated into transmission and distribution equipment better able to withstand lightning voltage. . . . Steel buildings, it has been found, are the safest places when lightning flashes. The chance of being struck in the home is one in several million.

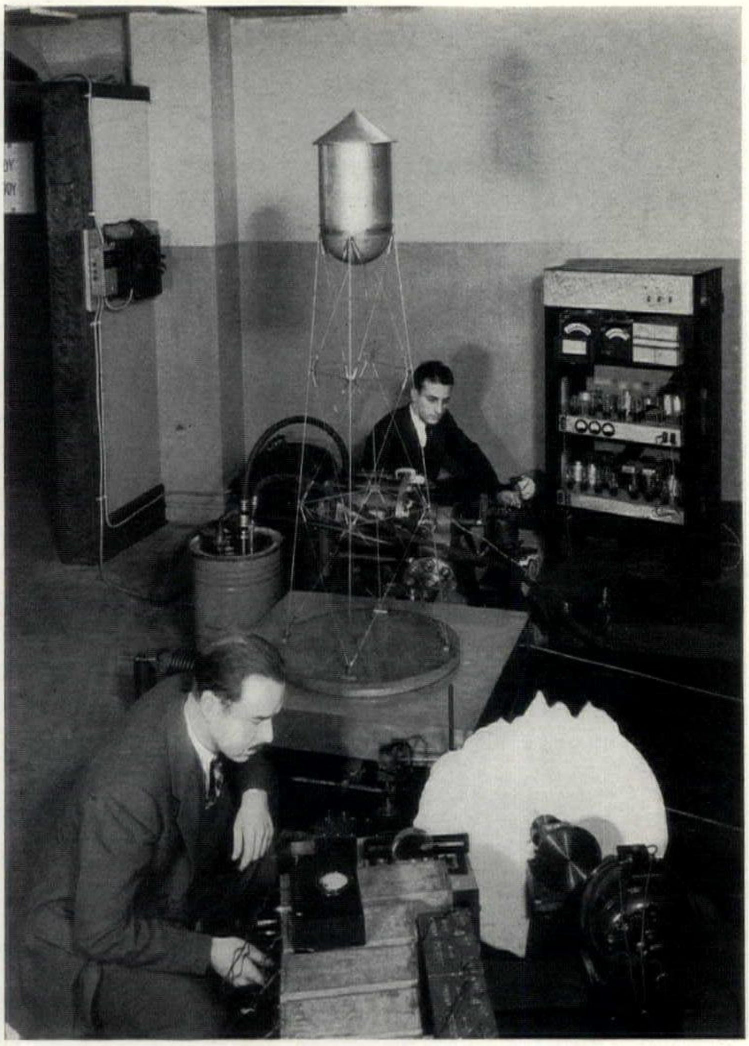
MODEL EARTHQUAKES
for testing building designs

Earthquake reproducer designed by Arthur C. Ruge, Research Associate in Seismology, in consultation with Dr. Vannevar Bush, Vice-President and Dean of Engineering, Massachusetts Institute of Technology.

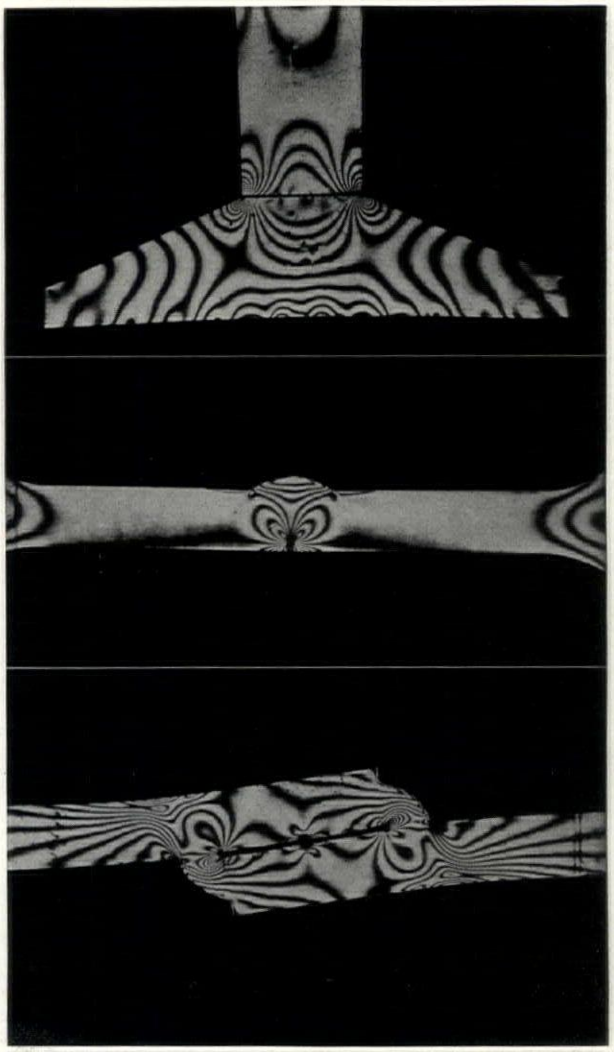
This shaking table for the first time makes it possible to duplicate in the laboratory the motions of destructive earthquakes directly from seismograph records. The new machine is used to study the destructive effects of earthquakes on buildings and other structures by means of scale models.

Operating mechanism: A "shadowgraph" (really an optical cam) is made from an actual seismogram by silhouetting the wavy line which represents the quake-motion. The white shadowgraph shown in the laboratory view is a seismogram of the 1933 earthquake at Long Beach, California. A pencil of light (an electric "eye") is the only connection between this device and the shaking table on which the scale model (in this case, an elevated water tank) is being tested. Beyond the model is the driving mechanism. The primary driving power is obtained from oil under pressure working against a piston connected to the platform, which is free to move in any direction. The electric analyzing device controls a valve which feeds the oil into the piston chamber. This valve transmits to the piston every detail of the earthquake waves as seen by the electric eye.

Special features: Heretofore shaking tables and devices have been capable only of simple



model earthquakes shake structural models



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internal stresses are made transparent

back-and-forth motions. The new machine has no limitations as to how irregular an earthquake it can reproduce. All that is necessary to change from one quake motion to another is merely to pass a different shadowgraph in front of the electric eye. Although forces of over 2,000 pounds can be produced when necessary, the shaking table produces only the amount of force needed to make it follow the shadowgraph properly. Since the forces generated by the machine are exactly known, it is possible to observe by means of models how structures would be affected by a given earthquake. . . . Up to the present only a few quakes have been recorded within damaged areas, but information of engineering value is currently being gathered by the United States Coast and Geodetic Survey.

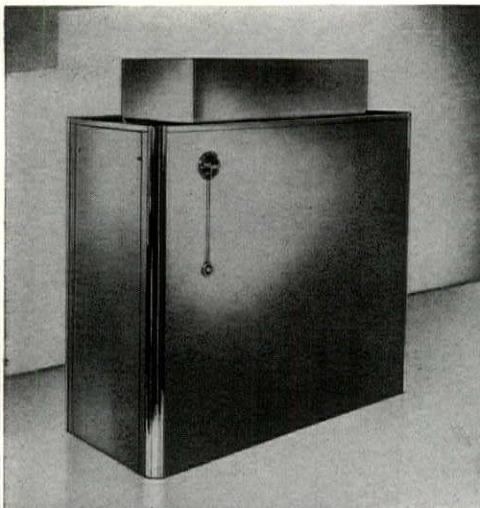
PHOTO-ELASTICITY
permits analysis of internal stresses

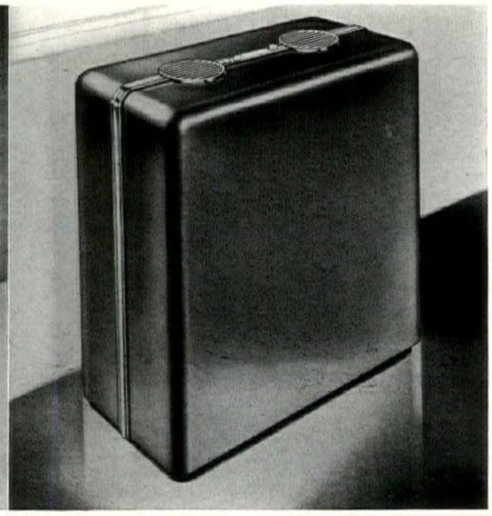
Stress analysis by means of polarization (see section, "Polarizing Glass," page 243) is being investigated at Massachusetts Institute of Technology, Department of Mechanical Engineering. This work is chiefly in the mechanical field; comparatively little attention has been paid to structures, primarily because structural stresses can usually be determined analytically with greater speed and precision than by any model method. The following report of these studies has been specially prepared for The Record by Robert W. Vose, instructor in photo-elasticity.

When stress is applied to practically any transparent material, changes occur in the speed of transmission and type of vibration of light passing through the material which are characteristic of the imposed stress. In engineering these phenomena are used, under the name of photo-elasticity, in determining the stresses in transparent models of structures, and by analogy in their prototypes.

Stress analysis: While in theory three-dimensional stress systems may be analyzed by the method, in practice only two-dimensional systems, as occur in flat plate models, can be handled. In such cases the stress condition at a given point may be completely described by the two "principal stresses" and their directions. Through the use of proper polarizing equipment light may be guided through the planes of these stresses, and their magnitudes and directions determined. . . . While progress is continually being made in the field, photo-elasticity has many limitations, and cannot be considered a "cure-all" for problems in engineering design. Perhaps its greatest use lies in the education of designers, since it presents visually facts which may otherwise appear only as abstruse mathematics.

Applications: From the problems which have been handled in the Photo-Elasticity Laboratories at the Massachusetts Institute of Technology the following have been selected as being of interest. . . . Figure 1 is the photo-elastic picture of a section of a wall and wall footing resting on soil pressure and loaded to simulate the weight of a structure above. Points of interest are the concentrations of stress at the lower corners of the wall, and the light soil pressures at the edges of the footing. . . . Figures 2and 3 represent sections taken through two different types of welded joints. The butt weld shown in Figure 2 illustrates a common defect—incomplete fusion—and the extreme stress concentrations accompanying it, while the lap joint shown in Figure 3 exhibits the eccentricity, bending, and concentration which unavoidably accompany this type of joint.





2 . . 1 **Herman Nelson Corp. units**

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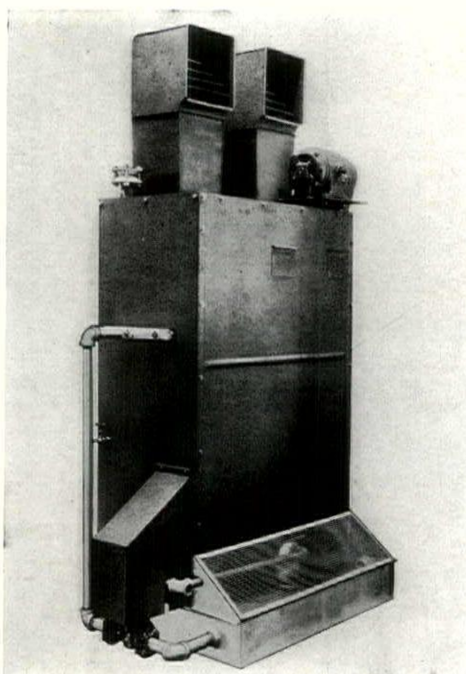
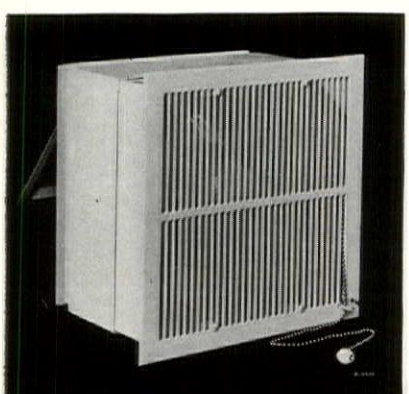
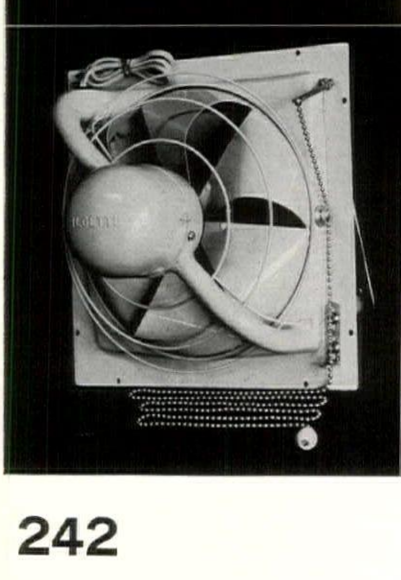
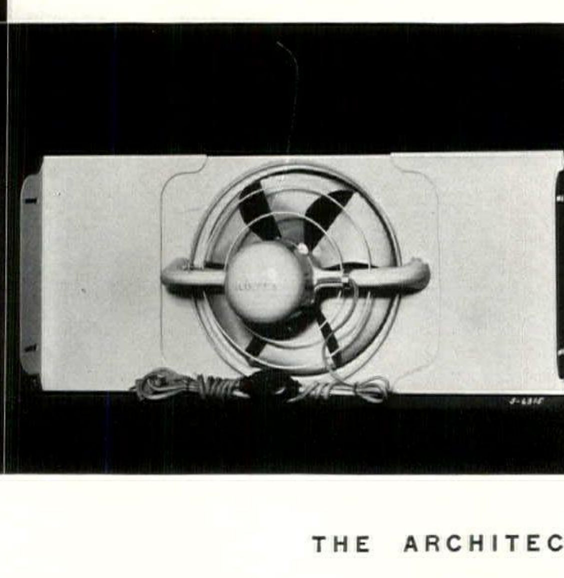








7 **York Economizer**

5 . . 6 **Ilgette Kitchen Ventilators**

AIR CONDITIONING
heating . . . . ventilating

AUTOMATIC EQUIPMENT
for residential, commercial fields

Introduced by The Herman Nelson Corporation, Air Conditioning Division, Moline, Ill.

Self-contained summer air conditioner: Cools, circulates, dehumidifies. . . . Illustration 1.

Oil-burning air conditioning furnace unit: Designed to provide air conditioning for comfort—heating, air motion, humidification and air cleansing with optional cooling and dehumidification. . . . See illustration 2.

Conversion oil-burner: Gun or pressure type. . . . Illustration 3.

KITCHEN VENTILATORS

Introduced by Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago. (See Sweet's Catalog File 26/62.)

Capacity—400 c.f.m., 45 watts. Speed of 1,550 r.p.m. Self-cooled, non-radio-interfering motor.

Built-in-the-wall Ilgette: When chain is pulled down, the fan unit is started and a weather-tight outer door is opened. . . . See illustration 4.

Window built-in Ilgette: Mounted in place of a pane of glass. Illustration 5.

Portable window Ilgette: Two adjustable panel sizes: 26" to 36" and 36" to 46". Larger sizes on order. . . . Illustration 6.

YORK ECONOMIZER

Produced by York Ice Machinery Corporation, York, Pa. (See Sweet's Catalog File 26/21.) Available in a number of standard factory-built models, with capacities ranging from 3 to 50 tons of refrigeration; larger sizes assembled to order.

This apparatus reduces the water consumption of air conditioning systems by about 99% depending on operating conditions. It is a combination forced draft cooling tower and refrigerant condenser, for indoor or outdoor installation. . . . See illustration 7.

TIMKEN GC BURNERS

Introduced by Timken Silent Automatic Co., Detroit.

Moving parts have been reduced to a minimum for pressure-type burners. Installation costs are lowered through use of standardized refractories. A "flame control" device insures control of the air supply. Five sizes are available, ranging from 510 to 1,090 square feet of equivalent direct radiation.

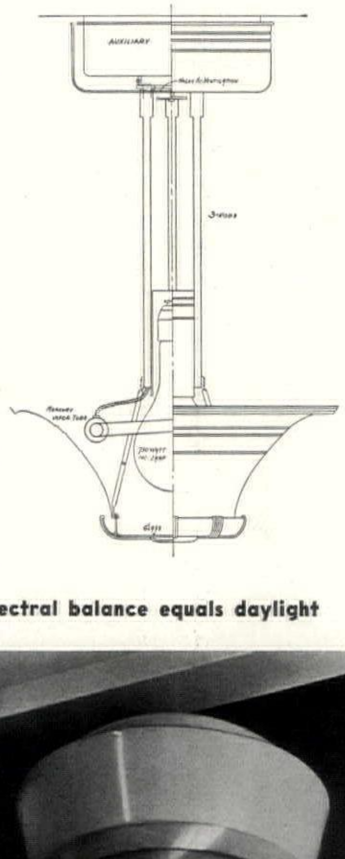
ZONOLITE AIR DUCTS

Introduced by Zonolite Corp., Detroit. Distribution: mesh ducts constructed by licensed sheet metal workers, insulation then applied by trained Uonolite employees.

Over a duct fashioned of a special weave wire mesh Zonolite insulation (a micaceous, non-ferrous granular material) is applied. This application makes a solid covering. No sound-absorbing liner is necessary as the Zonolite cover absorbs the noise through the mesh openings.

CONTROL OF LIGHT . . . . polarization, daylight lamps

masking light with glass



spectral balance equals daylight

POLARIZING GLASS provides new tool

Glass invented by Edwin H. Land and marketed under name of Polaroid for general commercial, industrial, and scientific use, by Land-Wheelright Laboratories, Inc., 168 Dartmouth Street, Boston. Now available only in optical qualities for use in scientific instruments and research.

Light has two distinguishable qualities—wave length and wave vibration. Technically, it has been easy to control wave lengths of of light to produce different colors, but a directional control of the wave vibrations has been possible only by means of cumbersome and expensive laboratory methods The commercial availability of Polaroid now puts the second quality of light under practical control, and opens up a wide range of unexplored possibilities in design.

Polarization principle: Light travels as a wave motion vibrating in all possible directions in planes at right angles to the direction of the beam. A polarizing crystal combs out the light waves so that only those vibrating in a single plane parallel with the crystalline structure are transmitted; vibrations inclined at small angles are transmitted partially; vibrations at right angles are stopped completely. If a plane-polarized beam of light is then directed at another polarizing crystal with its axis crosswise to that of the first, no light passes through; all vibrations have been combed out and no light whatsoever reaches the eye. . . . Iceland Spar, tourmaline, nicol prism are familiar polarizers; as natural crystal formations, they are small, inconvenient, expensive. Polaroid is relatively inexpensive and its synthetic flexibility of size permits a light beam of any diameter to be polarized. In appearance it is like clear colorless glass.

Making of Polaroid: A flexible film, only a few thousandths of an inch in thickness, is formed by suspending numerous minute artificial crystals in a cellulosic matrix. Each of these tiny crystals (1,000 billion needles of herapathite, a sulphate of iodoquinine, to a square inch of film) can polarize light, but since they are all embedded helter-skelter in the film, they must be straightened out so that they will lie with their axes parallel. This is done by stretching the film while still plastic. When all the billions of crystals have been properly orientated the film is optically equivalent to a single large polarizing crystal. The crystalline structure of Polaroid is so minute that it remains invisible at a microscopic magnification of 1,100. The film can be sandwiched into any glass or other film formation for practical use.

Commercial applications: The principal usefulness of Polaroid is the elimination of surface glare caused by reflected light. It is said to have already more than 800 probable uses. Some typical markets, other than the building field, are: (1) blocking out blinding glare from oncoming automobile headlights; (2) making and viewing three-dimensional movies in full color; (3) medical examination.

Apartment privacy: Windows can be equipped with Polaroid in rooms which face across courts or light wells. The view is normal except when the window is seen through another pane of Polaroid across the way, set to comb out the light in a different direction; such a window appears black. Objects between the two sheets of Polaroid remain as clearly visible as through ordinary window glass. (Of course, the windows have to remain closed; if one is opened, the advantages of privacy in the other are lost.)

Variable surface colors: Brilliant colors of every hue can be obtained for display signs, stage decoration, trick facades, by placing clear colorless cellophane between two sheets of Polaroid. The thickness of the cellophane itself is uniform, but the distances which light rays traverse vary with the thickness measured relative to the point of observation; this varying thickness as the observer passes by causes a change in the wave length of the reflected light, and consequently in its observable color. The net result is a constantly changing kaleidoscopic arrangement of colors as the observer moves or looks about. By varying the thickness of the colorless cellophane at desired points different combinations of reflected colors can be secured.

Stress analysis: Internal behavior of structural parts can be detected through studying the behavior of models made from transparent material (celluloid or transparent bakelite) while subjected to stresses and strains under polarized light. It is possible in this way to discover faulty products in course of manufacture and to make tests of complicated structures. . . . See section, "Photo-Elasticity," page 241.

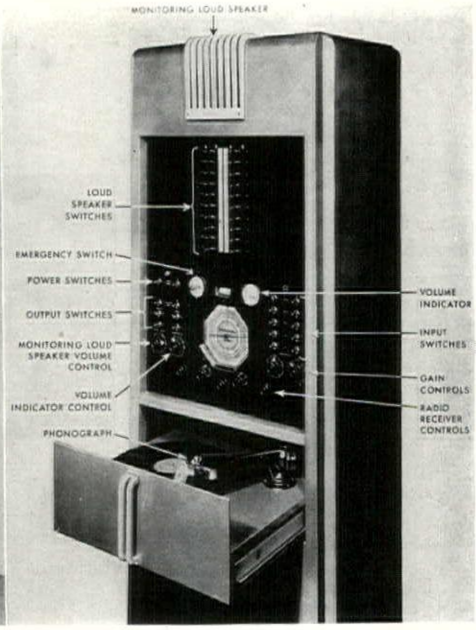
CIRCULAR MERCURY-INCANDESCENT LIGHT gives daylight quality

Produced by General Electric Vapor Lamp Co., Hoboken, N. J. Over-all cost compares favorably with other light sources.

The light consists of a unit in which a circular mercury-vapor tube and an incandescent lamp are combined beneath one reflector to provide the desired spectral balance. It is recommended for industrial lighting applications involving accurate color differentiation or critical inspection.

Color control: The high blue and green emission characteristics of the mercury-vapor tube are blended with the excess red emission common to incandescent lamps in proportions which make for optimum visual characteristics. Undesirable excesses are not filtered out from the incandescent lamp, but instead deficiencies are supplied. Because this blending process is additive, the full light value of both tube and lamp are utilized. . . . As regularly equipped with a 33-inch mercury-vapor tube and a 200-watt incandescent lamp, the unit operates at 500 watts to supply light at a color-balance of 38.6% red, 35.5% green, 25.8% blue, as compared to afternoon sun of 37.7% red, 37.3% green, 25.0% blue.

Installation: The light unit itself contains the auxiliary for operating the mercury-vapor tube, and is installed and connected to the line in the same manner as the ordinary unit for incandescent light. It can also be installed inside specially designed fixtures, as shown by accompanying sketch.



loudspeakers become "talk-back" microphones

CONTROL OF SOUND

PROGRAM SOUND SYSTEM

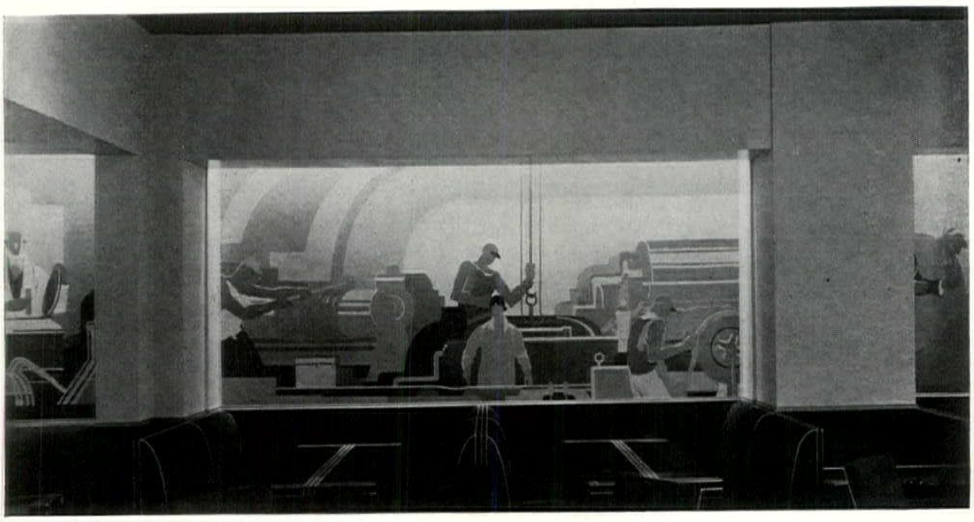
System designed by Bell Telephone Laboratories, introduced by Western Electric Company (see Sweet's Catalog File 29/19).

This system distributes programs from microphones, radio receivers, phonograph records. It is operated from a single cabinet.

"Talk-back": Sound may not only be sent out for reproduction over distant loudspeakers but the same loudspeakers may in turn be used as microphones for picking up sound for transmission back to the central point. This device provides a means for overhearing in a central office anything that may be happening at any loudspeaker location.

Applications: In schools—the principal may address all students from his office or listen to the work in any classroom. In stores—department heads may overhear transactions between sales persons and customers in any department. In hotels—for paging and for distributing music either from radio stations or from the hotel's own orchestra. In hospitals—for paging doctors and for permitting them to talk with the main office.

Variable features: One system arrangement provides for a single program, another for the choice of two simultaneous programs. In the first case, one amplifier is used and in the second, two. Switching facilities include as many as 60 keys for controlling loudspeaker or head-phone extensions. They are mounted in groups of 20 and may be wired so as to control each extension individually or several extensions in groups, as required. Besides the built-in microphone facilities, additional microphones may be located in offices or nearby halls or ballrooms. Controls are arranged so that announcements may be made over any one or any group of loudspeakers or, in an emergency, over all of them.



murals of washable rubber flooring

FURNISHINGS

RUBBER MURALS

Decorations in "Rubber Room" of Hotel Portage in Akron, Ohio. Painted in the original by Ivor Johns, artist, and muralized by Kenneth C. Welch, architect. Materials by Goodyear Tire & Rubber Co.

Duplicates of the originals were made in charcoal outline on heavy wrapping paper and used as patterns for separate pieces of colored rubber. These pieces were mounted on fiberboard with rubber cement before being erected on the walls.

BAKELITE LAMINATED PHOTOMURALS

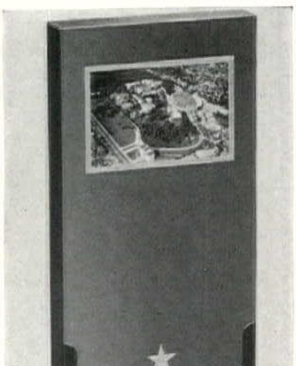
Developed by Formica Insulation Co. (see Sweet's Catalog File 15/15).

Photographic inlays measuring up to 3 by 4 feet can be incorporated in Formica as a dense, hard, permanent sheet.

PORCELAIN ENAMEL SCULPTURE

Design by Russell Barnett Aitken, sculptor. Enamel fused on Armco ingot iron by W. A. Barrows Enamel Co., Cincinnati.

"Warrior Screen," an interpretation of an African devil dance, weighs 400 pounds, is 9 feet high and 12 feet wide.



photomurals in Formica

decoration in porcelain enamel

SUBSIDIES FOR HOUSING

by ARTHUR C. HOLDEN

Chairman, Technical Advisory Committee,
Housing Section of Welfare Council
of New York

There are many varieties of subsidies applicable to housing. In general these may be divided into two classes, Direct and Indirect. Direct Subsidies imply those which require direct outlays in the form of grants in aid. Indirect Subsidies may also require outlays, but these are usually applied not to housing direct but to services or other expenditures which may indirectly benefit housing. On the other hand services or aids directly beneficial to the purpose of housing may be promoted, which may properly be designated as indirect subsidies inasmuch as they do not involve outlays or expenditures. No hard and fast classification is possible because the various types of subsidy shade off into one another through variations in purpose and method. In the United States considerations of source are equally important for the reason that the federal system limits the functions of the central government to powers delegated by the Constitution and reserves to the States and the people ultimate sovereignty with respect to other powers which in turn are defined and limited by the various state constitutions. Local powers emanate from the states and are subject to charter and regulation at the pleasure of the state governments. For this reason both the method and purpose of subsidies are dependent upon the source from which they originate.

To clarify the possible range it is simplest to set up a table, inadequate as it may be, and then to append a brief critique of the items with respect to source, method, and purpose.

CLASSIFICATION OF SUBSIDIES particularly with respect to Housing

DIRECT SUBSIDIES:

1. Capital Subsidies—non-refundable payments to the capital account in consideration for the establishment of desired facilities.

   Example or precedents: A land grant to a railroad, subscription by government to a part of capital stock, or outright grant in aid.

2. Operating Subsidies—non-refundable periodic or contingent payments in consideration for the maintenance of desired services.

   Example or precedents: Annual subsidy from government for the maintenance of a necessary though unprofitable ferry; or for the carrying of mail; payments by government for part care of inmates in hospitals or other charitable institutions.

3. Leasehold Subsidies—the leasing of land or improved facilities at a rate less than market or economic rent in consideration for a benefit or public purpose.

   Example or precedents: Public lands leased at a nominal rental to a hospital, museum, school, or institution organized for a public purpose; or, as in the case of private enterprise, facilities leased to a church or specially favored party.

INDIRECT SUBSIDIES:

1. Virtual Subsidies—special or extra services of government rendered prior to or in addition to the services normally rendered.

    Example or precedents: Opening or paving of streets, or extension of rapid transit lines into outlying areas in advance of development.

2. Time Subsidies—favorable terms for delayed payments on assessments for benefit through public improvements, or with respect to taxes for current services.

    Example or precedents: Street paving costs carried by ten annual installments; bonds used to finance expenses for services in a current year thus transferring the burden of payment to later date and future user of property.

3. Immunity Subsidies—specific legal exemptions or immunities granted for a public purpose.

    Example or precedents: Moratoria respecting foreclosure proceedings or, stays against compliance with legal requirements as an incentive to low rents, assembly of property, and other public purposes.

4. Tax Subsidies—limitation of taxes imposed or exemptions from specific taxes granted for a public purpose.

    Example or precedents: Tax exemption for the securities of a municipal subdivision; limitation of taxation to land value only for low rental housing corporations; or blanket tax exemption extended to buildings erected during a shortage.

5. Credit Subsidies—special terms of credit, due to the security of governmental prerogative, offered as an aid to promote a public purpose. There are several distinct ways in which credit benefits may be extended:

    a. Governmental Borrowing: The Government may borrow at a lower rate than possible to private borrowers and, for the benefit of a desired public purpose, transfer its loan either (1) at the same rate, (2) at a lesser rate, or (3) at a small premium.

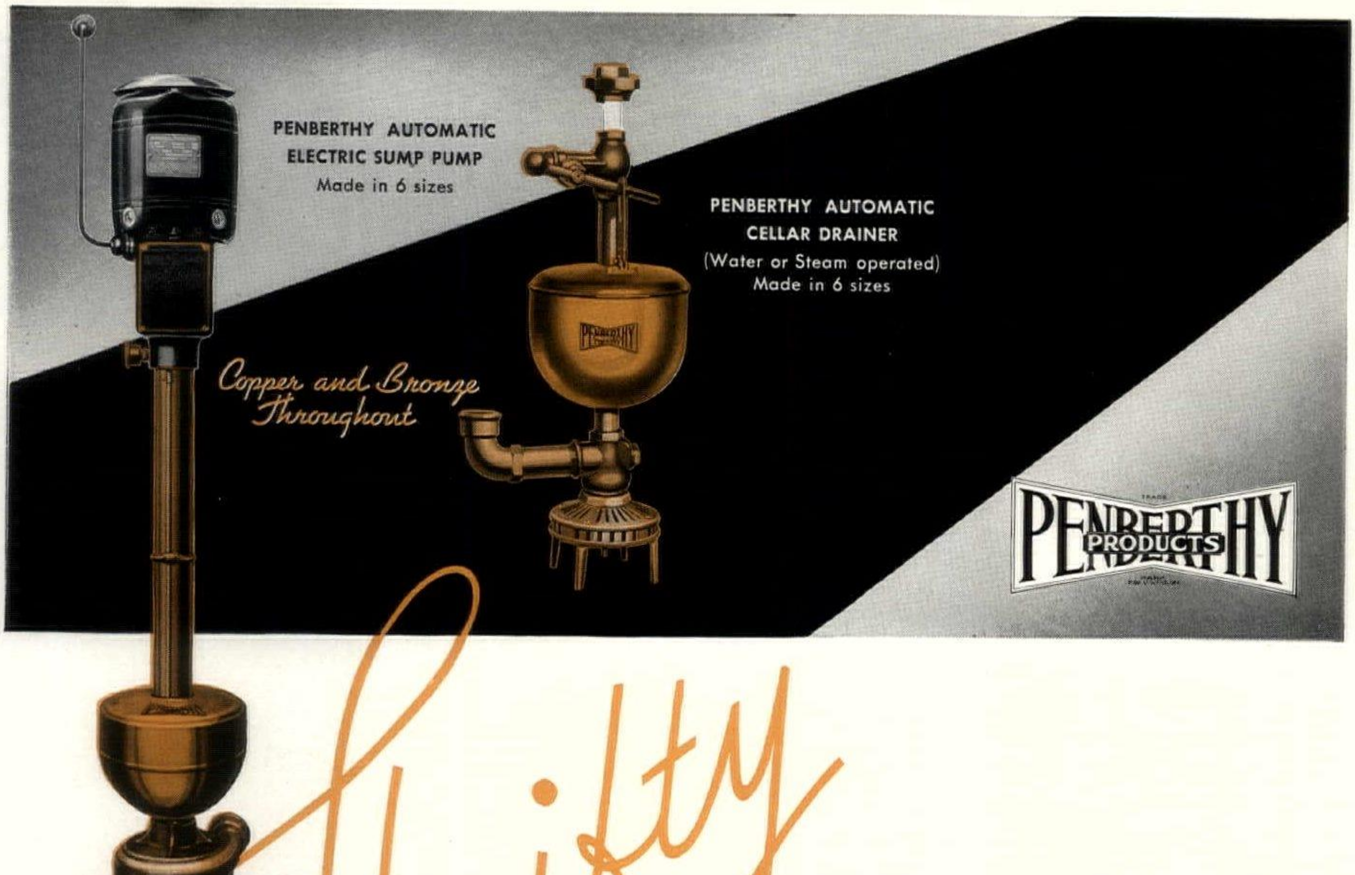
    Example or precedents: The so-called Dual Contracts made by the City of New York with two private rapid transit companies whereunder the city advanced a portion of the necessary capital and was required to meet interest charges even though the companies could not make good their part of the contract. Another instance is the recent RFC which as a special fiscal agent of the U. S. Government can command money at a low rate and make loans to industry or other agencies for the maintenance of necessary services.

    b. Contingent Liability: The government may through a fiscal agent, in order to induce the flow of private capital into desired channels or to assist in the remaking of damaged credit mechanism, arrange for the insurance of credit advances by private individuals or agencies and by the security given induce lower interest rates or more liberal advances of credit.

    Example or precedents: The FHA has been empowered to insure liberal mortgage loans for homebuilding and low rental housing projects—Insurance of savings deposits has also been provided for.

    c. The Origination of Balancing of Credit: The government may empower its fiscal agent to issue notes good as legal tender provided adequate means for their retirement and control are provided for, and that these notes may be applied for a public purpose.

    Example and precedents: The Bank of England was chartered to raise a specific sum to finance a war with France and was in return given the monopoly of note issue and the guarantee of the proceeds from certain revenues for note retirement. The U. S. financed the Panama Canal by an issue of bonds against which the privilege of note issue was given. Although these bonds carried a rate of 2% they could have been sold at a still more nominal rate. The security for their retirement was the tolls on the Canal.



Thrifty

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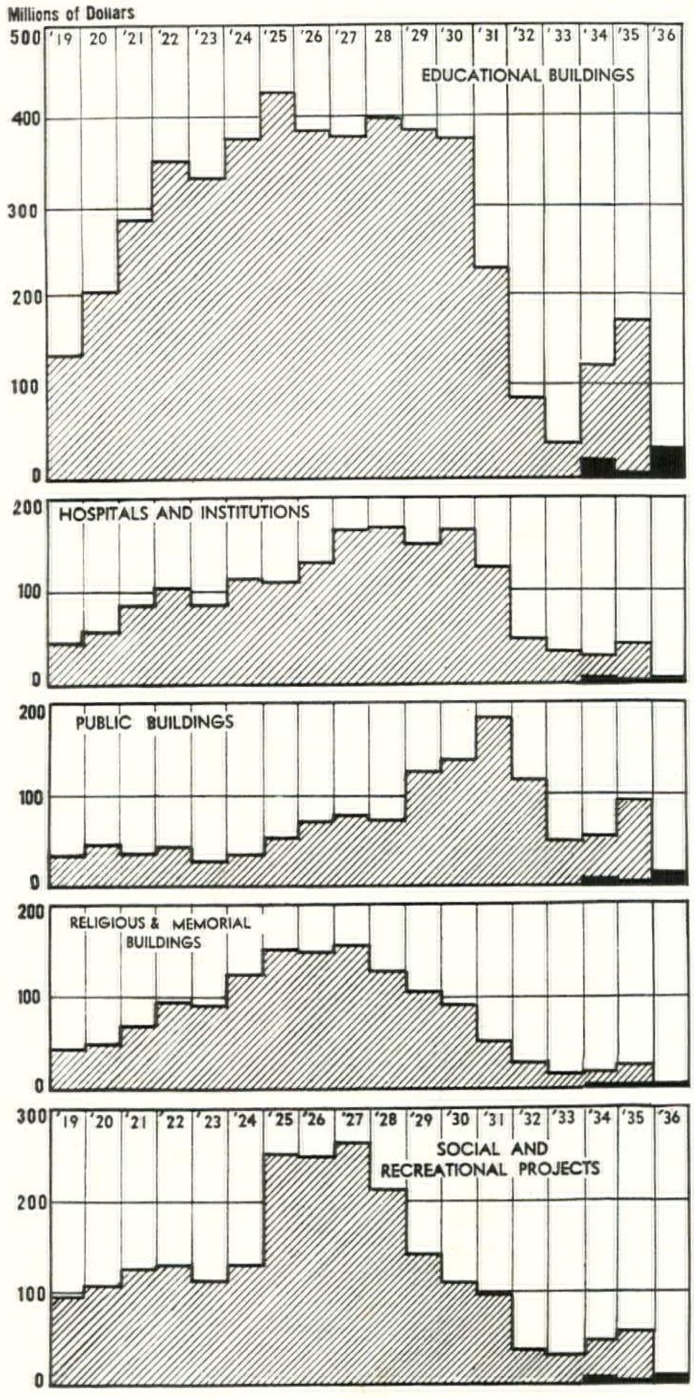
Penberthy Products are carried in stock by jobbers everywhere.

PENBERTHY HOT WATER HEATING SPECIALTIES

PENBERTHY INJECTOR COMPANY *Manufacturers of* QUALITY PRODUCTS *Since 1886*
DETROIT, MICHIGAN • *Canadian Plant,* Windsor, Ont.

NEARBY OUTLOOK FOR PUBLIC AND INSTITUTIONAL BUILDING IMPROVES



CONTRACTS FOR PUBLIC AND INSTITUTIONAL BUILDING:

Bars denote annual totals. Black portions show January totals only.

By L. SETH SCHNITMAN, Chief Statistician

F. W. DODGE CORPORATION

For 1935 the total volume of public and institutional building operations undertaken in the 37 Eastern States amounted to $402,150,300. This was a gain of about 45 per cent over the total of $276,358,400 for 1934.

The largest quantitative gains over 1934 occurred in educational types and public buildings of federal, state and municipal agencies. Hospitals and institutions scored an advance of about $10,000,000, or more than 25 per cent; religious and memorial structures advanced by somewhat more than $5,000,000, or almost 30 per cent; while social and recreational facilities showed an increase of about $13,000,000, or almost 30 per cent.

For the first half of 1936 the total volume of public and institutional building in the 37 Eastern States should exceed by at least 40 per cent the total of only $135,600,400 reported for the first six months of 1935.

For January 1936 the volume of such construction totaled $65,974,500, which was more than four times the volume shown for January 1935. That such a rate of improvement cannot be maintained, however, is apparent from the records of contemplated building.

Large gains over January 1935 occurred in each branch; educational buildings scored the broadest improvement.

Gains were well distributed geographically.

Recent gains resulted chiefly from the acceleration in the Federal Works Program which is now nearing its maximum expansion.

Charts cover contracts in 37 Eastern States only.

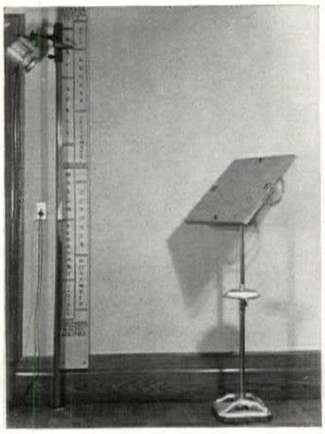
THE

ARCHITECTURAL RECORD

VOLUME 79 NUMBER 4 APRIL 1936

NEXT MONTH . . . FIFTH AVENUE OFFICE OF BANKERS TRUST COMPANY, NEW YORK CITY. Shreve, Lamb and Harmon, Architects. An alteration job involving four floors. Of special interest for studied integration of modern banking services, for use of wood paneling in the banking room and in the bank elevator lobby to provide an environment of informality, and for advanced design of the safe deposit vaults. . . . **RISK RATING FOR MUTUAL MORTGAGE INSURANCE.** By Frederick M. Babcock, Chief, Underwriting Section, Federal Housing Administration. Mr. Babcock points out the modifications, additions and clarifications of interest to architects designing private houses for clients financing construction with loans secured by insurable amortizing mortgages. . . . **NEW FACTORS IN THE DEMAND FOR HOUSING.** Government employees in Washington, a Chamber of Commerce in Meadville, a city government in Springfield—all found present housing inadequate and the means of creating new housing through existing channels unsatisfactory. Setting out to fill specific needs, they arrived at widely different results: but these subdivision projects are significant for the trends they disclose in housing developments. . . . **PORTFOLIO OF CURRENT ARCHITECTURE.** . . . **FIVE LOW-COST DWELLINGS, WITH BREAKDOWN OF QUANTITIES AND COSTS.** Skidmore and Owings, Architects. . . . **TECHNICAL NEWS AND RESEARCH.** Provides a continuous flow of information on new technical developments — new uses and new products. Trends and events showing advances in building production are reported — new research findings, new planning or design ideas, new materials, new equipment, new enterprises, new kinds of obsolescence. Each month the new information is presented topically according to use-classifications — for example, structural parts and systems, structural analysis, structural protection, electrification, water supply and plumbing, food preparation, control of atmosphere, control of light, control of sound, furnishings and decoration, storage.

NEWS OF THE MONTH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3 *Photographs by Zimmerman*

NEW GADGETS AT COLUMBIA'S SCHOOL OF ARCHITECTURE

Students at Henry Wright's new Town Planning Studio at Columbia, abandoning traditional Beaux-Arts pencil-and-paper techniques, are employing machines for problem study. (1) The Heliodon, widely used abroad to duplicate any desired condition of time or location, appears in U. S. (2) Student Henry Feigin finds his trees too small to adequately shade his model at 2:00 p.m. August 30, latitude 38. (3) Using the new Surface Gauge to check model against "topo," Student Oppenheim finds an error, corrects it with a chisel.

"It is absurd," says Town-Planner Wright, "for students to attempt three-dimensional problems with a two-dimensional medium." The course is open only to graduate students.

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TOWARDS A NATIONALIST ARCHITECTURE

The accelerating reorientation of architectural education now going on in the United States is seen as a nationalist trend by Professor Roy Childs Jones of the School of Architecture at Minnesota University. In a report to the American Institute, Professor Jones, who is president of the Association of Collegiate Schools of Architecture, stated that architectural schools have declared their independence of foreign influences.

"The general pattern of the more than fifty schools in this country has been molded by many influences, mainly foreign." New experiments in organization and curricula are changing this, according to Professor Jones. "The general ferment of the times has permeated the schools of architecture to no small degree. The temper of students, teachers and practitioners is to revaluate. . . .

"A new and promising cooperation between the schools and the profession is a significant development in current trends. There has been too wide a gap between school and practice. In the last year or two an organized plan has been set up by the schools, the profession and the examining boards. Somewhat after the fashion of the medical interne, the architectural student will spend three years in actual and varied practical work."

Professor Jones advocates a closer relationship between the architectural departments and the rest of the university, to promote a wider appreciation of architecture. "If only for selfish reasons, this idea might be made of immense value to the profession, since there is probably no better way for the architect to 'educate' his public than to get hold of his future clients while they are young and impressionable."

•

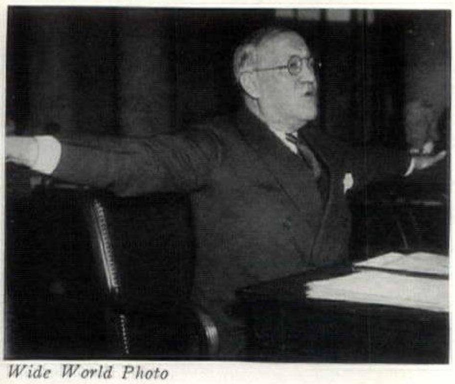
WOULD JUSTICE HOLMES HAVE LIKED IT?

Arthur A. Thomas thinks not. The aged Negro Messenger, when interviewed at his job in the Supreme Court, looked around the marble halls and shook his head: "The judge never did get to see it, but I reckon it's just as well—he wouldn't have liked it anyway."

•

R. A. SELLS PROJECT TO TENANTS

Beauxart Gardens, a 50-family Resettlement Administration Project near Beaumont, Texas, will shortly be turned over to a local corporation composed of community residents. Selling on a monthly installment basis at $23.08, each house complete with land will cost $3,058.78. Second of such transactions, it represents a new R. A. policy of turning all projects back to local management as soon as complete.



Wide World Photo

SENATE'S NO.-ONE-AND-ONLY HOUSER

Senator Robert F. Wagner, N. Y., sponsor of the mysterious "dual housing" bill which may or may not come before Congress this session.

A.I.A. SPONSORS COLLABORATIVE POLICY IN SMALL HOUSE DESIGN

Small House Associates, described by its founders as "a limited architectural service," has opened an office in New York City. This is the first unit of a proposed nation-wide service of small house design, made possible by a new A.I.A. policy, in which architects will collaborate on a plans-and-limited-supervision service for small home builders. This service is expected "to bring the architect more fully into the small house field" by contrasting architectural service with use of plans only.

GARDEN - LOVERS PILGRIMAGE TO NATCHEZ

Languishing for lack of a Rockefeller, lovely and unlucky Natchez — Mississippi's oldest town—must raise its own funds for the preservation of old buildings. To this end the Garden Club sponsors each spring a Pilgrimage, during which lovers of the antique may see many of the old plantation houses.

Once queen of the river country, Natchez lost supremacy after the Civil War. Since then a roseate mist of sentimentality (successfully exploited by novelist Stark Young) has settled over it; but Natchez remains one of America's least known and finest examples of colonial architecture and town-building.

A FAIR FOR THE PAST OR FUTURE?

Flushing Meadows, an area of undeveloped marshland in Queens, L. I., has become the latest battleground of classicism vs. modernism in exposition design. Site of the proposed World's Fair of 1939—for which no state or national funds have as yet been appropriated—it is already the object of heated controversy. National figures in the fields of architecture, art and the social sciences find themselves grouped in two opposing camps, with a centrist group between.

Right:

Royal Cortissoz, art critic and avowed traditionalist, thinks "the genius of beauty must preside over the Fair." The governing group of architects and artists must be "absolutely ruthless" in enforcing their plans to this end. On the other hand, Mr. Cortissoz thinks that "any one who introduces politics into the 1939 World's Fair . . . ought to be shot."

George McAneny, president of the Fair Corporation which will ultimately determine policies and select designers, is noncommittal but remembers the 1893 Chicago Fair "as an expression of our art and architecture that I presume has not been surpassed since."

Center:

Olin Downes, music critic of the New York Times, is "absolutely dazzled" by the possibilities of music at the Fair.

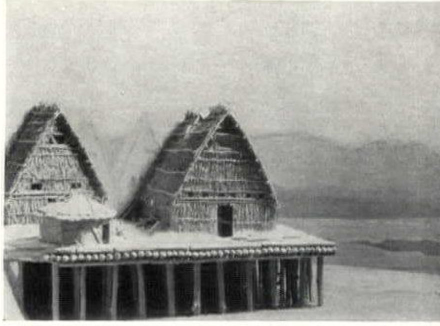
Electus D. Litchfield, architect, hopes the Fair will "be a monumental composition of great beauty." But he warns that "none but the brave deserves the Fair."

Left:

Michael Hare, architect and secretary of a strong left Committee, opposes spending $45,000,000 (estimated cost of Fair) in an effort "to dodge life." The only justification of such a Fair would lie, he thinks, in showing the American people "the way to a fuller life."

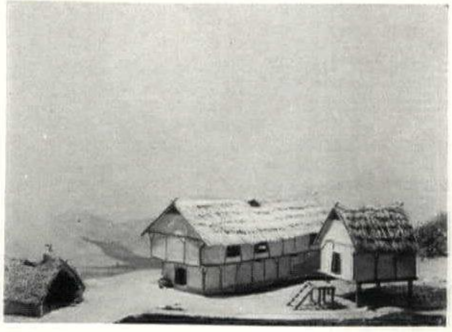
Henry Wright, town planner and member of the Committee, thinks that "the Fair should be built around an idea and not a Court of Honor."

Photographs by R. E. Pope

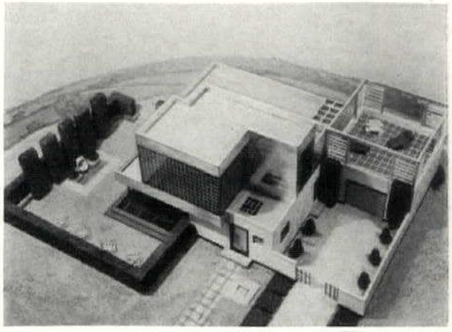


1. Neoliths fished through holes in the floor.

2. A $50,000 model for Egyptian suburbs.



3. Caesar found this type easy to sack.

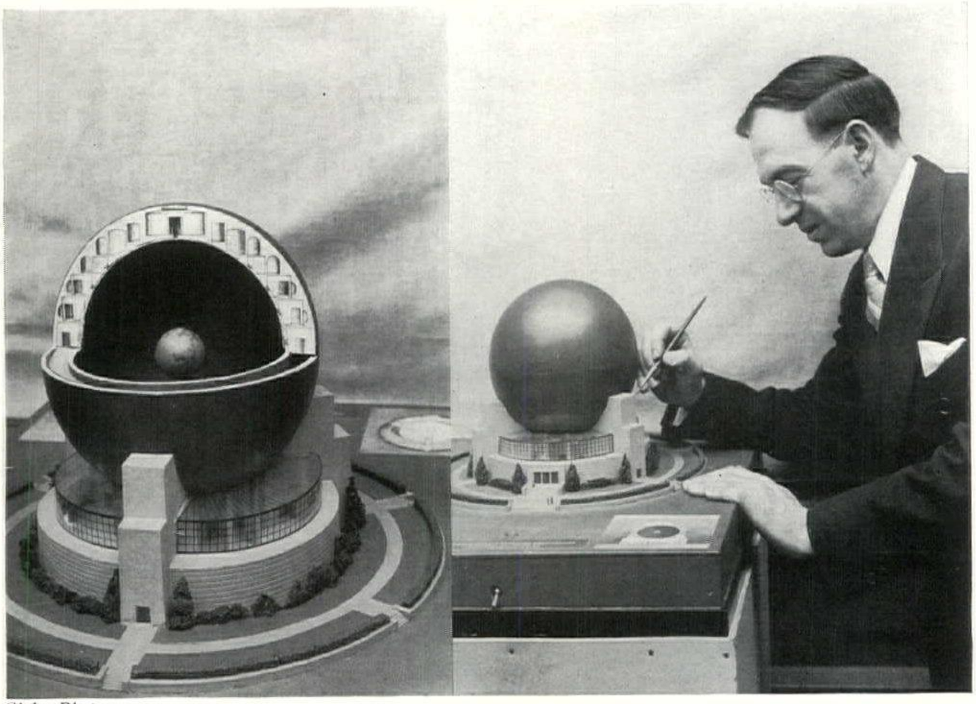


4. With big windows to let in light.

IN DEFENSE OF THE "DETACHED" HOUSE

Appearing in New York's Museum of Science and Industry are 11 dioramas showing the development of the housing idea from Neolithic to present times. Popularizing the contemporary American idea that all houses must be detached, this exhibit significantly minimizes history's numerous ventures in communal housing. Executed by Hugh and Helen Perrin, under supervision of Bemis, Burchard and Gunther, Associates.

NEWS OF THE MONTH



Globe Photos

THE COSMOSARIUM: A PLANETARIUM IN REVERSE

In a planetarium man studies an ideal heaven, free of cloud and rain: in Mr. Peter Bittermann's cosmosarium, man can study an ideal earth, free of strikes and war. Both will be money-makers in the average city, according to Mr. Bittermann, architect, whose cosmosarium has the distinction of being the first definite proposal for the proposed 1939 World's Fair.

The cosmosarium consists of a circular masonry base, three buttresses and a hollow concrete sphere 128 feet in diameter. The base will be given over to entrance hall, cloak rooms and small exhibition rooms, with larger glass-walled galleries on the second floor. The three buttresses will contain elevators for access to the spiraling ramps between the inner and outer spheres. The interior of the sphere is 100 feet in diameter, in the center of which hangs a 20-foot model of the earth, exact to the last detail and executed at a scale of 32 miles to the inch. From the ramps between the inner and outer spheres, the spectator will be able to view the world from all angles at a relative distance of 20,000 miles. (Manhattan Island, visible only through binoculars, will be ½″ long by 1/16″ wide.) A model sun will shine with proper brightness, planets and stars will move in their respective orbits. Escalators will make inspection easy and lounging spaces will be provided at regular intervals along the ramps.

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NAMED FOR AMERICA'S MOST DANGEROUS WOMAN

Superstructure bids are being taken on the Jane Addams Houses, 1,000-room PWA low-rent housing development in Chicago. First of 48 PWA projects to reach this stage, it is named for the famous founder of Hull House, whom an ROTC bulletin listed as "America's most dangerous woman" because of her constant efforts for peace.

GOLDFISH ON THE SKYLINE

Using more of everything than any other sign in existence — 1,084 feet of Neon tubing, 29,508 lamp receptacles, 110 tons of structural steel—the new Wrigley spectacular now flashes across Times Square. Abandoning the frenetic, eye-jerking technique of the past, the new sign paints a picture of lazy submarine life in the tropics. Goldfish 42 feet long glide through emerald Neon seas, electric bubbles rise slowly to the surface. This plea for slower gum-chewing tops a new taxpayer on Broadway between 44th and 45th.

•

URBANISM IN NORTH AFRICA

The Exposition of the Modern City, open in Algiers until April 19, brings to the African city the work of international figures in architecture and city-planning. Sponsored by the International Congress of Modern Architecture, this exhibit is divided into four main sections—Urbanism, Architecture, Housing, Planning and Construction. These sections are further subdivided on a geographic basis—Algiers and Its Region, Algeria and North Africa, Metropolitan, Colonial and Foreign.

The Congress, composed of national "groups," was organized in 1927; its purpose is the exchange and analysis of modern problems in planning technique.

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A.I.A. CONVENES IN WILLIAMSBURG

Because of inadequate hotel accommodations, delegates to the national convention (May 5-8) will commute daily from Old Point Comfort to the Rockefeller Restoration. Excepting May 5, all day sessions will be held in Williamsburg; these sessions will be open to all architects, irrespective of Institute affiliation.

GRANULATED SUGAR "BOMB" ROCKS SYRACUSE UNIVERSITY

Police and Secret Service agents "questioned and released" the twenty-five architectural students at Syracuse who decided, after a night charrette on a church problem in architecture, to mail Chancellor Charles W. Flint a bomb. Batteries, cotton soaked in melted sugar, cardboard tubes filled with granulated sugar—"to represent some imaginary explosive"—and an old clock "wound up so it would tick," constituted the infernal machine. It was opened, after having been dipped in water, at the post office. The ensuing furore was so great that the students "voluntarily reported to Police Headquarters to explain it was all a joke." Glenn M. Beach, spokesman for the group protested earnestly: "I swear this was done in the spirit of fun and none of us realized the seriousness of the prank. . . ."

CINCINNATI A.I.A. DINES, OMITS COMMITTEE REPORTS

Meeting on March 17 for the 519th time, the Cincinnati Chapter had as its guests the Architects' Water Color Club, a group which has no officers, no dues and no minutes of the last meeting. "Amid the peaceful din of ale mugs" the members drove the sinful serpents from Old Erin, adjourned to the next room to hear Frederick Garber criticize the 180 sketches and lithographs which composed the Club's annual exhibition.

BUFFALO SETS A PRECEDENT

The year-old Small House Bureau of the Buffalo A.I.A. sets a precedent which the Institute itself has followed—the use of "stock" plans and specifications for use in the small house field, with optional supervision at a uniform fee.

F.A.E.C.T. CONVENES IN ROCHESTER

The Second National Convention of the Federation of Architects, Engineers, Chemists and Technicians will be held in Rochester, N. Y., April 17, 18 and 19. The main problems before the Convention will be: affiliation with the American Federation of Labor; continuance of existing WPA projects at prevailing wage rates; legislation for protection of Civil Service standards; unemployment and old age insurance; housing; professional licensing; improvement of technicians' status in private concerns. Each Federation Chapter is entitled to three delegates for the first three hundred members and one for each additional five hundred. All technical organizations are urged to send two fraternal delegates.

VERSAILLES A LA PETER HENDERSON

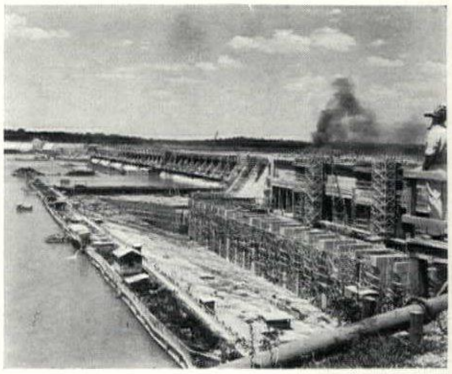
Brought to the New York Flower Show as a background for a formal garden by Peter Henderson Company was the garden façade of Marie Antoinette's play castle, Le Petit Trianon. The façade, scaled down to create the illusion of distance, overlooked a garden of forced hybrids such as Antoinette never dreamed of.

KATE NEAL KINLEY MEMORIAL FELLOWSHIP

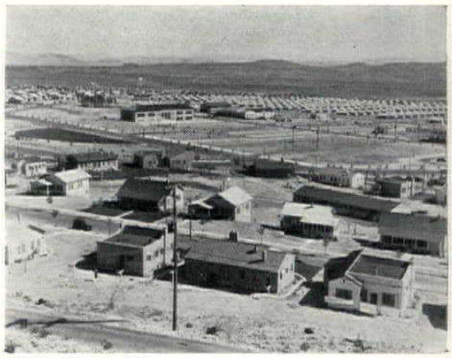
A $1,000 award for a 10-month program of study here or abroad. Requirements: Applicants must be graduates of College of Fine and Applied Arts of University of Illinois or equivalent institutions. Applications must be filed before June 1, 1936. Inquiries to Dean Rexford Newcomb, College of Fine and Applied Arts, University of Illinois, Urbana.

LEON V. SOLON

Under contract to color all Rockefeller City statuary is polychromist Solon, who last year tinted the Laurie sculptures over the main entrance of the RCA Building. Mr. Solon, many times a medalist, was polychromist of Philadelphia's Museum of Art. He was recently awarded the Binns Gold Medal of the American Ceramic Society.



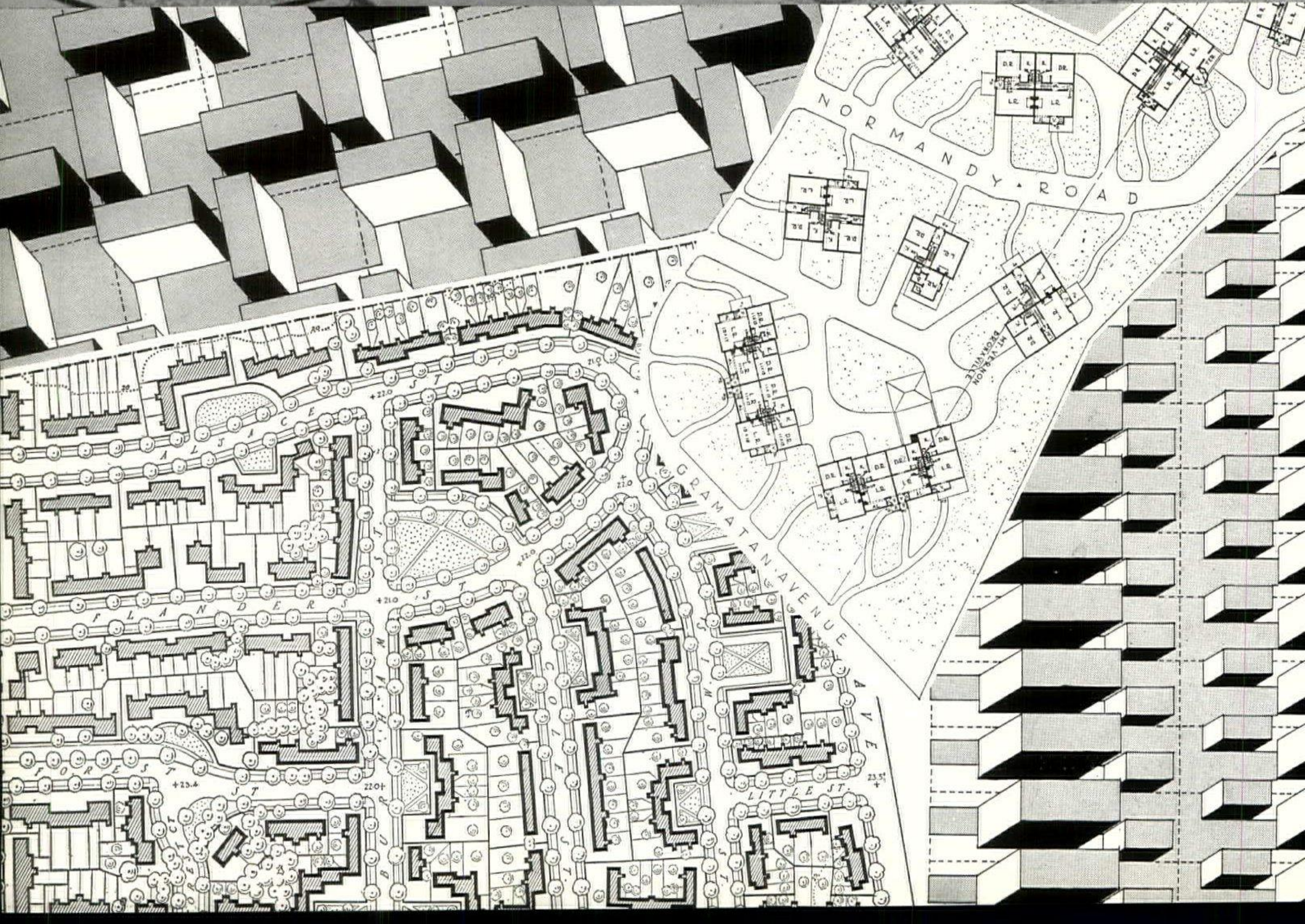
LEGALIZED BY A RECENT SUPREME COURT decision, construction proceeds ahead of schedule on TVA's Joe Wheeler Dam. Located 12 miles upstream from Wilson Dam, this project is part of a vast program to rehabilitate the Tennessee Valley.



Wide World Photo

FHA HELPS LIQUIDATE BOULDER CITY

A group of Salt Lake City (Utah) business men has purchased the model city built by Uncle Sam to house workers on the now-finished Boulder Dam. More than 600 houses and many of the larger service buildings, containing over 3,000,000 feet of lumber, will be razed; rebuilt in six western states as two-, three- and four-room modern houses; sold under the FHA Single Mortgage System. Only a remnant of the planned city in the desert will remain.


NORMANDY ROAD
GRAMATAN AVENUE

THE ARCHITECT AND THE SMALL HOUSE

By William Stanley Parker, F.A.I.A.

In starting to focus my thoughts on the subject of this article I wrote down the above title and then found it was the precise title given to an article I wrote for The Architectural Record of September 1931. That article aimed at an indication of the opportunity for the use of an architect's service in the small house field as well as methods of economy he must develop in his practice if he is to make himself useful in the low-cost portion of this field.

A good deal of water has gone over the dam since then. This metaphor suggests a further illustration of the changing situation in this phase of construction. So far as architectural service has been concerned there has been an actual damming up of its potentialities by the heretofore current practices and standards of the loaning agencies and the speculative builders.

Money was freely available to any speculative or operative builder with no requirements that the work should be competently supervised and with only such approval of design as the membership of the security or appraisal committee could and did exercise. An architect on a security committee was a rare exception that merely proved the rule. Whatever judgment was applied to the quality of the design and its fitness for its site, such judgment was inevitably inexpert and casual. The physical evidence offered by the houses actually built is sufficient support for this statement.

If the bank were not concerned to demand technical judgment in regard to design and construction, it was clearly not to be expected that the speculative builder would worry. The bank's interest would continue for twelve years. The builder expected to, and generally did, get rid of his responsibility a relatively few weeks after the house was built. And the freer hand he had to cut corners, the larger his margin of profit. The buyer must beware. He is the one to hold the bag until the bank takes it over.

Thus had been erected the dam that held back the big pool of architectural service and prevented it flowing in desirable manner with the current of small house construction activity. But times have changed in certain important respects. The underlying real estate mortgage structure became jeopardized and the HOLC was set up to save the patient. In the process various symptoms clearly demonstrated that the sickness had been greatly aggravated by careless exposure of the patient to uneconomic practices, developing a good deal of water on the lungs.

It became apparent that much money had been loaned on material and labor not actually put into the property and on community values related to architectural fitness that had been falsely appraised or neglected. The HOLC operating on a national basis naturally developed certain standards for appraisal, and the dam that had been shutting off the flow of architectural service into this field was immediately lowered an appreciable amount.

The point particularly to be emphasized in this instance is that the lowering of the dam was due to the act of a nationally organized loaning agency. For the first time standards of design and construction were set up and arrangements made for their appraisal by technically trained persons. While a smaller amount of service by fee-architects resulted than had been hoped and expected, the various state offices included architects in important supervising capacities and much experience was gained that is bearing fruit.

The small house patient having been eased over the crisis, aids to as rapid a convalescence as possible were seen to be greatly needed and the Federal Housing Administration was established for the purpose. While the HOLC ministered to the errors of the past, the FHA was to aid the patient in its future steps, freeing its muscles from cramp, and developing exercises so it could walk alone again but with a new accident insurance policy that would protect it against serious falls.

This naturally involved the prescription of certain normal methods of procedure that would protect the patient, such as an adequate appraisal of neighborhood conditions, a design fitted to its site and of itself good, adequate specifications and plans, and competent supervision to assure conformity thereto. Again the dam was lowered and even more significantly than before, because while the HOLC let architectural service flow into the modernization field, the FHA now paved the way for it to enter as well the vastly more important field of new construction.

Again the point to emphasize is that the lowering of the dam was due to a national organization that had become, in a new way, a part of the loaning agency group. Just how much architectural service is going to be released will depend on two factors: first, the real depth of the pool of service architects are able and willing to provide in this field and second, the one important resisting factor that still remains the architect's most serious opponent in the loaning agency set-up. Let us then consider these two factors in the order stated.

In endeavoring to appraise the amount of service architects are ready to provide in this small house field, it may be useful to estimate how much service it could absorb. Any such estimate will be a good deal of a "shot in the dark" because it is a field heretofore almost completely ignorant of such service, and which architects themselves ignored.

As a basis for an estimate, let us assume that some form of limited service, approved by the profession, is made available for houses costing less than, say $7,500, most of which would be below $5,000. Let us also make the assumption that loaning agencies and builders want such service. Let us assume the service involves twelve conferences and inspections taking two hours each or a total of 24 hours per house, the equivalent of three 8-hour days. Let us assume two other days are used for related work, preparation of designs, specifications, and other incidental work related to such service.

On the above assumptions, an architect could personally handle about a dozen houses at a time, taking about three months to build, or say 50 houses each year. Assuming an average fee of $150, based upon repeated use of stock designs made by the architect for the service of such clients, his gross annual income would be $7,500, with a probable net profit over and above office expenses of from $4,000 to $5,000 a year.

The number of houses to be built during the next ten years has been a fertile field for estimates. They range from seven to fourteen million. Let us be conservative and assume 600,000 a year and assume further that 400,000 of these would fall in this low-cost small house field. If the potential demand for houses costing from $2,500 to $5,000 is actually met, this last assumption may well be too low. At 50 houses per architect per year, 400,000 houses would require the full services of 8,000 architects, earning from $4,000 to $5,000 a year, or total net earnings to the profession of $40,000,000 a year, gross earnings being $60,-000,000 on a gross construction cost of about one and a half billions.

There are, of necessity, a number of assumptions made above, and each one is subject to criticism as being too high or too low. The reader is asked to revise these various assumptions in accord with his best judgment and to revise the totals accordingly. I believe that no matter what reasonable revisions are made, the total potential architectural service indicated will be enormous. The total number of architects in the country, as estimated by the Code Committee from figures submitted by the National Council of Architectural Registration Boards, is less than 16,000. On the above assumption half the profession would be fully occupied in supervising small houses, for which a negligible amount of service has been provided heretofore.

What must the profession do if this potential demand for its services is to be met and, what is more, actually attracted? Recent experience in several cities indicates the need of well-organized group action in order to develop a technique adapted to the economical service of this type of client and to form an organized point of contact with the loaning agencies through which the clients will probably be reached.

The Federal Housing Administration, with its Underwriting Manual, constitutes a signboard pointing to the architectural profession for the guidance of any one desiring to finance the construction of a house with an insured mortgage. Its standards of design, and for the documents illustrating the design, require competent architectural service. Architects should become wholly familiar with this manual in order to know just what will be required. Incidentally, a full knowledge of the underwriting methods involved will be desirable if the architect's plans are to fit all the requirements when first submitted. The waste involved in corrections and repeated submittals must be avoided if the architect is to be successful in serving small home owners with a limited service.

The possibility also suggests itself of attracting such clients directly to the architect by offering a broader service that shall include advice as to the different methods of financing available. This would mean that the architect must become fully familiar with the financing procedures and limitations of savings banks, cooperative banks, building and loan associations, and the newly created Federal Savings and Loan Associations. These latter, together with many cooperative banks and building and loan associations, now function as members of the Federal Home Loan Bank System.

At present the small house owner or builder tends to go first to a contractor or speculative builder and then to the loaning agency. Neither the builder nor the loaning agency, as already pointed out, has been inclined to raise the question of an architect. Policies now developing among thoughtful loaning agencies are tending towards an advertising campaign that will seek to lead the owner to go first to the bank. A program of public information by the profession may some day be developed, when the facts warrant it, that will advise the owner that the architect is more broadly equipped than either the builder or the loaning agency to advise him simultaneously on design, construction cost and methods of finance. To justify such a program architects must make full knowledge of financing procedures a normal part of their technical equipment.

The newly developing policies of loaning agencies just mentioned refer to the program for a Home Builders Service now being tested out by certain member banks in the Federal Home Loan Bank System. It constitutes the third step in the process of lowering the dam that has been holding back architects' service from this field. Again the action is taken by a national loaning agency. Being now thoroughly accustomed to alphabetical symbols, let us print the initials of these three forward steps that have a vital significance for the architects of this country—HOLC—FHA—FHLB. This third step follows naturally and logically after the second. The FHA, in its manual, enunciates the standards that are required for a mortgage that will be deemed proper for insurance. The Home Builders Service, being developed for the Federal Home Loan Bank System, provides a procedure calculated to produce houses that will meet these standards.

The service as now suggested is to be made available to owners through the member banks but not made mandatory. It involves of necessity organized cooperation by the profession, for architects must be available and ready to serve clients of the banks on some definite basis, agreed upon in each district by the architects and the banks. There is nothing violently novel in the proposal. Certain conservative savings banks have provided for years somewhat similar service on all structures they have financed. The novelty consists in the fact that a national loaning agency is suggesting to its member banks all over the country that they all set up such a service for the benefit alike of themselves and their customers.

It is, of course, the intention of the banks, in setting up this service, to feature it in their advertising as something of value to home builders, aiming to lead them first to the bank rather than to the contractor or operator. Thus a substantial amount of advertising of the profession, and the service it can render to the small home owner, will automatically result. And it will be all the more effective in that it will emanate not from the profession itself, but from another source.

The service as proposed is optional with the owner. To what extent will the loaning agencies urge the customer to use it? To what extent will they continue to give equally favorable loans on houses of doubtful design and unsupervised construction? To what extent will they give a preferential treatment to customers who use this service, perhaps a more generous appraisal, or perhaps a longer period of amortization, or perhaps even a slightly lower interest rate? On the answer to these questions rests, perhaps, the extent to which this service will result in business for the profession.

And on one other very simple human factor —the quite understandable selfish interests of the members of the various security committees and appraisal committees. They constitute that one important resisting factor that I referred to above as the architect's most serious remaining opponent in the loaning agency set-up.

Special fees are collected from borrowers to cover inspections by members of these committees. They view the site and appraise the value of the lot and the proposed house. This function they must of course continue to perform. It is their essential responsibility. Any fees pertaining to it are legitimate and should be continued.

In addition to this function, however, members of these Committees are accustomed to make an inspection prior to each payment on the loan in order to determine that the work has progressed to the required extent. These inspections, except in rare instances, give no consideration to whether the work has been properly executed but only to whether the foundations are in or to other facts of general progress that determine whether it is appropriate for a further payment to be advanced by the bank.

It is commonly admitted by representatives of these loaning agencies that these so-called inspections are very largely made from an automobile without bothering to go onto the lot or into the building. For these inspections the borrowers pay special fees. The inspections give no service to the borrower and give no protection to the bank so far as assuring proper construction processes, except in the rather rare cases where the committee member is an architect or a contractor who actually exercises his technical knowledge by careful inspection and actual enforcement of good practice and the requirements of the plans and specifications on which the loan is based. Again the physical evidence of the houses built during past years is adequate support for this statement.

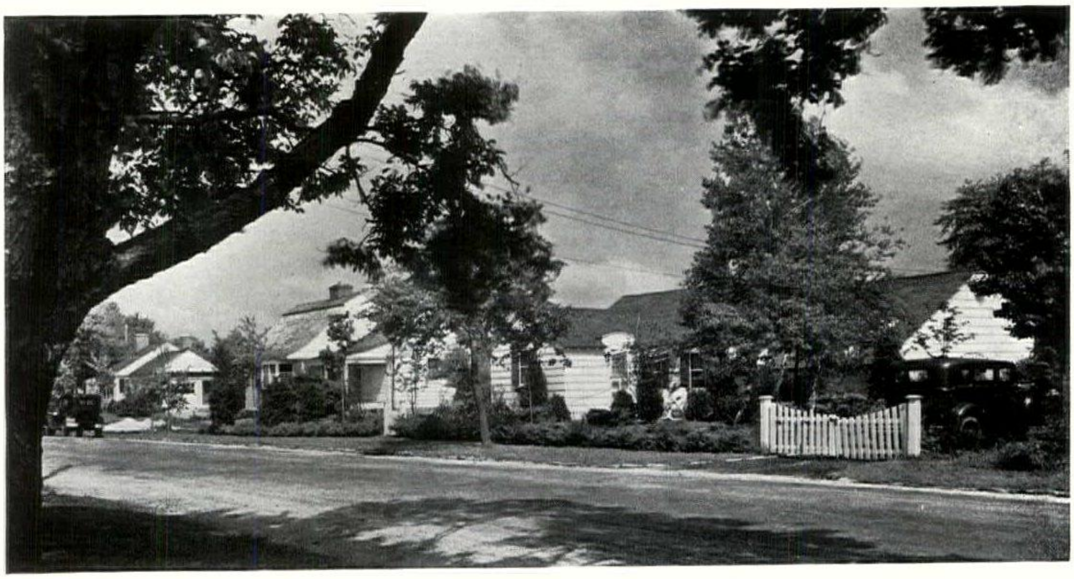
If the proposed Home Builders Service is used, the technical inspections by the architect will provide not only an assurance of proper materials and workmanship but also information on progress by which to make the various payments on the loan. Visits by members of the Security Committee will be valueless and fees for such visits, therefore, im proper. The architect will have a responsibilit to both the owner and the bank. Where a specu lative builder is the temporary owner, the archi tect's responsibility must be primarily to the ban as the representative of the ultimate home owne whose interests are principally involved.

Here there is the factor that will test the in tegrity of the loaning agencies and the members o their appraising committees. Happily there ar indications that they will recognize their position of trust and their responsibility to the investors i the shares of these loaning agencies. The pas procedures have gradually developed over a lon period of years. The bitter fruits of these method have been tasted by the loaning agencies and th myriads of poor families who have sunk all thei savings in a shoddy piece of real estate. The tim for a change to saner procedures has come.

Will the architects of the country rise to th occasion and prepare themselves to meet th problems of this vast new field of service, the doo to which are being opened to them by FHA an FHLB?

Will the member banks of the FHLB and othe similar loaning agencies recognize their respons bility and see that the doors are opened way bac and a welcoming hand held out to their ne architectural partners?

To revert, for a final word, to the earlier meta phor—how far has the dam been lowered? An to confuse the metaphor still more—to what exte will the profession "go over the top"?



HARBOUR GREEN NASSAU COUNTY, LONG ISLAND

THE FEDERAL HOUSING ADMINISTRATION AND SUBDIVISION PLANNING

By SEWARD H. MOTT, Chief
Land Planning Technical Section
Federal Housing Administration

Under the Federal Housing Administration's Insured Mortgage Plan approved lending agencies are being insured against loss on residential mortgages which meet the requirements and receive the approval of the Federal Housing Administration. If the security warrants, up to eighty per cent of the appraised value of a property may be borrowed at low interest rates. The principal is paid back in monthly installments over a period which may be as long as twenty years. This plan has decreased the cost of home financing tremendously and home buyers are eager to take advantage of it. To make certain that the security behind these mortgages is a safe risk, a most interesting system of appraisal has been set up which not only rates the physical property and the borrower but carefully considers the neighborhood in which the property is located. If the neighborhood rates lower than fifty per cent the property is rejected. This definite recognition of the influence of the neighborhood on property values is of great significance. The specific phase of neighborhood rating that will be discussed in this article has to do with the review and approval of undeveloped subdivisions. Because the type of neighborhood that will be created in an undeveloped subdivision must to a considerable extent be assumed, a careful investigation of all the factors affecting its development is made before it can be approved as a desirable site for homes. The Federal Housing Administration's Circular No. 5 on Subdivision Development will be of particular interest to all architects and builders. It is a Subdivision primer and outlines briefly the salient points in subdivision development. These are grouped under the heads of ***Minimum Requirements*** and ***Desirable Standards.*** In this Circular will be found the following statement of policy. "It is only by consistently developing areas which are ripe for use, by reorganizing subdivisions which suffer from planning and financial and legal encumbrances, and by postponing or abandoning the building up of subdivisions which are premature or plainly superfluous, that a stable realty condition can be established which will justify mortage lending and the insurance of mortgages in new neighborhoods."

Minimum Requirements

Before a subdivision is approved as a desirable site it must conform to the minimum requirements. These are:

First Requirement—there must be convincing evidence of a healthy and active demand for homes of the type contemplated and at the prices asked.

This requirement can be considered the keystone of the Subdivision approval. No matter how attractive its surroundings or how well it is designed and restricted, a real need must be demonstrated before approval can be given a subdivision. When there is little or no demand, the property cannot be considered economically sound and it, therefore, is not a safe mortgage risk. The wild platting of land that in the past has resulted in losses of hundreds of millions of dollars to purchasers and investors can be influenced to a very considerable degree through insistence that a demand must be demonstrated before approval will be given.

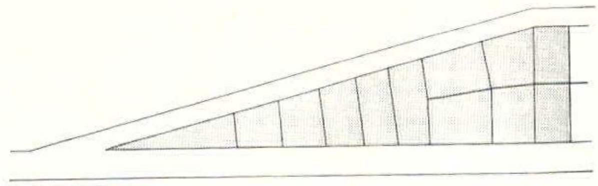
The need of a property may be measured in a number of ways. Dependence is placed to a great extent on the judgment of experienced real estate men in the district insuring offices, who are thoroughly familiar with the local real estate market. Data collected by the Federal Housing Administration's Economics and Statistics Section are also relied upon. Such matters as population growth, industrial activity, number of vacant houses, trend of residential development, sales in comparable properties, real property inventories and a check on the lots that are available in competing subdivisions are considered.

Second Requirement is that the site must be suitable. It must be plainly appropriate for the type of development contemplated. The topography and the condition of the soil and tree growth are noted and possible natural or created hazards such as flood, fog, smoke, obnoxious odors and similar undesirable conditions checked.

Third Requirement is that the subdivision must be easily accessible by means of public transportation and adequate highways to schools and employment and shopping centers. The distance to be traveled and the cost of transportation must be within reasonable limits and appropriate to the type of development contemplated. The cost of transportation and access to employment centers of a workmen's development would, of course, be somewhat different from that of a development for more expensive homes.

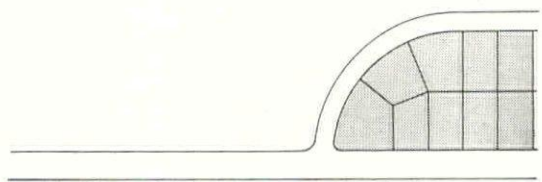
Fourth Requirement covers the installation of appropriate utilities and street improvements. The type and cost must be carefully related to the actual needs of the development. Wherever possible we want the improvements to meet the specifications of the city or county so that they can be dedicated.

When a street is dedicated the responsibility for maintenance, of course, is transferred to the municipality and there is fair assurance that the improvements are appropriate to the climate and needs. Due to climate and local custom, road construction that is considered adequate in one section of the country is undesirable in another. A dirt road that would be perfectly satisfactory in Texas where the ground does not freeze would be most inadequate in Minnesota. This also applies to other utilities and improvements. Consequently, no hard and fast rules have been drawn covering the kind of improvements to be put in with the exception that an adequate supply of pure water is always necessary and a method of disposing of sewage is required that meets the approval of the state or local health authority. However, water supply from wells can seldom be relied upon either for purity or quantity and therefore is not encouraged. If the drainage is not excellent and the lots of fairly generous size, disposal of sewage by means of septic tanks presents serious difficulties.



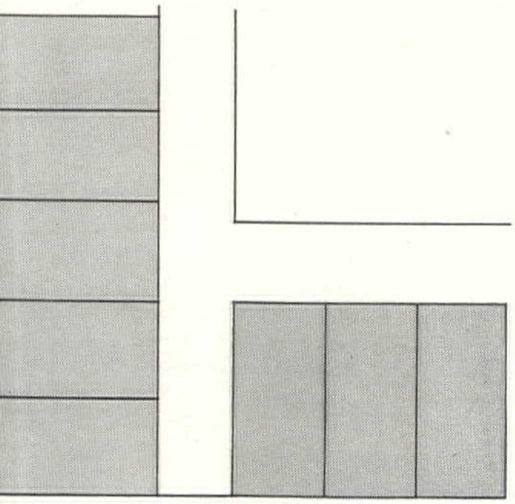
BAD

Sharp intersections making serious traffic hazard and resulting in expensive and inefficient lot subdivision.



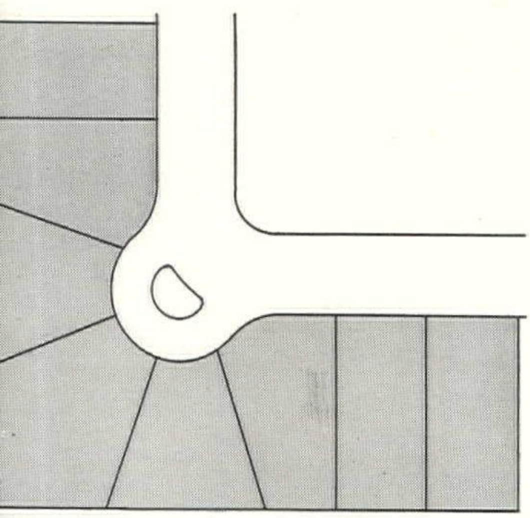
GOOD

Street interesecting highway at right angles, eliminating traffic hazard and resulting in well-shaped lots.



AD

eatment of a corner of a subdivision. cessive area in streets; lots and houses rouped in poor relation to each other; ead-end street without turn-around, mak- g difficult traffic problem.



OOD

eatment of a corner of a subdivision. inimum area wasted in streets; houses tractively grouped in relation to each her; no traffic dead-end.

In practically all cases the responsibility of furnishing an adequate supply of pure water at a fair price is placed squarely on the shoulders of subdividers and where the cost of extending the city sewers is no greater per lot than the cost of a properly designed septic tank, the installation of sewer lines is required. Investigations indicate that poorly improved subdivisions seldom develop into attractive or stable neighborhoods. Such properties are usually sold on a land speculative basis with but little interest in the building up of a permanent community. The actual investment of the promoter is usually so small that he can take a quick profit in the land and get out, assuming no responsibility for its development or the enforcement of the restrictions. The result is usually an orphan subdivision and a blighted and undesirable neighborhood—an area to be avoided when investment risk is considered. This does not mean, however, that the Federal Housing Administration requirements are so severe as to prohibit the approval of low-priced properties.

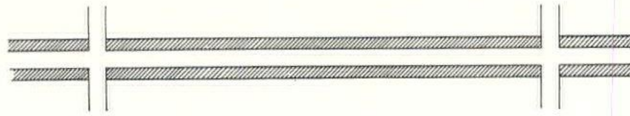
Fifth Requirement is "Whenever the subdivision or any part of it falls within the jurisdiction of a city, county or regional plan or of subdivision regulations, the design and development shall comply with such plans and regulations." The surest way of stabilizing a neighborhood and consequently real estate values is through well-drawn zoning and city planning regulations. Because economically sound real estate is of paramount importance to the Federal Housing Administration, zoning, planning and subdivision regulations receive its hearty and full support. The import of this is far-reaching. As the program develops and people become more conscious of the desirability of the Federal Housing Administration's plan of financing, greater and greater pressure is placed on the subdividers to qualify their developments. Numerous letters have been received from real estate firms stating that without Federal Housing Administration approval they are meeting tremendous sales resistance and that even when other methods of financing are available the people still want to use this plan. If the subdivision is not approved they buy in an area that is. I think that at last a real lever has been found to force the unscrupulous developer to conform to local zoning and subdivision regulations.

Sixth Requirement is that additional protection be provided by means of appropriate deed restrictions. Few zoning regulations are broad enough to provide the complete protection necessary to assure the subdivision developing into a really homogeneous neighborhood. All too seldom are areas zoned for single-family use only, and only occasionally do zoning ordinances regulate the size of the lots. Another shortcoming of most zoning regulations is the excessive areas allocated to commercial use. Many studies have been made by city planners and municipal organizations of the percentage of area that should be assigned to retail stores and similar business uses but it is seldom that a zoning map reflects their findings. In the outskirts of most of our cities and along the main arteries are miles of vacant frontage that have been zoned commercial and that will be vacant for years. This property can produce no income and is rapidly being overburdened with taxes. The result is blighted unoccupied strips along these main approaches. Unless both sides of the highway are controlled by the developer, deed restrictions can do but little good in overcoming this condition. Consequently, thousands of feet of valuable frontage have had to be excluded from the benefits of the Federal Housing Administration's financing plan. It would seem much wiser if local business and retail stores uses were limited to centers grouped on the main thoroughfares at important intersections and at convenient intervals. These centers could be planned as a unit with architectural control, adequate parking facilities and with a sufficiently large area from which to draw customers. There would be little danger of a shopping center of this kind adversely affecting residential value.

Seventh and Last Requirement is a sound financial set-up. The subdividers must be financially able to carry through their sales and development program and there must not be a disproportionate number of lots that have reverted or purchase contracts or taxes that are delinquent. The assessments and taxes to which the property is liable must be in line with the type of development contemplated.

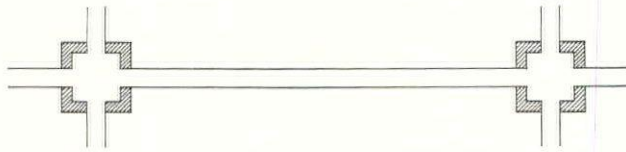
These are the Minimum Requirements that must be conformed to. From this point on it is the endeavor to secure as many of the *Desirable Standards* as possible. These desirables are recommendations, not requirements. However, if some of them were notably lacking approval would be withheld until the condition was corrected. They include the careful adapting of the subdivision layout to the topography and to natural features; the adjustment of the street plan and street widths and grades to best meet the traffic needs; the elimination of sharp corners and dangerous intersections; long blocks with the consequent elimination of unnecessary streets; a carefully studied lot plan with generous and well-shaped house sites; parks and playgrounds; the establishment of community organizations of property owners and the incorporation of features that add to the privacy and attractiveness of the community.

These *Minimum Requirements* and *Desirable Stand-*



BAD

Zoning permitting excessive shoestring commercial development along entire length of street; architectural control difficult; parking problem not considered; sites for more stores than community can support.



GOOD

Zoning providing for retail store centers grouped at suitable intervals and important intersections. These centers can be developed with architectural control; parking facilities and sufficient area from which to draw customers to assure necessary amount of business.

Desirable Standards

ards are the elements that must be present in new residential areas to insure the orderly growth of our cities and the development of stable and desirable neighborhoods.

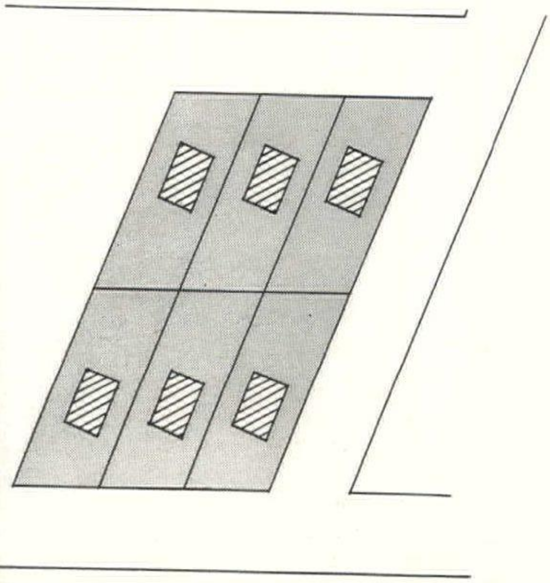
The procedure that has been set up for the analysis and review of undeveloped subdivisions and the application of the requirements and standards is as follows:

Let us assume that a real estate operator wishes to construct houses in an undeveloped subdivision or that he desires to assure prospective lot purchasers that the property in his subdivision is eligible as security for insured mortgages. He first goes to the local insuring office and applies for the approval of his development. He is there requested to fill out a subdivision questionnaire which is sufficiently detailed to bring out the pertinent facts concerning his property. He must also furnish plot plans and location maps, a copy of the deed with the restrictions, photographs of the tract and plans or photographs of existing or proposed houses and other relevant data.

A valuator familiar with local real estate conditions and subdivision development is assigned by the local office to visit the property, note discrepancies in the questionnaire and to fill out a report outlining his opinion of the property with particular reference to its need and marketability and to the business and financial standing of the operating company. These complete data with the report are then forwarded to the Washington Headquarters where they are reviewed by a member of the staff thoroughly familiar with good subdivision practice and rulings, and recommendations are made on the desirability of the property. Every effort is made to make the criticism constructive and to outline in detail just what must be done before the property can be considered a desirable site where loans may be safely insured.

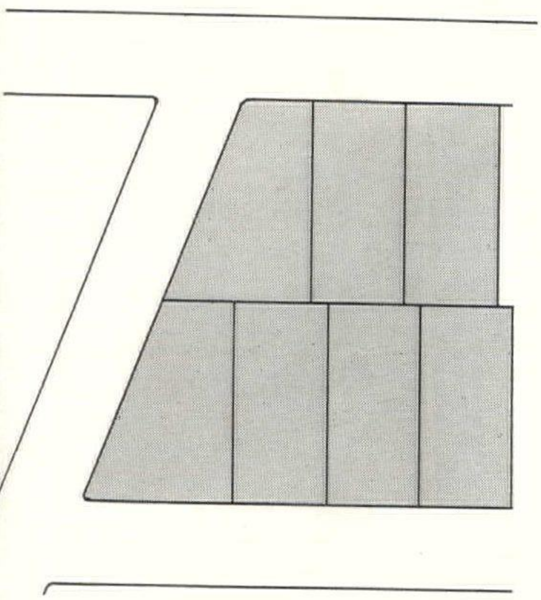
One of the most frequent shortcomings is lack of convincing evidence of a healthy demand. Statistics of population growth and similar data are not always satisfactory. The surest way in which the demand can be demonstrated is by the actual construction and sale of homes. Therefore, in many cases the Federal Housing Administration agrees to make commitments in a subdivision providing a certain number of homes are actually constructed and sold. In this way the Administration is protected against the risks which are always present when pioneering in a new area and the developer is given the assurance that if his project is sound, funds for the erection of dwellings on easy terms will be provided.

It is also found that seldom are the deed restrictions sufficiently complete. Those that are most frequently missing include: the segregation of certain areas for



AD

arrow corner lots; lot lines forming bad gles with the street, forcing dwellings to placed in poor relation to each other d to the street.



OD

ner lots of generous size; lot lines at t angles to street line; permitting ses to be placed in good relation to h other.

specific uses such as single-family dwellings, apartments or retail stores; side yard provisions which would assure dwellings being placed a minimum of ten feet apart; the prohibition of the resubdivision of lots and the erection of more than one dwelling on a lot; restrictions making mandatory the approval by health authorities of the construction and location of septic tanks and wells; provisions for control of the design of the houses and the continuance of the restrictions for a period of at least twenty years.

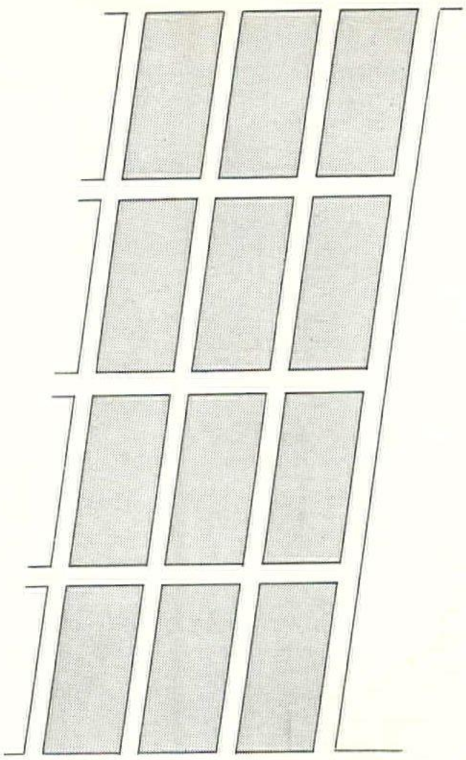
Next to the lack of appropriate deed restrictions and evidence of a demand, the following matters are most frequently found to be in need of correction: weak financial structure, nonconformity to city, county or regional plan, the sale of lots by metes and bounds instead of from a recorded plat, street and utility improvements that are inappropriate or of a type unacceptable for dedication; poor road and lot layout; poor maintenance; and inadequate water and sewer facilities.

In the criticism of the lot and road layout it is frequently recommended that qualified land planners or engineers be employed and, where it is difficult to describe the changes desired, rough sketches are sometimes made indicating the manner in which the layout can be improved. These sketches are not drawn to scale and are but suggestions to be worked out by engineers or planners.

Numerous letters have been received from real estate concerns welcoming these recommendations and giving assurance of their hearty cooperation. There are, of course, a few dealers whose chief object is the quick and speculative sale of lots rather than building up a stable residential district, who object to the standards set, but the vast majority of the reputable real estate men are cooperating splendidly.

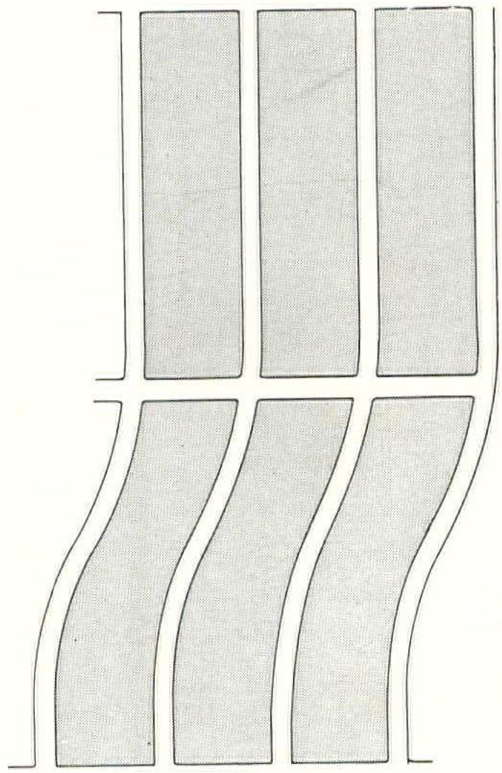
At the present time the Federal Housing Administration is training a group of competent men who will devote their entire time to investigating and checking subdivisions. Through this group it is expected not only to keep a closer check on the market and on dangerous over-development, but also to keep much better track of the manner in which agreed revisions are carried out by the developers. Because of their contacts with the subdividers the objectives of this program will be better understood and the rulings, therefore, made much more flexible.

If this program goes ahead, as there is every reason to expect, it should exert a very material effect toward the well-planned, orderly growth of our cities and the establishment of stable home surroundings and sounder real estate values.



BAD

Monotonous gridiron plan with unnecessary and expensive cross streets; land wasted in streets that could be used for lots.



GOOD

Attractive curvilinear streets with unnecessary cross streets eliminated, resulting in minimum street construction and maximum area for lots.

MODERN PROBLEMS IN SUBDIVISION WORK

WITH CRITICAL NOTES ON SELECTED PLANS

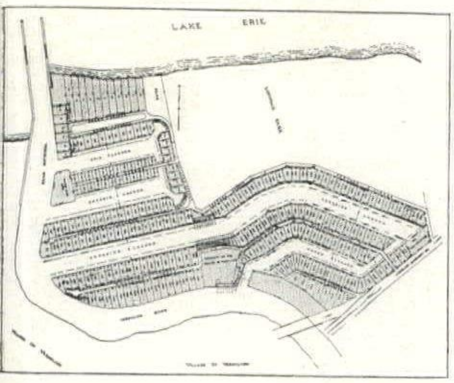
BY CHARLES DOWNING LAY

The obvious superiority of professional work has been the most gratifying feature of my study of these subdivisions picked from all parts of the country and from many examples. America has been too long a country of amateurs and it is pleasing to see that their work cannot be as good as professionals' and that professional standards are rising, in town planning and in architecture as well as in all the other arts.

The permanency of work in town planning and in architecture as it is affected by its technical and artistic qualities is a matter of importance to the developer, the home owner and the banker.

I feel certain that the developments in the following pages which are most skillfully done in planning and in architecture will be the most lasting. We soon grow tired of eccentric styles in architecture and we grow impatient with inconveniences, with dangers and with stupidities in planning, and this weariness and impatience is soon made apparent in declining values, in difficulties in selling.

There is to me no indication of peculiarly American characteristics in any of this planning, but that this will appear I have no doubt. We are not as yet ready to plan our streets for full use of the automobile nor has the automobile probably reached its full development. When that day comes we may find some changes in our town planning and in these minor subdivisions which, after all, are fundamental.



VERMILION LAGOONS — VERMILION, OHIO

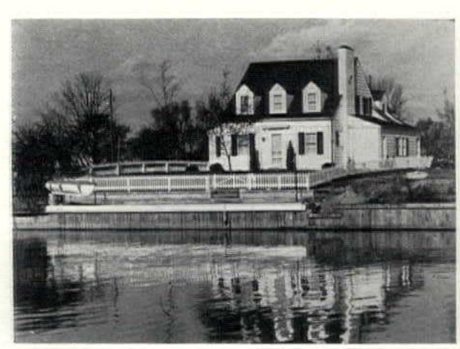
Wells Realty Company, Cleveland, Ohio

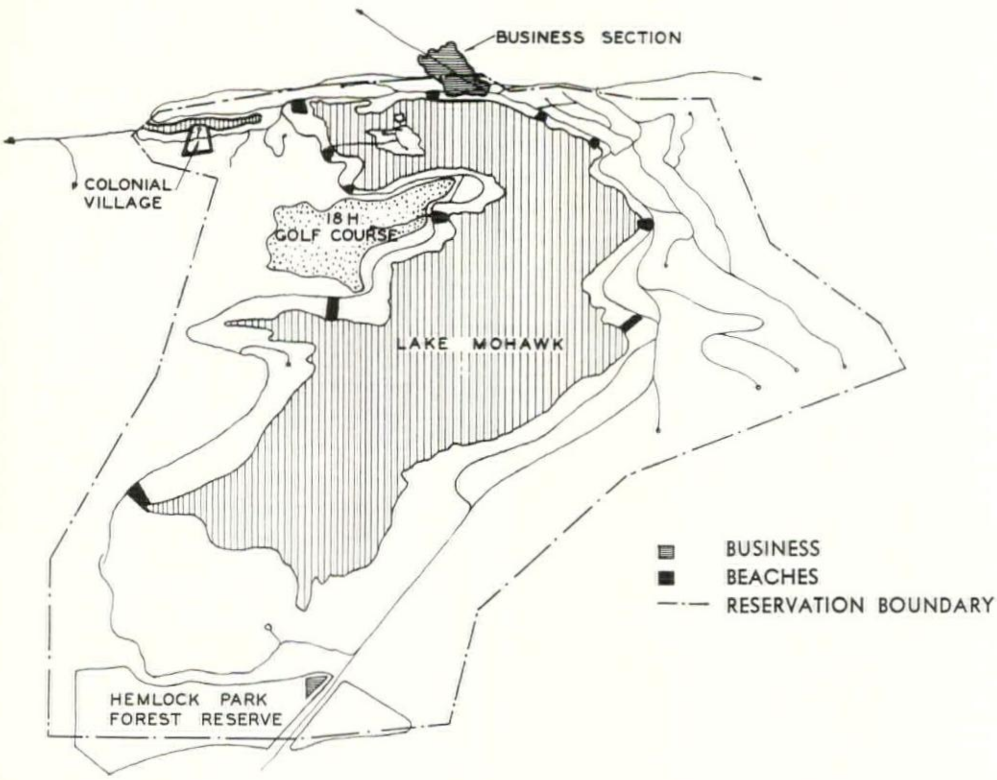
Vermilion Lagoons, a waterfront development on Lake Erie, 45 minutes from Cleveland and near Oberlin, Lorain and Sandusky, was conceived and built by L. A. Wells who is in the dredging business. It is a good class development with sewer, water and streets, owned and maintained by the town of Vermilion.

The site of 65 acres was originally a sandy flat between the Vermilion River and the Lake. Lots have been filled by dredging canals 140 feet wide. The lots, 50 feet wide by a minimum of 62 feet, all front on lake or canal and extend back to a narrow roadway. Houses are restricted to the Cape Cod style but there is wisely no minimum cost established. So far the architecture, including beach club and yacht club, is without distinction and shows carelessness in the technique of design. The street and canal layout might have been more skillfully done. There is a beach on the Lake for the use of residents which is nearly 3 acres in area but this, I think, might have been greater without reducing the net return on the enterprise. Lots on the Lake are too deep, 220-300 feet, and this shore front must be impossible for mooring boats. A promenade the whole distance of the Lake front might have been better in the end.

There are but two bridges across the canals which makes boating perfect. The distance to the town, across the river, is shortened for pedestrians by a ferry which runs from somewhere to the town center.

It is admirable and interesting in conception. It must be a paradise for boating as well as a quiet, isolated colony for comfortable living. It is the sort of thing which every planner would like to do but which is seldom accomplished. It is unlikely that this would have been done had the owner not been in the dredging business, and thus entirely familiar with the work and its costs.





LAKE MOHAWK RESERVATION SPARTA, NEW JERSEY

Arthur D. Crane Co., Sparta, New Jersey
Edwin R. Closs, Architect

Lake Mohawk is at Sparta, in Sussex County, N. J., about 3 miles from Lake Hopatcong. It is at an elevation of about 740 feet and is surrounded by hills about 300 feet higher, or even up to 1,200 feet. The lake is made by damming the head waters of the Walkill River and flooding a swamp. The Walkill flows northward through New York to the Hudson at Kingston. Lake Mohawk is about 3 miles long and ¾ of a mile wide. The line drawing is not a map, but a tracing of the air view to show the location of beaches, the reservation boundary, and the business center.

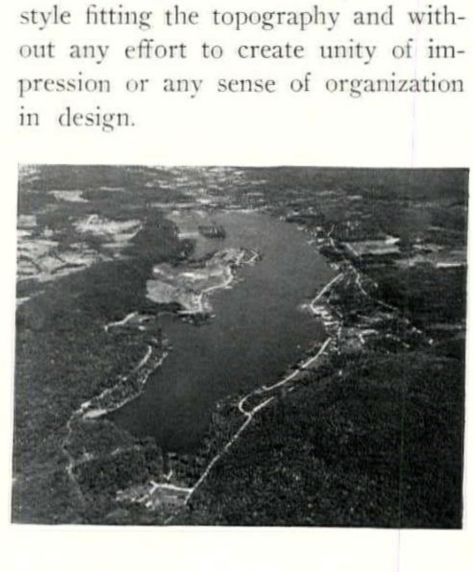
It appears to be a typical development in the American manner; privately owned and operated for profit; the use of the area restricted to lot owners, and with the usual accompaniment of golf course, bathing beaches, etc. I imagine that it is like many other clubs which gain exclusiveness by self-imposed restrictions. Tuxedo was, perhaps, the earliest of these enterprises, but there are many others scattered all over the country, some which started as fishing clubs, like Forest Lake, Pa., and have become prosperous summer resorts. Blooming Grove is another nearby in Pennsylvania. They were carved out of the wilderness, or made up of abandoned farms and at first were likely to be primitive. A clubhouse of logs, where men might spend a week or a week-end shooting or fishing. Cabins owned by members and used at first only when sport was good, became finally summer cottages of considerable importance. They were seldom without their commercial side, whether the land was owned by an individual or by bondholders.

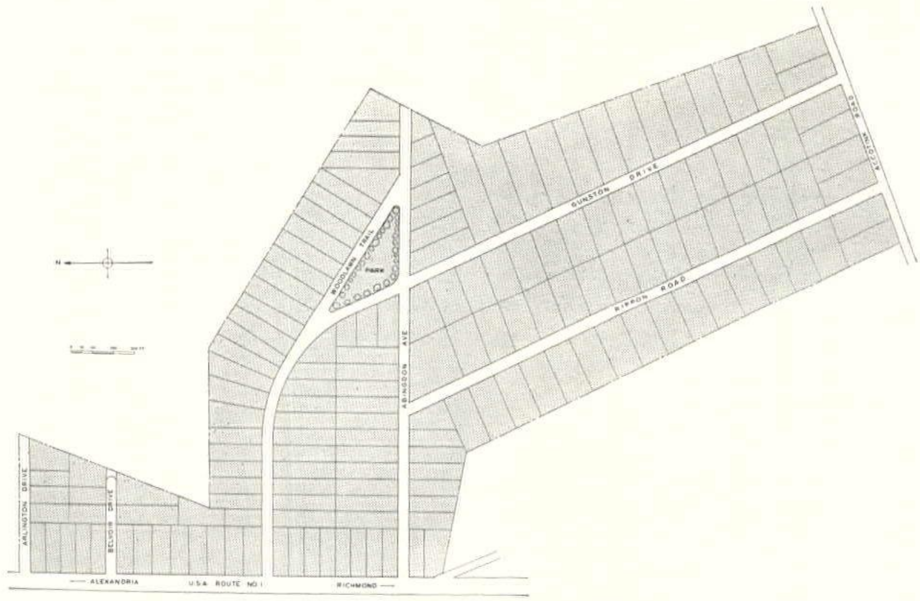
Few of these clubs have been planned in advance and they suffer from the casualness of the work and from the results of haste and expediency. It is true, most of them were intended to be wild and it was doubtless the hope to keep them simple, but as time goes on they become elaborate and incongruities of early planning become conspicuous.

Some, like Onteora and Twilight Park in the Catskills, and many in Maine were started without the sporting motive, in order to create a community which could be controlled and which would be lasting. Many have lasted through changing periods of the horse and buggy, golf, the automobile —in spite of a continuous tendency (made possible by the automobile) to have a permanent summer home in the country.

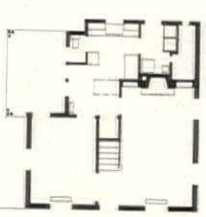
The history of some of these communities would be an interesting subject for a doctor's thesis in town planning, and their future will be more interesting than their past.

Lake Mohawk gives every indication of being planned in the picturesque style fitting the topography and without any effort to create unity of impression or any sense of organization in design.





SECOND FLOOR



FIRST FLOOR

HYBLA VALLEY FARMS — ALEXANDRIA, VIRGINIA

Carroll F. Morrison, Engineer, Alexandria, Virginia
V. Ward Boswell, Developer, Alexandria, Virginia

Hybla Valley Farms is on a fairly level tract of land in Virginia, 9 miles from Washington. The entire tract is 180 acres, divided into plots from one acre up. It is restricted and the cost of houses is from $5,000 to $7,000. Each house has a dug well and a septic tank.

It is a subsistence homestead community for white collar workers in Washington, done without government money and therefore significant.

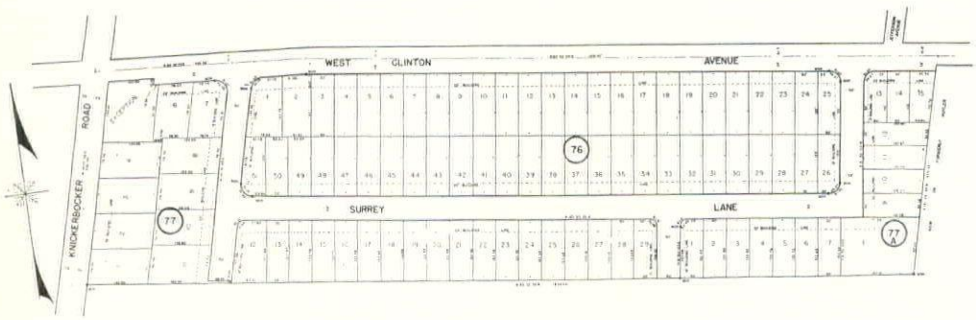
The plan of streets and lots seems adequate, but not interesting or well studied. What reason there might have been for the dead end on Abingdon Avenue, Belvoir Drive and Arlington Drive, I do not know, but I am inclined to think that in a difficult and irregular plot like this it would be better to disregard adjoining property, as has been done on the west, and make the layout self-contained. This possibility is suggested by the lines of Rippon Road and Gunston Drive, which are continuous from one existing highway to the other.

The lots on Arlington Drive and Belvoir Drive are isolated from the rest of the community, and are less desirable on that account.

I would like to see more of a center than is suggested by the Park. A community of a hundred or so families is enough to support a small shopping center, a school and, perhaps, a church. There is no more impressive or even important site for a public building, and no sufficient provision for a center, with all that such a thing implies in space for parking cars and for growth, which might be considerable as the surroundings develop. A weakness of American town planning, as it seems to me, is in the failure to provide good sites for public buildings.

I don't know the character of the Alexandria-Richmond U. S. No. 1, but if it is a busy road it is not a good place for shops, and I would prefer to face the lots all toward the interior streets.

MODERN PROBLEMS IN SUBDIVISION WORK



LYLEWOOD HILLS — TENAFLY, NEW JERSEY

Reis Homes, Tenafly, New Jersey

Lylewood Hills, Tenafly, N. J., is a subdivision of 95 lots in an old community. The promoters have recognized the terrible cluttered effect and the destruction of back yards through filling them with garages, and require that all garages be attached to houses.

Lots are 50 x 135 feet, with some larger. The most significant thing about this development is the building of good looking and small homes in quantity to sell for $50 a month. There is nothing in the layout of lots and streets except a further subdivision, in an inevitable way, of a plot too large for present use.

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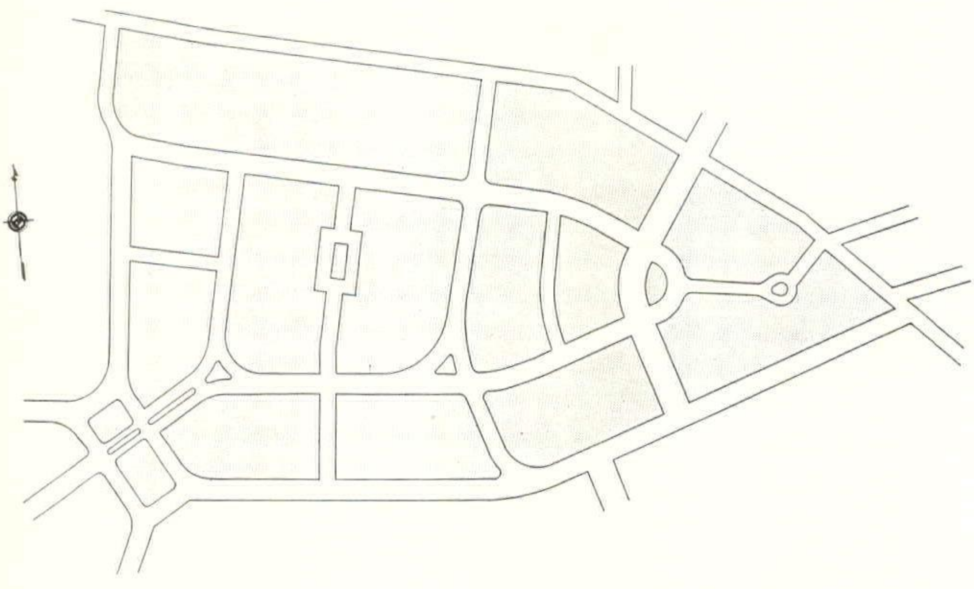


BROADACRES — GLENS FALLS, NEW YORK

John Nolen, Landscape Architect, Tom Rogers, Agent: Glens Falls, New York

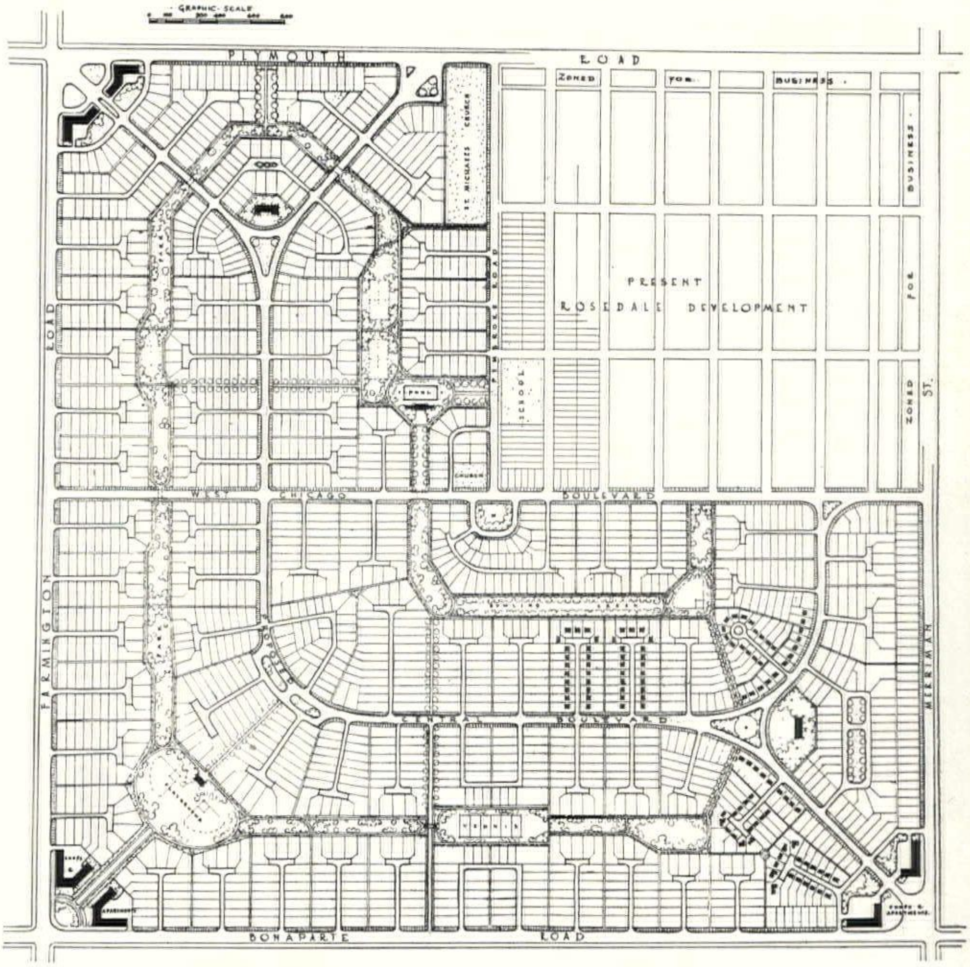
Broadacres, Glens Falls, N. Y., was started about ten years ago. Lots, 50 x 150 feet for the most part, sell for $2,000. The layout was done by John Nolen and has the professional touch. Like all work of town planners, it cannot be criticized fairly from the plan because the relations to the surrounding streets, the adaptation to topography, and the views from the lots cannot be known from a lot plan. It is probable that the blocks would be longer if it were done today and that the street plan would therefore be simplified. There is an interesting variation in street widths, though it is impossible to see from the map why Roosevelt Avenue should be 100 feet wide and stop on Coolidge which is 71 feet.

The difficulties and discouragements of a planner working for a promoter are enormous, first because the promoter is inclined to think of areas instead of thinking of lot units and is therefore penurious in the use of property. He is also inclined to favor gadgets in the plan, and these gadgets may be too wide avenues, too short blocks, tricky interior squares, park strips in the center of a street, or what not.

It is hard sometimes to persuade a promoter that the cost of filling a lot, for instance, may nearly equal the selling price of the lot, or that the cost of property put into park or plaza space can be as well added to the cost of lots for sale as the space used for streets can be.

If the venture is at all reasonable in the existence of a demand at the price required to come clean with a reasonable profit, it should be easy to persuade a promoter that a slight decrease in profit might be more than made good by ease and quickness of selling and thus in a reduction of selling costs. I cannot believe that quality which is determined by good design, by good construction and by generous space devoted to public use is not a good selling point, and that it cannot be made to pay an extra dividend.

CRITICAL COMMENT BY CHARLES DOWNING LAY



ROSEDALE GARDENS DETROIT, MICHIGAN

William Pitkin and Seward Mott

Landscape Architects

Rosedale Gardens is an interesting development because it seems to show the recognition of the value of quality and the inadequacy of the old-fashioned rectangular layout. One quarter of the tract shown is the standard rectangular layout, but the new three quarters by William Pitkin, Jr., and Seward H. Mott of Cleveland is entirely modern in conception.

It has in the same space one large boulevard, instead of seven streets, which gives access by means of cul de sac streets to an equal area. The cul de sac for residential districts will undoubtedly be a permanent feature of American planning for residential areas. No pedestrian walk from the cul de sac to the park is apparent, though it seems essential; the alleyways do, however, connect with this park strip.

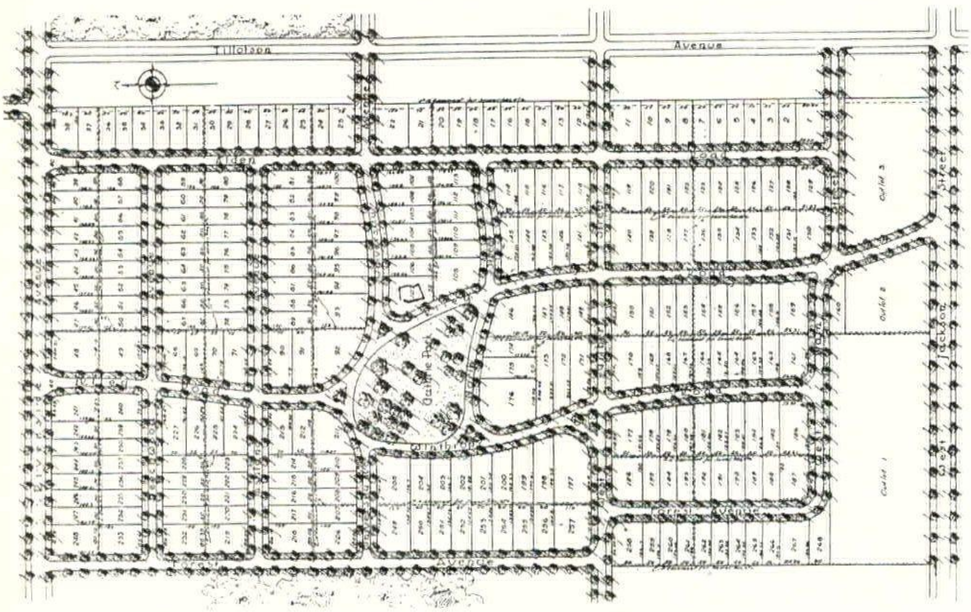
The plan seems to me interesting and intelligent and technically competent. Further study will, I think, lead to some feasible scheme for avoiding the great depth of some lots, and for a uniform arrangement along the central Boulevard. It is a little disturbing to have the lots for a long distance with their sides to the Boulevard and then to come upon 6 facing it, and then two more facing. The corner lot in a cul de sac is always troublesome because of limited frontage, and the trouble is not made less by joining two cul de sacs to make a loop. Yet I believe the loop is more convenient and does not increase traffic hazards to any considerable amount. The one-way street which has simplified traffic so much in cities has never, so far as I know, been adopted as a principle of design in residential areas. It seems to me to offer considerable freedom in design and some saving in space.

The next great improvement in residential areas, which I have long advocated, is a complete separation of motor and pedestrian traffic, so that the front of the house faces a pedestrian parkway and the back a motor road without sidewalks. Simple pedestrian bridges would give a complete separation. Children play where they will, but I think the inclination to play on the pedestrian street and to avoid the motor road would be strong.

The Rosedale Gardens plan has corner entrances—four of them—which I think unfortunate. They are difficult or impossible to make pleasing in appearance, and they complicate traffic regulations. Central Park in New York has several which have always seemed a mistake in design. In the case of Rosedale Gardens they may have been adopted to save distance by cutting corners, but I think the saving is not worth the disfigurement they cause.

Business in this plan seems to be taken care of in the old part, along Merriman Street and Plymouth Road and at the corners under apartments, but I would like to see some provision for it in the very center at the junction of West Chicago Boulevard and Pembroke Road. My ignorance of conditions on the ground may lead me into a merely rationalistic decision. The spot is not conveniently accessible at present and it might be wrong to make it so.

Would it be right or not to treat this comparatively large tract as an isolated, self-contained unit? To consider it as a complete town or community which would be left only by the men going to work or by their wives going shopping in the big center? The present design seems to be based on the assumption that every one leaves the community for business, for amusement, and for shopping.



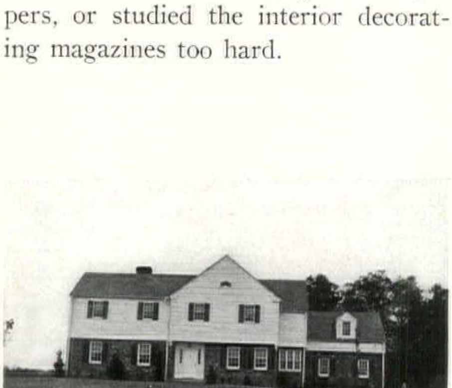
KENMORE **MUNCIE, INDIANA**

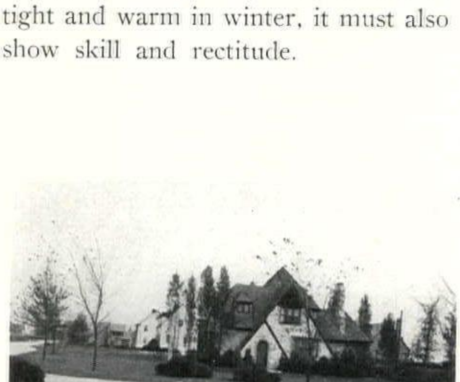
The Bender Company, Muncie, Indiana

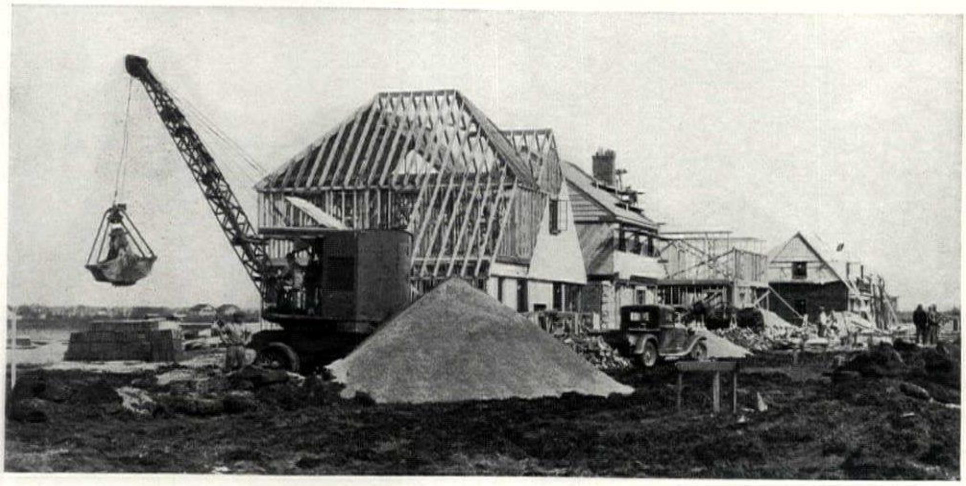
Kenmore, at Muncie, Indiana, is a standard 50-foot lot subdivision with some curving streets cleverly fitted to a standard rectangular plan. The 50-foot lot, however, is only a unit and the lots, as sold, are always larger as they must be for such large and substantial houses.

The houses are, however, a little fantastic, as if the lady client had read too much of the woman's page in the papers, or studied the interior decorating magazines too hard.

All American designers, outside of the great names, seem lacking in technical skill which, if they had it, would prevent many of the clumsy, stupid things they do in design of streets, of houses, of gardens, of pictures, and sculpture, signboards and posters. More of us have got to take these things more seriously and have some conscience in our work. It is not enough to design a house that will be tight and warm in winter, it must also show skill and rectitude.







GARDEN CITY

GARDEN CITY, LONG ISLAND

Mott Brothers, Hempstead, Long Island

This development on Long Island is being undertaken by Mott Brothers, who are very active in the New York region. The subdivision is more notable for its selling schedule, price range and individual houses than for its plot plan. The site is relatively flat and treeless, using a 60-foot minimum lot. The streets, utilities and landscaping are all done by the developing company, the cost being prorated between the homes and included in the initial purchase price of house and lot. The development is quite completely restricted.

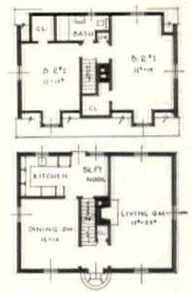
Like most of the active subdividers in this region, Mott Brothers furnishes a complete house-building service—design, construction, landscaping: to this they have added an interior decorating service, free to buyers. They have an architectural staff which designs each house to meet the specific requirements of each client. (The client may engage his own architect if he so desires.) All houses are built by the construction department, using a standard set of specifications which strikes me as being unusually complete and high-class:

All Houses Built under "The Reynolds Certified Specification System"

Poured concrete foundations
Steel girder and columns
Reynolds Metalumber framing
Bangor slate roof
Double oak floors
Copper flashings, leaders and gutters
Campbell steel casement windows
Copper piping and hot-water boiler
Reynolds plumbing fixtures, colored
Stall shower with chromium framed glass door
Fully tiled bathroom, walls and floor
Steel medicine cabinet
Inlaid linoleum on kitchen floor
Kitchen cabinets with flush doors
Wood-burning fireplace
Insulation by Reynolds metallation
Reynolds oil-burning unit and Reynolds air conditioning
Reynolds Ecod metal plaster base
McPhilbin lighting
Chase solid brass and copper water pipes and fittings
Attached built-in garages
Aromatic cedar closets

By this method of construction they are able to retail the houses shown at the prices listed, complete with landscaped lots. Of the three houses shown, No. 2 strikes me as an especially interesting one, though the exterior leaves much to be desired. The first floor has been very carefully designed to concentrate all service features on the street side, and the living space on the garden side flows together well. All three houses show good planning and indicate the responsiveness of operative builders to changing buyer demands.

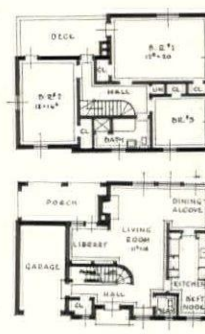
1 $5,500



Second Floor

First Floor

2 $6,750



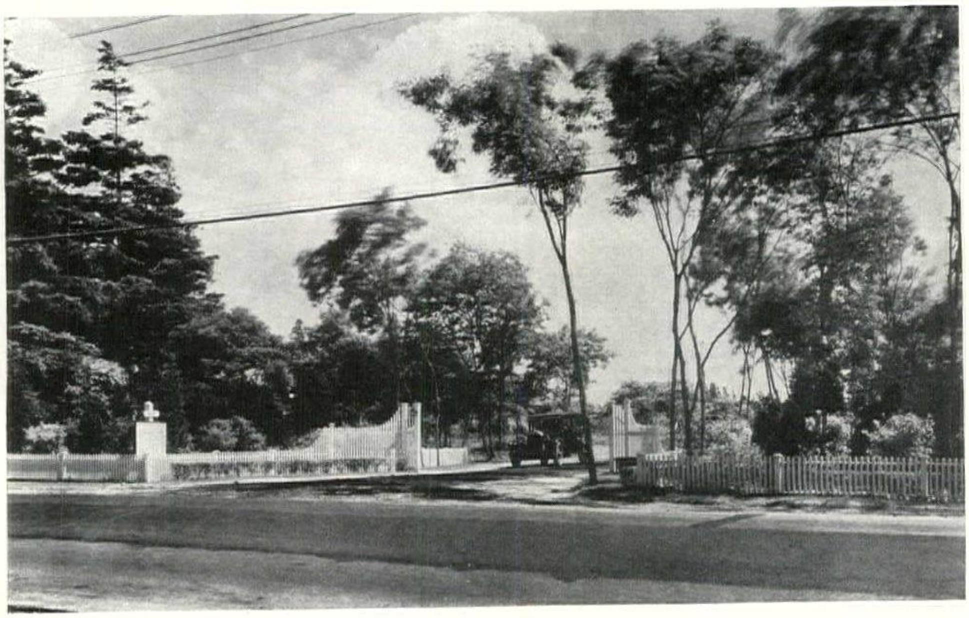
Second Floor

First Floor

3 $7,000

Second Floor

First Floor

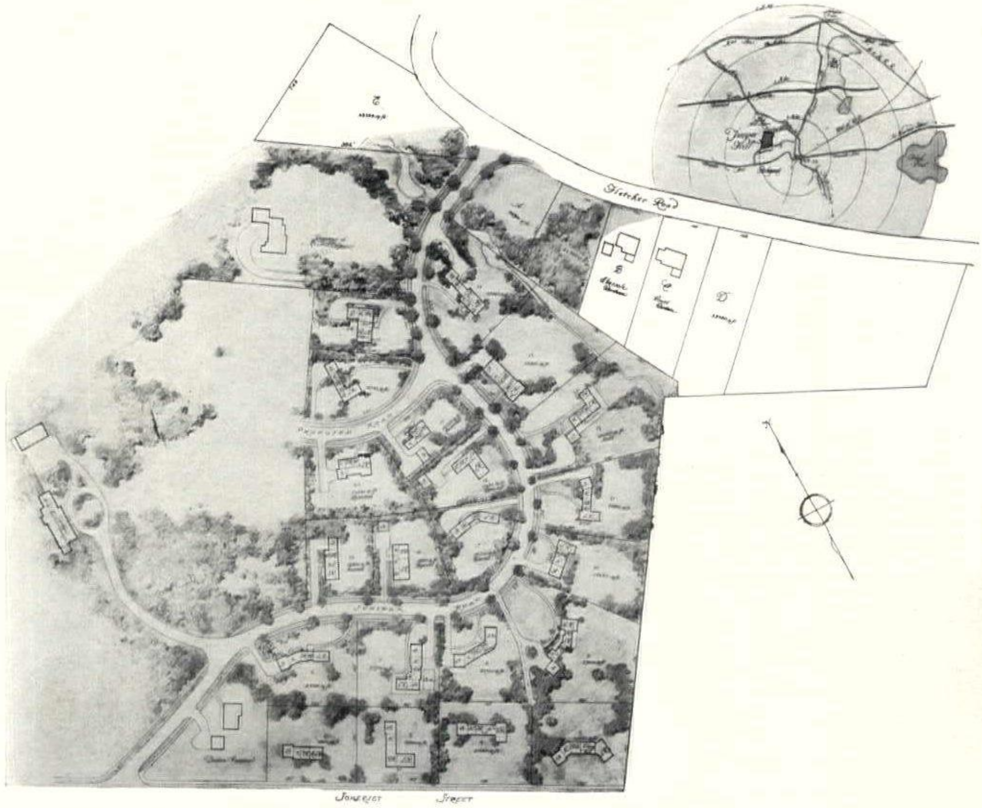


HARBOUR GREEN — NASSAU COUNTY, LONG ISLAND

Harmon National Corporation, New York City

Harbour Green is located on the South Shore of Nassau County, Long Island. It is unfortunate that no plot plan is presented as the project has an unusual shape and is well planned. An L-shaped tract, with a narrow frontage on an arterial highway, it runs back and widens out along an ocean frontage. This problem of access through the narrow section of the development is well handled. The character of the entire subdivision is simple and countrified. Curbs and sidewalks have been omitted, effecting economies for the buyer and contributing to a rural atmosphere. The native growth of locusts and cedars has been remarkably well preserved. Lots are a minimum of 100 x 100 feet, and ample restrictions as to set-back and height give a uniform openness to the project. The public areas of the subdivision are maintained by an annual assessment on each lot holder, whether he has built or not. This is an admirable provision, provided the owners have sufficient control over the expenditures of such a fund.

Developed in 1932 by the Harmon National Corporation, this subdivision indicates the possibilities of planning in the price range of $6,000 to $10,000. This company offers a complete home-building service flexible enough to fit individual requirements, standardized enough to effect economies impossible in individually built homes. Besides architectural, building and landscaping services, included in the purchase price, the company maintains a 1-year maintenance service.



JUNIPER HILL — **BELMONT, MASSACHUSETTS**

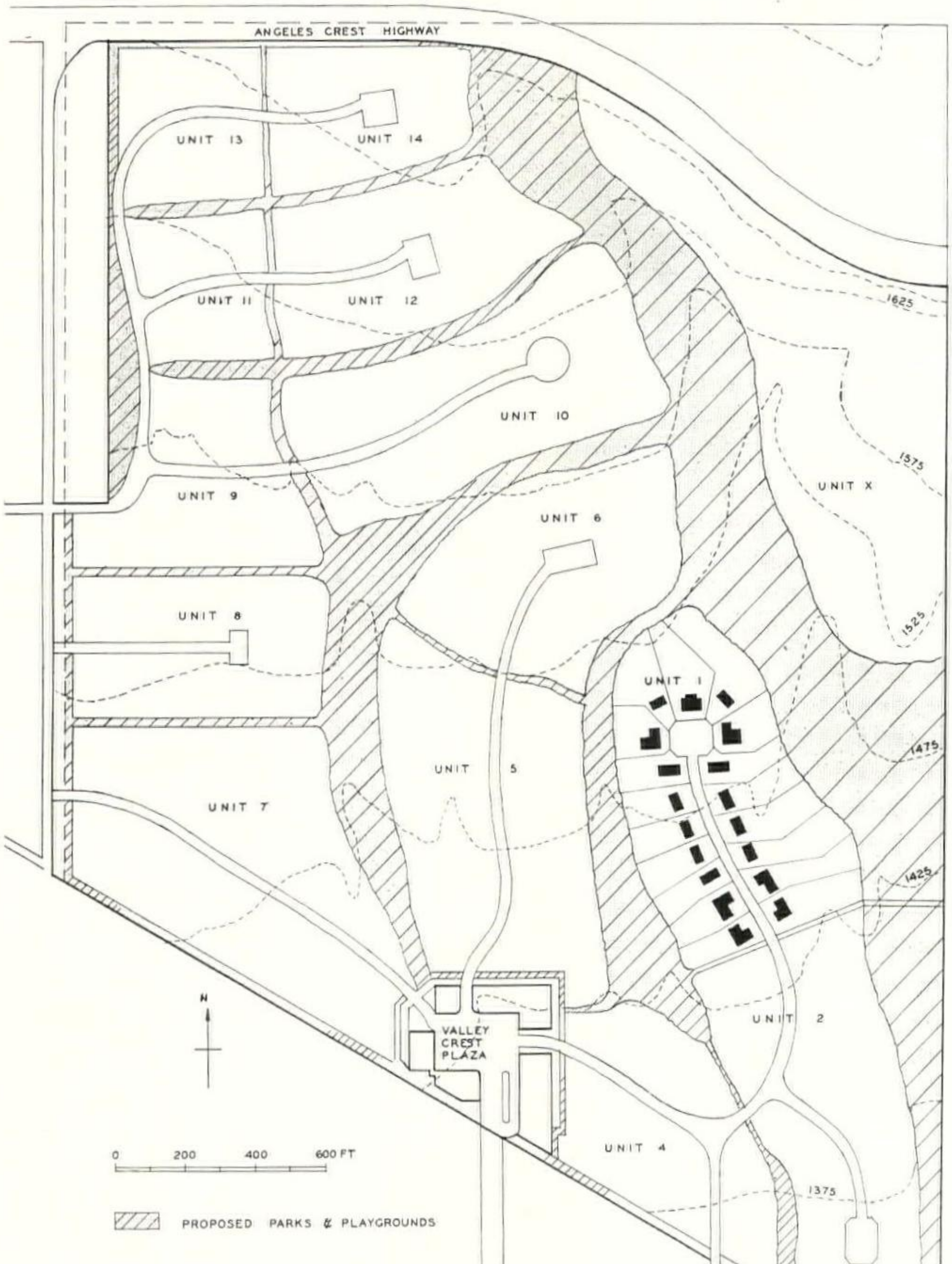
Olmsted Brothers, Brookline, Mass.

Juniper Hill at Belmont, Massachusetts, is by Olmsted Brothers. It is a high-class suburban development in the best naturalistic manner of which the designers say: "Juniper Hill is an attractive cedar-clad upland, with a sheltered southeasterly aspect and a commanding outlook over Cambridge, Boston, and Boston Harbor. The area is small (about 12 acres) but the terrain and layout are such that the distant view can be practically assured from each lot, a fine private estate on the west gives protection and tone to the property, and the whole neighborhood is zoned for single-family residences.

"Only three and a half miles from Cambridge and Harvard College, and seven miles from Boston, it is a particularly convenient location for suburban living.

"The lots average about half an acre in area with a few larger units. Land cost, development cost, and carrying charges come to about 18 cents a square foot, and it will probably be sold at from 18 to 25 cents or so. The intent is to provide opportunity for first class modest homes for a total investment (house and lot) of from $20,000 to $30,000.

"The project is protected by carefully drawn restrictions aiming to assure a homogeneous effect of distinctive quality in both the architectural and landscape developments, and protection for each lot owner against the damaging influence of inferior homes close at hand. One house is to be built for sale immediately and the grounds developed, in order to illustrate and fix the standard which the grantor has in mind. All plans submitted by individual lot owners must be approved by the grantor and must accord with the general character established for the community. Olmsted Brothers are serving as general planners and directors for the project. As the grantor's agents they are responsible for effective cooperation among designers, on work being done by the grantor, and in so far as possible, for the beauty and general agreeableness of this community."



VALLEY CREST
LA CANADA, CALIFORNIA

Ralph Flewelling, Architect

C. H. Cheney, Consultant

Valley Crest at La Canada, fifteen miles from Los Angeles, is the work of R. C. Flewelling, architect, and C. H. Cheney, city planning consultant. It is a community association on a tract of about 150 acres to be divided into ¼-, ¾-acre plots. It is fairly steep, being 10-12½% in most places, with a total rise of about 300 feet.

Deep gullies (15-20 feet) running across the contours are used for park strips, varying in width from 50-200 feet. There is, as it appears to me, no consistency in the planning. Some roads run straight up the slope; others take an easier gradient; but all are cul de sacs.

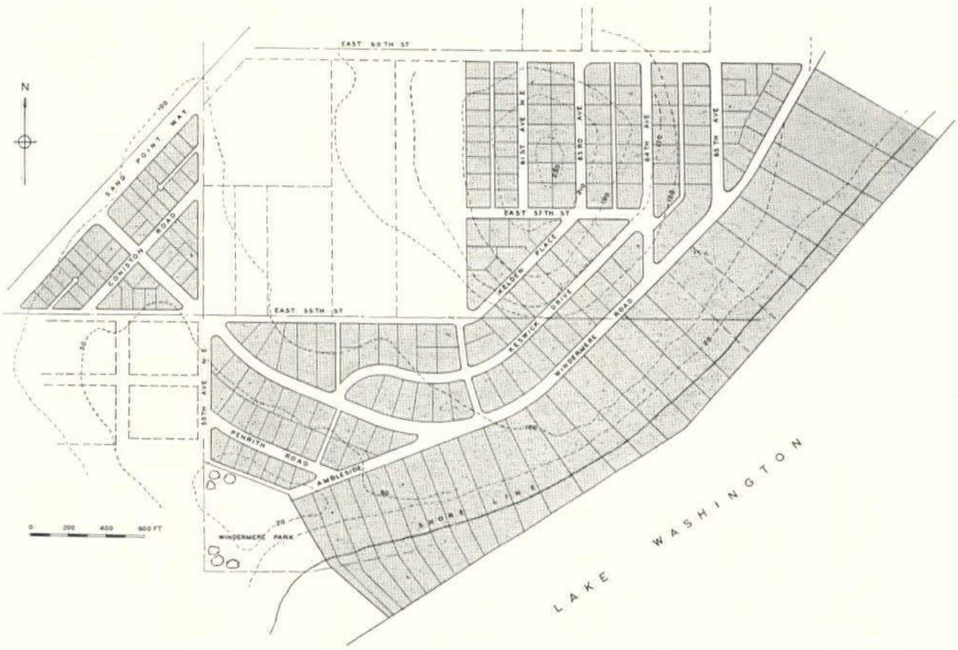
The plaza, which is the main entrance and may be considered the point from which all roads start, is on land sloping 10 per cent.

Each lot connects at the back with a walk and a park strip, even where there are no gullies. There seem to be no walks along the motor roads.

Comment on an informal scheme like this, without greater knowledge of the conditions, is impossible.

WINDEMERE
SEATTLE, WASHINGTON

Whitworth, Rutherford & Harris, Engineers



Windemere, on Lake Washington at Seattle, is a high-class development of 135 acres set up into 221 lots, fully restricted and fully improved. The prices range from $5,000 to $25,000.

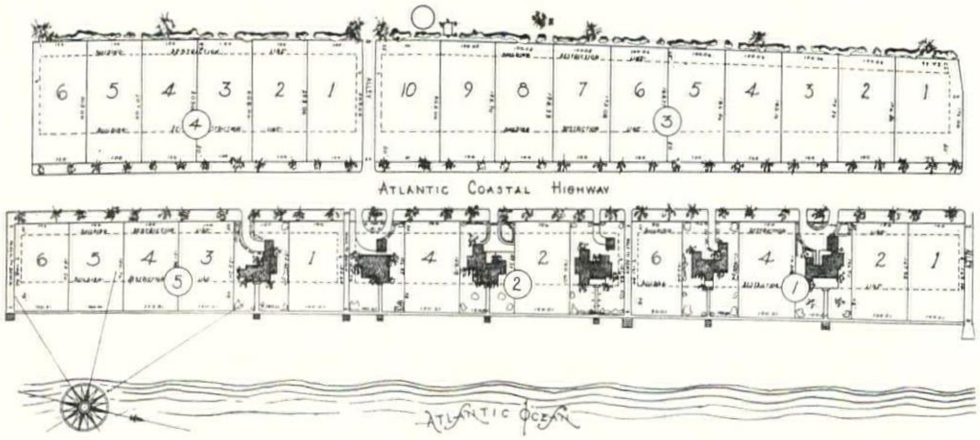
The photographs show a charming country and expensive, well-designed houses which, however, are not uniform in cost. The minimum costs are in one district on 60 and 80 by 120 and 130-foot lots—$5,000; these are furthest from the water. Next is a $6,000 district which in the plans, and for reasons unknown, breaks into an $8,000 district. The $10,000 range also breaks into the $12,500. The $15,000 and $25,000 districts are side by side and have lake frontage with lots 100 or 120 feet wide and 470 and 614 feet deep. It is easy to guess that width of lot and, perhaps, the orientation or outlook determine the minimum building cost. The deep water-front lots are obviously arranged to give a building site a hundred feet or so deep on an old table 25 feet or more above the lake.

This all seems right to me because it bases lot costs and improvement restrictions on the real values of shore, outlook and situation or environment. The property adjoins Windemere Park which may be a public park. There is no public area in this subdivision and apparently no thought of community enterprises or gatherings or sport, though the population might be

57 in $5,000 houses	On the basis of 1 house to a lot
51 in $6,000 "	
69 in $8,000 "	
18 in $10,000 "	
12 in $12,500 "	
8 in $15,000 "	
9 in $25,000 "	
8 lots unclassified	
232 houses	

The planning of the lots and streets is not too intelligent and, though not dumb, technically, in its details it is lacking in skill. There are some bad lots, a number of clumsy street intersections, and a street plan which necessitates two lanes for pedestrians; alleys which seem unnecessary in a district of this high character occur in 3 blocks, but not in all. Many lots 200 feet in depth have a street at each end; others, 248 feet deep or more, have a street at each end but are undivided. Grades, as shown on some of the streets, are as high as 20%. There are too many short blocks. It is apparent that more study of precedents adapted to these difficult conditions would have produced a better layout with fewer roads and more and better lots.

The execution of the work, with its concrete roadway curbs and sidewalk, seems exceptionally good.



PONTE VEDRA — JACKSONVILLE BEACH, FLORIDA

Telfair Stockton & Co., Jacksonville, Florida

Ponte Vedra, Jacksonville, Fla., is a shore resort with golf club guest houses and building lots.

The architecture of cottages and houses is simple and competent. The most unusual feature is the location. It is a strip of land 150 feet deep between the Atlantic Coastal highway and the ocean, cut into 100 lots. Another strip, 200 feet on the other side of the highway, is similarly divided. It might be called strip planning and, of course, it offers few opportunities for variety and no chance for picturesqueness if it were desired.

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HOPE RANCH — SANTA BARBARA, CALIFORNIA

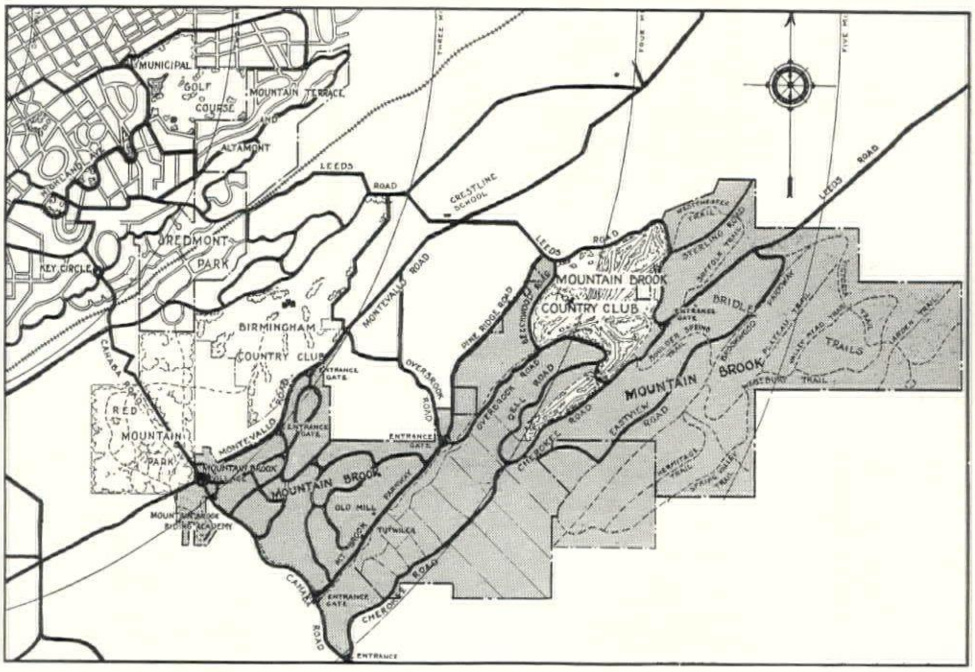
H. G. Chase, Agent, Santa Barbara, California

Hope Ranch, four miles west of Santa Barbara, California, has land at two prices—$1,800 per acre north of Vieja Road and $5,000 per acre south.

There is a golf course, hunt club, polo field and beach club, all on a hilly district where lemons grow.

The smallest separate plots seem to be one acre but much of the area is in 5 or 6-acre tracts with some as large as 30 acres.

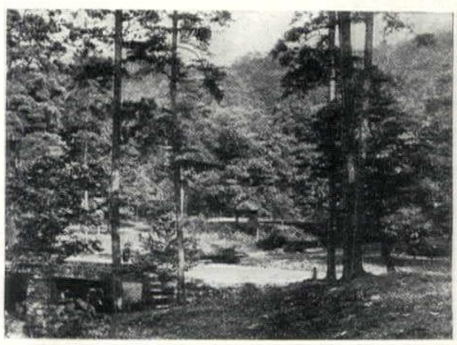
The roads in a subdivision of this character are chiefly utilitarian, being designed to provide access in a rather rough terrain to picturesque building sites and having no part in an organized design. If they serve this purpose well enough and also are agreeable to drive on and give pleasant views of the country and the sea, no more can be asked. No one can say with conviction that it has been done badly or even that it might have been done better. If the best sites have been developed for residences and if the roads are fairly easy and safe, after that their design is almost wholly determined by their cost in one alignment or another and scarcely at all by any reasons which would possibly be called aesthetic.



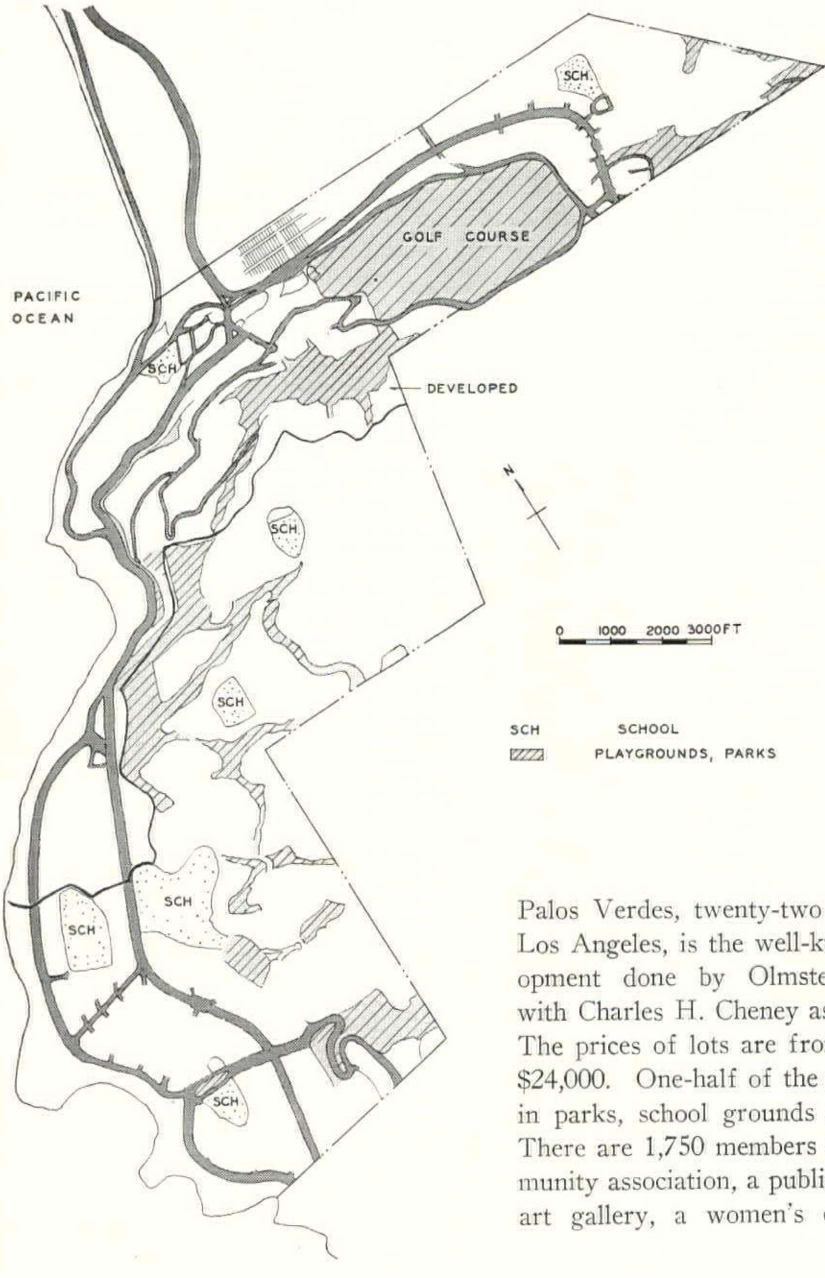
MOUNTAIN BROOK — BIRMINGHAM, ALABAMA

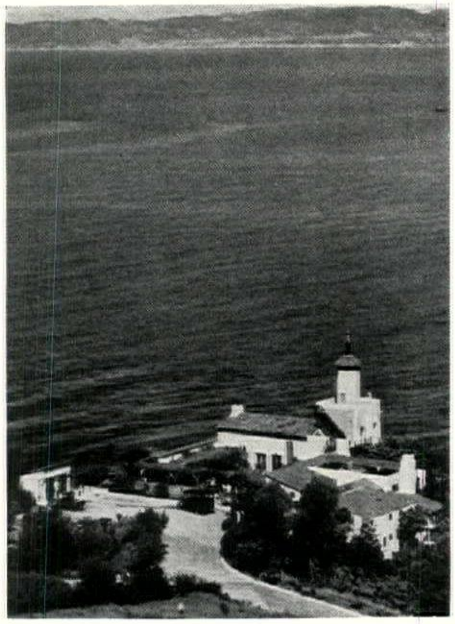
Jemison & Co., Birmingham, Alabama

Mountain Brook, four miles from the center of Birmingham, Ala., is a sophisticated naturalistic design by W. H. Kessler, landscape architect. A charming country club in the community was designed by Aymar Embury, II, and Miller & Martin.



I judge it to be on the southerly limits of the Appalachians in a mixed forest of hardwoods, characteristic of the Appalachians, intermixed in places with pines. No lovelier setting could be imagined, and it seems to have been done with feeling by Mr. Kessler. The houses are of a high class and well designed.





PALOS VERDES ESTATES
LOS ANGELES, CALIFORNIA
Olmsted Bros.; and C. H. Cheney, Consultant

Palos Verdes, twenty-two miles from Los Angeles, is the well-known development done by Olmsted Brothers with Charles H. Cheney as consultant. The prices of lots are from $2,800 to $24,000. One-half of the total area is in parks, school grounds and streets. There are 1,750 members of the community association, a public library, an art gallery, a women's club. It is zoned mostly for single-family detached dwellings—3,200 acres of a total of 16,000 have been developed. The land is along the ocean which is skirted by a drive. There are few building lots between the drive and the shore which seems to be everywhere open to the public. Inshore from this are minor roads parallel or leading up the hills.

HOUSE OF FRANK A. PIRNAK ROCKVILLE CENTRE, LONG ISLAND

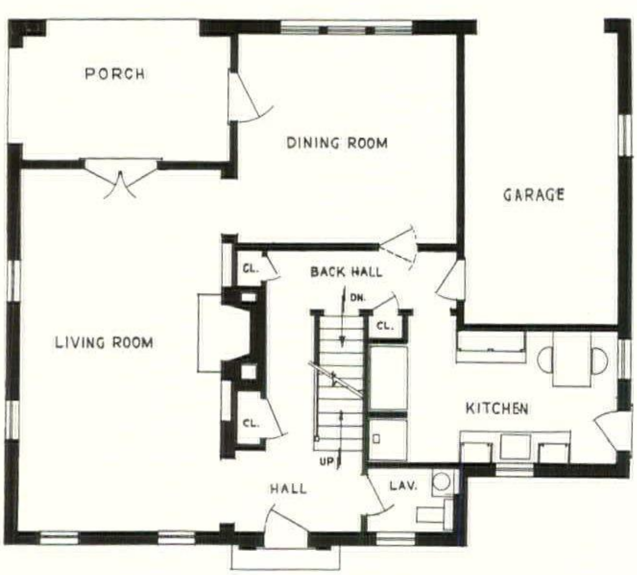
Photograph by Murray M. Peters

HENRY TITUS ASPINWALL, ARCHITECT

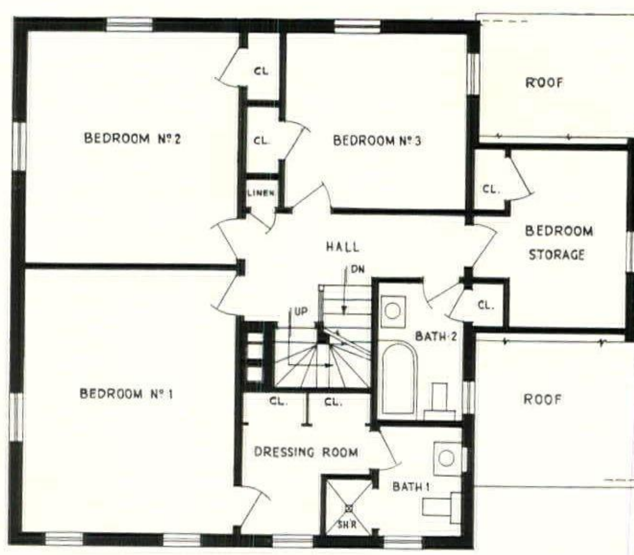
Concrete foundations, wood frame and brick veneer walls, slate roof. Wall finishes: plaster and wallpaper; tile in bathrooms. Oak floors; tile in bathrooms; linoleum in kitchen. Celotex insulation. Heating is by steam. Color scheme of exterior: red brick, white wood trim and shingles, black slate roof. Sash are double-hung and of wood; screens, copper. Square plan adopted for such advantages as economy in plumbing and minimum required steps. **Cost: $9,000.**

Photographs by Murray M. Peters

HOUSE OF FRANK A. PIRNAK, ROCKVILLE CENTRE, LONG ISLAND HENRY T. ASPINWALL, ARCHITECT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

"BETHANY WOOD"

BETHANY, CONNECTICUT

A RESIDENTIAL COMMUNITY DEVELOPED BY J. COX HOWELL

L. BANCEL LaFARGE, ARCHITECT

GENERAL PURPOSE

To establish a residential colony on the outskirts of a considerable city, with all the major advantages of both city and country and no great distance between them. It should be small enough for a modicum of privacy—small enough to be homogeneous and easily administered. At the same time it must be large enough to provide an interesting and satisfying society within itself. Twelve to fifteen families seem at present to be the optimum number, which allows an average of approximately four acres to each family on the tract that has been acquired, including playgrounds, roads, and similar areas. The faculty of Yale University, already fairly well represented in the neighborhood, is used to set the social and economic standards.

COMMUNITY INTERESTS

As the group grows in size, certain community projects will be suggested, such as expert supervision of children, exchange of books and periodicals, cooperative buying of standard supplies and services, and the development of recreational facilities. A non-profit corporation composed of the landowners will form a convenient means for carrying out such plans as meet with general favor.

FINANCES

The financial basis of the project is not immediate profits but long-time investment. Besides a normal return from the portions that are sold, determined by cost and market, an earned increment is expected when the portions now held in reserve are opened for use. The reserve is assessed as woodland and the tax rate is 20 mills, so the burden is not large. In order to build up an earned increment in the reserve, the first few houses and lots will be sold at, or below, actual cost. Under these circumstances it has seemed best not to undertake any liability at the start, and the title is free and clear.

A more impressive display could be made by mortgaging part or all of the property; at the same time it would add to the carrying cost and involve complications in re-financing and releasing portions to be sold. As it is, there is nothing but the fee simple to be considered. This policy also adds to the safety of the venture, and to the possibility of accommodating buyers.

Little difficulty is anticipated in financing buyers of the kind that are likely to be attracted. Yale University will lend money for home-buying to any of the faculty on very favorable terms. For the convenience of others, arrangements have been made with one of the leading insurance companies to furnish whatever mortgage money is required.

Some care will be taken to protect inexperienced or overambitious buyers against the dangers of excessive financial obligations, even if sales are lost thereby.

GENERAL POLICIES

Throughout the undertaking, an effort has been made to avoid extremes and to seek instead the point of diminishing returns. For instance, the houses that have been built are not incombustible, but great care has been used to reduce the fire hazard without unduly increasing the cost of construction. In the same way, a balance has been sought between capital outlay and the cost of maintenance and operation.

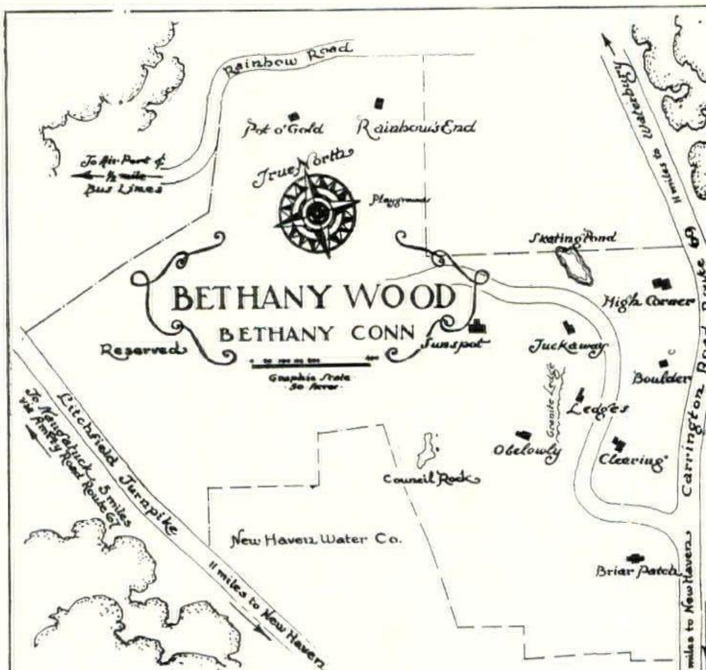
The same philosophy applies to all personal relations. The measure of fitness of an applicant to join the group is not wealth or occupation or social position, although those factors all bear on the subject. The important element is a disposition and ability to maintain friendly and harmonious relations with all concerned.

Another phase of the same philosophy appears in the endeavor to keep all proposals as elastic and plastic as possible, so as to adjust and accommodate them to changing conditions. Even major plans are in the nature of questions written in chalk on the blackboard, until the necessity arises for positive action. Accordingly, although the property has been thoroughly plotted with reference to house sites and all the concomitants of driveways, water, sewers and the like, it has not been laid out in plots or lots, and anybody may buy anything that promises to be mutually satisfactory.

In line with this reasoning, public sentiment and social pressure will be relied on to a large extent instead of limitations written into the deeds. Restrictions in this undertaking will have to do with the number, character, and placement of buildings, but not with their cost or design; and will limit livestock to domestic pets.

LOCATION AND PHYSICAL FEATURES

The property lies between an old and a new highway, with frontage on both and on an unimportant dirt road that joins them. By the new highway, Route 69, the distance to New Haven Green is eleven miles and to Waterbury ten miles. The land is a high wooded ridge (altitude about 600 feet), roughly crescent-shaped, opening to the south and with higher land to the north. Each arm fronts on a highway, and the two arms embrace a deep wooded hollow that belongs to the local water company and so is not likely to be disturbed. The views embrace West River Valley and the West Rock Ridge (a State Park), and on clear days there are glimpses of the Sound with the dim line of Long Island beyond. The geological formation is a bastard granite. Oak predominates in the woods, five varieties being represented, with the usual hardwoods and undergrowth.



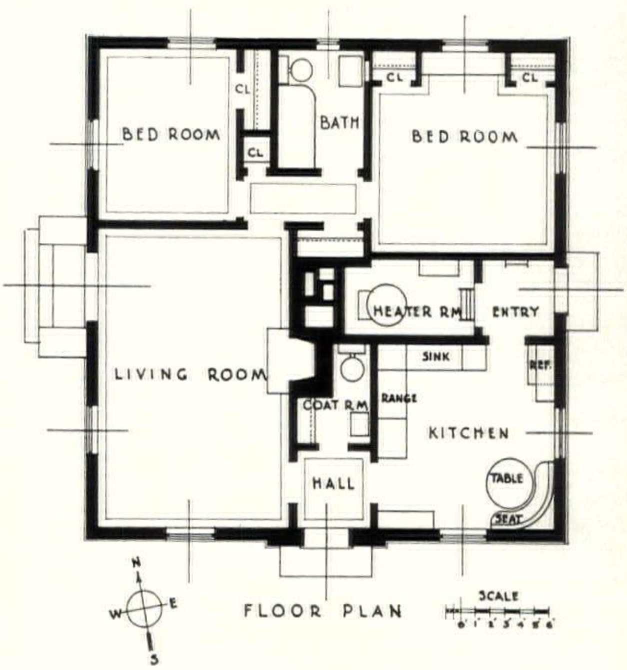
Photograph by Frederick Bush

IMPROVEMENTS ALREADY MADE

A stone-filled gravel-surfaced road has been built, 17 feet wide and about 850 feet long, with branches to three houses; in all, about 1,300 feet of roadway. An eight-inch well has been drilled, 195 feet deep, and equipped to supply six houses with water. It overflows two gallons a minute; the water is rated 42 in hardness in a scale in which anything under 50 is called soft; 51 to 100, medium soft; 100 to 200 medium hard, etc. The capacity at the 100-foot level is 30 gallons a minute.

An electric power and telephone line has been brought into the property, so placed as to serve eight possible sites and to be easily extended.

Three houses have been built. The smallest—stucco with slate roof, insulated with rock wool, oil-burning air conditioning furnace, about three acres of woodland—represents an investment of about $7,300. The largest, with 19-inch walls of quarried stone, can be equipped and finished to suit a buyer for about $18,000, with an acre and a half of woodland. A plot of about two acres has been assigned to the third house, which is of common brick laid by the Ideal method; its interior also can be arranged and finished to please a buyer, at a total cost of about $14,000.



FLOOR PLAN

Photograph by Frederick Bush

SCHOOL FACILITIES

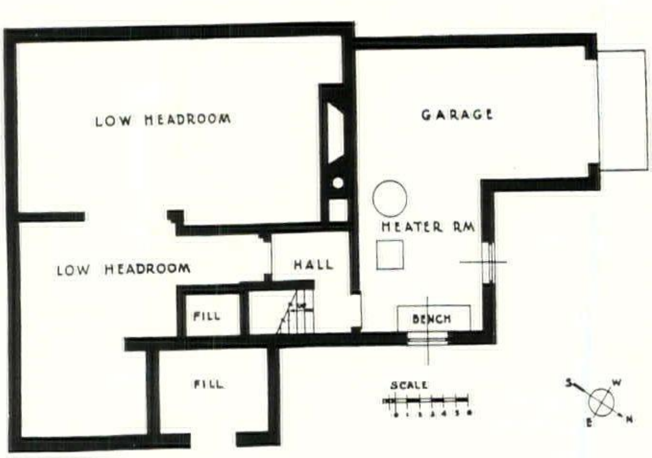
The town in which the property is located transports school children to its new, well-equipped grade school. High school students are taken to New Haven, Waterbury or Naugatuck, according to circumstances, at the town's expense. There are, of course, several private schools within easy reach by car. A small pre-school or nursery group may be anticipated on the property in the course of time.

DOMESTIC SERVICE

Tentative arrangements are being made with a few young girls living in the neighborhood to supply whatever domestic service may be required. Each applicant will be carefully checked as to home conditions, habits, associations, and so on, and then encouraged and helped to acquire the necessary training. Not very much can be done until a larger demand has been established, but the outlook is promising.

OUTDOOR SERVICE

A small farmer living nearby will supply occasional semi-skilled labor and will make regular rounds to remove garbage, papers, and other house wastes. This service can be increased and extended as occasion requires.



CELLAR FLOOR PLAN

A MARK TO SHOOT AT

A somewhat isolated colony like this is wholly dependent on its cars. Good roads and good low-priced cars have made

Photograph by E. H. Keeler

FIRST FLOOR PLAN

SECOND FLOOR PLAN .

it possible; without them it could not exist. Each family will have at least one car, some will have two or three, friends and guests will often bring their own cars for varying lengths of time. To attach two or three car stalls to a house of modest size is to distort it, to make the tail wag the dog. To provide car space in separate garages is to litter the landscape with outhouses. As a possible solution of the problem, a dignified building is being designed with six stalls,

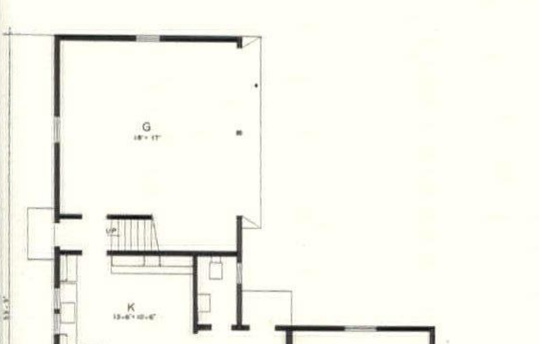
Photograph by E. H. Keeler

FIRST FLOOR PLAN

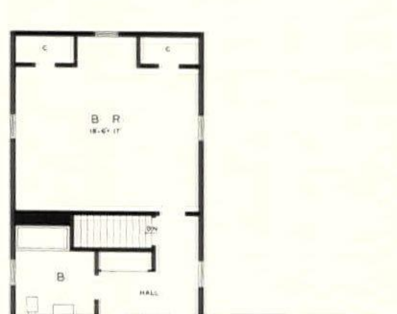
SECOND FLOOR PLAN

so placed as to serve four or five houses very conveniently. Stalls will be rented at cost by the day, week or month. Such accommodations would supplement whatever car space each house affords, according to the needs of each family. The cost is no more, the architectural problem is simplified, and the convenience is greatly increased. The question that remains to be considered is how well the public will take to such an arrangement.

HOUSE OF MR. AND MRS. GORDON V. KUEHNER **WEST HARTFORD, CONNECTICUT**



FIRST FLOOR



SECOND FLOOR

KEITH SELLERS HEINE

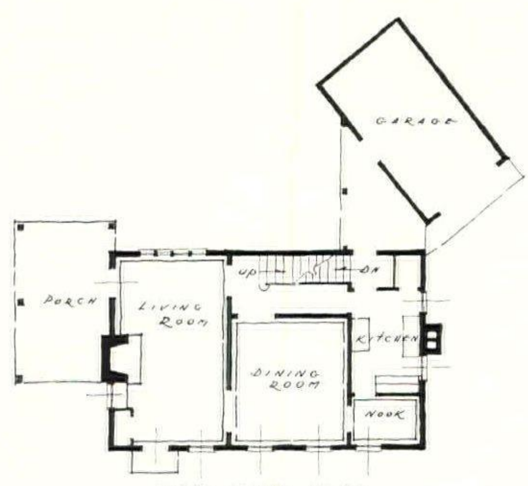
ARCHITECT

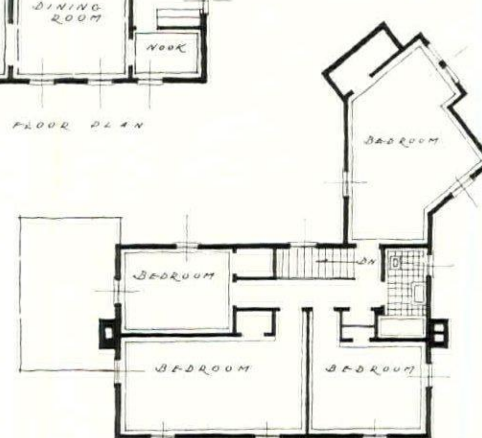
Frame construction with front wall of first floor in brick veneer. **Insulation:** $3\frac{1}{2}''$ rock wool on outside walls and second floor ceiling. **Heating:** Gar-Wood conditioned air. **Cost** (completed in 1935): **$13,500.**

Photograph by Murray M. Peters

PAUL ARNOLD FRANKLIN

ARCHITECT





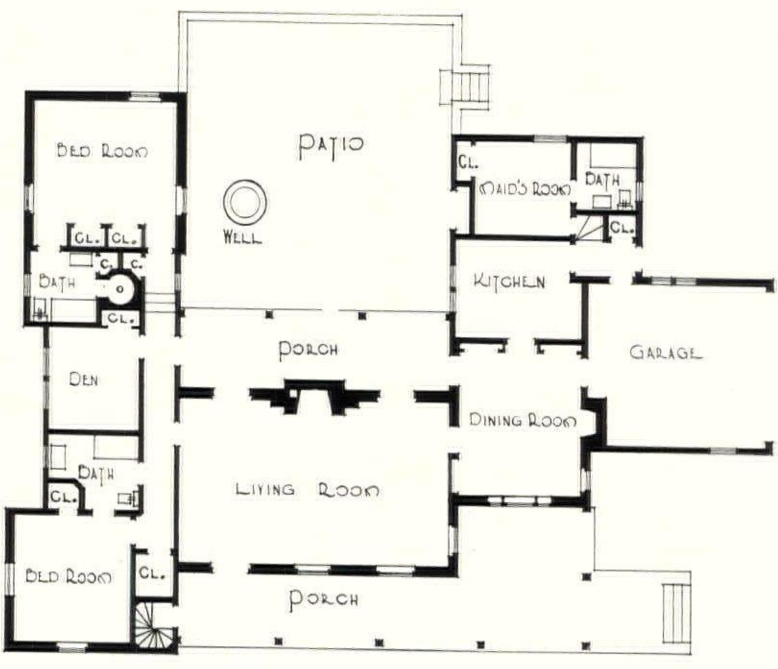
HOUSE OF MR. AND MRS. PAUL NICHOLSON

PORT WASHINGTON, LONG ISLAND

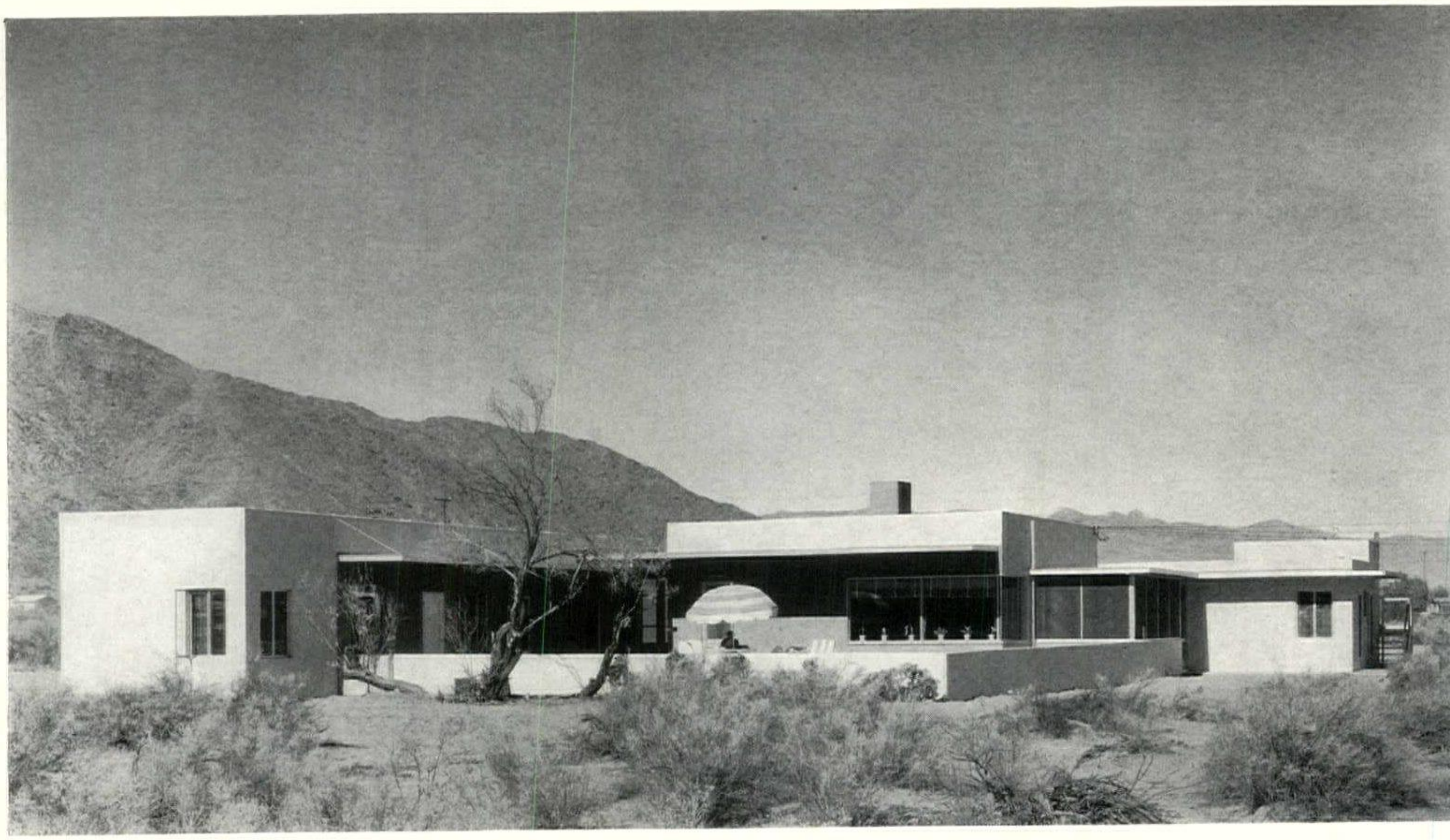
Photograph by George Haight

HOUSE OF PRENTISS FULMORE — ALTADENA, CALIFORNIA

VAN PELT AND LIND
ARCHITECTS



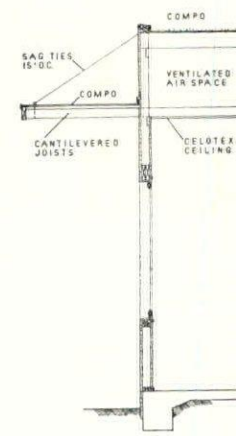
Concrete foundations, wood frame (stucco and boarding), roof of split shakes. **Floors:** oak and rubber tile. **Wall finishes:** plaster, wallpaper, tile and wood boarding. Aluminum foil insulation on walls and roof. Hot-air heating. Air conditioned. General Electric kitchen. **Exterior color scheme:** oyster white and yellow ochre; roof, natural. Wood sash, double-hung; copper screens. **Cost: house, $10,300; landscaping, $800.**



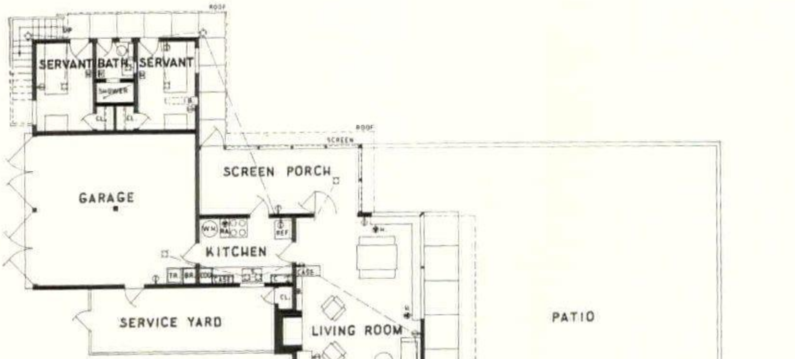
HOUSE OF H. U. BRANDENSTEIN

PALM SPRINGS, CALIFORNIA

VAN PELT AND LIND, ARCHITECTS

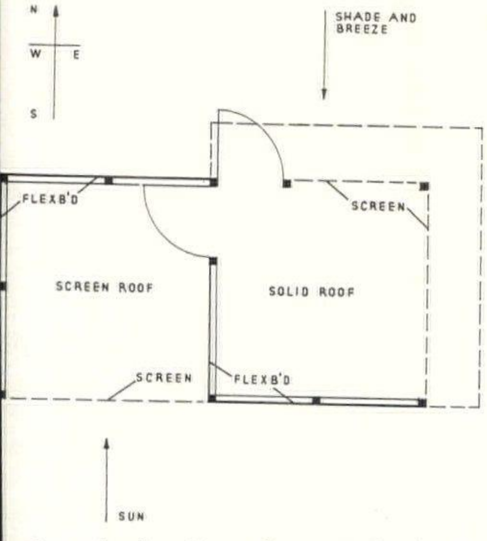


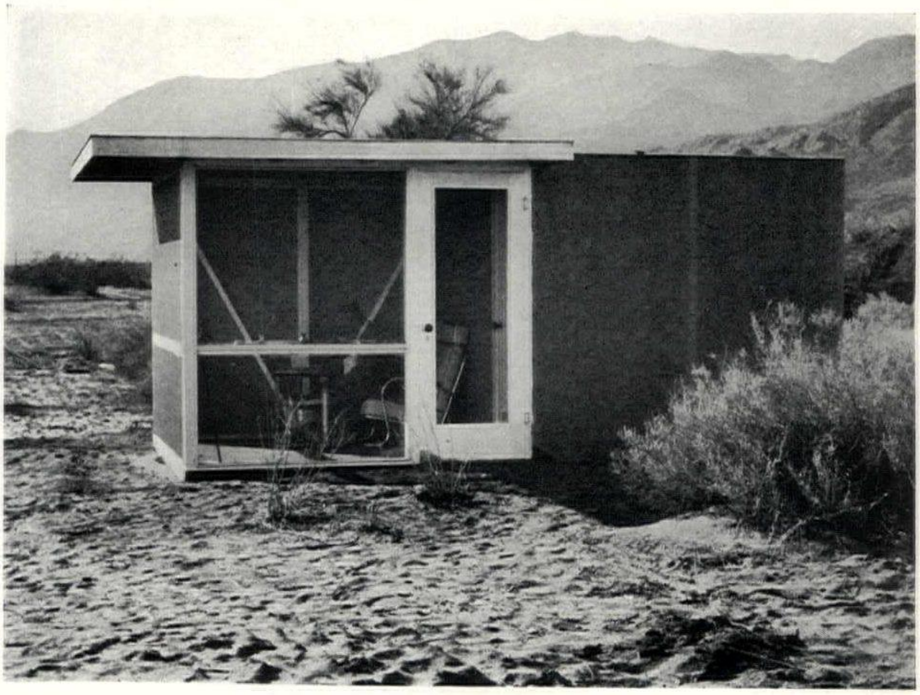
WALL SECTION showing room insulation by means of Celotex ceilings and ventilated air space above. Outdoor passages from one part of house to another are roofed against occasional rain by roof supported on extension of ceiling joists.



Floors: cement. **Walls:** wood frame plastered o both sides. **Roof:** ceilings of Celotex; three-foo ventilated air space between ceiling and Pabco 20 year gravel covered roof; ceiling joists cantilevered to form porch-passages. **Windows:** stock Trusco steel casements. **Doors:** wood, combination scree and hinged casement. **Heating:** Thermador, circu lating type, recessed electric wall heaters. **Colo scheme:** exterior walls, sand color; walls under over hangs, blue-green; porch and overhang ceiling cerulian blue; doors and windows, aluminum pain Interior, floors, tan; walls, natural gray plaster; cei ings, cream; doors and windows, sage gree **Hardware:** dull chromium. **Curtains:** light canva with inside face of light green, outside face, terr cotta. **Cost** (completed January, 1936): **$3.08 pe square foot.**

SCREENED PORCH OFF LIVING ROOM
USED FOR DINING

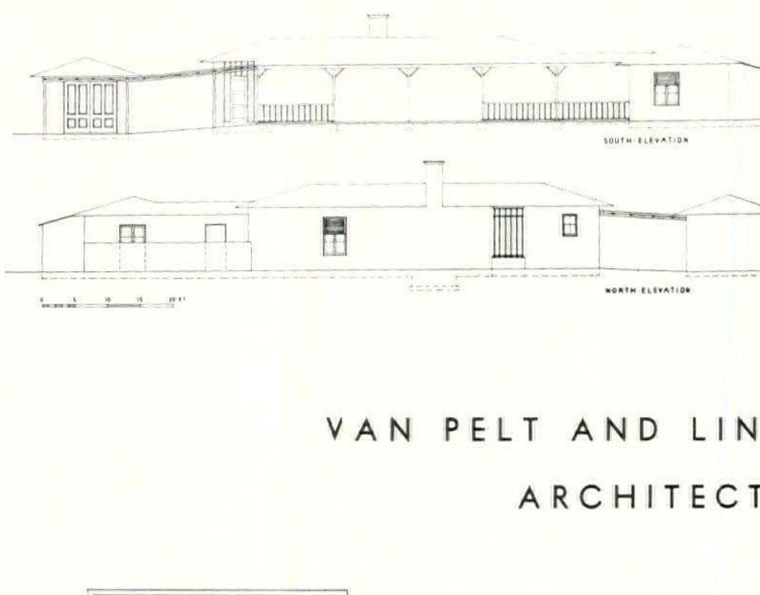




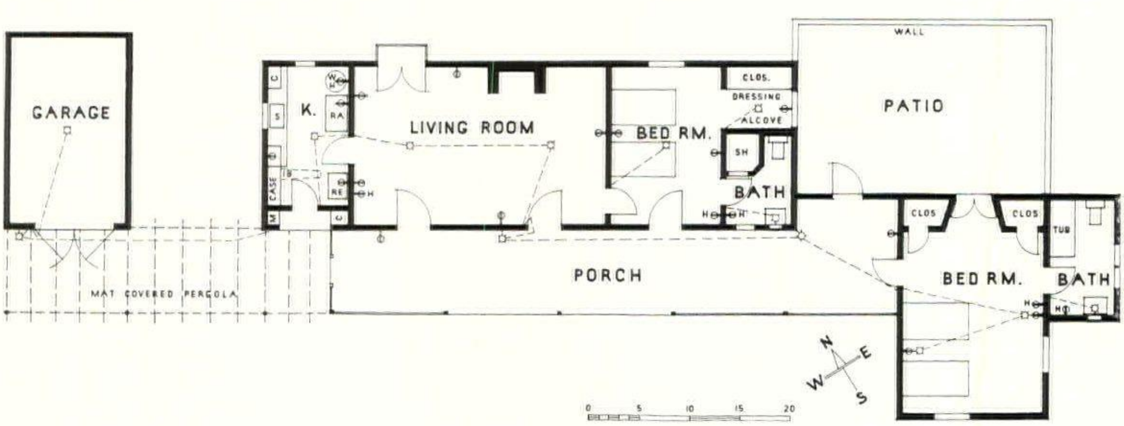
utdoor Study. View from north showing aded sitting area exposed to breeze. Cold eather area is exposed to sun above and south, protected from north wind. Hot eather area shaded and exposed to north reeze, protected from sun on south and est. Both rooms are screened against in-cts. The study is located away from house r privacy and quiet.

HOUSE OF CHALTON POWERS PALM SPRINGS, CALIFORNIA

Construction: 2 x 4 studs, 16" on center, plastered inside and out; high, open trussed wood ceilings; roof of cedar shingles, 15 pound ragfelt between each course. **Floors:** cement with integral color in top dressing, waxed; no cement markings, expansion taken up by Malthoid strips in dry joints at partitions. **Doors:** exterior, wood, French type; interior, wood, stock three panel. **Windows:** stock wood casements. **Heating:** water heater, range, portable room heaters, all electric. Kitchen counter of rubber tile. Crane plumbing fixtures. **Finishes:** cold water paint on plaster, wood ceilings and walls; shingles painted with Cabot's Collopakes; woodwork, oil paint. **Cost: $2.75 per square foot.**



VAN PELT AND LIN
ARCHITECT



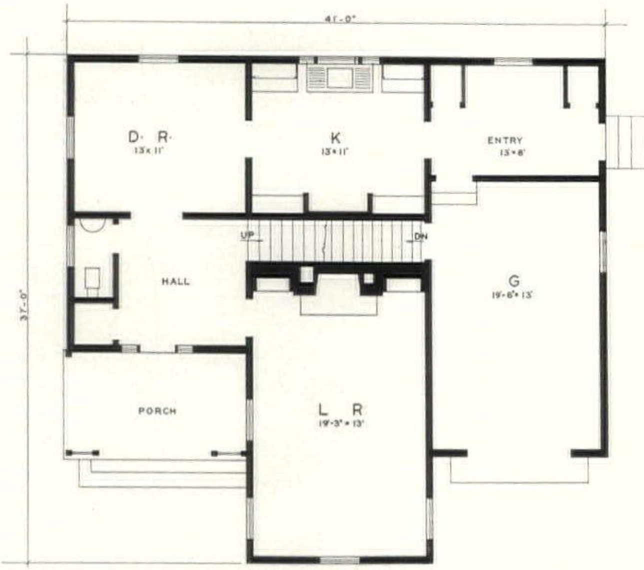
FLOOR PLAN

hotograph by Hedrich-Blessing Studio

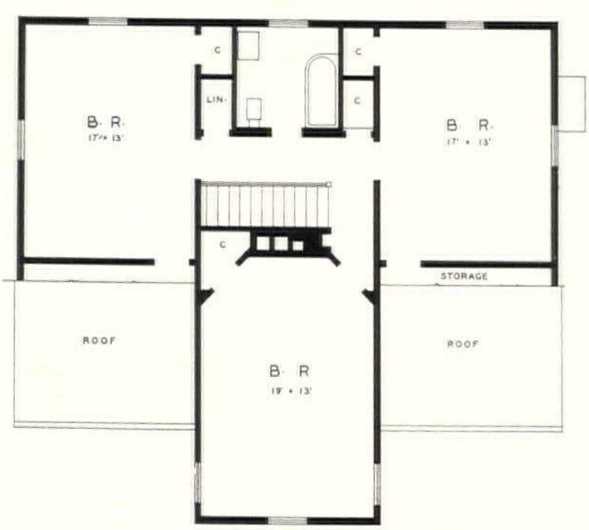
IOUSE IN JEWEL TEA PARK — BARRINGTON, ILLINOIS

WALCOTT AND WORK
ARCHITECTS

Concrete foundations, wood frame walls; wide shingle facing. Shingle roof. Wall finishes: plaster, wallpaper and paint. Oak floors; tile in bathroom. Insulation, flexible blanket-type on wall; 4" of rock wool on ceilings; asphaltic waterproofing. Hot-air heating. Color scheme: exterior, white; interior, varied. Wood sash, double-hung; copper screens. **Cost: $8,000.**



FIRST FLOOR



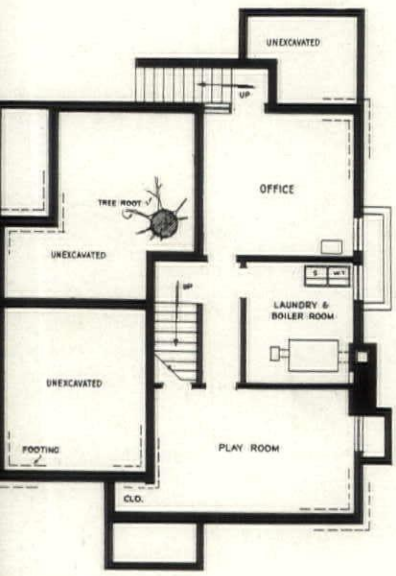
SECOND FLOOR

Photographs by Jessie Tarbox Beals.

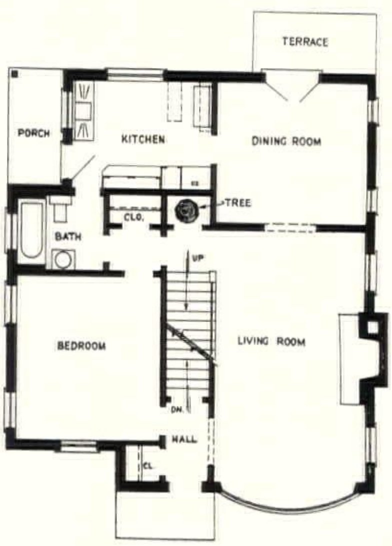
OUSE OF DR. R. H. ALLISON

SUMMIT, ILLINOIS

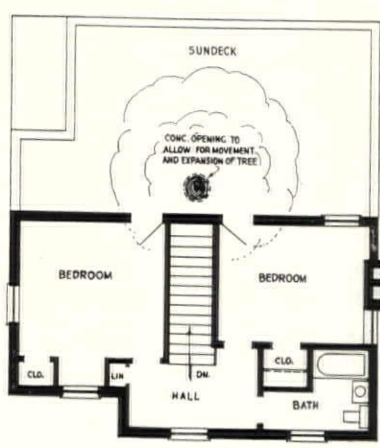
GEORGE LOANE TUCKER
ARCHITECT



CELLAR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN


5446

GEORGE LOANE TUCKER

ARCHITECT

To accommodate a few patients who might visit the doctor at off hours, an office and separate stair were incorporated into the basement plan. There was a beautiful tree on the lot which would have had to be cut down to place the house properly on the lot. The owner was finally persuaded to preserve it. Four-inch tiles were run into the roots of the tree from three sides to give them air and water, and the house so placed that the oak tree ran through a guest clothes closet on the first floor and emerged on the terrace of the second floor. Allowance was made for possible growth and wind movement of the tree by placing flashing around it.

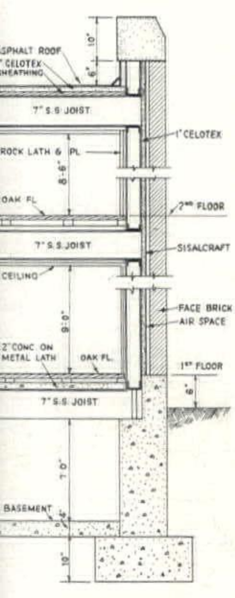
Rooms for one child and a "family-type" maid were placed on the second floor, with the owner's bedroom on the first floor where midnight calls would not disturb the remainder of the household.

Construction is brick veneer on Stran-Steel with concrete sub-floors and oak finished floors. The exterior is medium face red brick with white trim. **Cost: $10,000.**

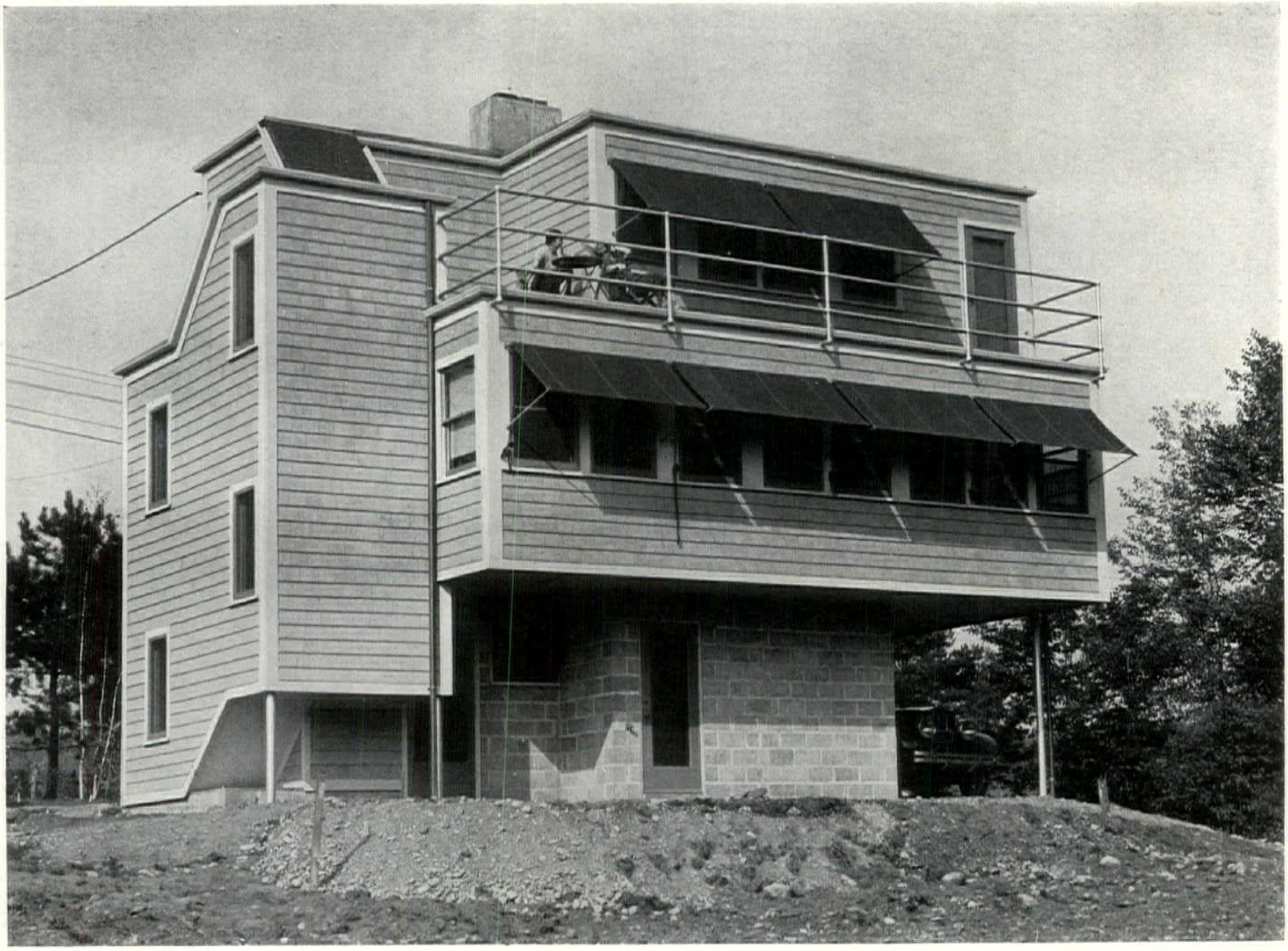
Opposite:
ENTRANCE DETAIL

Right:
LIVING ROOM

Photographs by Jessie Tarbox Beals

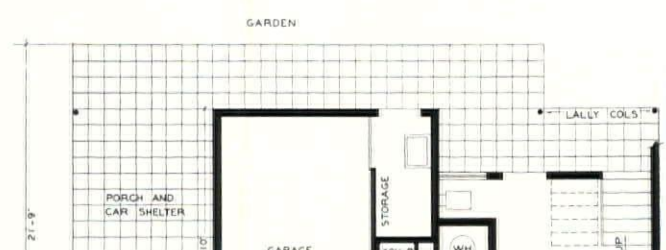


TYPICAL WALL SECTION



RALPH-BARBARIN HOUSE NEAR STAMFOR

This house is intended for either summer or all-year use. The principal living rooms are on the second floor. The third floor consists of a completely equipped apartment or "penthouse" for guests. Both floors have independent stairway entrances. This is made possible by the location of a stairway tower at one end. The principal windows of the house face toward a large artificial lake and wooded hills and toward a garden in opposite direction. The ground floor has a garage, heater room, laundry-storage, and a porch; this porch can serve as an auxiliary garage. The sheltered second-floor overhang is on the side of house toward garden. The house walls are of concrete block construction for the ground floor. The structure above is of wood frame, insulated with aluminum foil and faced with shingles. Interiors have plywood walls.

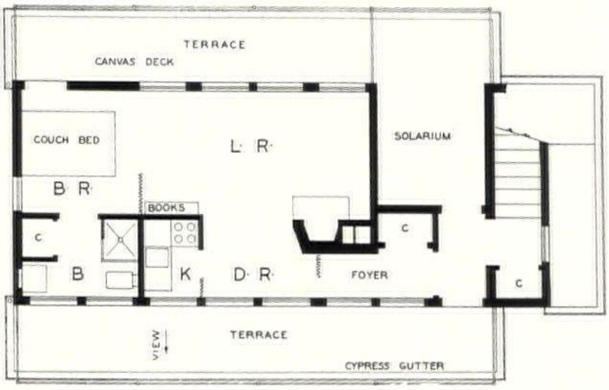


GROUND FLOOR

CONNECTICUT

DESIGNED BY A. LAWRENCE KOCHER AND ALBERT FREY

FIRST FLOOR

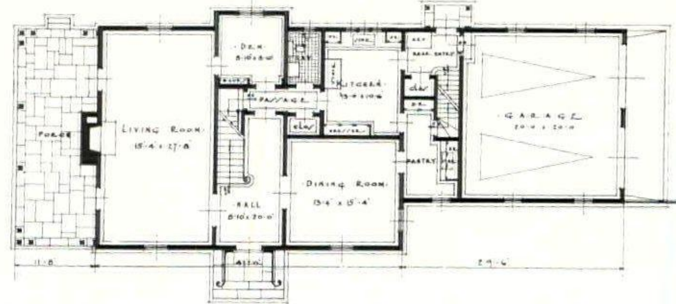


PENTHOUSE

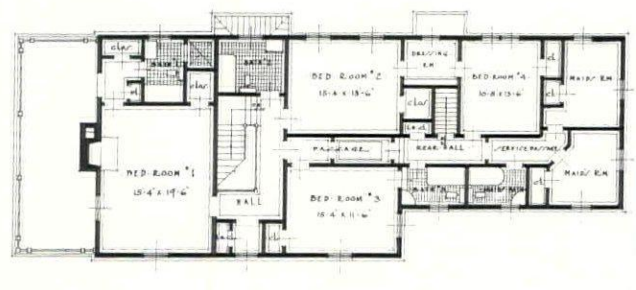
Photograph by Henri H. Davis

HOUSE OF MRS. GEORGE BARR KAYSER
PARK RIDGE, HARRISON, NEW YORK

GEORGE BARR KAYSER
ARCHITECT

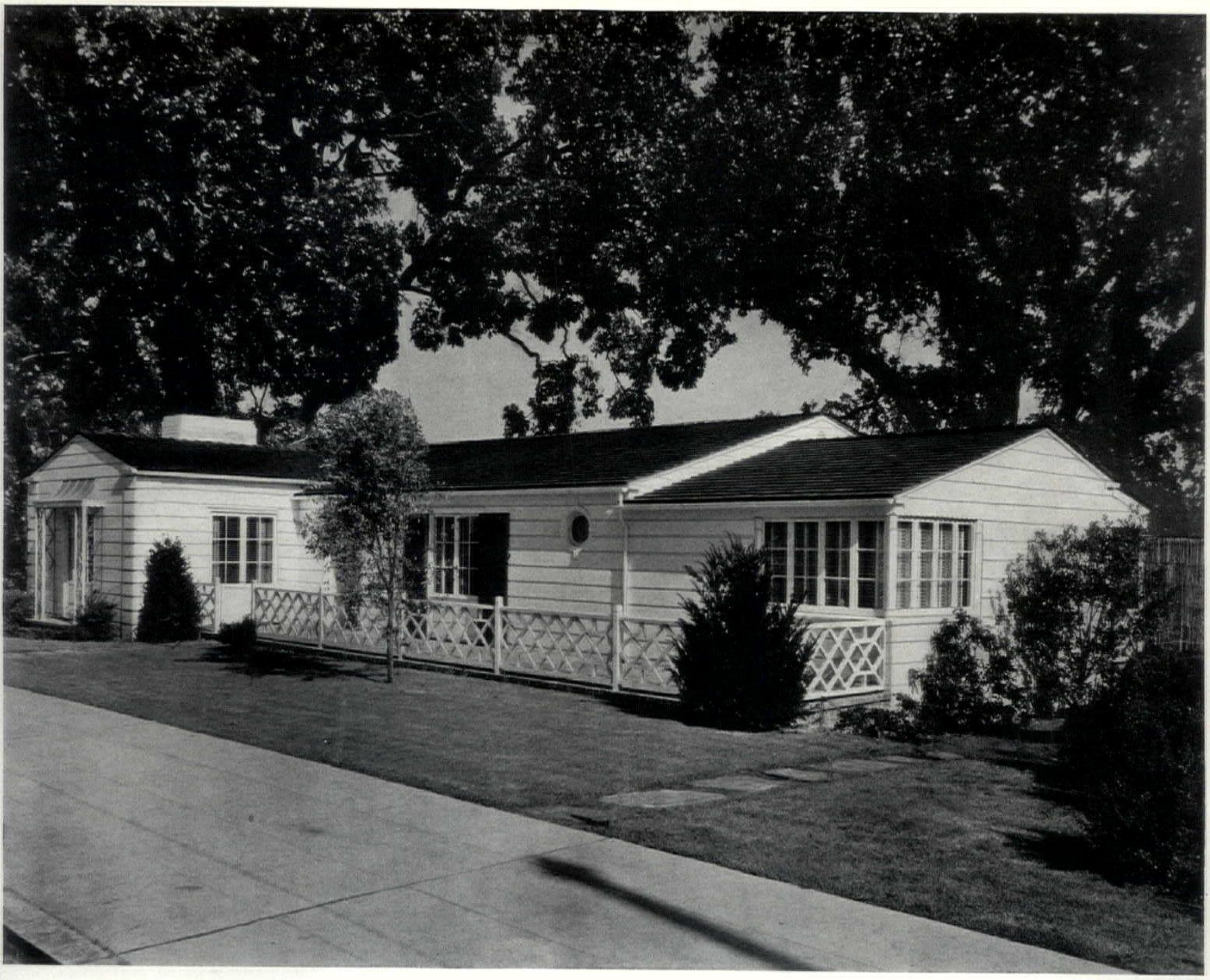


·FIRST·FLOOR·PLAN·



·SECOND FLOOR PLAN·

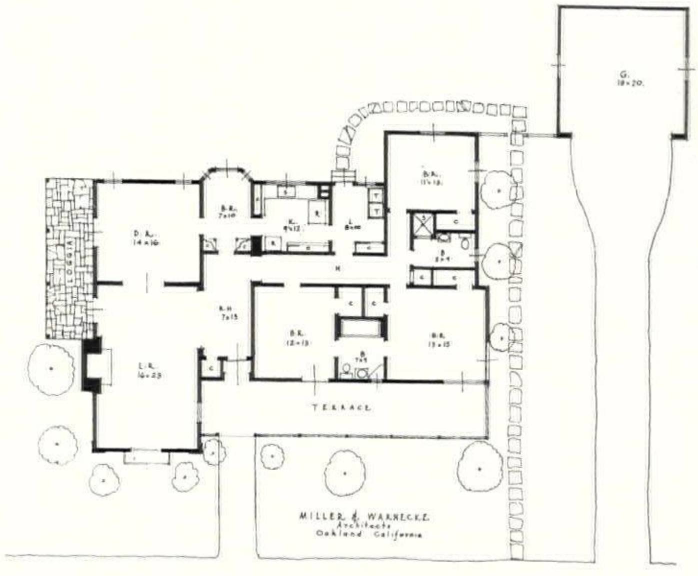
Concrete and concrete block foundations, wood frame walls, shingle facing, steel frame girders; slate roof. WALL FINISHES: plaster, wall-paper; wood wainscot in dining room; tile in kitchen. Oak floors. INSULATION: 4" rock wool on second floor; Reynolds Metallated Fabric on exterior walls. WATERPROOFING: three coats of hot tar and felt on all exterior cellar walls and over entire cellar floor. Dailaire air conditioning system. Murphy built-in kitchen and pantry cabinets. Russell and Erwin hardware in bronze finish. COLOR SCHEME OF EXTERIOR: light cream; black slate and blinds. INTERIOR: light and medium cream stippled walls; bedrooms, paper; dining room, apple green and light cream. Double-hung wood sash; casement in kitchen; copper screens.



A MODEL HOUSE
OAKLAND, CALIFORNIA

MILLER AND WARNECKE

ARCHITECTS

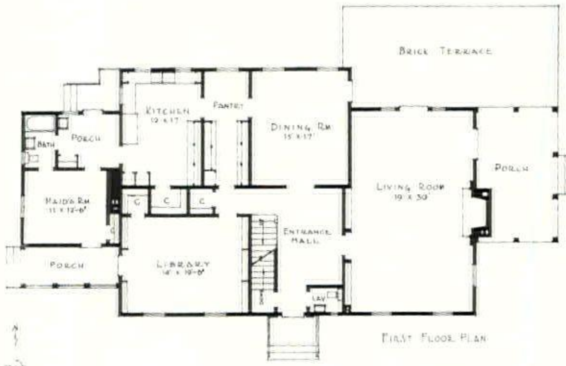


Concrete foundations, wood frame walls, V-jointed rustic (redwood) facing, painted white. ROOF: redwood shakes, 10" to weather; galvanized iron sheet metalwork. FLOORS: oak; tile in baths; linoleum in kitchen and breakfast room. Plaster and wallpaper finishes. Hot air heating. Schlage hardware, brass finish. Sherwin-Williams paints. General Electric wiring. COLOR SCHEME: exterior, white with green shutters; dark roof. Interior: paneled dining room; red wallpaper in living room, brown in halls; woodwork, bone white. Wood sash, both casement and double-hung; copper roll-screens; double strength Lustra glass.

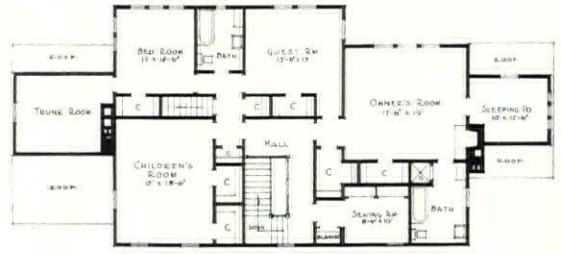
Photographs by Mott Studi

HOUSE OF R. E. STEARNS
SAN MARINO, CALIFORNIA

HIBBARD, GERITY AND KERTON
ARCHITECTS



First Floor Plan



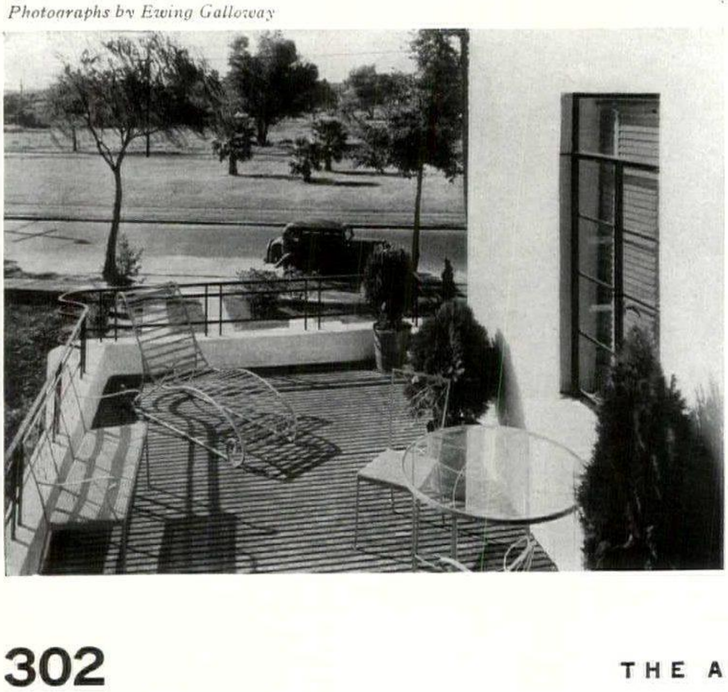
Second Floor Plan

THE LONE STAR HOME
NEW ORLEANS, LOUISIANA

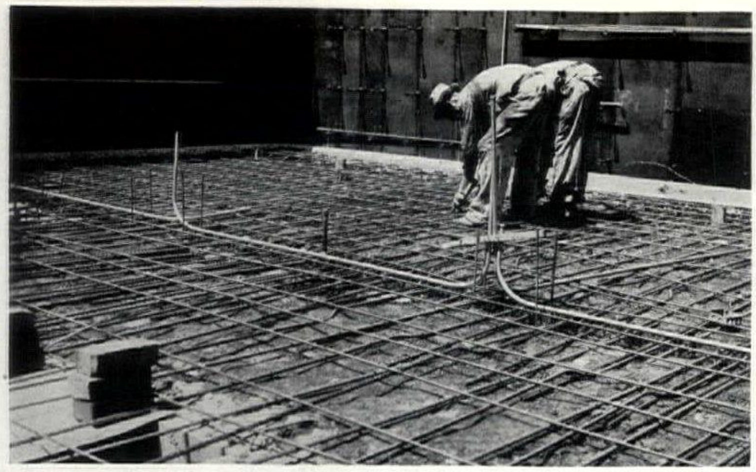
WEISS, DREYFOUS & SEIFERTH
ARCHITECTS

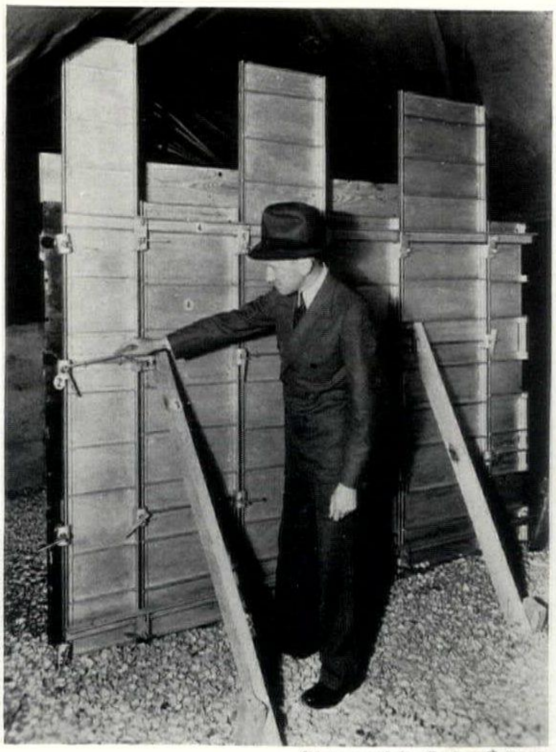
MODEL HOUSE built to demonstrate the possibility of attaining fire-resistive construction and durability at moderate cost.

Photographs by Ewing Galloway



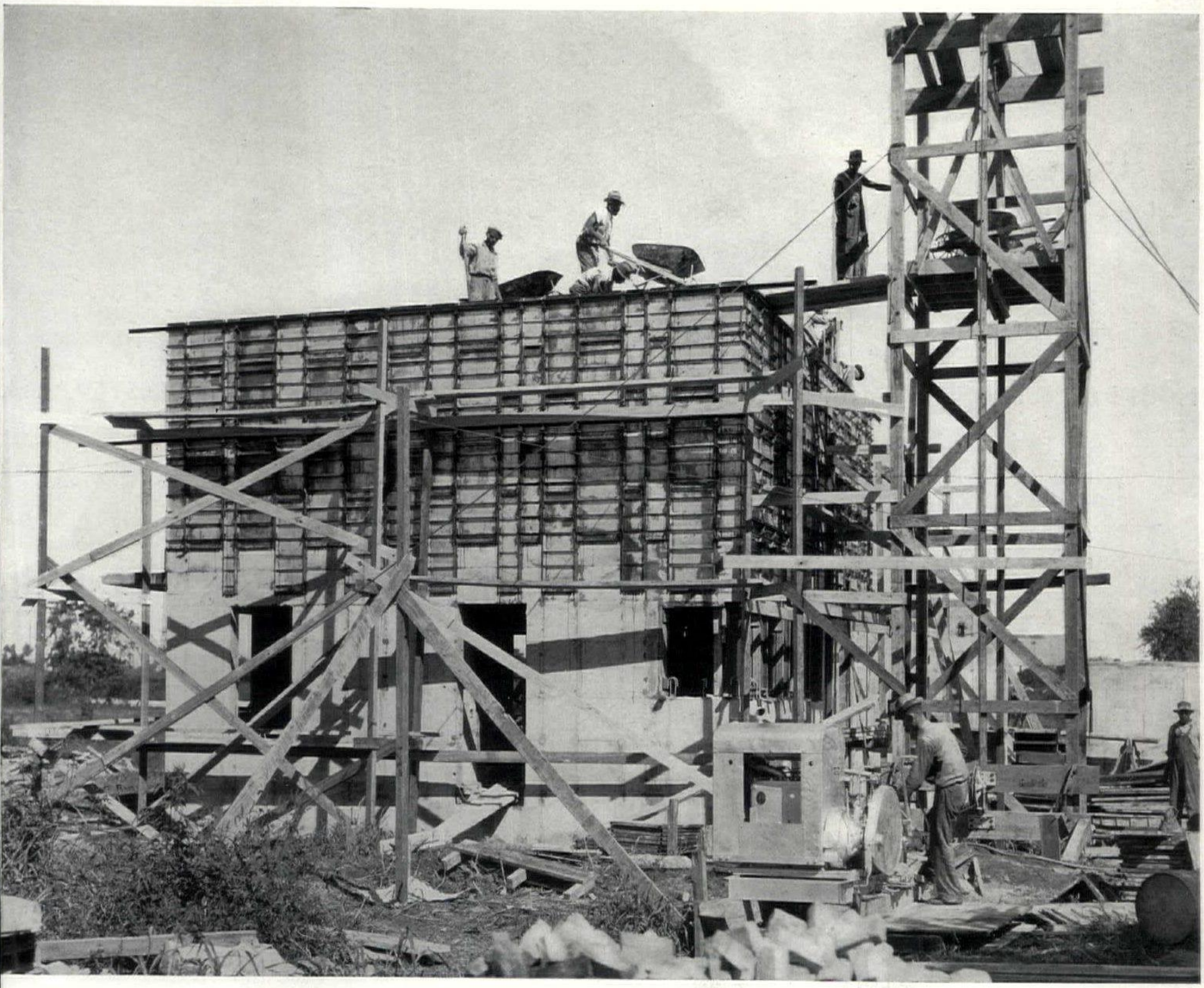
FOUNDATION: slab, 10" reinforced concrete, from 3'6" to 7'0" in width under exterior walls; WALLS, 8" reinforced solid concrete designed as beams with two one-inch bars top and bottom; height from top of foundation slab to top of first floor slab is 4'6". FRAME CONSTRUCTION: exterior walls 8" reinforced concrete ribbed walls, ribs spaced on 12", 18", and 24" centers, 3" slab thickness with ribs 5" deep and 4" wide. Slab reinforced with 3/8" round bars placed 12" c. to c. horizontally with each rib having two 3/8" bars vertically. Wide jambs and mullions have four bars; tie beams four 1/2" round bars; roof parapet, four 5/8" bars. EXTERIOR SURFACE: natural concrete walls with black polished terrazzo in mullions and in parapet over entry motif on front of structure. ROOF: pitched with 4" solid reinforced concrete slab underneath; roof frame consists of 7/8" wood sheathing, 2" x 6" rafters, and 30-lb. roofing felt under J-M No. 35 Variegated Green cement asbestos shingles, rough texture 8" x 16" tapered. Gutters, flashing and downspouts, 16-oz. copper. FLOOR SLABS: first, second and second floor ceiling, 4" reinforced concrete, with first floor slab placed on loose fill. Lone Star Portland Cement used in first floor. Incor 24-hour cement used in second and attic floor slabs for quick form and shore removal. Fenestra steel casements, worm and gear under screen operators. HEATING: gas-fired forced hot air circulation, Payne Series "FAU"; Ducts, 26-gauge galvanized iron; cold air return—concrete under kitchen from entry hall; registers, Uni-Flow, vent pipe Transite.

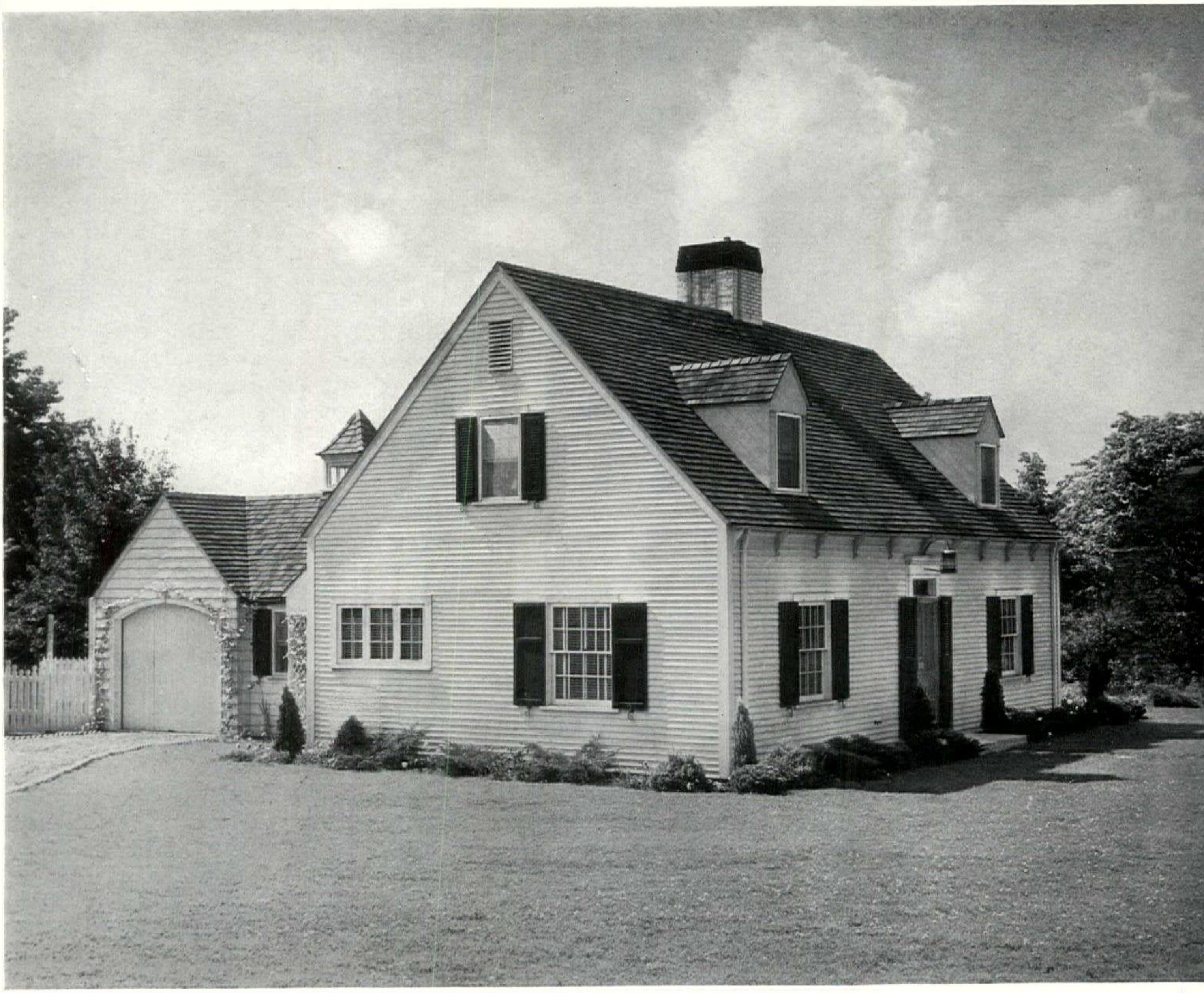




Photograph by Ewing Galloway

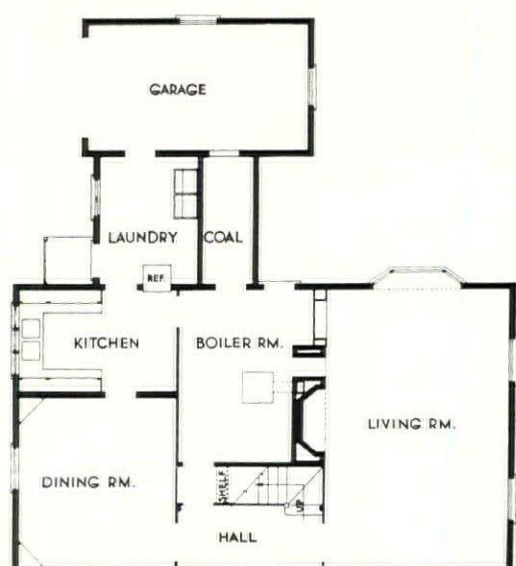
ABOVE: Notice the generous use of heavy steel reinforcing rods in the floor slab. Ribbed concrete walls were reinforced equally well. RIGHT: This photograph shows how the new "flexible" steel forms are fitted to one another. They come in sections and are fitted together by means of screws to the other side sections, thus making it possible to build walls of any thickness required. BELOW: Pouring concrete into flexible steel forms.





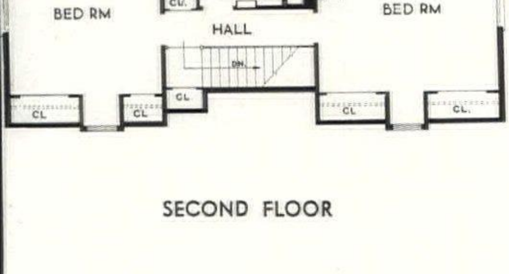
HOUSE OF DR. AND MRS. C. A. STURDEVANT **MEADVILLE, PENNSYLVANIA**

EDWARD STUART PHILLIPS, ARCHITECT,
of the firm of E. A. & E. S. PHILLIPS,
ARCHITECTS



FIRST FLOOR

No basement; foundation walls 3 feet deep. First floor slab of concrete with wood floors and sleepers supported on bricks. This space used as return duct. Heater room centrally located on first floor so that maximum length of ducts is 8 feet. Several partitions of vertical pine boards 1" thick. Cinder block foundations, wood frame walls, shingle roof. Walls of plaster. Oak floors. Aluminum foil insulation on roof and walls; asphaltic waterproofing applied to first floor slab. **Heating:** hot-air oil burner. BX wiring. Chase lighting fixtures. McKenny wrought iron hardware. Sherwin-Williams paint throughout. **Color scheme for exterior:** white with green. **Interior:** knotty pine; wallpaper, tinted. Sash are double-hung and of wood; screens, bronze. Libbey-Owens-Ford standard glass. **Cost: $6,700 complete without furnishings.**



SECOND FLOOR

ELEVATION

ALCOVE FROM LIVING ROOM

HOUSE OF DR. AND MRS. C. A. STURDEVANT, MEADVILLE, PENNSYLVANIA

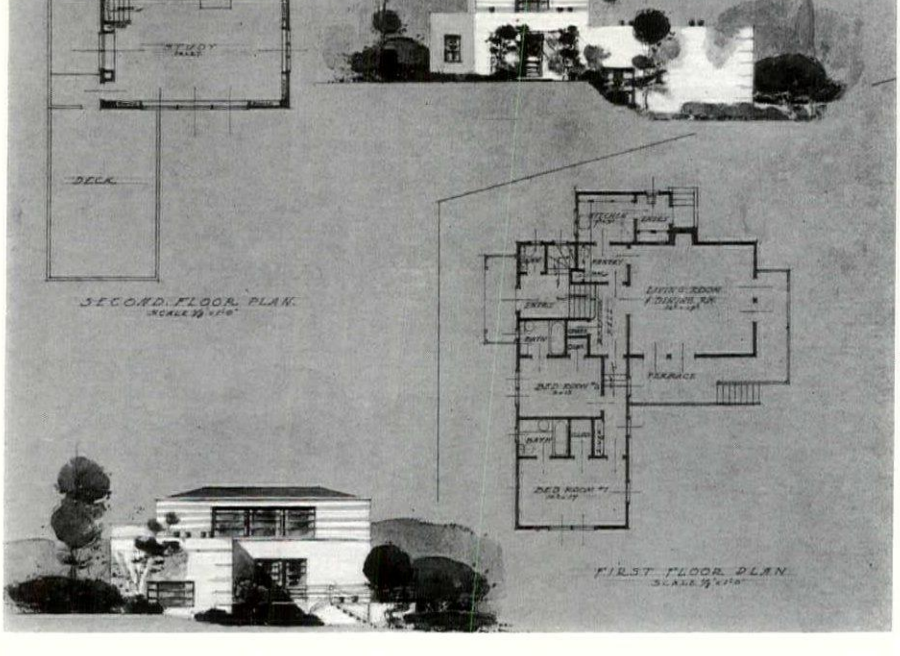
EDWARD STUART PHILLIPS, ARCHITECT

HOUSE OF B. A. G. FULLER **HOLLYWOOD, CALIFORNIA**

RALPH C. FLEWELLING
ARCHITECT

Concrete foundations; "V" channel D. F. siding and exterior plaster; air-dried red cedar shingle roof. **Wall finishes:** plaster, plywood and wallpaper; structural glass wainscot in baths. Oak **floors;** rubber tile in entry and study; linoleum in baths. 15 lb. W. P. asphalt saturated felt paper in 12" strips under each course of shingles. Brush coat on exterior plaster. Waterproof membrane over concrete floor slabs that are below grade. Hot-air heating. **Built-in features:** dumbwaiter, bookcases, ironing board, cabinets, wardrobes. Corbin hardware in antique Colonial brass. Steel **casement sash;** copper screens. Double-strength Pennvernon **glass.** Exterior painted cream. **Cost:** **house, $9,500; landscaping, $1,200.**

TERRACE AND OUTSIDE STAIRWA



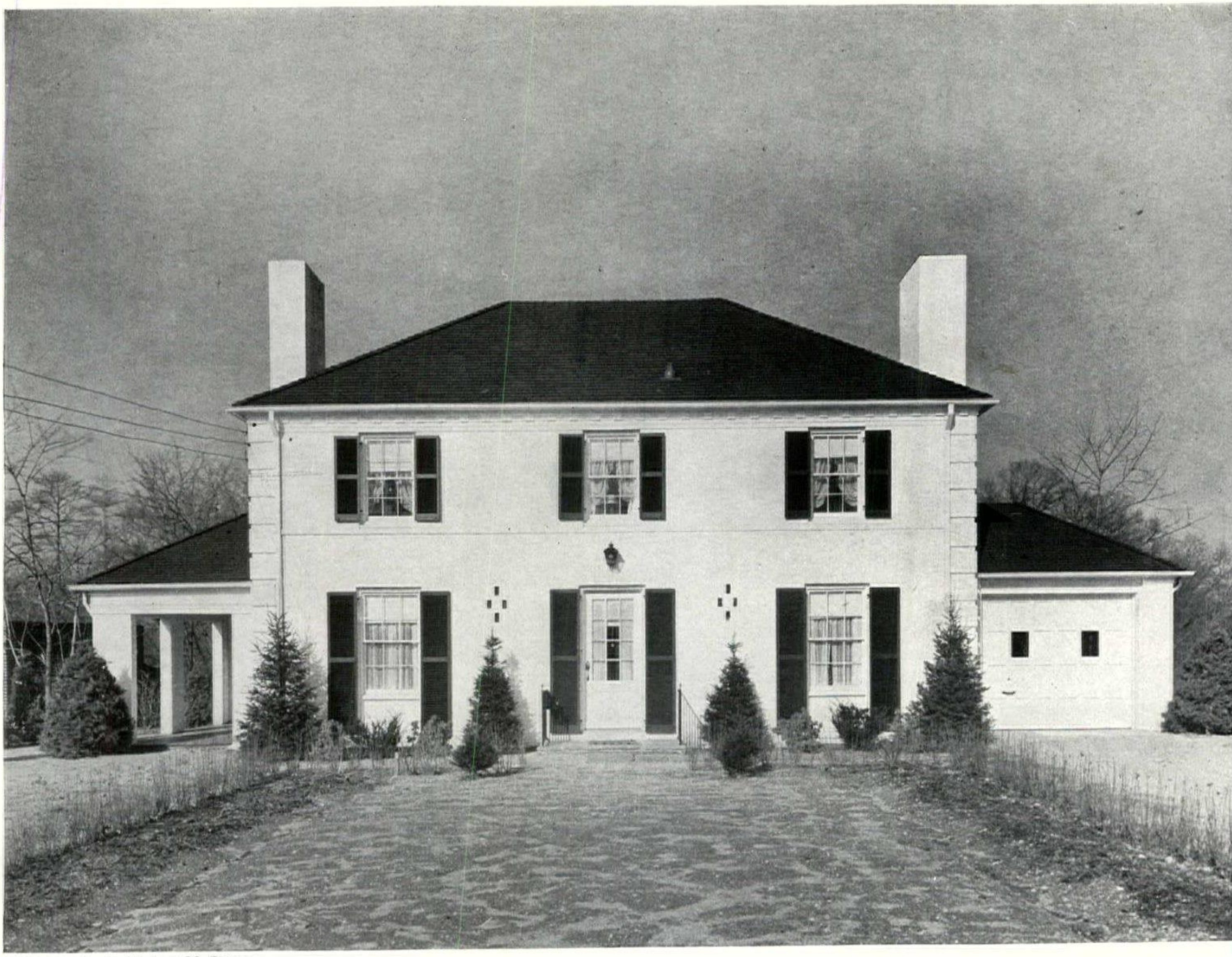
RALPH C. FLEWELLING

ARCHITECT

LIVING ROOM

HOUSE OF B. A. G. FULLER **HOLLYWOOD, CALIFORNIA**

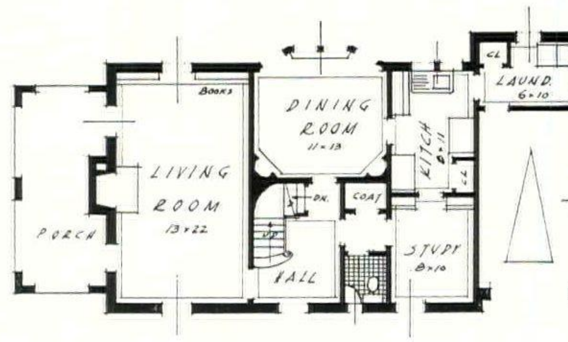
The study, shown on plan reproduced on opposite page, is at the top floor level. This was done for quiet. The interior room shape conforms to the shape of roof. New type materials were used for walls and ceiling. Floors are of rubber tile.



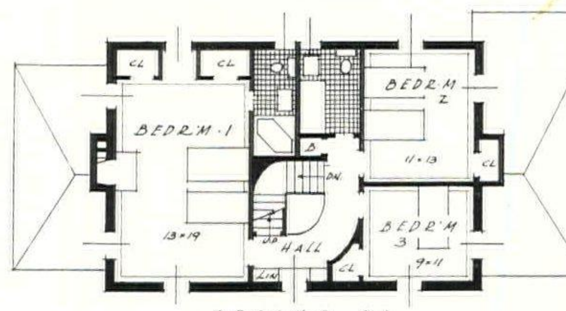
Photographs by Murray M. Peters

HOUSE OF MR. AND MRS. WM. J. NAVIN
PORT WASHINGTON, NEW YORK

THEODORE WHITEHEAD DAVIS
ARCHITECT

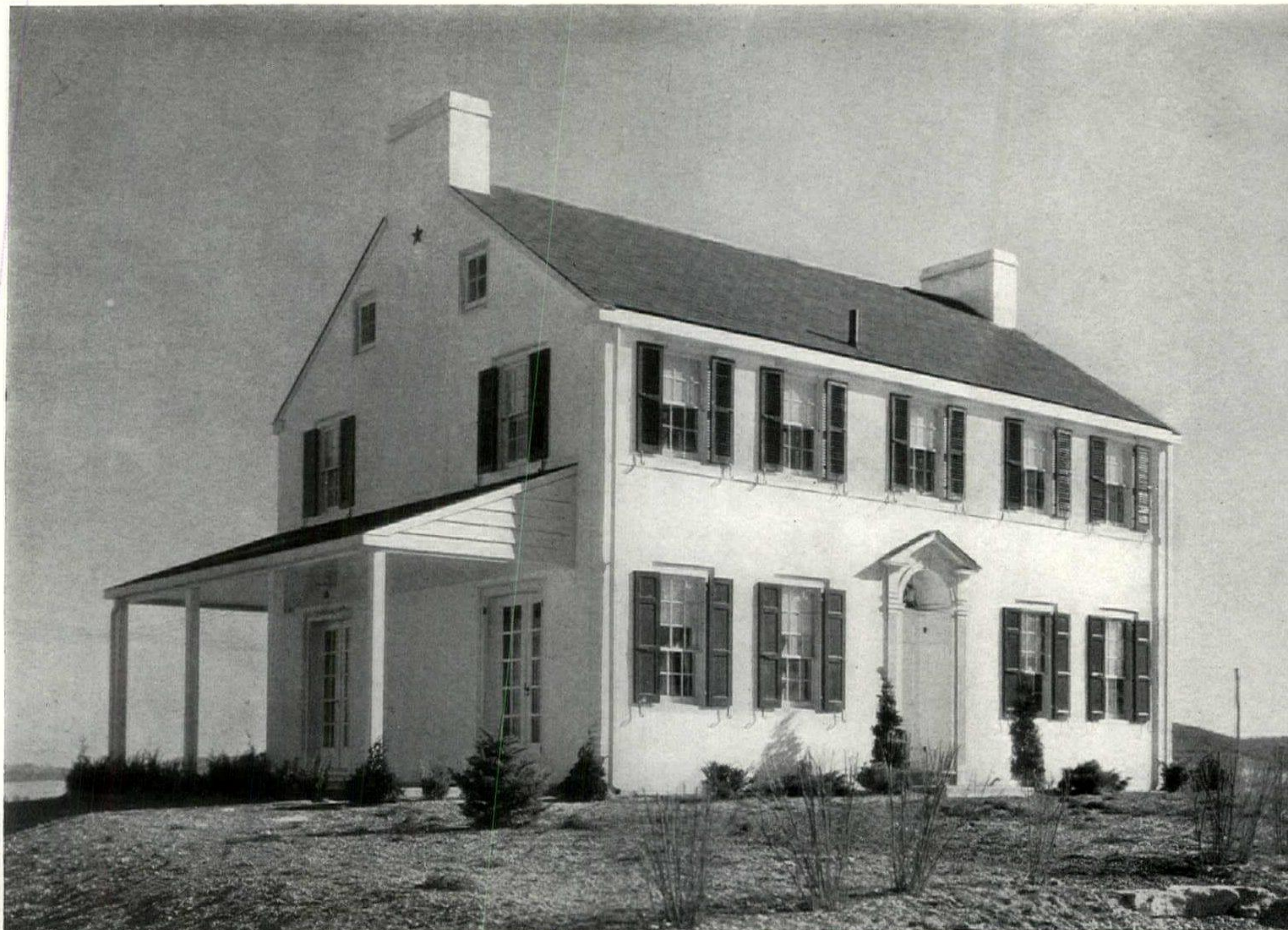


FIRST FL



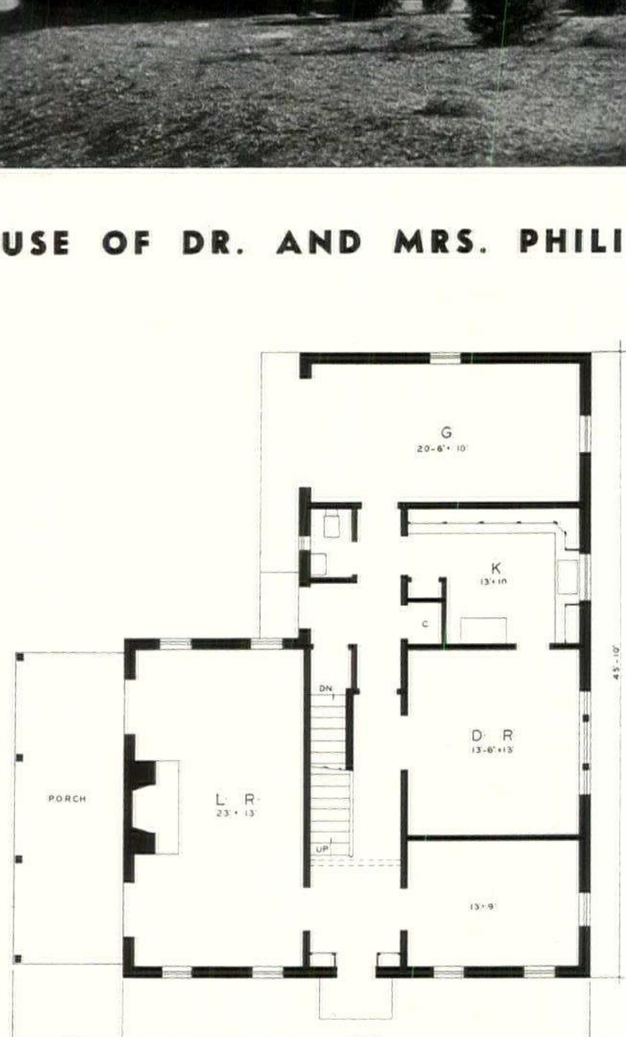
SECOND FL.

Foundation: 12″ concrete blocks. Wood frame construction with brick veneer outside. Roof is shingle, stained dark brown. Inside walls are papered except kitchen and rear entry which are painted. Oak floors; linoleum in kitchen and rear entry; tile bathrooms. Second floor ceiling insulated with blanket-type insulation. Heating plant is vacuum converted from steam system; first floor radiators are concealed. Equipped with copper bronze screens, storm sash on rear (north), copper gutters and leaders. Exterior whitewashed with permanent whitewash. **Cost: $10,000.**

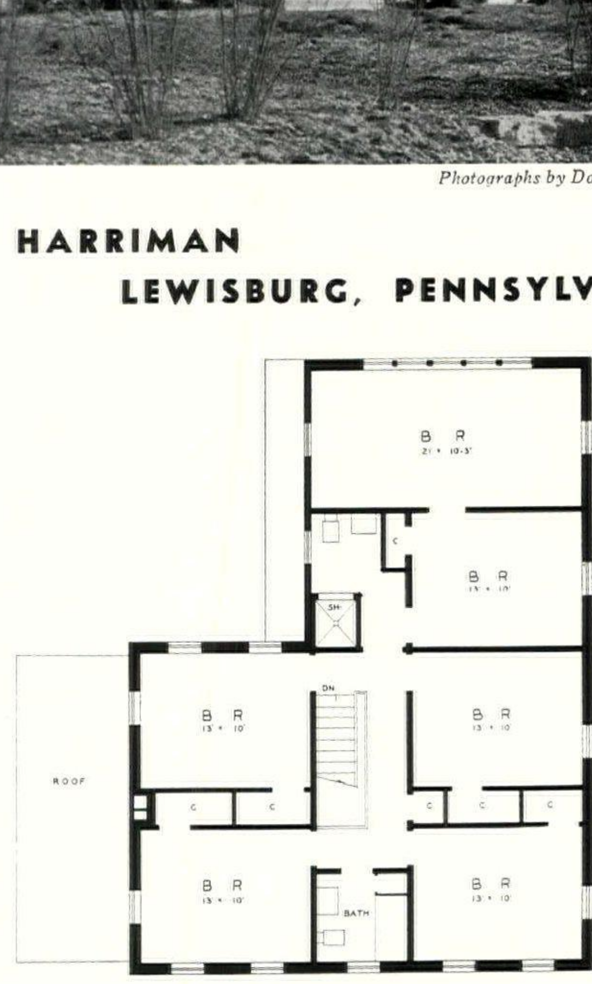


Photographs by Donald H. F

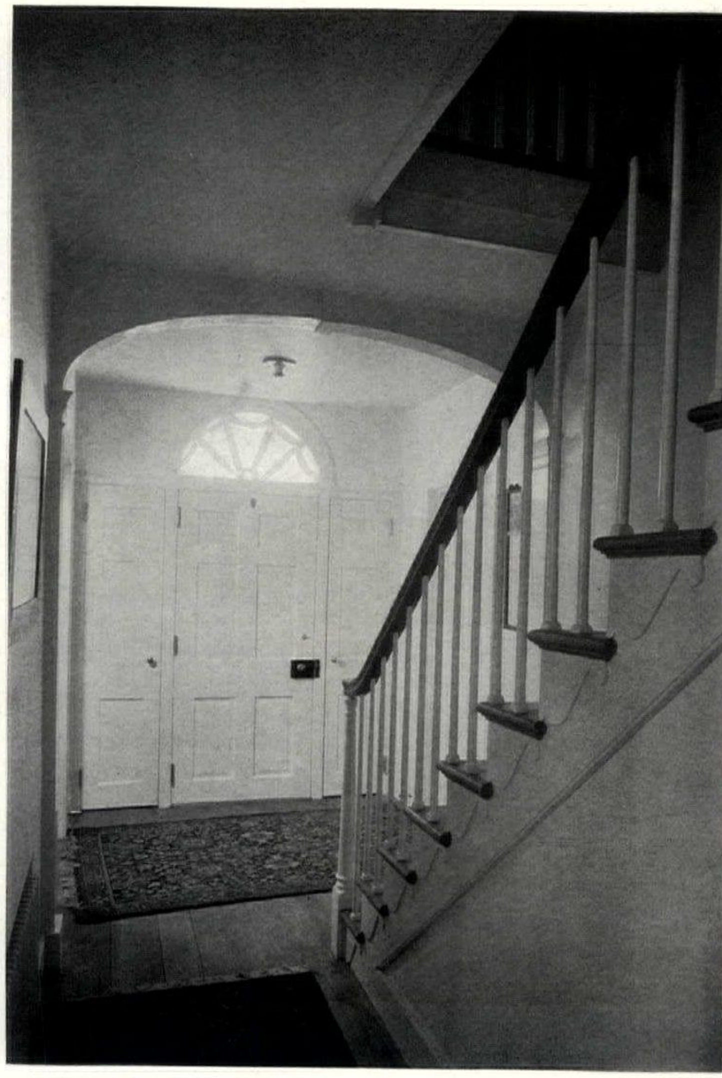
HOUSE OF DR. AND MRS. PHILIP L. HARRIMAN
LEWISBURG, PENNSYLVANI



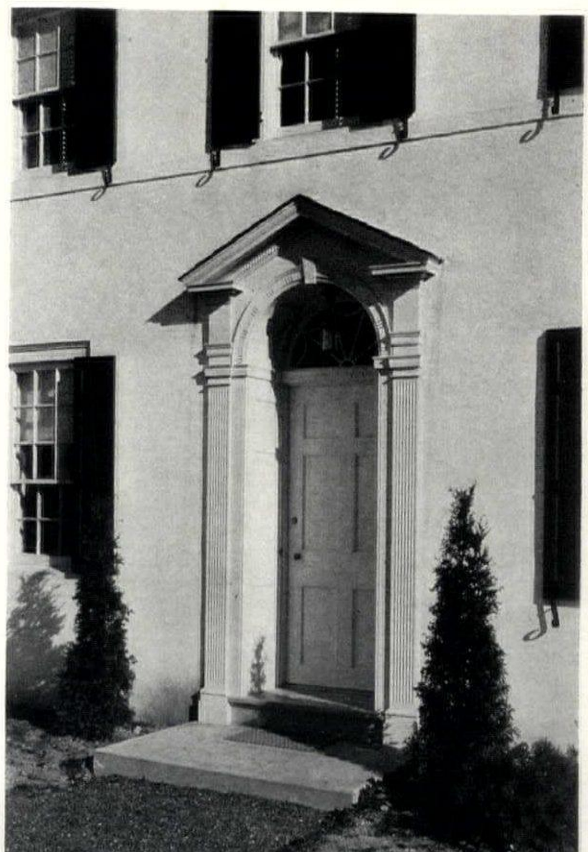
FIRST FLOOR



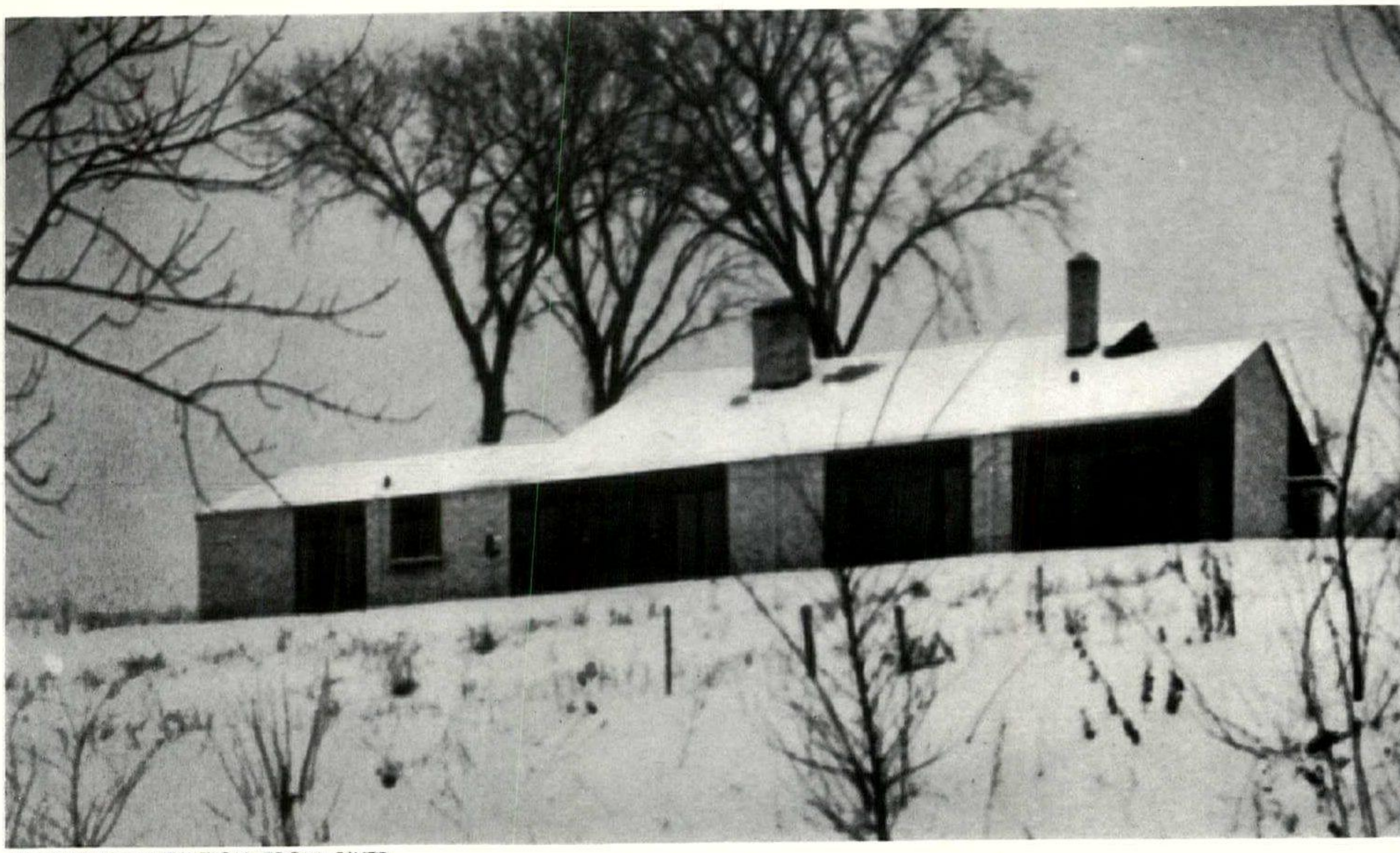
SECOND FLOOR



M. A. CLINGER, ARCHITECT



Concrete block foundations and walls, slate roof. One inch furring applied directly to blocks on inside. Rocklath and plaster used for interior. **Wall finishes:** exterior, cement plaster; interior, gypsum plaster. Floors of random width knotty pine. Hot-water heating. Work shelf with drawers and cupboards below and cupboards above built around entire kitchen; sink built into work shelf. Corbin hardware in polished brass. Romex wiring. Sherwin-Williams and du Pont paint used throughout. **Color scheme of exterior:** whitewash on plaster, with dark green shutters. **Interior:** ivory trim, ivory plaster and natural floors. Double-hung sash of wood; copper screens. **Cost: house, $7,000; landscaping, $200.**



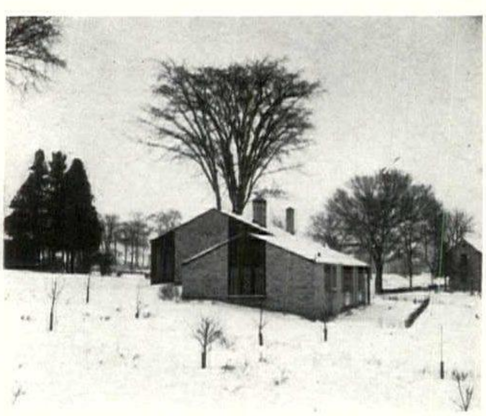
SOUTHEAST ELEVATION FROM RIVER

HOUSE OF E. L. WILDE

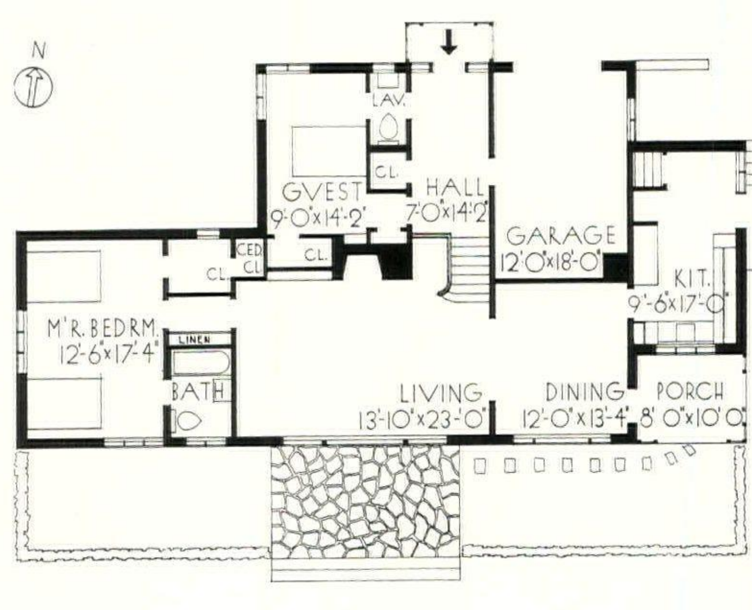
WATERTOWN, WISCONS

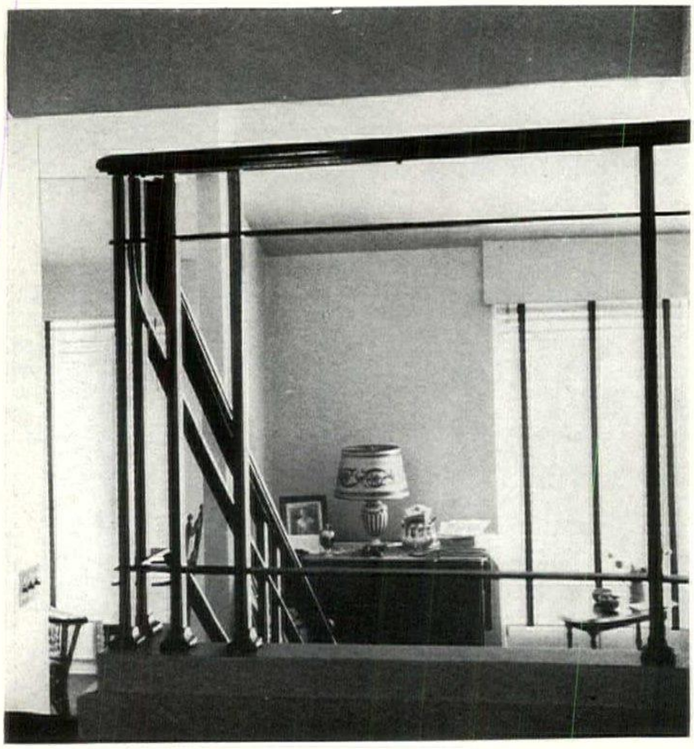
GEORGE FRED KECK

ARCHITECT



VIEW FROM SOUTHWEST

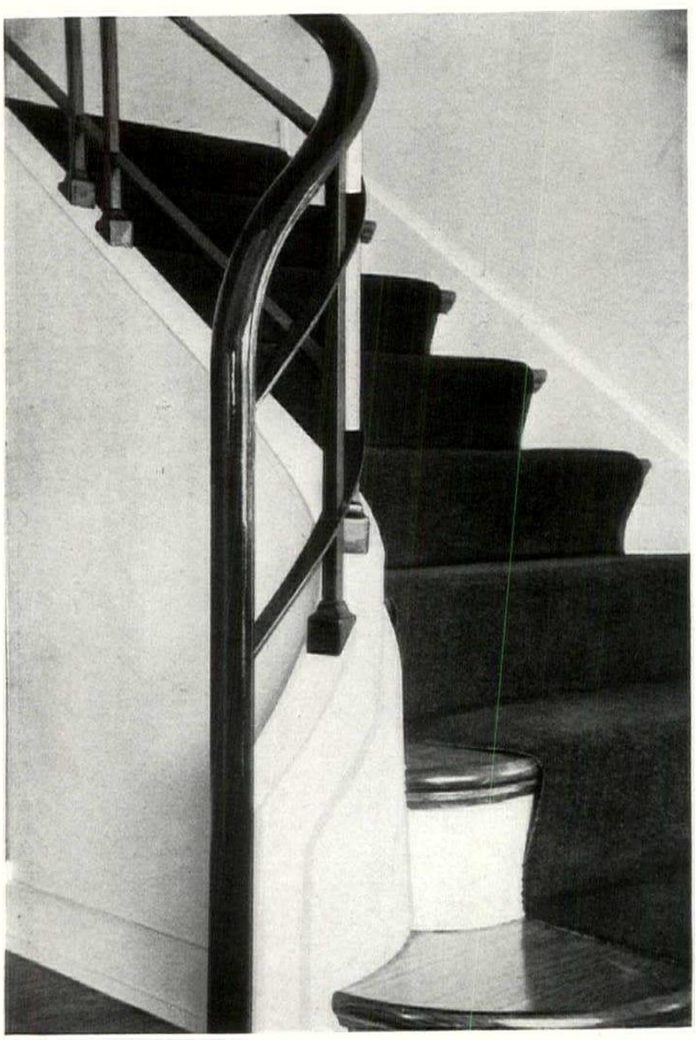




STAIR RAIL DETAIL

THERMOPANE PLATE GLA
WINDOW IN LIVING ROO

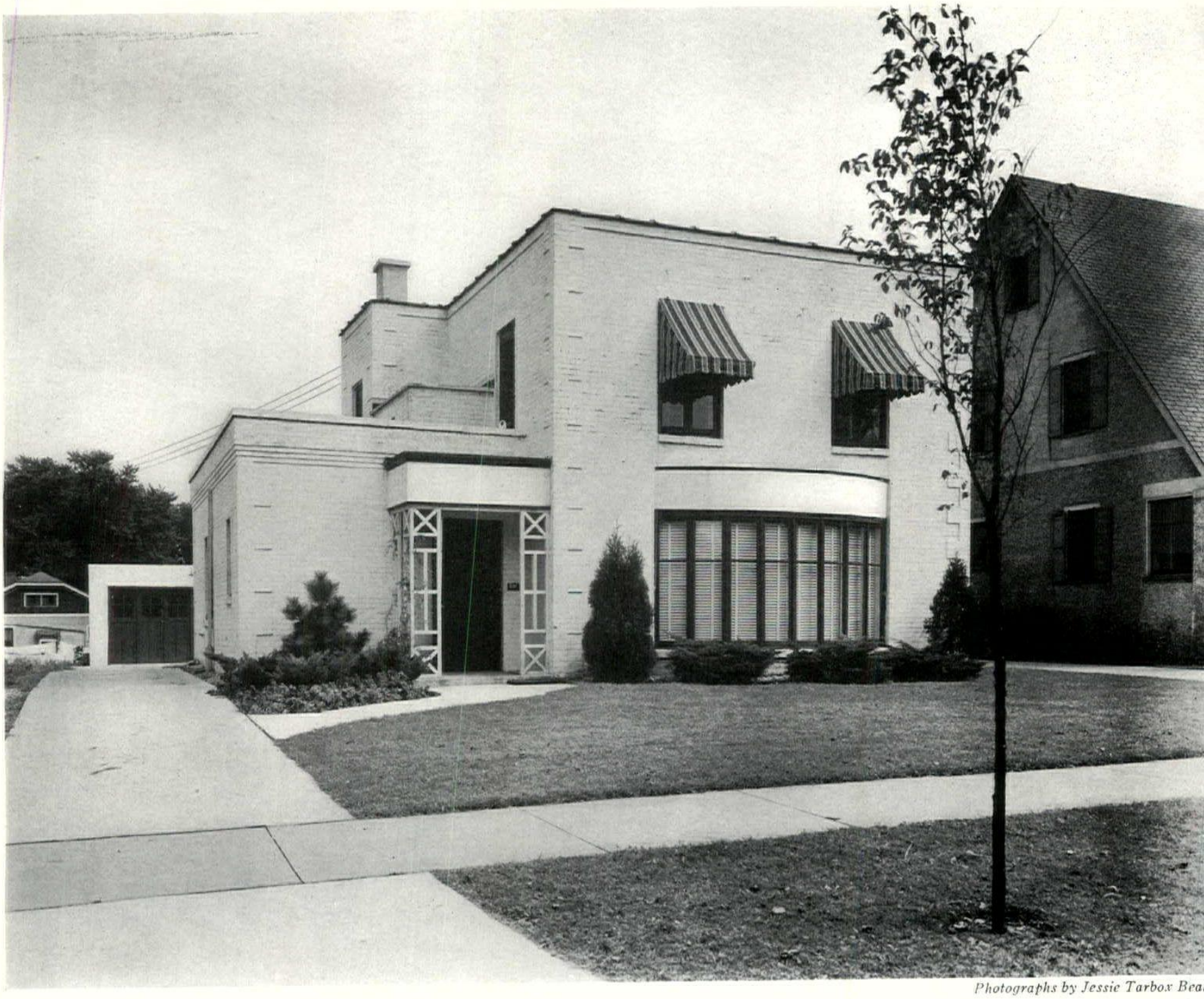
STAIR RAIL DETAIL



HOUSE OF E. L. WILDE
WATERTOWN, WISCONSIN

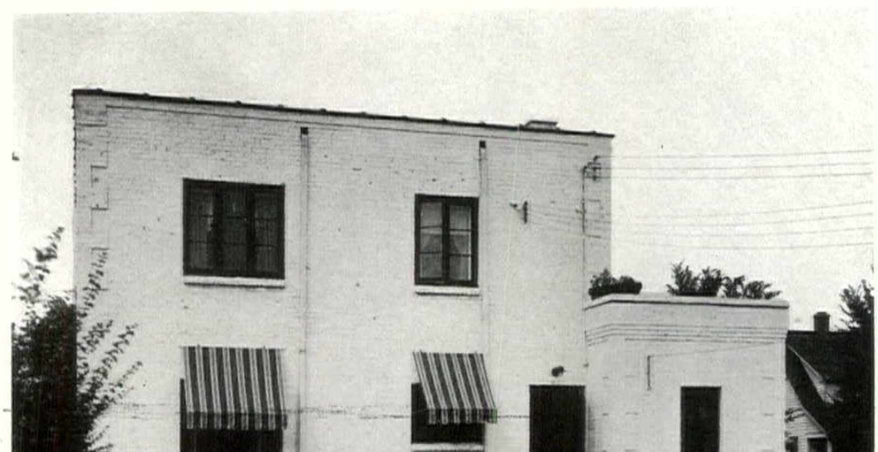
GEORGE FRED KEC
ARCHITEC

Concrete foundations, brick veneer walls, creosoted wood shingle roof. **Wall finishes:** hard finished plaster; tile in bathrooms; all plaster painted with enamel throughout house. **Floors:** oak, linoleum; tile in bathrooms. One-inch insulation board used as a plaster base; mulsified asphaltic waterproofing. Delco oil-burning heating system. Corbin brushed nickel hardware; lighting fixtures, stock to match hardware. Pratt and Lambert paint throughout. **Exterior color scheme:** common brick in cream with traces of orange; wood and shingles painted a deep brown; sash, deep green. **Interior:** living room, dining room and hallway, blue; kitchen, yellow with red; bedrooms, peach; baths, blue tile; all wood floors are stained a light brown. Wood casement sash, $1\frac{3}{4}''$ thick for Thermopane. Thermopane glass, plate $\frac{1}{8}''$ thick with $\frac{1}{4}''$ air space, in living and dining rooms. **Cost: $9,000.**



Photographs by Jessie Tarbox Bea

HOUSE OF CHARLES DOETSCHMAN **AURORA, ILLINOIS**



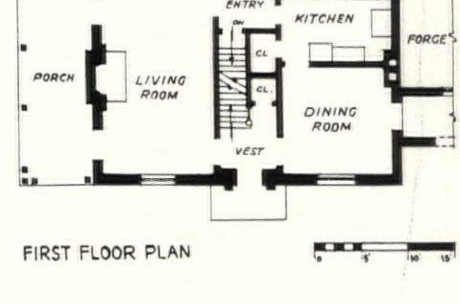
GEORGE LOANE TUCKER
ARCHITECT

Photograph by Gottscho

GROOM'S HOUSE FOR RICHARD V. N. GAMBRILL — PEAPACK, NEW JERSEY

JAMES C. MACKENZIE, ARCHITECT

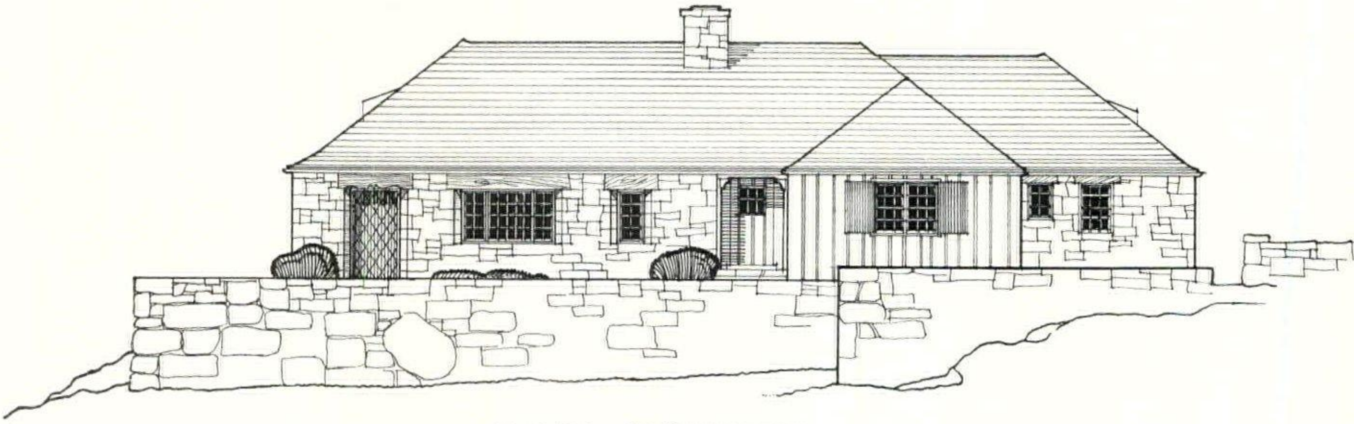
SECOND FLOOR PLAN



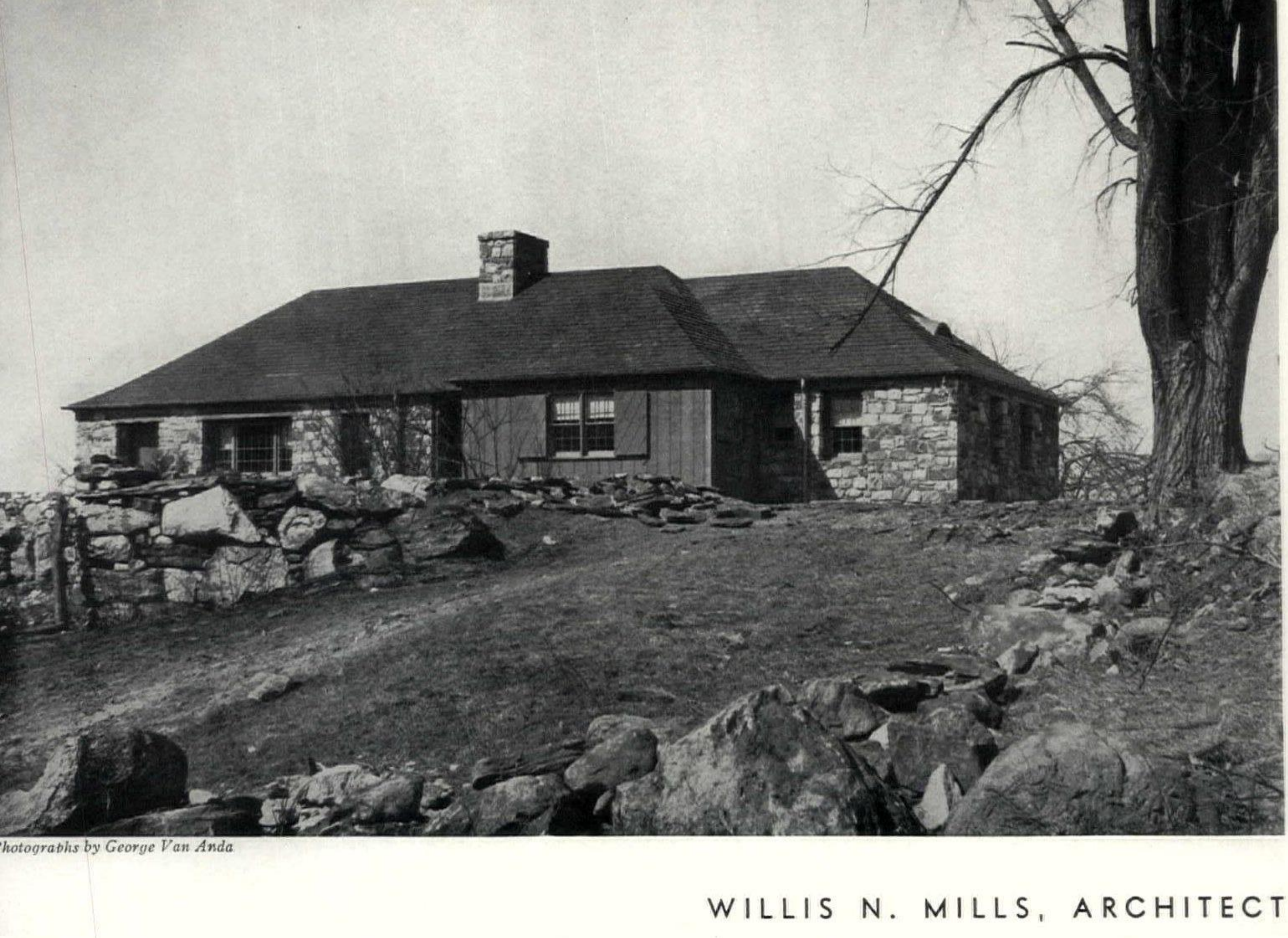
FIRST FLOOR PLAN

WEEK-END HOUSE FOR C. D. DALLAS KATONAH, NEW YORK

As a first step in the gradual development of his 50-acre tract, the owner decided to build a week-end house so planned that it would serve as a three-car garage and servants' quarters in the ultimate development of the property. The site selected was on a natural terrace formed by the foundations of an old barn located near the road. The high terrace wall forms a background for a small flower garden at the lower level.



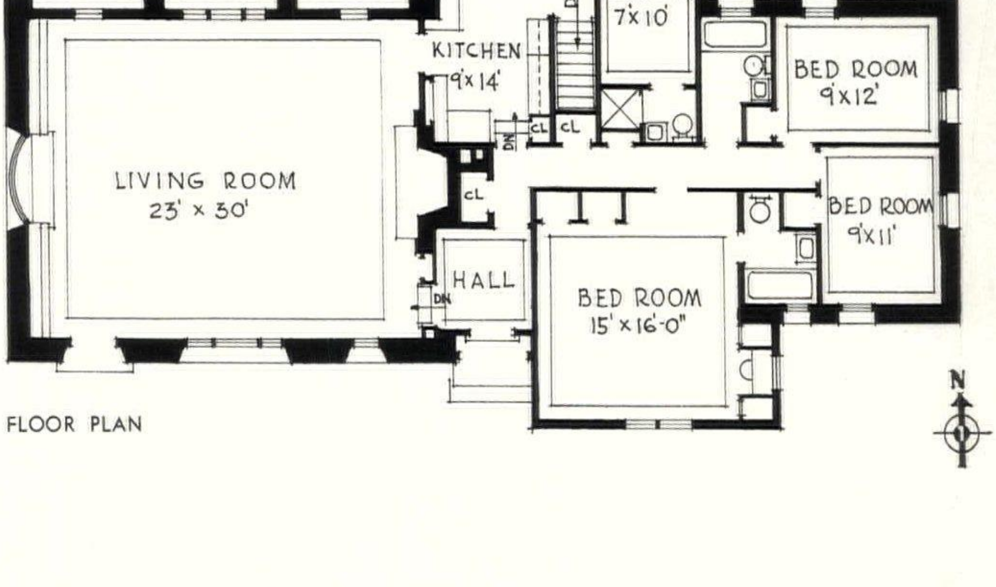
SOUTH ELEVATION



Photographs by George Van Anda

WILLIS N. MILLS, ARCHITECT

The exterior is of local stone and molded redwood boards stained a warm gray; roof of rigid asbestos shingles. Leaders and gutters are lead-covered copper. Shutters and doors are painted blue.



FLOOR PLAN

Photographs by George Van Anda

WEEK-END HOUSE FOR C. D. DALLAS — KATONAH, NEW YORK

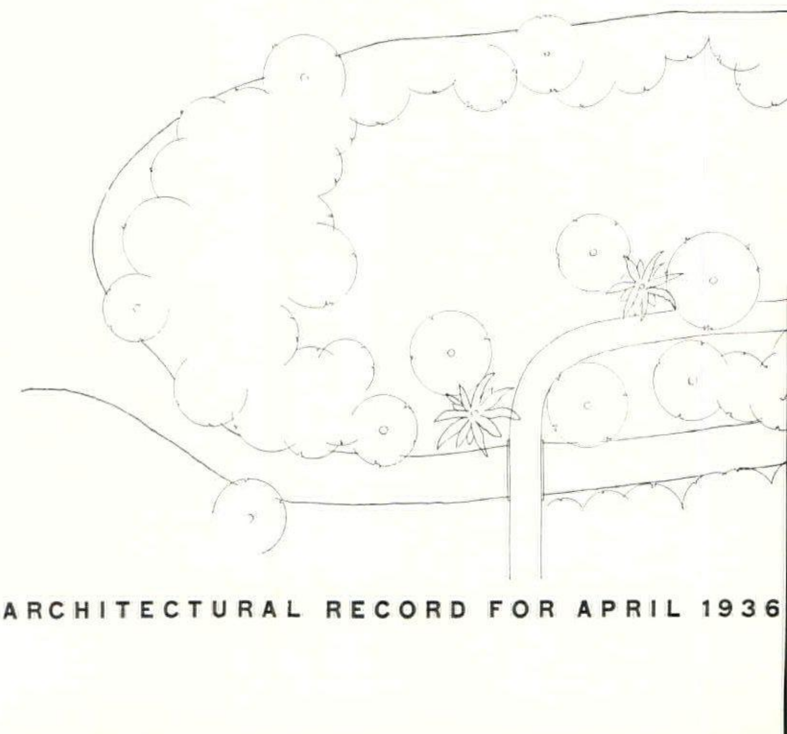
WILLIS N. MILLS, ARCHITECT

The living room is sheathed in pine. The ceiling is sand-finished plaster with structural beams exposed. A temporary wood floor of broad pine boards covers the concrete below. An extended view to the west is framed by a large bow window set between removable bookcases which extend the full width of the room. Bedrooms have painted floors, and papered walls in gay colors with interior woodwork painted flat white. Hardware and interior lighting fixtures were handmade by local craftsmen. A small basement includes storage space and furnace room. **Heating system:** steam, with H. B. Smith boiler and American Radiator Company radiators. **Plumbing:** sewage disposal, septic tank and the tile disposal field; hot and cold-water pipes, copper tubing (circulating hot-water system for domestic hot water); Standard Sanitary fixtures.

VACATION COTTAGE FOR MR. AND MRS. R. H. DEARBORN

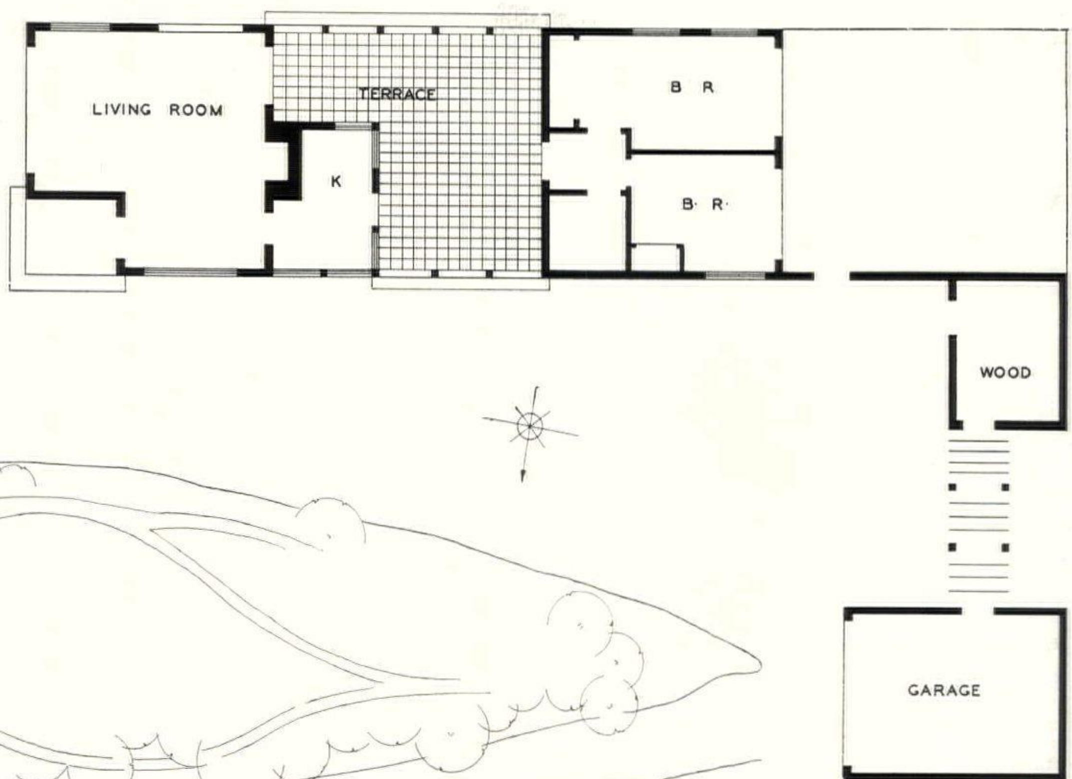
McKENZIE RIVER, OREGON

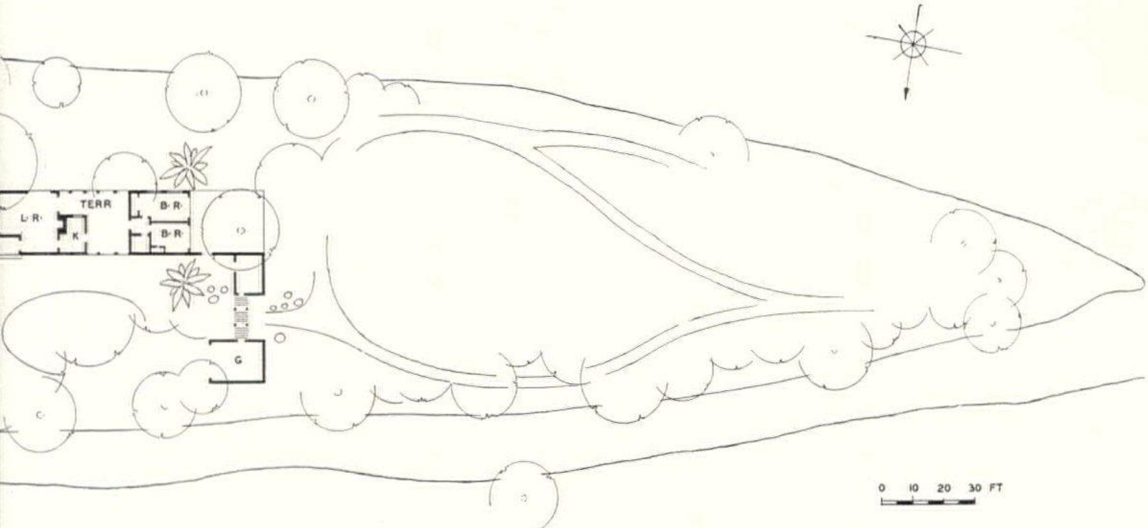
Concrete foundations, wood frame walls, facing of shakes cut on site, shingle roof. Porch, used for outdoor dining and living, was designed to frame view to river and creek from south and north sides of the house. The trees determined the location of house. Garage was an existing feature of property when house was built. Lumber was purchased from a small sawmill near site. In this wooded mountainous region wood was considered the logical material for economical construction. Bedrooms were designed as a separate unit to secure quiet and privacy. All interior walls and ceilings, 1" x 8" pine, natural finish. Fir wood floors, cement surface on porch. Heating: fireplace in living room, small stove for bedroom unit. **Exterior color scheme:** Cabot's light gray shingle stain on walls; roof not stained. **Interior:** all wood, natural finish. Wood casement sash; copper screens. Practically no planting was required. The site had rhododendrons, flowering dogwoods and other native plant materials. **Cost: approximately $1,800.**



ESIGNED BY

HELDON BRUMBAUGH





PLOT PLAN

WEEK-END HOUSE INTERIORS

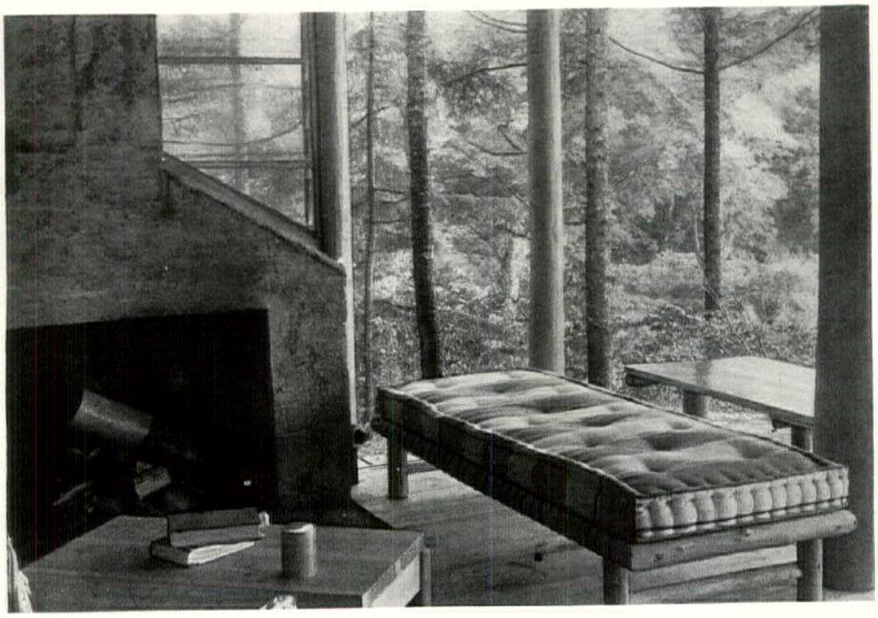
BY ANTONIN RAYMOND

ARCHITECT

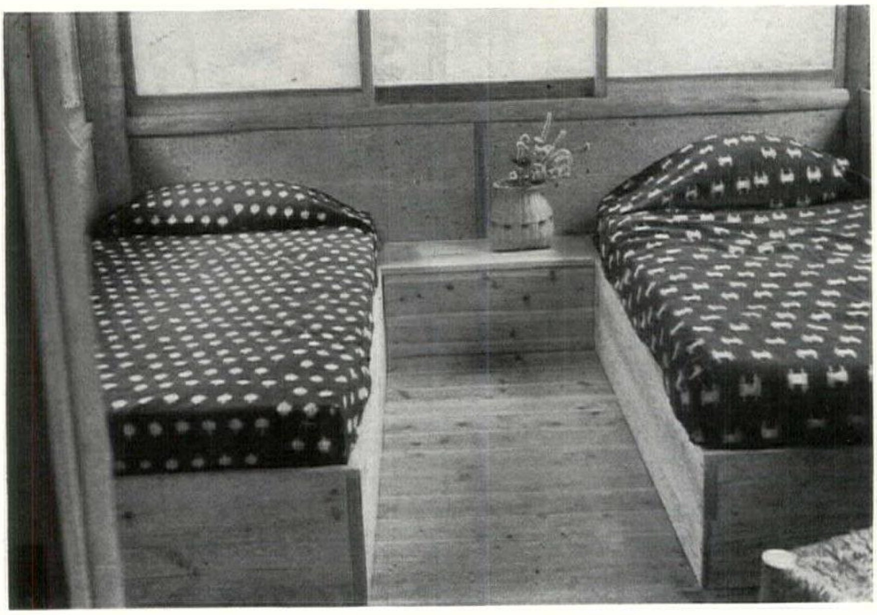
MISS WALKER'S COTTAGE

KARUIZAWA, JAPAN

Bedrooms, separated by sliding partition; ca be used as one or two rooms; exterior window are sliding type; beds are spring mattresse mounted on boxes and have inner-spring ma tresses; woodwork is of natural finish cedar.



Living Room. Fireplace is of lava concrete fro site, with unrubbed and natural surface. Sette consists of frame made from peeled sapling rope spring and mattress. A part of wall ope to a woodland setting.



Small bedroom with built-in bunks of box co struction and otherwise similar to other be rooms. Partition units consist of wood fram surfaced with handmade paper. All woodwo is of cedar.

Photograph by Zimmerman

ARTHUR EDWARD ALLEN is a specialist who works and talks in terms of quantity production of small house design. Some 15,000 houses, representing the largest home building enterprises on Long Island, have been built from his plans. At the present time he is working on thirty-five different projects, all within a price range of from $4,200 to $15,000, which he calculates will mature into a total of more than 3,100 houses by the end of the year. One of these projects is Bayside Hills, which the Gross-Morton Corporation is developing on the old Belleclaire Golf Course on Long Island, under the mortgage insurance standards established by the Federal Housing Administration; the project comprises 1,000 houses retailing at $4,940.

Slim, youthful—he is only 35—and as realistic as any of the operative builders with whom he deals, Allen has had an unconventional career as an architect. After a brief wartime service with the marines, whom he left a Brooklyn high school to join, he got a job as a time-keeper with a general contractor in Manhattan. Then followed some experience as a carpenter, a course in architecture at Pratt Institute and two years as a construction engineer inspecting 20 to 30 plans a day in the municipal building department before he hung out his architect's shingle. Since then he has been working closely with such real estate developers as Stewart Willey, the Gross brothers, W. R. Gibson, Wolosoff brothers, Frank Droesch, Lawrence Morton, and others. The Spanish style of house seen in such big developments as Merrick Gables on the south shore can be traced back to Allen's drafting table. In his business office at Jamaica, Long Island, where commissions are now coming in for projects as far away as Chicago, he has two draftsmen working full time and a third part time to assist him in turning out the working details. He personally evolves all his own plans and designs and prepares his own presentation renderings down to the last brushful of color. Allen likes the small house, primarily because its requirements are so specialized. He has never designed a skyscraper nor does he so desire; moreover, he thinks the skyscraper architect would have just as much trouble in designing a satisfactory small house as he would have in creating a complicated office building.

Not much exploration has been made of the small house field by the architectural profession in the past, but any one who is interested in knowing how one designer is pioneering will find some practical advice in the accompanying account of an interview granted one of the editors of The Architectural Record.

". . . find out what the buyer wants"

AN INTERVIEW WITH THE ARCHITECT OF ONE OF THE LARGEST FHA-INSURED HOUSING DEVELOPMENTS

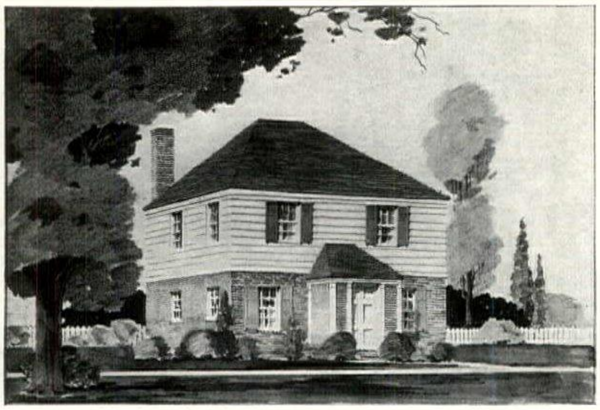
Do you see an extensive field for architectural services, Mr. Allen?

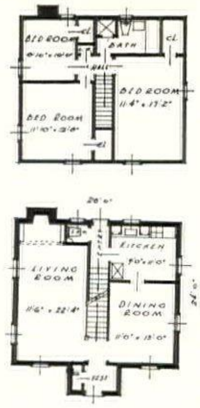
Yes, if the architect will convince himself that a house under $5,000 is worth bothering with. It's a highly competitive market, and any architect interested in this field must specialize. The lower the cost of the house, the more specialized becomes the work—more careful layouts and more efficient use of materials are necessary.

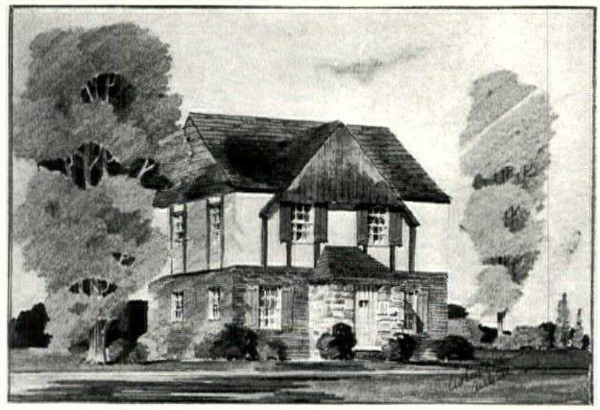
Whose interest does the designer have to consider primarily—the home owner or the builder?

Both. The architect can be of service to the buyer by suggesting to the builder what type of house arrangement, facilities and so on are desired or needed by prospective customers. What the buyer wants is an important consideration when the builder has to sell his product in competition. By providing as many quality features as possible at a given price level the architect helps the builder to sell the houses. Much better houses are being sold today for this very reason. A house selling at $4,990, which is a typical market price at present, is superior to the $6,990 house of seven years ago.

Another way in which the architect can help the builder in selling houses is by preparing sketches and renderings. A home buyer can see the floor arrangement easily enough in the model house which is usually erected early in the development for this purpose, but if he desires a different exterior treatment a colorful perspective drawing will help him visualize the final product. For example, at Bayside Hills this winter, in spite of 22 days of unusually severe weather, the builders were able to sell 34 houses from renderings on display in one of the model homes.







MANY VARYING EXTERIORS ARE DESIGNED FROM EACH BASIC FLOOR PLAN, USUALLY DEMONSTRATED AS A MODEL HOUSE

How do you find out what is wanted in the house design?

By interviewing people and by sending out questionnaires. Whenever a new model house is opened to the public I always wander about talking with visitors to get their reactions. So long as they don't know I am the architect they usually speak quite frankly. I also send out questionnaires to persons who have bought houses previously asking them what they would want if they were going to buy again. In this way I get a good check on changes in consumer demand. Incidentally, the buying public changes its mind very easily, so it is necessary to keep posted on market needs all the time.

Do you try out new ideas?

Not unless we are reasonably sure they will go over. I am planning to send out a new questionnaire asking whether the owners would prefer a house without a cellar if they could have another room above ground for the same amount of money. . . . If I find that they ever want a cellar on the roof, I'll give it to them.

Do you try to condition the public to want any special features?

No. Our efforts are directed entirely toward finding out what the public wants.

What features do you find buyers want at the present time?

Most important is a bathroom that's "Klassy" with a capital K. Then come the kitchen, the living room and a finished room in the basement, in order of importance. Fireplaces don't seem necessary—out of a hundred houses in Bayside Hills possibly 10 or 15 have fireplaces, for which the buyer had to pay extra.

What sort of equipment sells well?

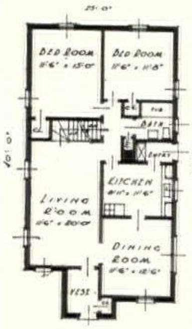
In the bathroom tile and colored fixtures, also plenty of mirrors. For some reason or other, possibly because the room looks larger, women like to have a mirror right over the tub. . . . The kitchen has to be colorful and must have plenty of cabinets. Also a linoleum floor and—this is a very important point—well-known, nationally advertised products. As soon as the visitors recognize a stove or kitchen cabinet as something they have seen in advertisements they feel they are getting quality goods. . . . Oak floors go very well in the living room. At present there is a preference for paint instead of paper on the walls, although a shift from paint to paper seems to be under way.

Do buyers ask for any special structural features?

At the present time they prefer brick and stucco. They put considerable emphasis on maintenance—this is a big sales feature. The modernistic house exhibits draw big crowds, but so far as I can discover buyers do not like flat roofs and plain walls—they still prefer the "Home Sweet Home" type. Besides, in many communities there are restrictions against flat roofs.

What is the usual procedure in developing a project?

At Bayside Hills, for instance, the builders told me about the property and asked me to look at it. Together we figured out the type of house to be built, the layout of streets and sewers and the general grouping of houses. In this pre-



PRESENTATION DRAWINGS ARE PREPARED SO THAT BUYERS CAN VISUALIZE THE DIFFERENT EXTERIOR TREATMENTS

liminary subdivision work I acted as a consultant. To get an idea of the development plan as a whole, a number of block models were made to scale. After that came the job of designing the plan types.

A fixed sales price had been decided on—6-room house or 5-room bungalow coming under $5,000. This allotted figure had to be broken down into cost of utilities like roads and sewers, cost of financing, sales overhead, and builders' profit. What was left could be used for building the individual house, and at this point the task of providing as much as possible in order to undersell competitors begins.

Suppose we have $3,200 left after the preliminary expenses are deducted, and we know from past experience that similar houses cost 16 cents a cubic foot, we immediately see that we have 20,000 cubes at our disposal in planning the house. As soon as a plan is in shape it is checked against outside bids—if a general contractor doesn't furnish an estimate I call in different subcontractors and arrive at my own figure. If it is discovered that the bid runs 10%, let's say, above the budgeted figure, then the house space has to be reduced 10%. Nothing is sacrificed in the quality of the materials—only the quantities are cut down. The room dimensions are governed largely by the economic sizes of materials, which is a requirement that makes small house design so specialized a line of work—it is necessary to know how not to waste any lumber or other materials.

The basic plan is demonstrated in the model house. Once this is erected orders can be taken for similar arrangements using different elevations if desired. In Bayside Hills, for example, an assortment of 37 different elevations, based on 4 different floor plans, is offered the buyer. The prospective home owner picks out whatever plan and elevation he prefers—that is why it is so important to have good presentation drawings to help him visualize what he can't see on the location.

Do you write the specifications?

The specifications are controlled entirely by prices. For example, if wire lath is selling at 20 cents and we shop around and find wire lath at 18 cents, we would use wire lath at 18 cents. Consequently the specifications have to be very open—just wire lath but no particular product would be specified, and the builder or owner is then free to write into the contract whatever product he selects.

On what basis are the architectural services paid for?

There is a fee for the original plan and a fee for each elevation, plus a royalty for every house built. If supervision is wanted, that's a separate charge. Likewise in consultation work there is a separate fee, depending largely on the size of the project.

Looking ahead, Mr. Allen, what major changes do you see occurring in this field of practice?

If you mean, do I fear the intrusion of the prefabricated house, I can say definitely, no. If you want to know, do I think that the architect will play a more important part in the small house field, my answer is decidedly, yes. The architect, if he is qualified, eliminates a great deal of the guess work inevitable when the builder is left alone in his decisions as to layout and exterior details.

MAJOR BUYING FACTORS IN THE SUBDIVISION HOUSE

A group of important operative builders were asked by THE ARCHITECTURAL RECORD to report what features they found most effective in the sale of houses. The replies, although varying in detail, expressed common agreement on the desirability of (1) quality materials, equipment and workmanship, and (2) spaciousness and efficiency of planning.

In the bathroom:

Decorative, easily cleaned and waterproofed wall finishes appear most important; tile floors and walls take first place in popularity, with structural glass and Vitrolite receiving frequent mention. Modern equipment and accessories are equally desirable—built-in tubs, shower stalls, chromium finishes, colored fixtures, mirrors, built-in vanities, medicine cabinets, and linen closets.

In the kitchen:

Here also, tile walls or wainscots or other permanent wall treatments are popular; likewise tile drain boards. Specialties like double sinks, mechanical refrigeration, modern ranges, exhaust fans and counter lighting are good selling points. Much emphasis is given to compactness and completeness of working space—ample storage, built-in cabinets, combination cabinet and sink, breakfast nooks, pantry, and space for table and chairs. Linoleum is mentioned occasionally as desirable flooring.

In the living room:

General arrangement for furniture, satisfactory orientation and fenestration for light and outside views and spaciousness are most important. Other popular features are wood-burning fireplaces, sufficient wall plugs, good electrical fixtures, built-in bookshelves, beamed ceilings. Plain walls and soft color schemes are mentioned as desirable.

Structural features:

Insulation and fireproofing are generally asked for by buyers. Other items are waterproofed basements and foundations, double flooring, steel beams, asbestos and slate roofs, attached garages.

Amortization:

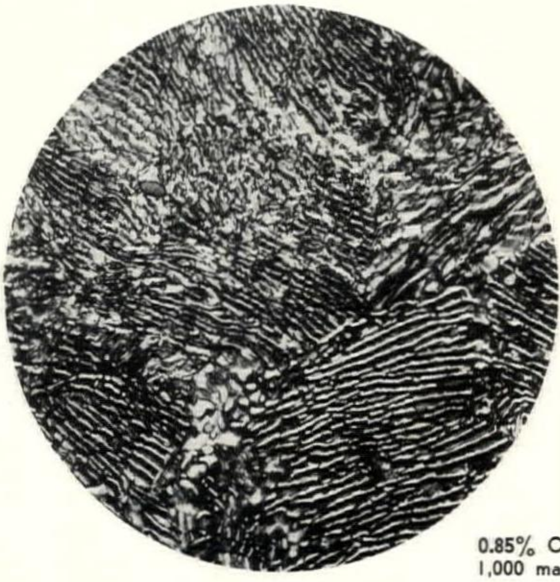
The importance of monthly amortization as a selling point was emphasized by almost all builders, but a marked division of opinion appears in their appraisals of the importance of the FHA standards for mortgage insurance as a buying factor.

ALSO SEE "SELLING POINTS," PAGE 40, ADVERTISING SECTION

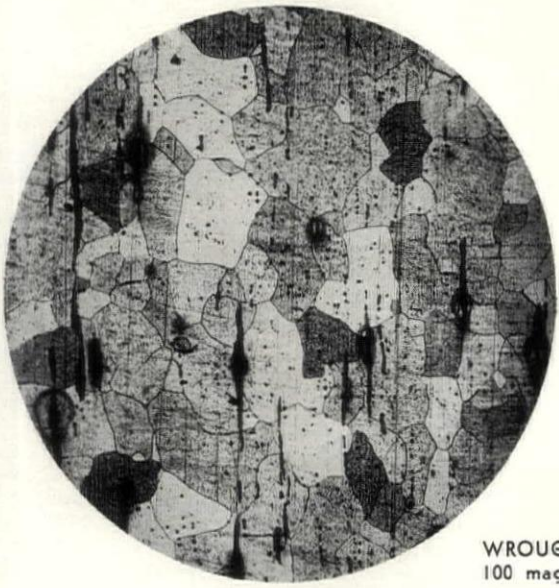
TECHNICAL NEWS AND RESEARCH

Characteristics of metals are changed by altering their crystalline structure. Modern foundry practice and alloying make possible the production of metals designed for specific needs. (Bausch & Lomb photomicrographs)

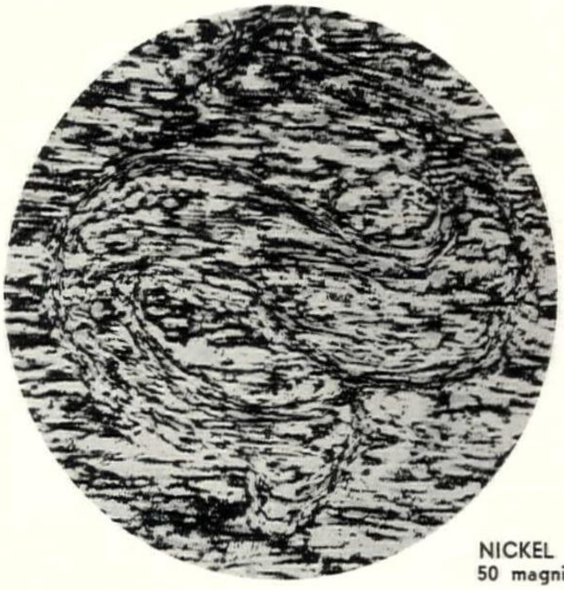
MUNTZ METAL (BRASS)
300 magnification



0.85% CARBON STEEL
1,000 magnification

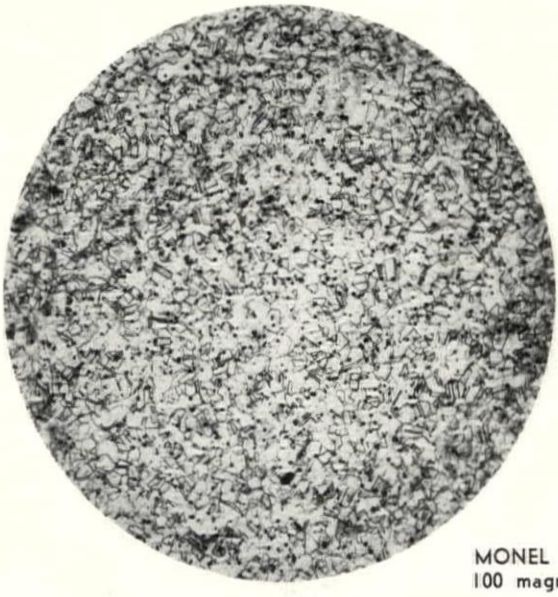


WROUGHT IRON
100 magnification



NICKEL
50 magnification

ANNEALED COPPER
300 magnification

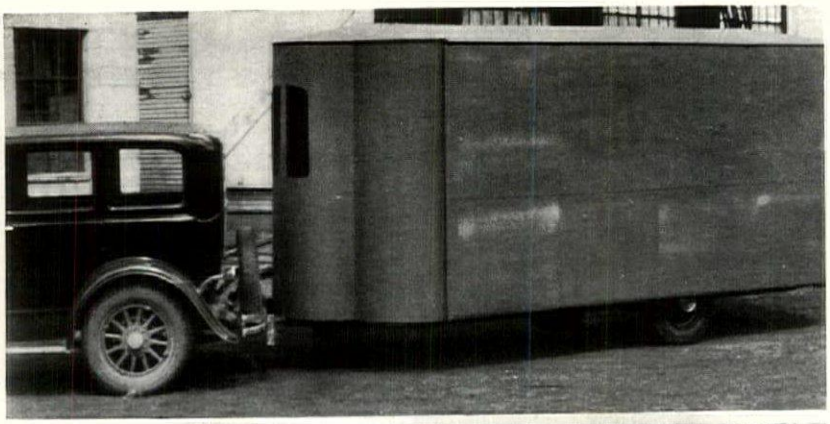


MONEL METAL
100 magnification

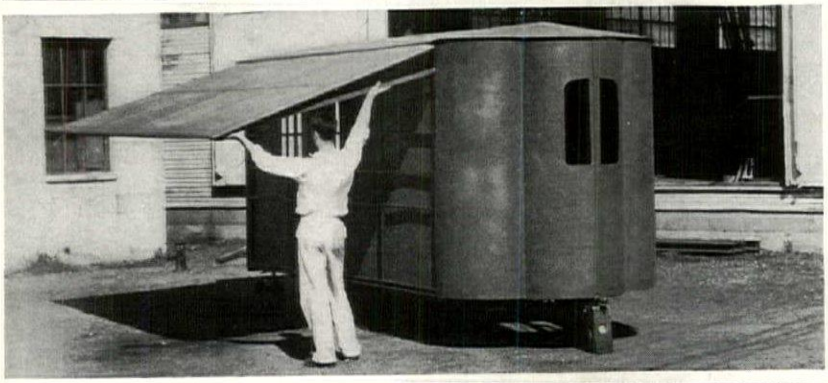
STRUCTURAL MOBILITY

mobile houses

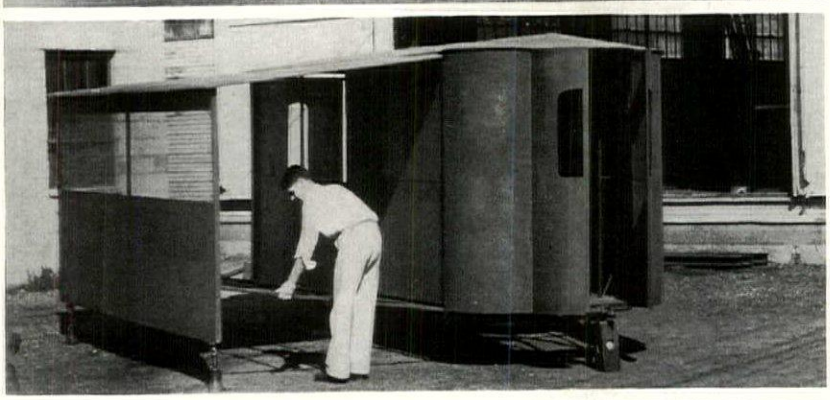
Designed by William B. Stout, president, Stout Engineering Laboratories, Inc., Dearborn, Mich. Production begins in May. Price range: $1,200 *to* $2,500.



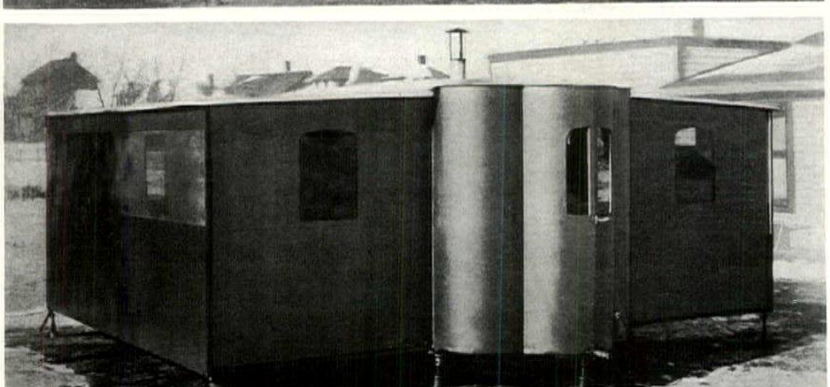
trailer sides



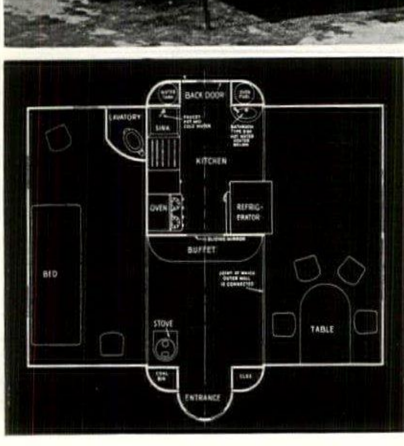
unbolt and

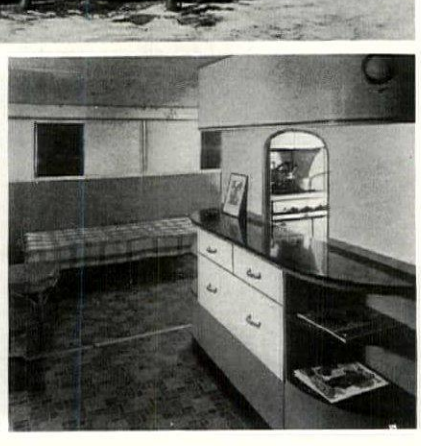


unfold into



room units



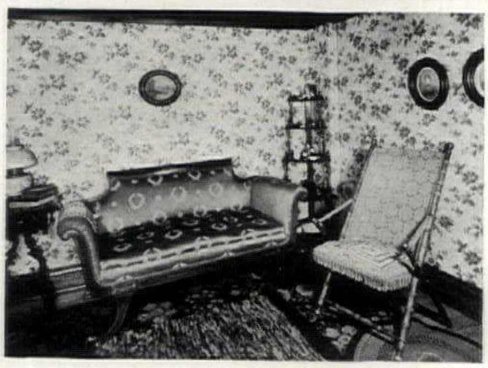


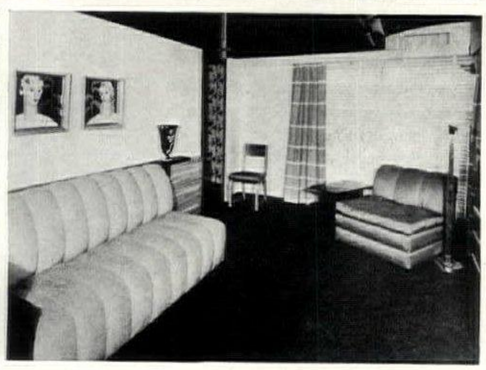
This design is primarily a home and only incidentally a trailer which may be moved from place to place at will. Passengers do not ride in the house while on the road, for it is full of furniture, equipment, clothing, food and bedding. Once arrived at a destination, the 16′ x 6′6″ trailer unit unfolds into a 20′ x 14′ living space within a half hour. After the house is extended it can be divided into two twin bedrooms and a living room. It has its own fully-equipped kitchen. The total structure weighs less than 3,000 pounds.

Construction: The outside walls are lightweight alloy metal screwed to a steel tubular frame welded into one-piece units. Interior finish is plywood, also screwed into position. The intervening air space is partly filled with Sepak sheets for insulation. Windows are sliding glass with brass wire screens. The center section, which contains the kitchen and entrance halls, is framed in steel tubing; hinged on each side are the folding wall assemblies.

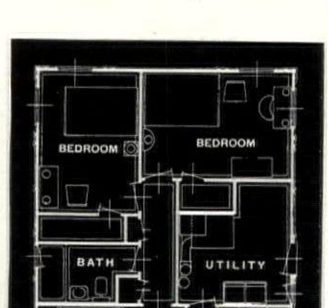
Equipment: The house is furnished for living—Electrolux refrigerator; 4-burner gas stove; hot and cold water tanks with automatic water heater; Philgas tank equipment, with closets, pantry, buffet, bar, dining table, all a part of the unit design. Six chairs and four wide single beds are included. A small coal stove furnishes heat in the winter. Two lighting systems are offered—one of 110-volt capacity with a 150-foot cable for connection with any system wherever the house may be located, the other of 12 volts with a special generator on the automobile. . . . Equipment varies in detail in each house model, as desired.

Trailer cities: According to Mr. Stout, well known as an automobile and aircraft designer—"In housing is the next great opportunity of industry for the creation of wealth; of new romance of industry and merchandising; and here will come the greatest advances scientifically that the world has ever seen and an industry whose progress will dwarf that of the automobile business within the next twenty years. . . . Starting with the tourist traveling hither and yon, stopping at various tourist camps and waterways—eventually these seem to take root, and in many places trailer cities are semi-permanent as to a large number of trailers. Before long when these can be heated and air conditioned, and made to be all-year-round places of living we will see more permanent dwellings of greater roominess and handiness, lighter and more complete construction, automatic in their accomplishments of the labor of living. This movement is already under way even in present houses. New vehicles will contain their own complete lighting systems and air conditioning pumps, and refrigeration for the hottest days, while this and that will fold out and add on in a way to give extra rooms, lounging space, porches. One trailer city in Florida last year had over 1,000 trailers in its little community, and will probably have over 1,500 this season."





transport trucks carry educational exhibits contrasting old and new living standards



factory-built house designs — with or without flat roofs, with or without basements

world's fair on wheels

General Motors "Parade of Progress," now in Florida on a 20,000 mile tour.

Eight huge transport trucks carry the exhibits and form part of the exposition. One trailer transports a diesel power plant, which lights the show on location and runs the exhibit machinery; another provides locker space for the crew; a third is utilized for sound motion-picture projection and the development and printing of photographs. The complete caravan, including demonstration cars, stretches down the road a distance of more than 2 miles when moving from one town to the next. . . . A large tent, which seats 500, is erected on location; its silvered top protects audiences against the heat of the sun. Passages connect show trucks and tent, so that the crowds are protected from rain. Educational exhibits carried in the big trucks contrast new standards with the old in transportation and in housing.

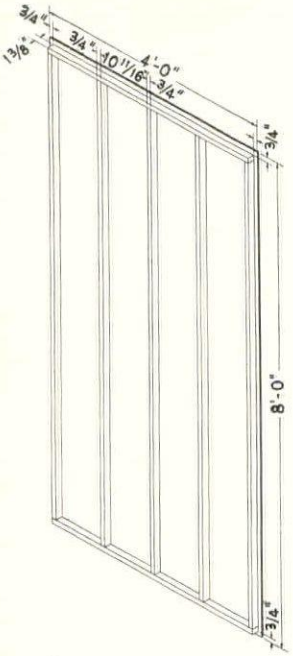
pre-engineered houses

Factory-built by Harnischfeger Corp., Milwaukee, manufacturers of electric traveling cranes and electric hoists. Production begins late this month at the rate of 10 houses a week. Present market limited to southern half of Wisconsin. Sales will be made through real estate brokers on FHA terms. Erection by local contractors under supervision of factory experts. Price: under $4,000.

The "20th Century Home" provides six rooms and bath. The house may be had with or without basement, and with either hip or flat roof.

Construction: The house unit without a basement is designed to be erected on 14 concrete piers. The basement type, slightly higher in cost, is erected on a concrete block foundation and includes a 4" concrete basement floor. The base of the house consists of 5 framed sections made with 12" electrically welded steel channels, firmly doweled and bolted together; each section is reinforced with five 6" cross channels. The underside of the base is completely covered by galvanized metal sheets and insulated by 1 inch of insulation material. The framework is fabricated from steel sections bolted and welded together. Exterior wall finish consists of special weather-resisting color-process coatings applied over building board and asphaltic coatings. The hip roof is built in 12 sections, each constructed of steel rafters to which 1" x 6" tongued and grooved roof boards are securely fastened for the nailing of composition asphalt shingles. Living room, dining room and hall, bedroom and closet floors are clear red oak; kitchen and bathroom floors are covered with high grade linoleum, and the utility or heater room has a concrete floor. Interior doors are of honeycomb core construction, with flush veneer sides.

Equipment: Air conditioning is provided by a forced warm-air system. There is a separate hot-water system with hot-water storage tank. The house is wired and equipped with lighting fixtures. Bathroom, kitchen and laundry are fully furnished.



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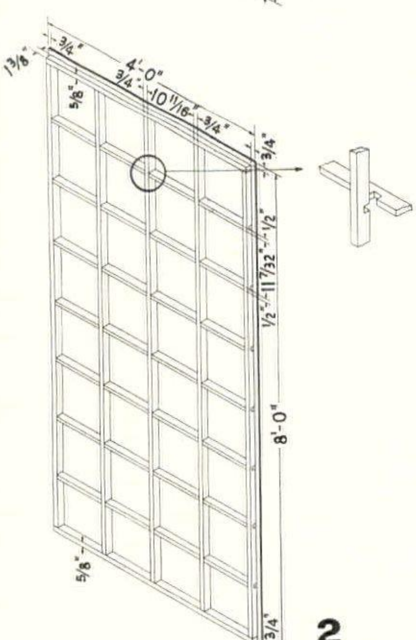

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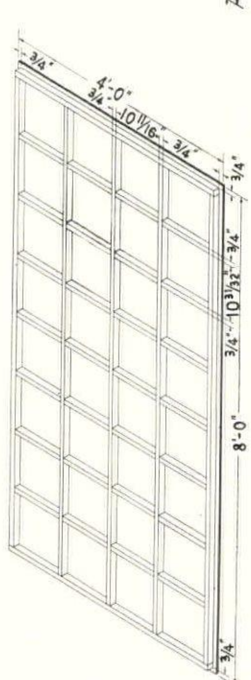


3

plywood-covered wall panels

The following report has been prepared by R. F. Luxford, engineer, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture. The laboratory is maintained at Madison, Wis., in cooperation with the University of Wisconsin.

Previous tests at the Forest Products Laboratory have shown that the strength and rigidity of floor and wall panels with plywood coverings may be increased enormously by gluing, instead of by nailing plywood to studs, plates, and sills. Increasing interest in this type of panel, especially since its use in an experimental house recently built at the Laboratory, led to a series of tests.

Panel construction: Six wall panels, each 4 feet wide by 8 feet long, were used in this series of tests. Panel 1 had five western white pine studs each ¾" thick and 1⅜" wide as shown in Figure 1. Panels 2, 3 and 4 were similarly constructed but with studs 1¾", 2¼" and 3⅝" wide, respectively. Panels 5 and 6 were similar in construction to Panel 1 except that crosswise pieces were inserted at right angles to the length (Figures 2 and 3). All studs were spaced approximately 12 inches apart. The covering was 3-ply ¼" Douglas fir plywood and was glued with casein glue (F. P. L. formula B-4) to the two sides of the studs. The necessary pressure during setting of the glue was provided by permanently nailing the plywood to the studs with 1¼" brads spaced 3 inches apart. The direction of face grain was parallel to the length. A vegetable protein glue was used in the manufacture of the commercial plywood. . . . The rigid attachment of the coverings to the studs by means of glue gives high resistance to shear between the studs and the coverings, thus causing one covering to be thrown into tension and the other covering into compression when resisting an external force. The panel acts essentially as a box girder and thus permits the use of a very thin wall to obtain the required strength.

Method of test: The six panels were tested in static bending over a 7′ 9¾″ span with the load applied at the third points. The rate at which the loading device descended ranged from 0.16 inch per minute for the panels 4⅛ inches in depth to 0.30 inch per minute for the panels 1⅞ inches in depth. Deflections were read to the nearest 0.01 inch for each 100 pounds increment of load. Control specimens cut from the panels after failure were tested in accordance with standard procedure to determine their strength properties. . . . In calculating the moment of inertia of the panels and the small specimens cut from them, all plies running perpendicular to the length of the panels were neglected. Because of the sanding incident to the manufacture of plywood the outer plies are often thinner than the nominal ply thickness. Such differences materially affect the strength and therefore actual thicknesses were accurately determined.

Relative strengths: Panel 1 had a maximum strength of 118 pounds per square foot when adjusted to the basis of a uniform load. A 60-mile wind has a pressure of about 12 pounds per square foot, which is approximately 0.1 the maximum load. The corresponding deflection for a 60-mile wind would be less than ¼ inch at the center of the panel height. Panel 1 is therefore amply strong but other considerations, such as necessary openings in walls for heating ducts, wiring, plumbing, and double-hung windows, may make desirable a thicker wall. . . . Panels 2, 3 and 4 had maximum loads of 134, 219 and 373 pounds per square foot when adjusted to the basis of a uniform load. These loads are greater than that for Panel 1 in approximately the amount expected because of the greater thickness of the panels. Lesser deflections for a given load, of course, accompany the greater thicknesses of the panels. The recorded deflections for a load of 15 pounds per square foot, assuming the load uniformly distributed, were 0.33, 0.22, 0.13 and 0.05 inch for panels with over-all thicknesses of 1⅞″, 2¼″, 2¾″ and 4⅛″, respectively. In other words, increasing the thickness of the wall by using wider studs increases the bending strength about as the section modulus is increased, or at a slightly faster rate than the stud widths are increased; and the stiffness increases about as the moment of inertia is increased, or in about the same ratio as the squares of the stud widths.

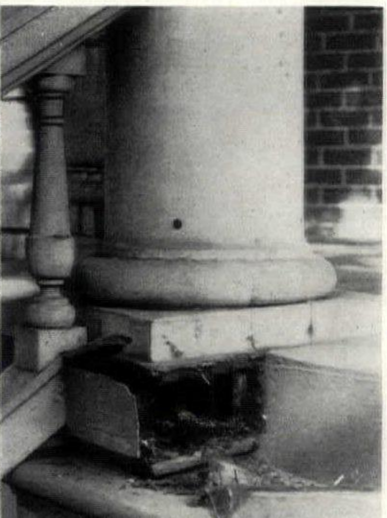
Buckling: Panels 1, 2, 3 and 4 buckled at loads one-fifth to one-third maximum because of the relatively low stiffness of the plywood perpendicular to the length of the panel. To stiffen the panel in a crosswise direction, pieces at right angles to the length were inserted in Panel 5, as illustrated in Figure 2. The lengthwise and crosswise pieces are notched half-way through at each intersection in forming the joints. Panel 5 showed considerably less tendency to buckle across the panel than did Panel 1. It was, however, lower in maximum load than Panel 1, the first failure occurring at the notches in the studs between one load point and support. The failure at the notches was caused by a high concentration of stresses, which is often several times that indicated by usual calculation. This concentration was brought about by the abrupt change in cross section. The failure at the notch occurred between a load point and a support where the shear stress is the highest. In order to overcome this difficulty and yet obtain greater stiffness than that obtained in Panel 1, short pieces were fitted snugly between the studs in Panel 6, thus leaving the studs of uniform cross section throughout their length (Figure 3). Panel 6 exceeded Panel 1 in maximum load by 25 per cent and in stiffness by about 20 per cent. Panel 6 also showed little tendency to buckle until near the maximum load.

Conclusions: These tests show that wall panels made with stressed coverings, such as plywood glued to joists to form a box girder, can be made with satisfactory strength and stiffness. For a wall height of 8 feet, 4′ x 8′ panels consisting of five studs ¾″ thick and 1⅜″ wide spaced approximately 12″ apart with ¼″ 3-ply Douglas fir plywood covering on either side with face grain parallel to length of the panel and glued to the studs are amply strong. . . . Increasing the thickness of the wall by using wider studs increases the bending strength about as the section modulus is increased, or at a slightly faster rate than the stud widths are increased; and the stiffness increases about as the moment of inertia is increased or in about the same ratio as the squares of the stud widths. . . . The tendency of wall panels to buckle crosswise of the panel at from one-fifth to one-third the maximum load can be greatly reduced by placing stiffeners between the studs at frequent intervals. These stiffeners would also greatly reduce any tendency of the panels to become wavy between studs.

STRUCTURAL PRESERVATION . . . termites, rot, fire

the termite shown 14 times enlarged

its shelter tube connection to ground



decay that comes from fungi growth

termite control

The following paragraphs are excerpts from recent addresses by Dr. Thomas E. Snyder, senior entomologist, U. S. Bureau of Entomology (1935 conference of Building Officials of America at Indianapolis and 1936 meeting of the American Wood Preservers' Association at Memphis).

Damage: "The fact that termites are discovered in a building is no reason for exaggerated fears on the part of the owner. Investigation has shown that the danger of collapse of any fairly well-constructed building from termite damage alone is extremely small in continental United States." . . . "It is estimated that termites cause a loss of $40 million annually in the United States."

Termites: "There are two types of destructive termites in the United States, namely, the subterranean or ground-nesting species and the dry-wood species. The former are more widespread and require moisture for their existence. To obtain this moisture they must, as a rule, maintain contact with the soil when attacking the woodwork of buildings. This is a weak point in their life habits, since they can be killed by breaking their connections with the ground. Shut off from soil moisture, they will dry up and die. The dry-wood termites can fly to and attack wood directly and can live in very dry wood." . . . "Damage by subterranean termites is much more common and generally more serious structurally than that caused by dry-wood termites. For the entire world, damage can be proportioned between these two groups in the ratio of 95 per cent by subterranean termites to 5 per cent by dry-wood termites."

Invasion: "Complete insulation from the ground of all untreated woodwork of buildings is the only effective permanent preventive or remedy against attack by subterranean termites. . . . The principal conditions which make it possible for the subterranean termites to get into buildings are: (1) The use of untreated wood or fiber products in the basements or foundations of buildings where termite damage is most likely to start. (2) The use, in foundations, of low grades of mortar, which enables termites to penetrate masonry walls and work their way up through the interior of the walls. (3) Through earth-like shelter tubes termites are also able to crawl over impenetrable walls and thus infest buildings."

Preventives: "Recommendations are as follows: (1) No untreated wood shall be used in foundations, basements, or cellars. (2) Cement mortar shall be used in masonry foundations. (3) All masonry foundations shall be capped with concrete or mortar and slate. (4) Metal mechanical barriers shall be placed over foundations. (5) Proper ventilation. (6) Screening of all ventilation openings and doors. (7) Earth shall not be used as a filler for the foundations of porches or sun-parlors adjoining houses." . . . "Foundation timbers should be impregnated with coal-tar creosote. Interior woodwork should be given at least brush or dipping treatments with zinc chloride or an equivalent preservative and then painted with a heavy enamel paint. Such paint alone will afford some protection from attack by dry-wood termites, but paint should also be applied to woodwork in attics, as well as elsewhere, where it is not ordinarily painted because not visible. To afford permanent protection to buildings, especially in the tropics, all woodwork used in buildings should be impregnated with standard chemical wood preservatives (Federal specifications)."

Correctives: "Termites infecting beams or other wood will dry up and die if the wood is disconnected from the ground, even if they have penetrated to the third floor. Knowledge of this fact will save time and expense, especially in the case of old frame buildings, where extensive repairs would be unwarranted. Eaten timbers need not be removed or replaced, unless seriously weakened structurally." . . . "Owing to the extent of possible ramifications of subterranean termites in a building that has been infested for some time, and the protection which they have in their burrows concealed in the wood, no control worth while can be obtained by fumigation or spraying. Spraying, even under strong pressure at borings made in eaten timber, is unsatisfactory."

termilite-treated insulite

Insulite Co., Minneapolis, now offers its products (Sweet's Catalog File 13/19) with a treatment to resist damage by termites, rot and fungi.

Termilite is a derivative of creosote. The preservative chemicals are mixed with the wood fibers used for the formation of Insulite products, thereby providing an effective and permanent treatment throughout the insulation material. Since the chemicals are colorless, odorless and tasteless, products so treated are not changed in appearance.

hardwood creosote preserver

Produced by Tennessee Eastman Corp., Kingsport, Tenn. (Sweet's Catalog File 12/7).

"NO-DK wood preserver" is a concentration of creosote obtained by destructive distillation of Appalachian hardwoods. Testing laboratory reports show that it is four times more toxic to decay and termites than ordinary coal tar creosote. It contains no free carbolic acid and, since it will not therefore burn the skin, it can be applied by any inexperienced workman.

improved wood preservative

Improved treating reagent developed by the Grasselli Chemical Co., Cleveland (Sweet's Catalog File 12/2).

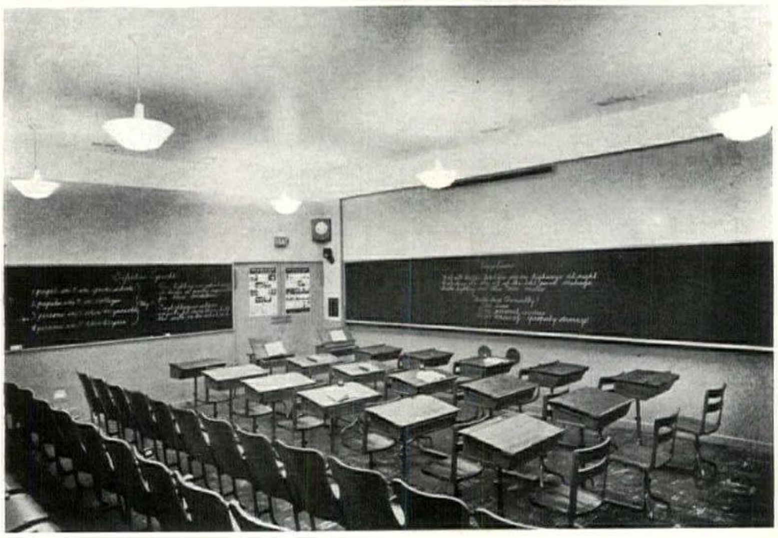
"Chromated Zinc Chloride" is essentially a zinc chloride treatment: the zinc chloride contributes the toxic properties while the sodium-dichromate theoretically acts as a mordant, fixing the zinc chloride more permanently to the wood fiber. In addition to providing protection against decay and termite attack, it contributes fire repellence to treated wood.

fireproofed lumber

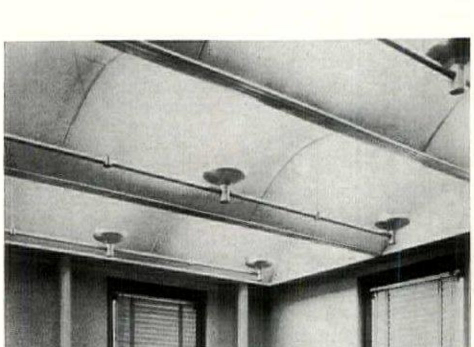
Produced by Protexol Corp., 37 Market Street, Kenilworth, N. J. (Sweet's Catalog File 12/5). Fire tests by Underwriters' Laboratories, Chicago.

Lumber is impregnated with incombustible salts in precise quantities. Red oak and maple used for flooring and trim have been tested and approved as "practically non-combustible and non-inflammable." Workability of the fireproofed lumber was found to be unimpaired; its appearance and ability to take paint and varnish are unchanged.

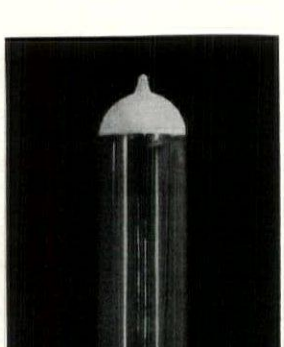
CONTROL OF LIGHT



lighting changes automatically with changing daylight conditions



light is reflected straight down



mercury vapor lamp

automatic school lighting

"Better Sight" demonstration schoolroom installed at General Electric Institute, Nela Park, Cleveland.

A flexible system of incandescent lamps is concealed behind false windows to give a simulation of changing natural light, ranging from bright noon sunshine to the murkiness of a winter day. Movable desks with chairs, conventional blackboards on two walls, chalk trays and erasers provide the necessary school atmosphere. Flanking the desks are three rows of additional seats for the accommodation of "visitors."

Lighting systems: General room illumination is provided by two rows of pendant semi-indirect ceiling fixtures, three units to the row. Each fixture contains a 200-300-500-watt three-light lamp. More than 50 foot-candles are delivered to the desk tops. Eight units recessed in the ceiling, each employing two 150-watt clear lamps behind prismatic glass plates, spray the blackboards with an even distribution of light. An unobtrusive "electric eye," just beneath an electric clock in the corner of the room, automatically controls the artificial lighting according to the amounts of "natural light" present in the room at any moment. The lighting system which provides the daylight effects from the windows is equipped with a thyratron tube control, and this permits the demonstrator to raise or lower the amounts of synthetic daylight at will.

vaulted ceilings reduce glare

System installed, for experimental purposes, by Ward Harrison, director of the Nela Park Engineering Department, in his office at General Electric Co., Cleveland.

This system is said to solve the problem of providing large offices of average ceiling height with a high level of illumination from indirect lighting but without causing discomforting ceiling glare. The light is reflected from the ceiling vaults and comes down uniformly. Little is wasted on the walls. . . . The parabolic arches are about 5 feet wide and 16 inches deep. The reflecting material is "Alzak finish" sheet aluminum. Each 250-watt lamp covers a 5-foot square and is positioned to be at the parabolic focus. The "sprinkler" system employed in this experiment is not essential; each unit could be suspended from a point in the ceiling immediately above.

new mercury lamp

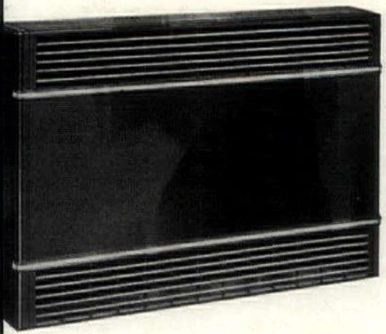
Developed by General Electric Vapor Lamp Co., Hoboken, N. J., and the Incandescent Lamp Department, Nela Park, Cleveland.

A new high-intensity mercury-vapor lamp —rated at 250 watts—is recommended for applications which do not permit use of the standard 400-watt lamp. It has an efficiency of 25-30 lumens per watt, producing as much light as is delivered by 425 watts in incandescent lamps. It has an operating life rating of 2,000 hours. A special transformer is required for each mercury-vapor lamp.

light-weight light bowl

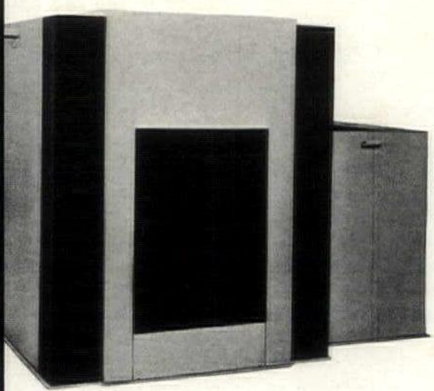
Introduced by F. W. Wakefield Brass Co., Vermilion, O. Bowl made of Plaskon.

"Commodore Luminaire" is an open-bowl lighting unit. The bowl measures 18⅜" in diameter and weighs 14 ounces (a similar glass bowl would weigh 10 pounds). It transmits 83% of the light and is itself luminous.

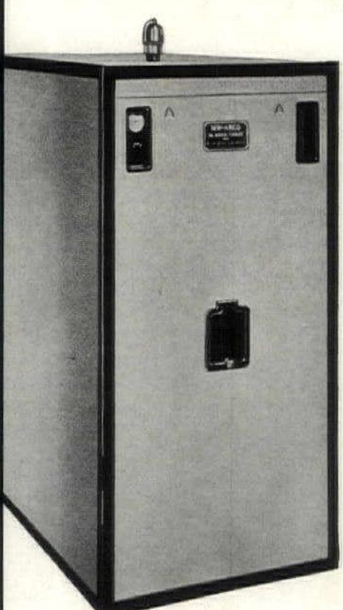


Modine Mfg. Co.

York Ice Machinery Corp.



Motor Wheel Corp.



MW-ARCO furnace

changeable grille convectors

Produced by Modine Manufacturing Co., 1231 Seventeenth Ave., Racine, Wis.

Four types of convectors—concealed, recessed, floor and wall types—are available. Interchangeable grilles make it possible to harmonize the convector with the decorations and appointments of any room. The heating section is an all-copper fin and seamless copper tube assembly.

residential air conditioner

Announced by Robeson Engineering Co., 290 Sanford Street, East Orange, N. J.

Central system provides heating, humidification, filtering. Blower is placed in combustion chamber to give quick heat transfer.

portable air conditioner

Produced by York Ice Machinery Corp., York, Pa. (Sweet's Catalog File 26/21).

Model BA-100 is a companion to the BA-75 portable air conditioner introduced last year for the cooling of offices, hospital and hotel rooms, and similar small spaces. The new unit is slightly larger, has increased cooling capacity and the optional functions of heating and humidifying in winter. An electrical panel operates on either 110 or 220 volts a.c.

weather control units

1936 models announced by Heater Division, Motor Wheel Corp., Lansing, Mich.

All models are self-contained units which provide facilities for automatically heating, filtering, humidifying and circulating the conditioned air. The units are fired with the MW Emancipator pressure burner, rubber-mounted on the front of the furnace to insure quiet operation. Heating capacities range from 85,000 to 175,000 B.t.u. output.

rubber-bladed fan

Marketed by Samson-United Corp., Rochester, N. Y. Cost: $7.95 (*standard*) *and* $8.95 (*de luxe*).

"Safe-Flex Fan" has flexible blades of tough molded rubber, rigid enough to deliver a steady current of air but sufficiently soft to prevent injury to even a child's fingers.

electric floor fan

Designed by Robert Heller. Marketed by A. C. Gilbert Co., New Haven, Conn. Retail: $25.

"Airflow" is an oscillating fan placed on a standard like a floor lamp and adjustable as to height.

oil-burning furnace

Produced by American Radiator Co. and Motor Wheel Corp. Announced by Heater Division, Motor Wheel Corp., Lansing, Mich.

"MW-ARCO Oil Furnace" is furnished as a complete unit with the boiler, burner and controls housed in a tailored cabinet. Efficiency is said to be greatly increased by a special pear-shaped prefabricated combustion chamber developed in the MW engineering laboratories. The unit is available in a range of models with ratings up to 755 square feet of installed steam radiation, 1,205 square feet of installed hot-water radiation and up to 391 gallons of hot water per hour.

two new oil burners

Developed by Bethlehem Foundry and Machine Co., Bethlehem, Pa.

Types: A model CE conversion burner, and a model FE flange type burner. *Features:* "Monitor" motor-fan-pump unit; rubber cradle mounting; improved "rotaire" diffuser; simplified nozzle-electrode assembly.

automatic gas water heaters

1936 models introduced by Premier Heater Division, Crane Co., LaPorte, Ind. (Sweet's Catalog File 26/26).

New features: 2½ inches of insulation; improved lines and baked enamel finish; controls and drop-out burner moved to 30-degree angle, reducing required floor space; greater array of sizes and capacities.

pneumatic spreader

Introduced by Iron Fireman Manufacturing Co., Portland, Ore. (Sweet's Catalog File 26/41).

This stoker carries "steam" size coal into the furnace on a stream of air. Fine particles of coal are burned in suspension; larger pieces (lumps up to 1½ inches in size are handled with ease) are spread over the grates in a uniform shallow layer. The temperature at the grate line is below the fusion point of the ash, and even high-sulphur coals do not form clinkers. . . . The stoker may be placed 8 to 15 feet from the boiler front, and even in a separate room. The only change required in the boiler front is a hole large enough to admit the spreader nozzle. Five sizes are available with capacities ranging from 75 to 500 boiler horsepower.

gas from farm wastes

Generator manufactured and marketed by Economy Gas Generator Co., 5 N. Grand Blvd., St. Louis.

"Economy Gas Generator" is designed to supply gas for cooking, heating, lighting, and power for household appliances and farm equipment. Gas is made from the controlled destructive distillation of waste materials—corncobs, leaves, straw, paper, refuse, wood, anything that burns.

Operation: The generator consists of an alloy metal retort mounted in a semi-steel furnace, a gas purifier, a sheet steel storage tank, and necessary piping, valves and gauges. The plant can be installed compactly within an area 10 feet square, or the individual elements can be placed separately in different locations to meet any desired arrangement. There are no moving parts. No skill is required in operation, and maintenance costs are low. Approximately 3½ hours are necessary to make a "run" which will yield the average family a 2 or 3 days' supply of gas. Two tons of average farm waste will produce gas sufficient for nearly 3 months.

wall tiles are set without cement

noises are blotted away

tile-holding grid

Lockon System invented by H. J. Reed Barrett, architect. Financed and developed by Industrial Developments, Inc., 40 Wall Street, New York. Marketed through Tile and Mantel Contractors' Association of America, Inc., and two chief unions in the field (see "Marketing News," page 42, advertising section).

Ceramic wall tiles with grooved edges are snapped into place on a series of metal strips to give a rigid, uniform surface for walls and ceilings. Extra cost of the metal grid is offset by saving of time and labor on the job.

Installation: Metal strips of cadmium-plated steel or bronze are supplied in suitable lengths as studs and purlins. Vertical studs are nailed or screwed to either rough or finished surfaces and plumbed only to the finished wall surface; horizontal purlins are next locked into notches on studs. Glazed tiles (available in standard sizes and colors) are then snapped into these supports. Joints, filled with mastic or cement grout, provide expansion and contraction and allow settlement. Appearance is identical with ordinary construction—no metal shows and standard wall accessories like towel bars and soap holders are easily attached. . . . Various wall materials are applicable to this system, but at present the specific use of tile is being promoted.

Flexibility: The system is quickly installed over old surfaces. No delay or dirt is caused by ripping off old plaster. Since the entire surface, including tile and metal supports, can be taken down, removed and reinstalled, the system has high salvage value, especially for short-term lessees who have heretofore hesitated to use tile because of its permanence of construction. Individual tiles are likewise easily removed and replaced to give free access to conduits and piping behind the tile surface.

snap-on moldings

Produced by Pyramid Metals Co., 455 North Oakley Blvd., Chicago (Sweet's Catalog File 15/24).

A corrugated pattern, 1¼" wide, has been added to the line of stainless steel moldings.

new super conduit

Produced by National Electric Products Corp., Pittsburgh. Listed and approved by the Underwriters' Laboratories, Incorporated.

"Suparduct" is manufactured from a non-ferrous non-magnetic alloy. Its dimensions are identical with those of steel conduit. It may be cut, threaded, bent and installed with the same tools and in the same manner as steel conduit. Its weight is less than one-third of the copper-silicon-manganese type of alloy and about one-third of steel. Because of its resistance to corrosion under all atmospheric conditions it does not stain or streak the surface of the structure on which it is installed.

colored stainless steel

Developed and produced by Oscar B. Bach in his studios, 305 East 46 Street, New York.

"Stainless Steel—Permanently Colored" is a process involving heat and chemical treatment whereby any desired color can be obtained in the surface finish of stainless steel. The stainless qualities are not affected; the finish, becoming an inherent part of the material, is said to increase the resistance to abrasion. The coloring technique is announced as commercially practical and reasonable in cost.

nickel-clad steel

Developed by Lukens Steel Co., Coatsville, Pa.

This bi-metal consists of a light layer of solid nickel permanently bonded to a heavier layer of steel. The cladding, possessing the same properties as nickel itself, combats corrosion. It is used in hot-water storage tanks to prevent rusty water.

steep roof pitch

Developed by Barret Co. (Sweet's Catalog File 8/3).

This product combines the waterproofing advantages of coal-tar pitch with unusual pliability and stability. Tests have demonstrated that it will not slide or "bleed" at the highest temperatures to which roofs are subjected and yet will withstand winter cold without cracking, checking or loss of bond. A fire-safe gravel or slag wearing surface is made possible on steep roofs as well as on flat roofs. The pitch is being promoted for use in built-up roofs with an incline from [illegible] to 6 inches to the foot.

porcelain enamel partitions

Produced by Sanymetal Products Co., Inc., 1699 Urbana Road, Cleveland (Sweet's Catalog File 20/17).

"Porcena" toilet partition installations consist of flush type insulated panels with porcelain enamel on both sides and doors finished in a plain baked enamel. The panels are 1 inch thick. They withstand rough treatment and are easy to keep clean. Color treatment and a variety of arrangements are obtainable.

metal toilet partitions

Produced by Mills Co., 965 Wayside Road, Cleveland (Sweet's Catalog File 20/7).

Bottom hinges are gravity type, with steel cams completely inclosed, and are adjustable to any desired angle of closing. Latches are fitted with anti-rattle springs. Door bumper and coat hangers have rubber tipped inserts.

doorless 'phone booth

Produced by Burgess Battery Co., Acoustic Division, Madison, Wis. Retail price: $10[illegible]

Extraneous sounds are absorbed rather than blocked in the design of this telephone booth. The interior is faced with Burgess Acoustic Treatment (a perforated metal sheet backed with balsam-wool) which blots up the sound and produces comparative quiet within the booth. Even the speaker's voice is not transmitted beyond the booth. Conversations are easily maintained in noisy factories, subways and other places where speech would otherwise be impossible. . . . The perforated metal facing may be washed easily. Its construction discourages defacement by pencil scribblers.

THE

ARCHITECTURAL RECORD

VOLUME 79 NUMBER 5 MAY, 1936

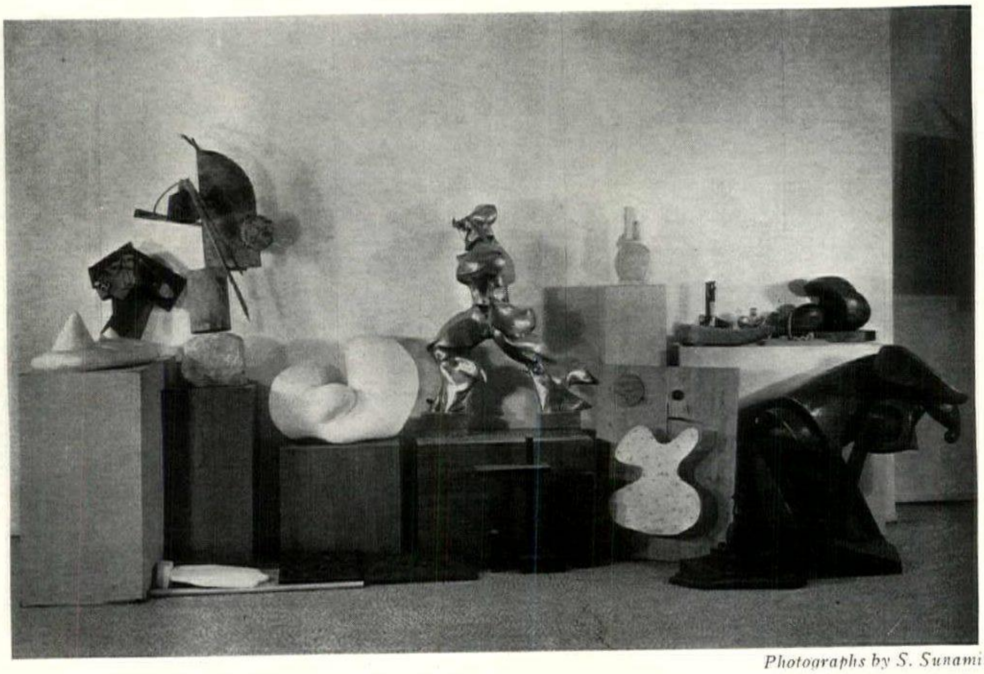
NEXT MONTH

A SPECIAL NUMBER ON EDUCATIONAL BUILDINGS, INCLUDING SCHOOLS AND COLLEGES, PUBLIC AND PRIVATE, WITH SUCH ACCESSORY BUILDINGS AS LABORATORIES, LIBRARIES, GYMNASIUMS, DORMITORIES AND THE LIKE.

The shortage of educational buildings is extremely urgent. It is due largely to deferred construction but more especially to obsolescence. The system of education is in process of reorganization, in response to increased specialization in courses of instruction and community service and of increased mechanization of both buildings and teaching adjuncts. School authorities and architects are impelled to economize on the structural shell for the benefit of the plan and equipment, with the result that the newer buildings represent significant developments in architectural expression as well as in educational and social service functions.

LEADING ARTICLES: THE CHANGING AMERICAN SYSTEM OF EDUCATION. By James E. Mendenhall . . . THE EDUCATIONAL PLANT AND ITS DEVELOPMENT. By William G. Carr . . . PLANNING THE CLASSROOM FOR RADIO AND MOVIES. By F. L. Devereux . . . A MODERN BIBLIOGRAPHY OF SCHOOL DESIGN. By Earl Sykes . . . CHANGED ARCHITECTURAL REQUIREMENTS OF THE SCHOOL PLANT. By John J. Donovan . . . PORTFOLIO OF MODERN EDUCATIONAL PLANTS

NEWS OF THE MONTH

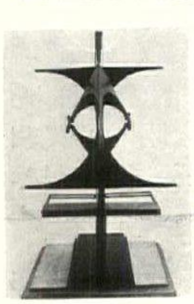


Photographs by S. Sunami

IS THIS ART? THE U. S. CUSTOMS OFFICIALS THINK NOT

Included in the current exhibition of cubism and abstract art at New York's Museum of Modern Art is the group of 19 sculptures shown above. When these objects arrived in this country the Museum sought to enter them as works of art, under paragraph 1,807 of the U. S. Customs Tariff, which provides for the importation of original paintings and sculpture as works of art, duty free. The 19 sculptures were refused. They were all original as defined by the paragraph; "they were simply not considered to be works of art by the customs' examiners." The Museum was informed that since they were not works of art a duty would be based upon their declared value; the duty in such a case would be prohibitive since the owners had naturally declared their value as works of art and not as raw material.

A. Pevsner: 1926



A. Pevsner: 1934

C. Brancusi: 1915

"The Museum made no claim as to the aesthetic merits of the objects in question: its position only was that the objects were created as works of art and that it intended to exhibit them as such." However, the sculptures were only admitted under bond, because they did not conform to the U. S. Customs definition of works of art, as being limited to "imitations of natural objects, chiefly of the human form, in their true proportion of length, breadth and thickness."

Art or no, the exhibition is interesting for the striking similarity between the paintings, prints, sculpture, architecture and furniture displayed. It reveals European architects and artists re-analyzing their concepts of the modern world and expressing themselves in the new techniques and media which are products of that world. Architect or sculptor, they are found using polished brass, nickel steel, plate glass, and even newsprint in an effort either to build or to represent their concept of modern society.

In his Introduction to the catalog of the Exhibition, *Cubism and Abstract Art*, Mr. Alfred H. Barr, Jr., Director of the Museum, writes: "Sometimes in the history of art it is possible to describe a period or a generation of artists as having been obsessed by a particular problem. The artists of the early fifteenth century, for instance, were moved by a passion for imitating nature. . . . In the early twentieth century the dominant interest was almost exactly opposite. The pictorial conquest of the external visual world had been completed and refined many times and in different ways during the previous half-millennium. The more adventurous and original artists were by a common and powerful impulse . . . driven to abandon the imitation of natural appearance."

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MILAN OPENS EXHIBITION OF MODERN HOUSING

Opening this month in Milan is the International Exposition of Decorative Arts, Industrial Design and Modern Architecture. Planned as a demonstration of Fascist progress, the Exposition has the endorsement of Mussolini himself. Particular emphasis is to be laid on the Section of Modern Housing which "conforms to the wishes of Il Duce, who desires to get closer and closer to the masses." According to Exposition officials this Section will concentrate on "three distinct social categories—the laborer, the white collar worker, and the professional man whose housing problems interest a large class to which no special attention has been given even in public housing."

As solutions to the housing problem of these categories, the Section on Modern Housing has this to offer: "a guest room for a boarding house or a hotel and two types of little offices annexed to the house at the side." This is offered as "a complement of little organisms dedicated to the practical life of the same social classes to which this Exposition is directed."

•

A PRIZE-WINNING ADVERTISING SIGN

Four hundred dollars worth of metal letters helped win for William Ginsberg, New York City engineer, a citation of architectural merit in the recent Washington Board of Trade architectural competition. The Washington Daily News Building, designed by Mr. Ginsberg, was one of four structures in the Capital chosen for its architectural merit. The citation read: "This award is made for the essentially modest and utilitarian character, together with the really successful and decorative use and placement of an essential advertising sign."

Mr. Ginsberg, when interviewed in his New York office, said that economy in structural design resulted in architectural simplicity. He estimated the total cost of the Daily News Building at $200,000, of which $3,000 was the cost of the architecture and $400 the cost of the sign.

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COMMISSIONER MOVES SHRUBS, ESCAPES COURT'S WRATH

It took the New York Supreme Court to clear Park Commissioner Robert Moses of the contempt charge growing out of his having moved some shrubbery from around the Central Park Casino. The charge grew out of a "taxpayer's suit to prevent waste of city property" brought by Louis H. Saltzmann, a restaurateur who holds the Casino concession. Mr. Moses explained that he did not realize that the temporary injunction applied to the grounds as well as structure.

HOUSER WINS GUGGENHEIM AWARD

Winning the first Guggenheim Foundation award made in architecture or housing, Miss Catherine Bauer of Washington, D. C., has been granted a Fellowship for a year's intensive study of European housing. Miss Bauer, author of last year's "Modern Housing," is one of the first American housers to touch upon the connection between organized labor and low-rent housing. In 1930 and again in 1932 she was in Europe "looking at housing, modern architecture and city planning—particularly in Germany, Holland, Austria and England." This year her plans are slightly different—"a closer look at Scandinavia, the work under recent legislation in England and, if I have time, something of how Germany and Italy have utilized subsistence homesteads for the purposes of Fascism." Most of all, Miss Bauer wants to study "the achievements of the last five years in Soviet Russia. . . . In Russia I think it will be possible to see how housing is tied in with the regional planning of resources and other broad economic activities."

Miss Bauer was born in Elizabeth, N. J., in 1905; graduated from Vassar in 1926; studied architecture at Cornell 1924-1925. In New York she had a series of jobs "of which the most impressive-sounding was pattern-promotion manager of Butterick." She went to Europe in 1930 "to look at modern architecture —from a purely aesthetic angle." She discovered "almost immediately that modern architecture was all tied in with the housing movement." Returning to New York, she did free lance research in housing and planning, free lance writing in architecture and housing. In the spring of 1931 she won a $1,000 prize from *Fortune* Magazine for an essay, "Art in Industry," on housing in Frankfurt, Germany. "That piece of luck made me a 'housing expert' whether I wanted to be or not." In 1932 she returned to Europe to do a series of housing articles for *Fortune* in collaboration with Lewis Mumford. "*Fortune*, however, did not use very much of our material, which made me want to put it all in a book."

Since 1934 Miss Bauer has been active in the Labor Housing Conference of which she is Executive Secretary. For the past year she has also been Consultant to the PWA Housing Division and the Suburban Resettlement Division of the Resettlement Administration.

Miss Catherine Bauer

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DESIGNS FOR AUTOMOBILE SALON NET STUDENTS $900

James Harrison Finch, Georgia Tech architectural student, was awarded a first prize of $500 in the fifth annual Illuminating Engineering Society-Beaux Arts Institute Competition. The problem this year was the design of an automobile salon with especial attention to lighting. Second prize, $250, to V. J. Miller, University of Illinois; third prize, $150, to Ray Stuermer, also University of Illinois.

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THESE TOWERS HAVE SCIENTIFIC SHADOWS

A dramatic picture of a new housing project recently completed at Drancy, outside of Paris. The project is notable for its construction as well as its plan. A system of prefabricated reinforced concrete construction is used, the basis of which is that precast units, erected on a light steel framework, form a permanent shuttering for concrete poured between them and an inner casing of cellular concrete units, the original steel frame acting as reinforcement. The 15-story towers are so placed on the plan that their shadows never fall across adjoining buildings.

NEWS OF THE MONTH

DESTRUCTION IN THE U. S.

The Potomac visits Paw Paw, W. Va.

Quiet waters mirror St. Paul houses

Wheeling houses beyond help of architects

Wide World Photos

Maryland family saves bedding and hound

This spring's widespread and disastrous series of floods caused the loss of many lives and hundreds of millions of dollars' property damage in eastern United States. The gigantic task of reconstructing devastated areas is hampered by lack of adequate Federal funds. Variously described as "inevitable" on the one hand, as "no act of God" on the other, flood control work will inevitably be accelerated by these disasters. Already Congress is flooded with legislation, while from Chattanooga, Tenn., comes the report that TVA flood control work reduced the flood crest 3 feet in that city.

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TWO FHA HOUSING PROJECTS BEGUN

Two low-cost housing projects insured by the FHA entered the stage of active construction last month when the mortgages were sold. The mortgage on the Meadville, Pennsylvania, project, involving $1,012,000, was bought by the Pennsylvania Workmen's Insurance Board. The New York Life Insurance Company is mortgagee for the $638,200 Wilmington, Delaware, housing project.

•

VALUE OF POESY IN BUILDING BOOM EXPLORED

Reynolds Corporation mobilized poets, song writers and dreamers to start the building boom at a dinner last month in a downtown New York office building. Mr. Richard S. Reynolds, president, called upon the group of newspaper and magazine writers who were his guests to glorify home ownership in poetry, song and story.

Mr. Reynolds started the ball rolling:

"Build me a home, I am lonely,
Lonely for a chimney and cat.
I've been about and I've found out
Life's too big for a flat."

Mr. Joseph Auslander, poet, of Columbia University, followed with

"Build me a home, I am hungry
For the bark of a dog in a lane,
For the sight of a light in a widow at night
And the song of a roof in the rain."

His wife, Audrey Wurdemann, Pulitzer prize winner in poetry, closed the trilogy thus:

"Build me a home in a corner
With my window flush with the lawn;
Where life overflows on the heart of a rose,
Where birds may wake me at dawn."

Mr. William S. Winthrop, musician, of Ridgefield Lakes, Conn., citing the practical effect of such tunes as "Moon Over Miami" and "Hawaiian Moonlight" in attracting visitors and even in promoting real estate sales in the territories they advertised, expressed the conviction that if the romance of the home could be more generally recognized in song and story the builder's work would be made easier. One discordant note was struck by a minister, in three stanzas of protest, based on the idea that "city landlords and city ministers constantly are losing church officers and workers to the suburbs." Another impromptu ministerial poem contained unfortunate references to "second mortgages, damp cellars and the slowness of commuting trains."

The Reynolds Corporation is not a publishing house but a large manufacturer of building materials and equipment.

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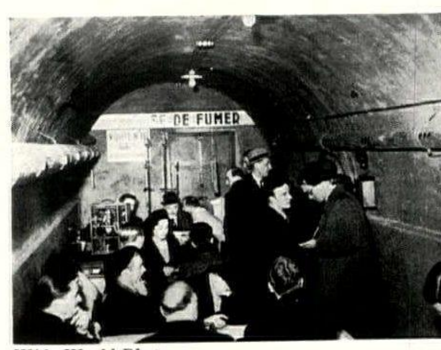
MORE GOTHIC FOR THE UNIVERSITY OF CHICAGO

Zantzinger and Borie, of Philadelphia, have been commissioned by the University of Chicago to design the new building which will be erected on the Midway to house the headquarters of the Public Administration Clearing House and nearly a score of other organizations interested in the improvement of public administration.

Cost of the structure is estimated at between $500,000 and $600,000. In conformity with the architectural scheme of the University, the building will be of Gothic design, with a limestone exterior.



Wide World Photo

LA VIE PARISIENNE

During one of the recent drills for the protection of civilian Paris against air attacks, a group from the neighborhood overhead occupied this underground shelter for 4 hours. The shelter, with a capacity of 52 persons, is of reinforced concrete with complete air conditioning, and is typical of the shelters being built throughout Paris. As war danger becomes more acute, architects and building designers are called on for novel types of shelter construction. As a protection against gas (but not bombs) the authorities have evolved a gas-proof canvas shelter.

658 BUFFALO FAMILIES WILL ENJOY LOW RENTS

Another of PWA's 49 low-rent housing projects, Kenfield, at Buffalo, N. Y., is released for construction. The project, which will cost $4,500,000, includes 658 living units in 2- and 3-story flats, recreational buildings, playgrounds and parks.

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PWA HOUSING PROGRAM REACHES CONSTRUCTION STAGE, AWAITS NEW FUNDS

A 130-unit project in Puerto Rico and three projects in the Virgin Isles, totaling 146 dwelling units, are now under construction. This is a part of the PWA's "national demonstration program of slum-clearance and low-cost housing," according to A. R. Clas, Director of the PWA Housing Division. The program includes 44 other projects in 35 U. S. cities. When completed these developments will provide approximately 25,000 families of the low-income group with sanitary living quarters. Seven housing developments erected by limited dividend corporations, operating on PWA loans and under Housing Division supervision, are now occupied.

Of the sites requiring demolition, 17 have already been cleared; demolition is proceeding in 26 others. Construction of foundations is under way on 23 projects. General construction is under way on 11 projects and landscaping bids have been accepted on 5 projects and proceed orders issued.

Pending the allocation of more funds, the Housing Division has indefinitely suspended all other projects either announced or initiated. Under the Wagner-Ellenbogen Bill, recently introduced into Congress, the Housing Division would be assimilated into a proposed "United States Housing Authority" whose primary duty would be to assist local public housing agencies, by grants and loans, to provide decent low-rent housing in their localities. It would also have the right to develop and administer demonstration projects both of low-rent housing and slum clearance but only upon the request and with the advice of local organizations and committees. The Authority would have other minor powers, including the right to make surveys and studies and to encourage research and experimentation in various aspects of housing.

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GREAT LAKES EXPOSITION GETS NEW CONSTRUCTION CHIEF

Albert N. Gonsior, former superintendent of construction at the Century of Progress, Chicago, has been appointed chief of construction at the Great Lakes Exposition, Cleveland, which will open on June 27. Mr. Gonsior is a graduate of the engineering school of the University of Illinois and, as chief of construction at the Chicago Fair, was assistant to Daniel Burnham, works director.

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NATIONAL WATER PLAN PROPOSED

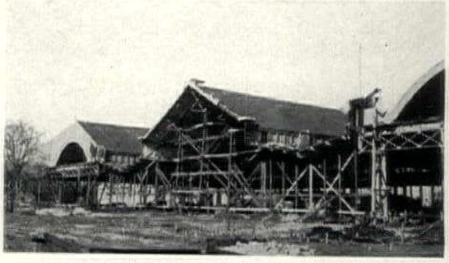
A "National Water Plan" directed to the control of floods, erosion and water pollution; to the uses of water for domestic purposes, irrigation and power; and to the drainage of water-logged and overflowed lands, will be delivered to President Roosevelt before December 1, 1936, by the National Resources Committee.

Recognizing the vital necessity of a national flood control program at a time when the eastern half of the United States has just experienced one of the most generally disastrous series of floods in its history, the Water Resources Committee of the Resources Organization is hastening its efforts to bring a developed program of flood control into relationship with a comprehensive program for the better conservation and use of all waters.

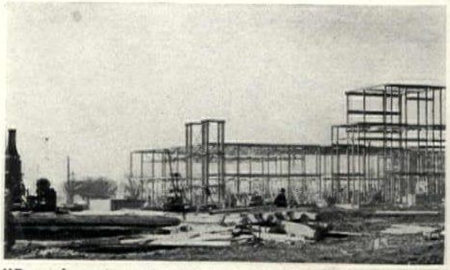
"The need for a general program of flood control in relation to other water problems becomes apparent when we realize that there are many river basins in the United States where floods are likely to occur in just as dramatic a manner as we have seen in New England cities, in Pittsburgh, in Johnstown, Pennsylvania, and other eastern cities in the last few days," Secretary of the Interior Harold L. Ickes, who is also Chairman of the National Resources Committee, said recently.

CONSTRUCTION IN THE U. S.

Machinery speeds the work



Old buildings get new faces



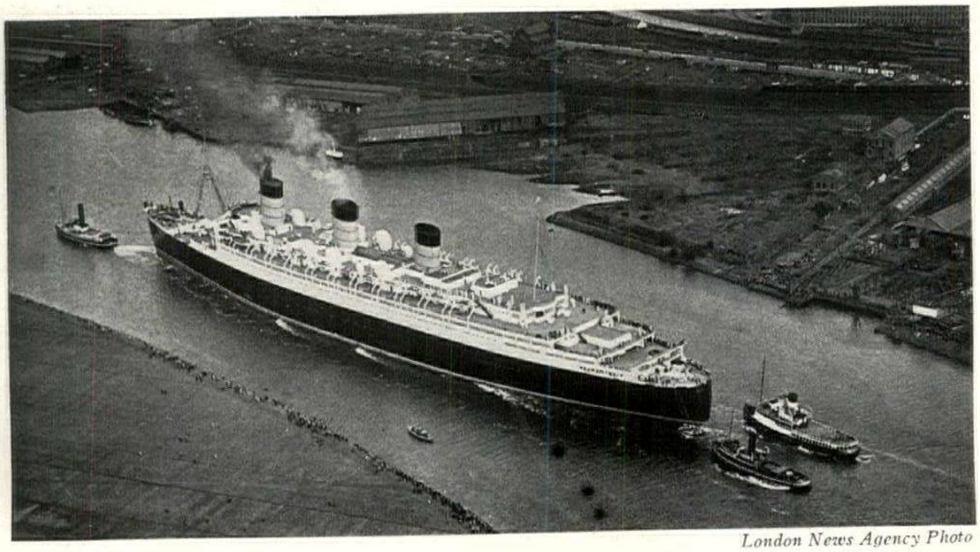
"Petroleum" and "Communications" are housed

"Agriculture" and "Food" will look like this

Work on the southwest's first World's Fair, the $25,000,000 Texas Centennial Exposition, is being rushed in Dallas. The Fair is being held on an old exposition site, the plan of which has been redesigned to conform to modern trends in exposition design. A number of existing buildings are being moved and remodeled and the new buildings, some of which are intended to be permanent, are being located according to this revised plan.

The Exposition opens on June 6.

NEWS OF THE MONTH



London News Agency Photo

HOUSERS TO SAIL ON "QUEEN MARY"

A few reservations on the Queen Mary are still open for those wishing to join the public housing tour of Europe to be led this summer by NPHC's secretary, Helen Alfred. Sailing on the Queen Mary, July 8, the group making the trip will visit housing developments in France, Czechoslovakia, Russia, the Baltic nations, the Scandinavian peninsula and England. Official contacts and personal investigation in all centers to be visited are assured. All-inclusive New York-to-New York cost for the trip is $661.50. Further information from National Public Housing Conference, 112 East 19 Street, New York.

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Pressephotos, Berlin

MODERN ARCHITECTURE IN THE PUPPET EMPIRE

A stairway in the recently completed Foreign Office in Hsinking, Manchukuo. Notice the map in the stained glass door at the left.

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SYRACUSE ACQUIRES BROCKWAY ARCHITECTURAL LIBRARY

Acquisition of the architectural library of the late Albert L. Brockway, a collection of approximately 400 volumes, by the department of architecture, Syracuse University, has been announced by Dean Harold L. Butler of the College of Fine Arts. The Brockway collection will become a part of the branch library in Slocum Hall, which houses the department of architecture. The new library includes many valuable editions collected personally by Mr. Brockway, who was instrumental in organizing the department of architecture and who served as its first head 40 years ago.

He began his library while studying in the Ecole des Beaux Arts, Paris, during 1886-87, and these early volumes show a preference for the French institution and viewpoint. Later additions, made from year to year, indicate an increasing comprehension of taste with the inclusion of standard works on ancient and modern English, French, German, Italian, Spanish, and American architecture. Also, a number of books deal with allied arts of painting, sculpture, civic planning, garden, art, industrial design, furniture, and decoration.

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SWARTHMORE PRESIDENT EXPLAINS UNUSUAL FIELD HOUSE

Elsewhere in this issue is illustrated the new Field House at Swarthmore College, Swarthmore, Pennsylvania. President Frank Aydelotte points out that gymnasium design is determined by the athletic functions it is intended to house. Swarthmore, he says, is not primarily interested in spectator sports.

"Intercollegiate sports, especially football, are at present lamentably overemphasized in American colleges and universities. Athletics are a principal source of newspaper publicity and advertising for which American colleges have unhealthy craving, and many institutions exploit their student athletic teams shamelessly for this purpose. Students who have seen their university authorities resort to unfair practices in order to win athletic contests will inevitably imitate those practices of success in busines or politics.

"The cure for such evils, however, is not, in my opinion, the abolition of intercollegiate athletics. It is instead the maintenance of sane, healthy athletic activities without undue publicity, and with emphasis upon the health and recreation which can be found in games, rather than upon attracting spectators or winning victories. The remedy lies further in providing so many opportunities for athletic sports that large numbers can engage in them with the consequent lessening of the importance of any single sport or any single contest. It is along these lines that our athletic policy at Swarthmore has been directed.

"It should be our aim to give to every individual, who has sufficient athletic ability and interest, the opportunity in college to belong to some team in which he can have the fun of competing against other colleges and to give him the chance as well to learn some individual game which he can continue to play after graduation. The new Field House brings us measurably nearer to the realization of these aims."

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WHEN IS A NUDE NOT NAKED?

An art jury, faced with the task of selecting a Texas Centennial statue, tentatively suggested Sculptor William Zorach's nude pioneer group of a man, a woman, a youth and a baby as a suitable memorial to Texas' 100 years of statehood. Two camps of opinion formed at once. The Right maintained that "pioneer Texas would have hanged to the nearest tree any family group going around naked like that." The Left asked: "Are we to pick out a replica of Grandma or Great-aunt Agatha and put her in an alpaca frock and sunbonnet?"

The sculpture, planned as a memorial for the campus of Texas State College for Women, at Denton, was defended by one jury member as being "not a literal anatomical nude. It is abstract."

CALENDAR OF EXHIBITIONS AND EVENTS

- **May 5–8**—Annual Convention, American Institute of Architects, Williamsburg, Virginia.
- **May 25–28**—Judging and Awards, Oregon State Capitol Competition, Salem, Oregon.
- **June 1**—Opening, Pennsylvania Academy of Fine Arts Summer School, Chester, Pa.
- **June 6**—Opening, Texas Centennial Central Exposition, in Dallas, Texas.
- **June 22**—Opening, Booth Travelling Fellowship Competition, College of Architecture, University of Michigan, Ann Arbor.
- **June 27**—Opening, Great Lakes Exposition, Cleveland, Ohio.
- **June 29**—Opening, Summer School, College of Architecture, University of Michigan, Ann Arbor.

THE ARTIST LOOKS AT CHAIN STORE ARCHITECTURE

From the grisly purple-red of its imitation mahogany to the "modernistic" design of its lighting fixtures, Philip Reisman has overlooked nothing in his painting, "Drug Store." All the artist's work shows a deep interest in contemporary architecture and constitutes a shrewd comment on how bad most of it is. From the current New York show of the artist's work.

OBITUARIES

Werner Hegemann died April 12 at the age of 55. His death brings to a close an active and varied career which, as teacher, editor and city planner, took him to all parts of the world. Although a native of Germany he was employed throughout the world. In 1905 he became housing inspector for Philadelphia and supervised the first city planning exhibition in Boston in 1909. Returning to Germany in 1910, his deep interest in socialist labor unions led to an aggressive campaign for a more decentralized system of housing which brought him against the authorities. From 1913 to 1915 he conducted a number of planning projects in the San Francisco region. Later, in 1921, he was helping to direct important real estate work in Wisconsin and Pennsylvania. From 1924 to 1933 he was intermittently city planning consultant to the German cities of Leipzig and Muenster and to Buenos Aires and Rosario in Argentina.

He was exiled from Germany in 1933 due to two of his books, "History Unmasked," an ironic critique of Hitler's aims, and "Frederick the Great," in which he classified the Prussian King as being "as great a scoundrel as Hitler."

Since February of last year he had been associate in architecture at Columbia University. His most recent book, "City Planning Housing," was published April 1.

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Albert Farwell Bemis died April 11 at the age of 65 as a result of an accident in a Grand Canyon hotel. Mr. Bemis, long prominent for his interest and research in housing, was the author of a trilogy called "The Evolving House." In 1934 he completed a survey of governmental housing projects in this country and abroad, in which he denounced participation of the Federal government in then projected housing enterprises. He was a life member of the corporation of Massachusetts Institute of Technology of which he was a graduate and, in 1910, was elected president of the alumni.

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Dead at the age of 79 years is C. Howard Walker, practicing architect in Boston for more than half a century. He had designed many structures in every section of the United States, and planned and was architect-in-chief of the Omaha Exposition in 1898 and the St. Louis Exposition in 1904. During a long career he lectured at Harvard College, the Massachusetts Institute of Technology, Museum of Fine Arts, the Lowell Institute and the Child-Walker School of Fine Arts. He is said to have been a pioneer automobile designer, having done some of the earliest work in automotive streamlining.

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Central Press Photos, Ltd.

THE SHAPE OF THINGS TO COME

An exhibit from the recent Ideal Homes Exhibition at Olympia, London. All the furnishings in this exhibit are of glass, including the chair in which the young lady sits.

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BOOTH TRAVELLING FELLOWSHIP RENEWED

The George G. Booth Travelling Fellowship in Architecture has been renewed this year and the competition in design will be conducted during the two weeks beginning June 22. The competition is open to all graduates of the school who have not reached their thirtieth birthday on that date. Further information from College of Architecture, University of Michigan, Ann Arbor.

Photograph by Samuel H. Gotts

PRINTING DISTRICT, NEW YORK CITY

REMODELING FOR A BRANCH BANK

SHREVE, LAMB AND HARMON, ARCHITECTS

By William F. Lamb

F. S. Lincoln

EXTERIOR DOORWAY

In the summer of 1934 the Bankers Trust Company asked us to help them solve a problem which had for some time been developing in their branch at Fifth Avenue and 42nd Street. We had finished a year before the extensive alterations and enlargement of their main offices at 16 Wall Street so that we were not unfamiliar with their general requirements as far as they applied to their physical needs. The 42nd Street quarters, formerly occupied by the Astor Trust Company, which they had absorbed some years ago, were, while quite handsome, entirely inadequate for the amount of business being done even in those depression years. They were scattered through five floors and two basements which, naturally, resulted in great inefficiency of operation and expense for the protection of money and securities.

Three different lines of travel were taken to find the best road to the solution of their problem: rearrangement or enlargement of the 42nd Street quarters, which they held under a lease running until 1937; a new building on a site undetermined; and the alteration of other suitable buildings, of which there were several in the neighborhood.

Preliminary Investigations

In order to draw the map which was to guide us on our way, investigations lasting several months were undertaken both by the bank and by ourselves, which covered (1) a complete survey in great detail of the physical set-up of their quarters, which was then expanded to approximate the areas and arrangements which were required for them to function economically and to provide for future expansion; (2) a geographical count of their depositors, both as to number and importance, to determine the most convenient location; (3) a traffic survey insofar as it would affect new business; (4) an analysis of the trend of development, particularly in relation to the Grand Central Station and the then new development at Rockefeller Center, considering also the probability of the removal of the Sixth Avenue Elevated with the consequent improvement of that district.

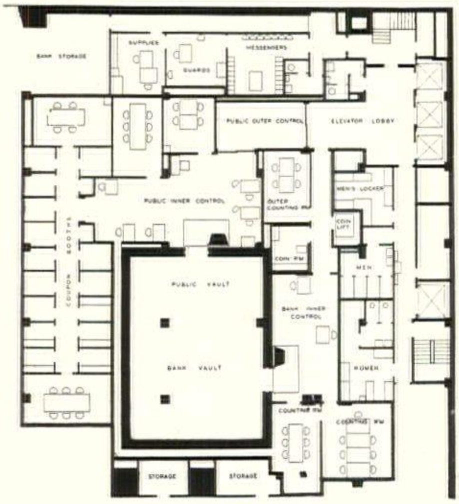
Conclusions

As these investigations developed, several conclusions began to be indicated; the bank's old quarters could not be enlarged economically in any way that would materially help them and, further, their location was not as favorable either for their present or their future business as one a few blocks further to the north.

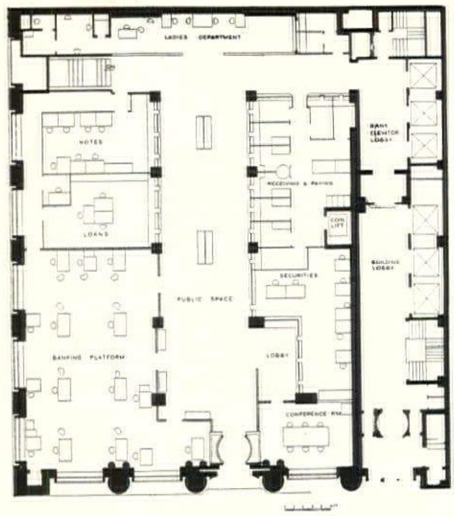
The first road proved to end in an impasse. We therefore kept on with our exploration of the other two, without letting the world at large know too much of our study.

Road number two was never very seriously explored; there were decided objections to building more space in an already glutted market, and a comparatively low building, for their use only, would have had to carry, even at the shrunken land values, an "overhead" which would not have been attractive. It was not a first choice, but rather a way that could be taken provided no suitable building could be found in the proper location.

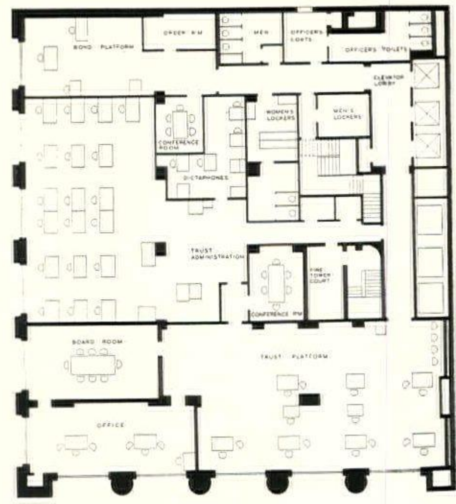
BASEMENT



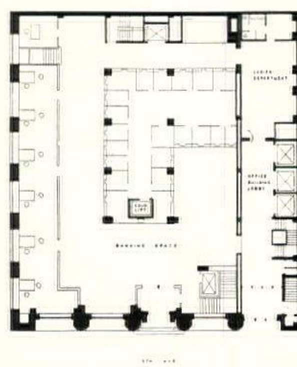
FIRST FLOOR



SECOND FLOOR



The third alternative seemed almost from the beginning to present the most reasonable solution, and of the available space investigated, that formerly occupied by the Harriman Bank on the southeast corner of Fifth Avenue and Forty-fourth Street answered most of the determined requirements. Its location near the center of the "depositor population" was convenient to Grand Central Station and to the developments on Fifth and Sixth Avenues; its entrances both on Fifth Avenue and on 44th Street were particularly adapted to motor traffic; and its façade, built of white marble, was unusually impressive with the great two-story Doric Order at its base. The fact that it was in the hands of the mortgagee did not make it any more difficult to reach a successful conclusion to the negotiations for its use.



PLAN BEFORE REMODELING

Constructed in the first decade of the century as the "Night and Day Bank," the building was extensively altered and enlarged about eight years ago. Some further structural changes were necessary: the removal of a large girder in the ceiling of the main banking room, the filling in of the rear court on the third and fourth floors, the shifting of certain stairways to improve the usefulness of the space and the introduction of additional elevators for the bank's exclusive use. The interiors from the third floor down had, with the exception of the building entrance lobby, to be completely gutted and rebuilt.

The Banking Room

The Banking Room, planned to achieve the greatest possible flexibility not only for the present but for future expansion, has its main entrance on Fifth Avenue. The entrance from the public building lobby was rearranged at the end of this lobby, giving access to the three new bank elevators placed near the southeast corner of the building. The former entrance from 44th Street was retained, with some changes to the steps. This rearrangement produced a banking room plan which, besides answering the determined space requirements, enabled the functions of the bank to be carried out with the greatest economy of operation, full protection to money and negotiable securities, and with convenience to customers. The Public Space forms a T with the wide stem based on the Fifth Avenue entrance and the head connecting the 44th Street entrance and the elevator lobby. On one side of this stem are the bank's "valuables," paying and receiving and the security cages, connected directly to the bank's vault by the coin lift, which both in basement and ground floors is within protected area. On the other are the officers' platform and the Loan and Note Departments in direct contact with each other without crossing public space. Beyond the cross is the ladies' department, convenient to the 44th Street automobile entrance, and with its own teller's cage and rest room.

In size and arrangement, the new Banking Room provides for the needs of the present requirements. The future is provided for in two ways. First, expansion of area can be obtained by moving all but three or four operating officers to the floor above into an area now occupied by clerical force, making the conference room no longer necessary on this floor. Thus, on both sides of the stem of the T, space may be created into which the enlarged departments may spread, preserving the fundamental philosophy of the present plan intact. Second, in order to assure the least inconvenience and interruption of the bank's functions while this enlargement is being made, the idea of the "movable bank screen" which we developed for the main offices of Bankers Trust was again used. This screen and also the railings are thought of rather as furniture than as permanent parts of the room, and are so designed of wood and bronze supported by tubular frames that they may be moved or extended literally "over the week end." This has been proven successful on several occasions when alterations were made in the bank's main offices.

The availability of two "flitches" of teak with exceptionally beautiful figure determined the finish of the room. It has been usual to design a room first and then select the wood to make it. Here the process was completely reversed. The size and number of the veneers controlled to a large extent the width and height of the panels both on the walls and the central piers. Moldings and cornices were eliminated, both to increase the apparent height of the room and, more especially, to enhance the beauty of the figured wood. The effect produced is one of great simplicity of design but with a richness and a quiet dignity that only a wood room can achieve.

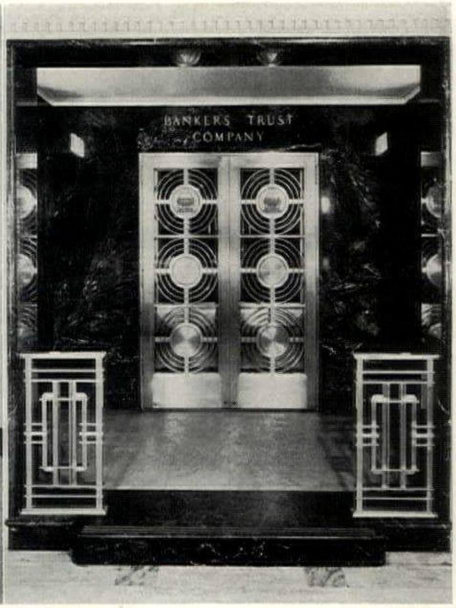
The same wood treatment is carried out in the bank screen and railings, in the ladies' department, and in the bank elevator lobby which, through a small vestibule of green marble inclosed by bronze grille doors, leads to the building lobby.

Ventilation and Lighting

The comparatively low ceiling height made any general indirect lighting scheme impossible. The central portion of the ceiling could, however, by some manipulation of the air conditioning ductwork, be raised about a foot which gave an opportunity for strip lighting, and this, coupled with reflectors at each end of the room, made it possible to limit the direct lighting to the two sides of the room where adequate working light was necessary. Fixtures on the axis of the main entrance were avoided. The supply of cooled and conditioned air was arranged so that the grilles became an integral part of the lighting fixture, the direction of the flow of air being controlled by vanes within the grilles. The entire ceiling is treated acoustically.

Basement

In the Basement new vaults were built, the old ones being inadequate and located outside the building line on Fifth Avenue, in fact, not only under the sidewalk



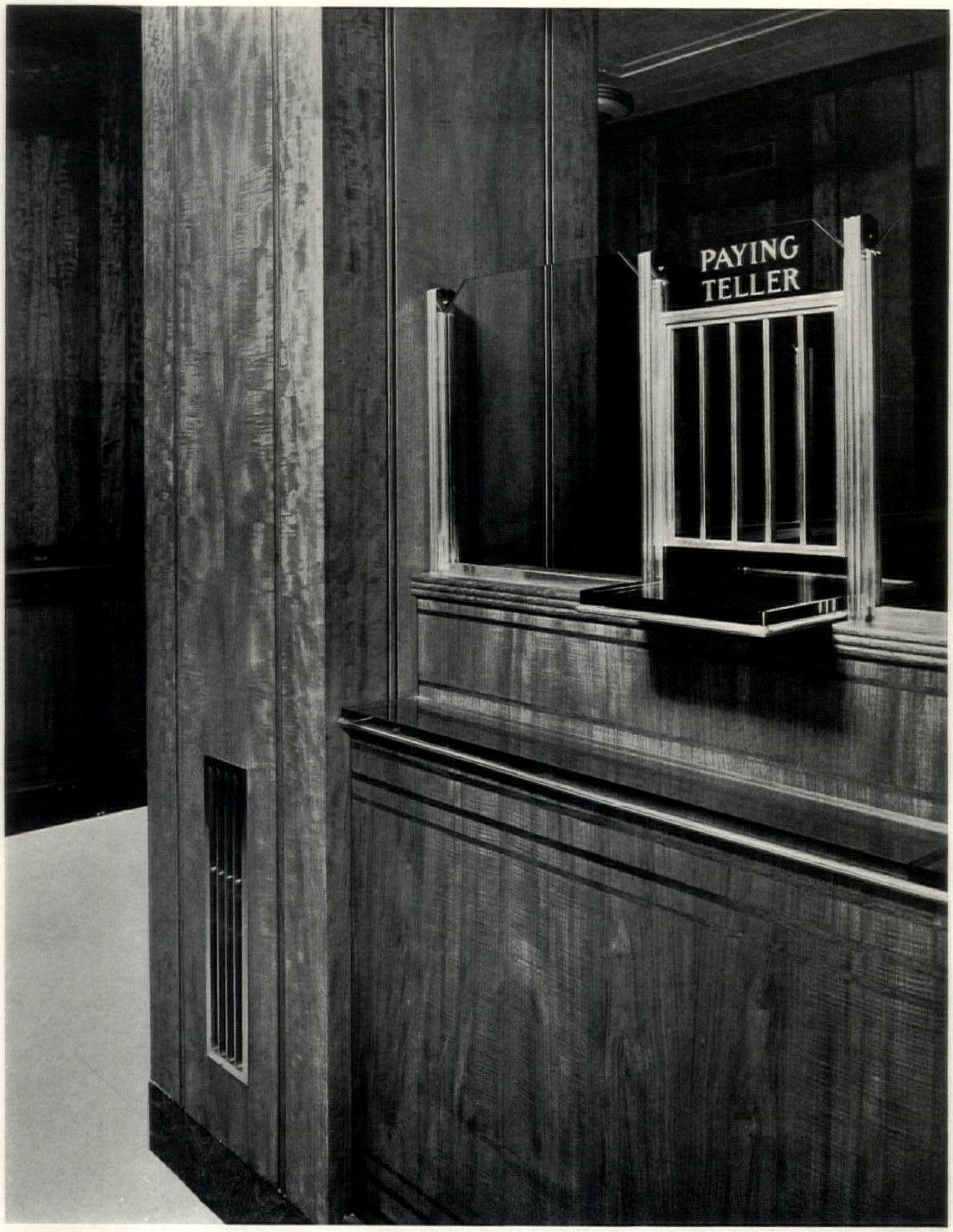
DETAILS OF BANKING VAULTS

Photographs by F. S. Lincoln

Photographs by F. S. Lincoln

GROUND FLOOR
TOWARD ENTRANCE

GROUND FLOOR
TOWARD REAR OF
BANKING ROOM



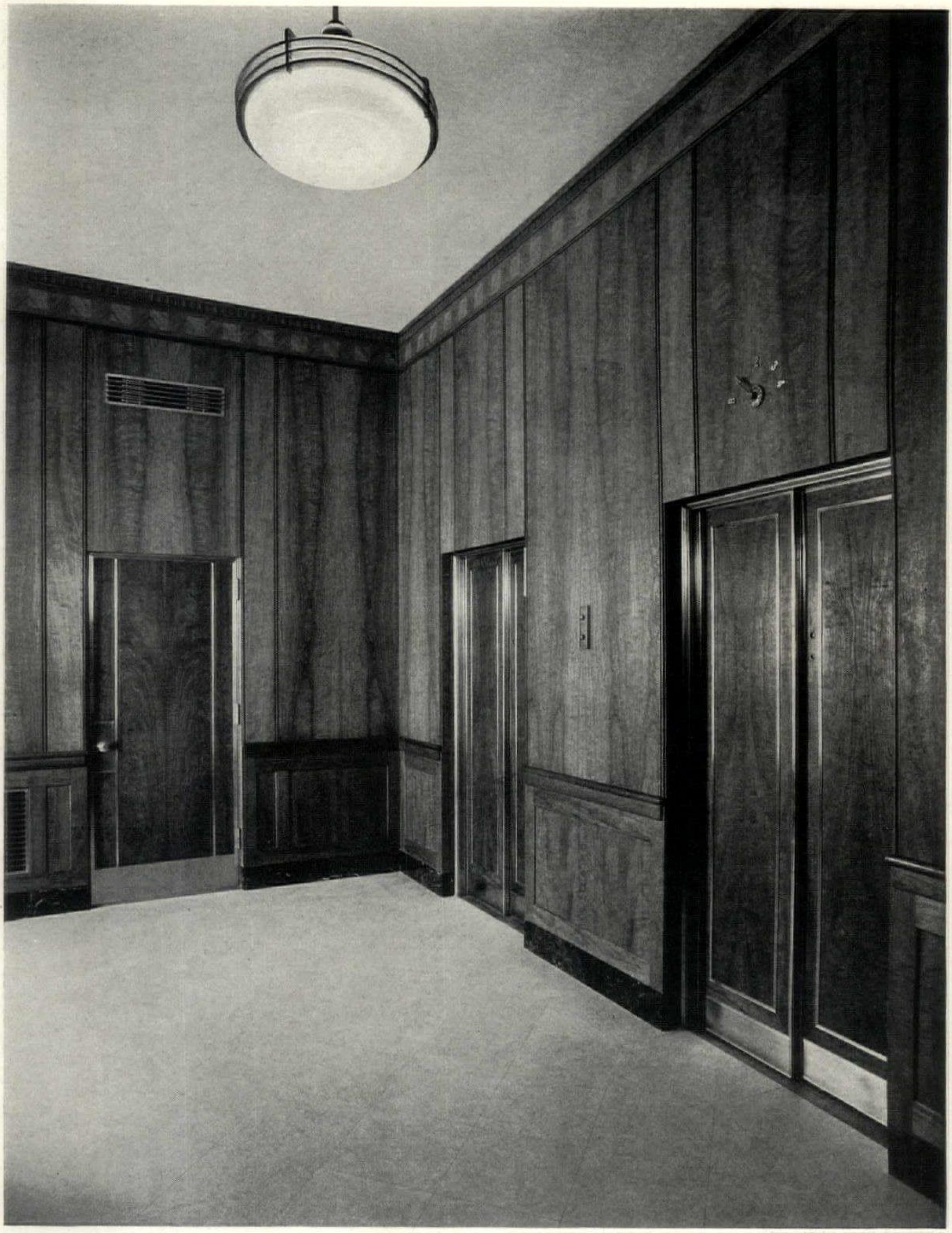
DETAIL OF COUNTER SCREEN

but in part under the roadway as well. Access to and control of these vaults was very carefully planned. The Safe Deposit Section is reached from the bank elevators through one grille door to the Outer Control and then through another, set at a right angle to protect the inner guard against hold-up, into the Inner Control opening to the vault itself. The same double protection is given to the bank vault, though on a different principle, for here the doors are bullet-proof with bullet-proof glass vision panels so that the inner guard can have visual control in case of danger. From the Public Inner Control there is access to 15 coupon rooms, each able to accommodate two people, and four large committee rooms. These are built of enameled transite partitions, for convenience in making additions or other changes. In the Bank Vault there are in the Inner Control area two large counting-rooms and in the Outer Control area the coin room, a semi-public counting-room for the

Photographs by F. S. Lincoln

OFFICE SPACE LOOKING TOWARD MAIN ENTRANCE

NORTHWEST CORNER OF MAIN FLOOR with ladies rest room and stairway to 44th Street at rear of photograph

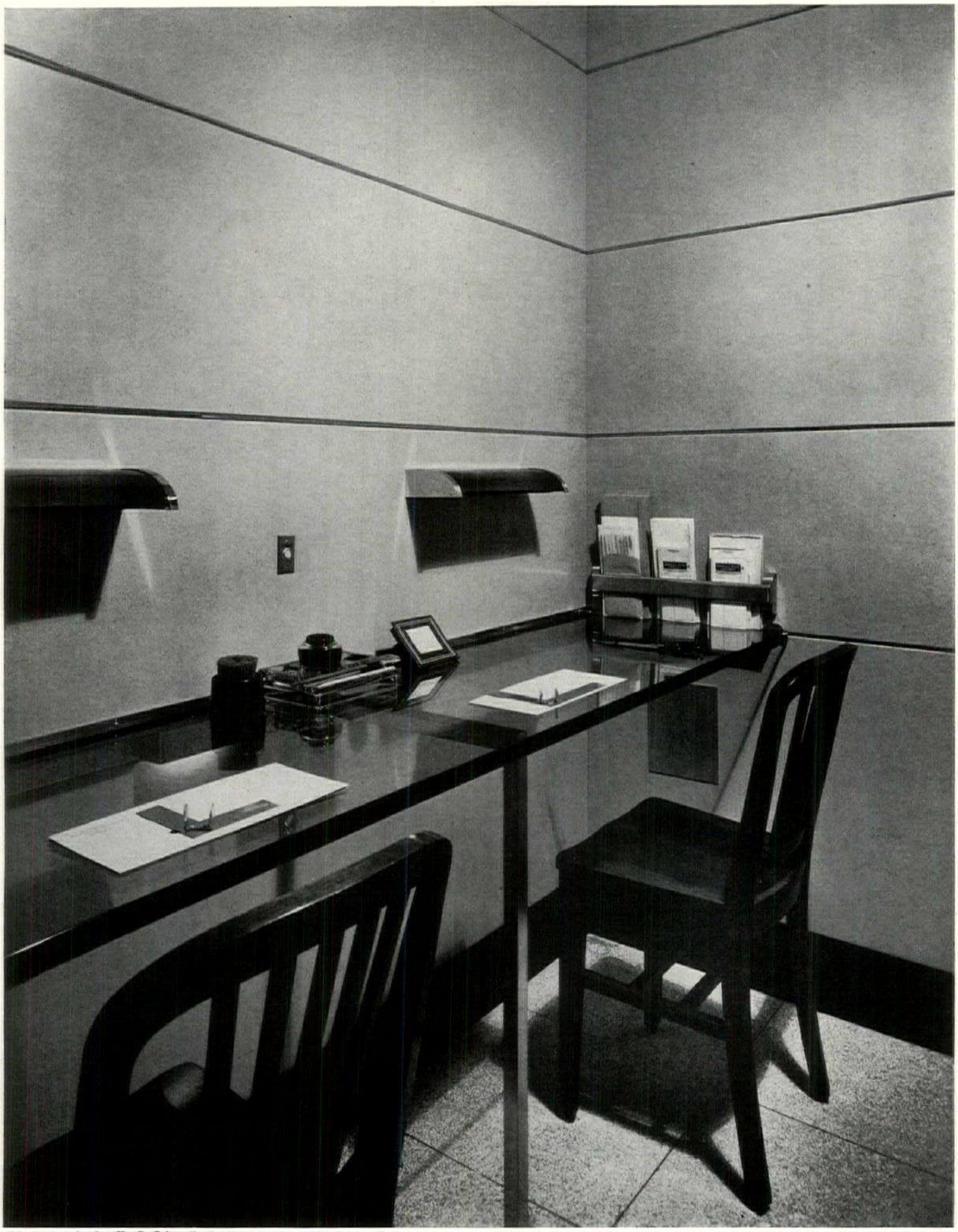


ELEVATOR LOBBY
ON MAIN FLOOR

delivery of securities for safe-keeping, and the security and coin lift which goes to the banking room above. Guard-rooms, toilets and locker rooms occupy the rest of the floor within the building lines and non-essentials, such as archives and other storage rooms for the bank's use, are placed under the sidewalks.

Second Floor

On the second floor along the Fifth Avenue side are the Trust Officers' Platform, an Office for the heads of the branch and a Board Room. These, together with a small conference room, are treated simply, with wood pilasters and dado, cornice and panel-mouldings, the whole painted green and set off by terra-cotta colored hangings. Here, except for the banking room, is the bulk of the public contact and the elevator lobby and halls are treated accordingly. The balance of the floor contains a small bond platform at the extreme east end and, between it and the Trust Platform, the trust administration clerical space so arranged that in the



Photographs by F. S. Lincoln

COUPON BOOTH IN BASEMENT

future it may become an executive platform should need for expansion arise.

Third Floor

The third floor is work area except for a small section at the easterly end occupied by the administration and medical departments, and the rest rooms and toilets. This and all other floors occupied by the bank are completely air conditioned, and provision has been made for expansion to the fourth floor, in all of the essentials.

Alterations are usually the architect's nightmare, existing conditions limiting him and forcing him into unsatisfactory compromises. This building, however, was an exception, and its structural layout was such that several different schemes were possible. It became simply a matter of choosing the best. It is doubtful if "an open lot and a million dollars" could have given the bank any plan more suitable than a quarter of that sum applied to a thirty-year-old building after comprehensive study of its adaptability to the needs of the client.

NEW TRENDS IN MORTGAGE APPRAISALS

by Frederick M. Babcock

CHIEF OF UNDERWRITING SECTION

FEDERAL HOUSING ADMINISTRATION

In view of the importance of the amortized single mortgage to moderate-cost private house architecture, William Stanley Parker in the April 1936 Architectural Record urged architects to "make full knowledge of financing procedures a normal part of their technical equipment." The risk rating system adopted by the Federal Housing Administration for mutual mortgage insurance is a major factor in the reorganized home mortgage market, partly because it represents advanced theory and practice in appraising and partly because it is national in scope. It has been generally accepted by lending institutions, many of which follow it without applying for insurance on the ground that an eligible mortgage is safe enough to dispense with the cost of insurance.

Mr. Babcock explains the principles of the risk rating system and sets forth some changes of detail recently introduced. These will be incorporated in the revised edition of the Underwriting Manual of the Federal Housing Administration which has just been issued. Examples of the use of grids will be found on page 286 for November 1935, although the five grids there shown have now been simplified into four.

SUCCESSFUL investment is based largely on choice of investments. In mortgage lending, the selection of mortgages presents a most difficult problem in investment technique. New devices are being introduced into the appraisal field and new concepts underlie current thought with respect to mortgage investment procedure.

In the November issue of The Architectural Record, the Risk Rating and Valuation system of the Federal Housing Administration was presented. The broad base of actual experience, including the examination of dwelling mortgages aggregating nearly three hundred and fifty million dollars, has given the Federal Housing Administration an opportunity to make a rapid advancement in the development of its risk-rating and appraisal methods. The modifications and refinements which have taken place during the last few months are impressive and are associated with both the technical requirements and the homely practical problem of analyzing mortgage risks.

What is Risk Rating?

What is Risk Rating? Risk rating is a technique which serves two purposes simultaneously. In the first place, it provides a uniform method with which to select mortgages for investment or, in the case of the Federal Housing Administration, to determine whether or not a dwelling mortgage is eligible for mutual mortgage insurance under Title II of the National Housing Act. In the second place, it automatically classifies mortgages as to quality as investments, making possible the grouping together in the mutual insurance funds of the Federal Housing Administration mortgages having similar risk characteristics.

The essential characteristics of the risk-rating system are not new. It embraces valuation, but does not replace it. It attempts to round out the experience yardsticks that have always been used by competent lenders in securing mortgages. It has succeeded in large measure in bringing about a high degree of uniformity in decisions with respect to eligibility and quality of proffered mortgages.

The risk-rating concept has had an interesting history. The central idea of measuring hazards in connection with real estate and mortgage investments grew out of a recognition of the inadequacy of appraisals.

In 1926 or 1927 it became apparent to certain appraisers that the more significant portions of their appraisal reports dealt with the direct analysis of hazards rather than with the estimated capital values of the properties. They commenced the practice of reporting the prediction of probable net earning capacity as well as the total value and ranked the two items with equal emphasis in their official valuation certificates. Shortly thereafter, major emphasis in the analysis of projects was placed upon the relationship existing between the contemplated debt service of the proposed mortgage and the predicted earning capacity of the property. These appraisers did not recognize nor use a specific method for the measurement of risk although their processes were, essentially, an examination of mortgage hazard. The analysis presently came to include an examination which took into account not only the probable amounts of income which would be available for the payment of interest and amortization, but a qualitative consideration with respect to the certainty and probable fluctuation of the earning power. This analysis had in it the basic concept of risk examination, but did not include as yet the idea of a rating of the risk. In general, the conclusions were to the effect that the set-up either was or was not too hazardous, but did not include any attempt to say how hazardous the risk was.

During 1932 and 1933 the examination of mortgage hazard was further pursued with the idea that mortgage transactions should be "patterned" so as to deliberately reduce the amount of risk of default. It was felt that the probable amounts of future net income, the characteristics and certainty, or lack of certainty, of future incomes, the financial structures representing ownership, and similar factors should be reflected directly in the provisions made for amortizing payments and other provisions of the loan transaction.

There appeared to be the possibility of introducing greater flexibility into the requirements for prepayments so as to increase the amounts of the payments automatically during good times and to reduce the obligation for payments during bad times. The strength of this suggestion lay in the fact that the combination of both a quantitative and a qualitative analysis of earning capacity in a property permitted the deliberate patterning of a loan transaction so as to reduce hazard. It was obvious that no amateurish treatment of the idea would lead to the development of a suitable technique. It was recognized that the use of such a device in connection with the lending of mortgage funds was closely related to the selection of proper rates of capitalization in the appraisal of income properties and rates of mortgage interest. Further consideration has been given to the application of the risk-rating or patterning idea in connection with income-producing properties since that time. The Federal Housing Administration found it necessary and desirable to utilize the same line of thought as a solution of its appraisal problem. It was recognized that the inherent inaccuracies of appraisals were seriously increased at that time due to circumstances in the general economic structure. Appraisers throughout the country were frankly admitting that there were few criteria on which they could base their estimates. There was little construction, few sales, and a demoralized rental market. It was apparent that the Federal Housing Administration would make a fatal mistake if the issuance of its mortgage insurance were based solely on attempts to appraise dwelling properties. Risk rating was the available solution.

The National Housing Act was a perfect vehicle for the purpose because:

(1) The Act permitted a relatively high percentage mortgage (80%), thereby making the selection of risks by effective means an essential and vitally important factor.

(2) The Act said that loans must be "economically sound." This meant that simple formulas and rules of thumb could not be relied on with safety.

(3) The Act required mortgages to be grouped according to similar risk characteristics. By strange coincidence this phraseology virtually constituted a mandate to the Federal Housing Admin-

istration to install some system of mortgage risk rating.

(4) The operations of the Federal Housing Administration were destined to include a large number of similar properties which would permit the risk-rating technique soon to be subjected to statistical examination. This type of verification of methods would have been a slow process in the income-property field.

The Federal Housing Appraisal Problem

The problem confronting the Federal Housing Administration in the summer and fall of 1934 was really a very difficult one. It was necessary to find a way of specifying, describing, and determining whether or not mortgages were eligible for mutual insurance under Title II. Appraisals alone could not fill this need. It was necessary to find a way to group mortgages according to risk. At the same time the unit (a typical mortgage of three or four thousand dollars) was so small that no elaborate or complicated system was permissible. The plan had to be reduced within practical limitations before it could be installed. Finally, the system had to be of such a nature that it could be placed in practical operation with the utmost speed by a newly assembled staff of men unfamiliar with the risk-rating line of thought.

It might have been possible for the Federal Housing Administration to avoid the real issue. This was not done. Real estate is an exceedingly complex commodity. Simple formula appraisals would have been possible, but would have represented a return to the Dark Ages of technical practices and would have had the effect of putting government approval on lending practices known to be unsound. The Administration had to introduce a technique into the field for immediate use. It is interesting that the methods adopted have worked out during the first year and a half in a most satisfactory manner.

The risk-rating system which was installed is now understood by a large number of people in the country. Immediately rejected in the new method was the traditional habit of relying primarily on valuations. The ratio of the loan to the value was recognized in the system as one of the most important clues to the amount of risk, but it was not accepted as *the* measure of risk.

The reason why valuations are not acceptable as the sole measure of risk, insofar as security is concerned, are few, but important. Valuations at best are relatively inaccurate. With the use of the best available techniques by an honest appraiser of good judgment, the appraisal which is produced is an opinion supported by certain data. At present it is self-evident that great precision is not possible and that the best appraisals can still be accepted as accurate within a considerable zone between minimum and maximum estimates.

Valuations, as measures of risk, are of significance only when the loan-value ratio is examined. It is pointed out by the Federal Housing Administration that the loan value ratio does not embrace all the elements of risk involved in the making of a mortgage loan. It is self-evident that the term of the loan and the ability of the borrower to pay are factors which do not enter into the loan-value ratio. It may also be pointed out that there are numerous characteristics of properties and locations which affect risk, but are not properly measured when reduced to the common denominator of an appraisal.

The use of the loan-value ratio removes the analysis from the actual place where risk may be observed and considered. And, of course, there was the remaining factor, already mentioned, that valuations, during 1934 and 1935 especially, could not be expected to have primary significance or satisfactory accuracy. Therefore, the Federal Housing Administration accepted the principle that the measurement of mortgage risk was the solution of the problem and that risk had to be recognized as an entity capable of such treatment.

Nature of Mortgage Risk

Mortgage risk is always present when a mortgage is made. For the purpose of risk rating it is simply necessary to recognize the presence of risk in different degrees in different mortgages. It is fallacious to presume that mortgages fall into two classes: those that are safe and those that are unsafe. Each and every mortgage investment is hazardous in some degree. Different mortgages vary as to the degree of hazard.

Mortgage risk lies in the future. We cannot know much about absolute risk. We are dealing with probabilities. Therefore, the best we can hope to do in the rating of mortgages according to risk is to attempt to determine the relative risk from case to case. This is the same as saying that risk may be expressed only in terms of predicting "chances" or likelihoods as seen from the present time.

Mortgage risk may be conceived of as an entity and may be treated as such. This is essential in order to make it possible to express a measurement of risk in simple terms. As an entity the over-all degree of hazard is composed of all the possibilities of trouble, expense, and loss in connection with the lending of mortgage funds. In other words, risk includes: Difficulty in connection with collections, unusual expense in connection with collections, excessive servicing costs, likelihood of foreclosure trouble, cost of foreclosure, delay in foreclosure, cost of rehabilitation, cost of carrying until sold, cost of resale, and loss on resale. The over-all degree of risk is necessarily associated with the relative degrees to which there is likelihood of troubles and financial losses such as those listed above. It might be possible to include in the list the depreciation of values of neighboring properties securing loans, owned by the same investor.

The above list indicates the specific form of risk. It does not, however, list the elements which contribute to and affect mortgage risk. These factors are numerous, complex, and subject to an almost infinite number of possible combinations in practical cases.

Included among the elements which contribute to risk are the wide variety of neighborhood and location characteristics. Different types of cities create different kinds of residential neighborhoods. An almost infinite number of factors affect the probable future trends of districts and the values of the homes in them. Some are more stable than others; some may be expected to have longer attractive lives than others. In making a list of the factors which contribute to risk it is necessary to recognize the great variety of architectural styles and designs. They have differing probabilities with respect to structural durability. They will be acceptable in future markets in widely differing degrees. Different methods of dwelling construction, different room arrangements, different sizes of houses, and different provisions for mechanical equipment introduce different degrees of mortgage hazard.

One of the most important groups of factors which affect mortgage risk is that which embraces the relationship between the physical property and the neighborhood in which it is located. Marketability is a basically important characteristic of a good mortgage loan. Different degrees of marketability represent different degrees of mortgage risk. There are varying degrees of conformity and nonconformity between neighborhoods and houses and these must be taken into account in listing the factors which contribute to mortgage hazard.

Also included are all of those elements of risk associated with the earning power of the prospective borrower, his ability to pay, his attitude toward obligations, and his prospects for the future. In the final analysis the probability that a borrower is able and intends to pay the mortgage debt represents the first line of defense against trouble with the mortgage investment. Therefore, a poor borrower, when considered in relation to the mortgage transaction, requires a low rating of mortgage risk. At the same time, a good borrower cannot go very far toward replacing the necessity for sound physical security in the real estate itself.

Measurement of Mortgage Risk—Essentials

In the attempt to develop a system which results in an over-all measurement of mortgage risk, certain essentials must be included. In the first place, the system must deal with many complex elements of risk. It must actually classify mortgages according to relative risk. It must be relatively simple. And, finally, it must result in uniform decisions in the hands of different competent men.

Considering the first requirement, namely, that the risk-rating system must deal with the elements of risk, it is apparent that there are not only many elements which may combine into an unlimited number of patterns, but that they are significant solely as probabilities and are interrelated and capable of treatment by groups.

The requirement that the system must actually classify mortgages according to relative risk does not include the necessity for any sort of absolute rating. What is required is that the resulting measurements must be correct insofar as is humanly possible in terms of their relationships with one another. In other words, the rating system should be able to arrange several hundred dwelling mortgages in rotation according to their probable relative degrees of risk, but it need not express the specific hazard involved in any absolute manner.

It is also necessary to have a system which is relatively simple. Otherwise it cannot be used effectively by a field staff. Furthermore, in dealing with dwelling mortgages, it is evident that any elaborate or cumbersome technique will prove to be too costly. The system must be one in which it is possible to make a forthright, direct analysis of mortgage risk with reasonable dispatch.

Finally, the system must result in uniform findings and consistent decisions. It must be a system by means of which different men working in different parts of the country will arrive at substantially similar answers. This would indicate that there must be some bench-marks as integral parts of the system in order to control the over-all range of the judgments of the men who apply it.

Measurement of Mortgage Risk—Methods

The Federal Housing Administration developed such a method and introduced it into its operations in the fall of 1934. Since that time the original method has been subjected to careful scrutiny with a view to polishing and refinement. At the present time the Federal Housing Administration is engaged in introducing certain simplifications all of which improve the technique of risk rating. They are not radical and do not represent any fundamental change in the general method of determining mortgage risk.

When the risk-rating system was originally devised, it was found that certain elements of risk were incapable of intelligent rating. For example, if an attempt is made to rate a house according to the number of baths, no satisfactory clue is possible because such a factor is not ratable. It cannot be done unless the valuator relates the number of baths to the requirements of the local market and the size of the house. However, when he is asked to rate a factor such as the adequacy of bath facilities he is able to form a very definite conclusion. Such a relationship is ratable.

Hence the Federal Housing Administration risk-rating system involves the ratings of a series of relationships. It does not rate the income of the borrower. Instead, it rates the ability of the borrower to pay the debt service. That is, the judgment of the examiner is applied to the relationship existing between the borrower's income and the debt service of the contemplated mortgage. Again, it is impossible to rate the presence of transportation, but perfectly possible to rate the "adequacy of transportation."

Each of the relationships considered is called "a feature of risk." For practical purposes, the number of features has been reduced down to 28. The selected 28 represent relationships which are sufficiently different from and exclusive of the other features so that an architect or valuator can form an intelligent independent judgment in connection with any of them. In the aggregate, the 28 features embrace all of the most important elements of risk involved in the making of a mortgage loan on a dwelling property.

The features are grouped, for convenience, into four general categories of risk, including:

The Property.............	8 features
The Location.............	9 features
The Borrower...........	5 features
The Mortgage Pattern.....	6 features

Each feature is rated by inserting an "x" mark opposite it in the grids which are contained in the underwriting forms of the Federal Housing Administration. In connection with any one feature, the underwriter has the option of placing the "x" mark in any one of six columns, headed respectively: "Reject - 1 - 2 - 3 - 4 - 5."

If his analysis of a condition of relationship with respect to any one feature indicates the loan to be too hazardous to be acceptable, he places the mark in the "Reject" column. One such "x" mark in a reject column is sufficient reason to declare the entire proposal unacceptable for mutual mortgage insurance. If, however, the circumstances found in connection with a given feature are above minimum requirements, he forms a judgment with respect to the degree of hazard and places his "x" mark in one of the other five columns. Highly dangerous conditions require the "x" mark to be placed in the "1" column. Superlatively excellent conditions call for a mark in the "5" column. Typical conditions introducing only a usual degree of hazard result in a mark in the "3" column.

Upon the completion of the rating of the individual features, summaries of the results found in each of the four general categories of risk are made. For illustration, in rating the location the valuator will have placed nine "x" marks in the location grid. If none of these occur in the reject column he carries the small figures or "weights" to the right-hand column and adds up the weights to secure a figure representing "Rating of Location." The weights are so arranged that the sum of the weights in the "5" column is 100%. The rating that he may secure will be somewhere between 20% and 100%. In those instances where the resulting rating is less than 50% the mortgage is declared ineligible for insurance.

Thus there are two bases upon which a loan may be rejected. It may be rejected because of a reject rating of a single feature or it may be rejected because of a rating of less than 50% in one of the four categories.

Because the relative importance of the categories differs from case to case the fourth category, namely, the Mortgage Pattern, includes a device by means of which to take account of this relationship. The resulting determination with respect to the eligibility of the loan is given by the final rating of the Mortgage Pattern.

Control of Mortgage Risk Measurement

The experience of the Federal Housing Administration has demonstrated an unexpected degree of consistency in the risk ratings applied to cases throughout the entire country. It was originally expected that there would be a decided amount of inconsistency in the results obtained. It was expected that the inconsistencies would not be serious, but that they would be sufficiently pronounced to be disturbing. With very few exceptions, a high degree of consistency has been obtained.

The general problem of controlling the judgment of the men who apply the system is, therefore, not a major problem as long as they belong to the same organization. That is, the employed staff members of the Federal Housing Administration, due to their regular business contacts with other members of the staff, seem to produce similar risk ratings of similar properties. However, inconsistency does appear in those instances where other agencies have employed the risk-rating system. It is, therefore, highly desirable to introduce some degree of control in the system of mortgage risk measurement.

The application of specific arbitrary rules is generally to be avoided as criteria in the application of risk rating. They tend to become too arbitrary and do not work well except in the form of minimum requirements in connection with certain features in the rating system.

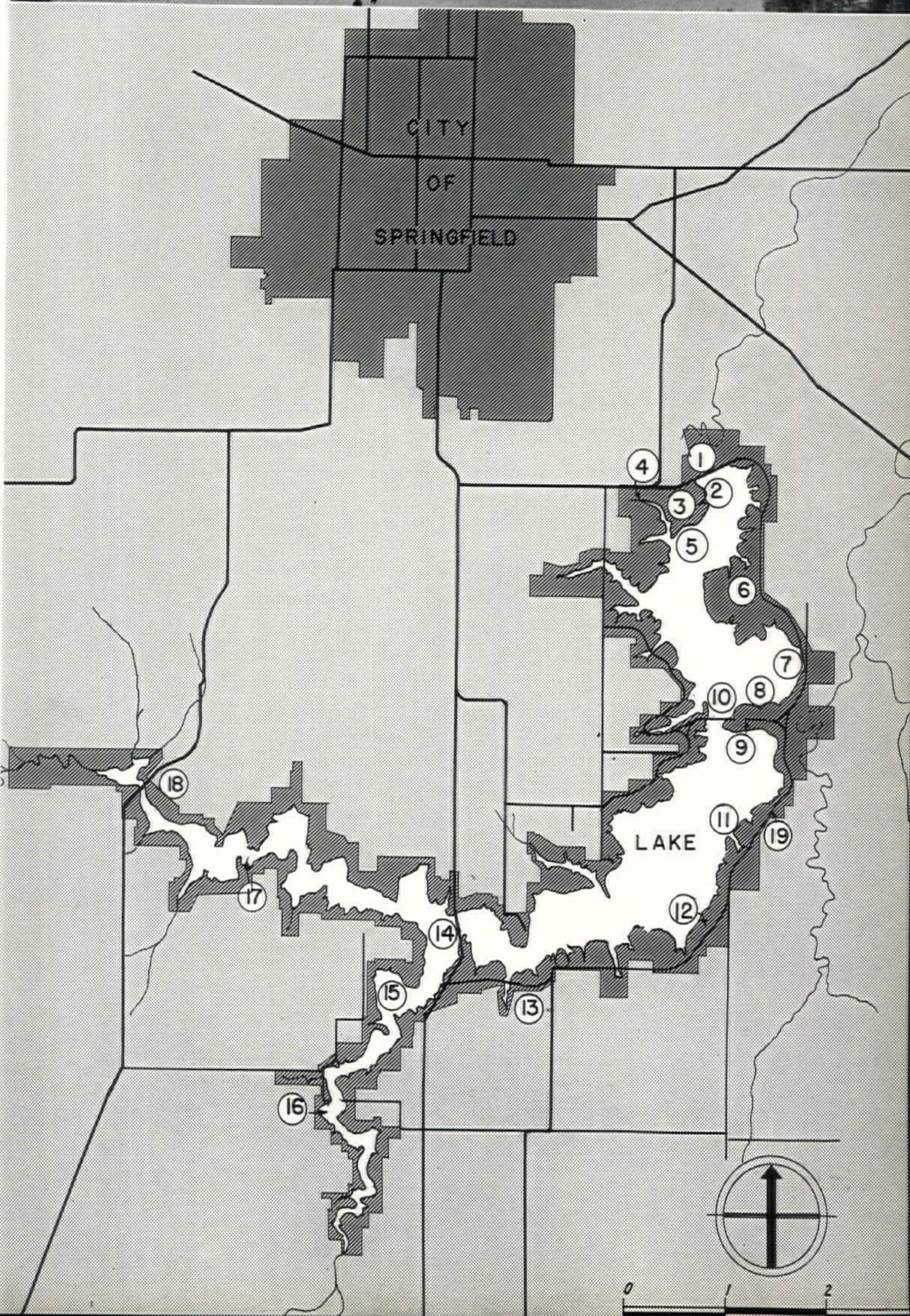
Why Risk Rating?

Risk rating has won its spurs. It has been found to serve a significant group of purposes and to integrate practice on a uniform and sound basis. It offsets the deficiencies of valuation. It provides a non-arbitrary criterion of eligibility. It produces, as a by-product, a logical classification of mortgages according to risk.

It provides the basis for the many comparisons which are required to make a proper appraisal of dwelling properties. It bridges the gap between the real estate research problem and the appraisal problem because it gives point to research projects. It provides a national yardstick by means of which to apply uniform analyses of mortgages. It furnishes a motivating force which induces builders to construct better properties. It is sufficiently flexible to apply to all types of properties and at the same time it does not delay the introduction of innovations in design. Finally, it permits the control of mortgage investment policy through the agency of a technique for qualitatively describing mortgage portfolios.

...AKE SPRINGFIELD ...EVELOPMENT

...RINGFIELD, ILLINOIS



Plan — showing relation of ...ect to city:

Spaulding Dam
Lakeside Power Plant
Lakeside Water Plant
Nursery
City Boat and Barge Dock
Proposed Golf Course
Dividing Dam
Lake Park
Beach and Beach House
Lindsay Bridge
Cottage Grove Park
Lincoln Gardens
Cotton Hill Park
New Highway Bridge
Wild Life Sanctuary
Glassier Bridge
Lick Creek Bridge
Highway Bridge
Sunset Place

A successful tradition of public ownership made it possible

Most cities have reservoirs, natural or artificial; but few of them show a proper recognition of their possibilities over and above that of furnishing an adequate water supply. The new city reservoir of Springfield, Illinois, is an outstanding exception to such a rule. Beginning in 1925 as a plan to supplement its water supply from drilled wells, the city of Springfield has developed a lake of 4,270 acres surrounded by 60 miles of shore line and 4,200 acres of park and controlled residential area. It has re-planned an entire rural area south of the city limits, rerouting existing roads, constructing new bridges, dams and a power house. It acquired, cleared, developed, and is now leasing the land occupied by the lake and its marginal developments. It has achieved all this, moreover, within the limits of time and cost set in its original plans.

A project in community planning such as Lake Springfield is only possible where a definite precedent for public ownership and control exists. Springfield, Illinois, a small city of 75,000, has for the last twenty years owned and managed its own water, light and power department; "this Department of Public Property has been and is operating on a very efficient basis, giving the consumers electric and water service at low rates, besides being able to expend its municipal development to the extent of building this unusual project."* Only with this successful tradition behind it was it able to plan and execute a project of this scope.

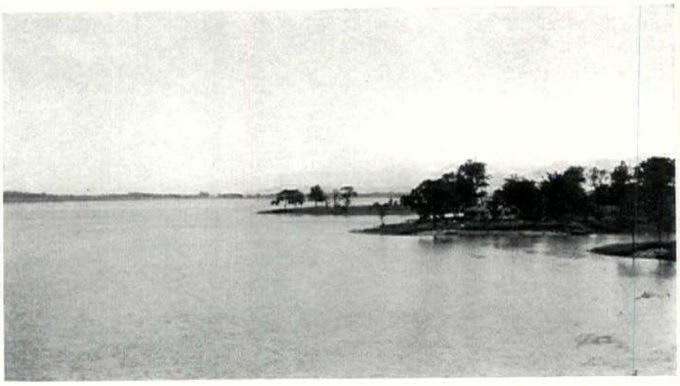
Since this project was primarily one of increasing the city's water supply, it was obvious from the first that the city would have to retain control of the lake shores for sanitary reasons. At the same time it was planned to make the recreational benefits of the reservoir fully available to the residents of a mid-western city far removed from any large bodies of water. Facing this task, an extraordinarily complete plan for the physical development of the marginal land was evolved. With this plan was evolved a system of control—leasing, zoning, and plans for further development.

The project pays for itself

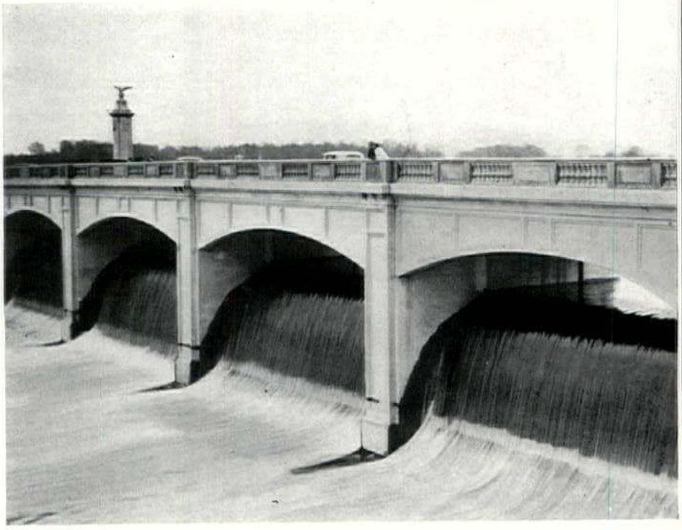
In 1930 the Lake Springfield project was presented to the voters in the form of a $2,500,000 bond issue. The proposition was complete in all details, being only one of some fourteen alternate projects which the city had engaged two firms of consulting engineers to study. A complete financial program was presented at this time. It was estimated that annual surpluses of the Water Department ($136,694 in 1935) would carry from a minimum of one-half to a maximum of four-fifths the amortization charges: any balance to be raised by general taxation. However, special attention was given to the subject of marginal land development and its effective use to carry a part of the financial load. Myron H. West, of Chicago, was engaged to develop a plan for providing a definite income from this area by properly utilizing it for lakeside residences, recreation centers, parks, etc. Up to date, all charges have been met with no taxation.

After the bond election immediate action was taken to purchase the lake site. "The main Dam, named for Willis J. Spaulding, Commissioner of Public Property, is located approximately three miles from the city. The lake in its entirety lies in southerly direc-

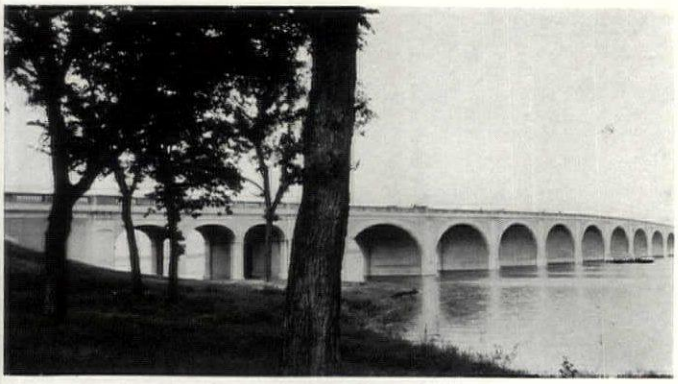
* See 18th and 19th Annual Reports. Water, Light and Power Department, City of Springfield, Illinois.



A large lake now covers the fat Illinois farm land



This dam guarantees adequate water for a city of 300,000



The scale of the arches was varied for architectural effect

tion and is in general approximately six miles distance from the city. Approximately 110 tracts of 8,500 acres, controlled by 107 owners, were involved. Considerable opposition was at first encountered. The lake site lies in a highly developed farming area and some of it was still owned by families who had originally acquired their holdings from the government."

Land values aren't scientific

An attempt was made to purchase large blocks of land by bargaining with groups of owners rather than with individuals. It was proposed that a soil survey be made of the area and that the fertility of the soil thus determined be the basis of the fundamental value of the land. The value thus determined was then to be modified to account for the proximity of the tract to paved roads or to the City. The value of all improvements was to be added to this as well as any severance damages or going concern value. The method was enthusiastically endorsed. Over two-thirds of the land to be acquired was thus surveyed and evaluated, with the result that the value set always seemed right for the other fellow's land but only in rare cases did the value placed on a tract suit the owner of that tract.

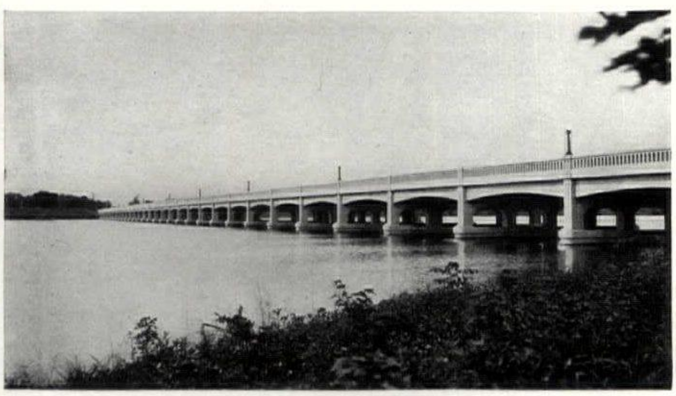
This method of bargaining was soon abandoned and individual negotiations established. One field man was employed on this work almost continuously for two and one-half years and purchased approximately 8,500 acres of land. Eleven bona fide condemnation suits were filed of which only three were contested. Ten other friendly suits were tried to clear title.

After a large share of the land had been purchased, clearing operations were begun. This work was largely completed during the winters of 1931-32 and 1932-33. The entire flooded area of 4,270 acres was cleared. Suitable timber was sawed into lumber and either used on the project or sold. Waste wood was cut to convenient size for hauling and was given away.

Work begun: 30-hour week, prevailing wage

The entire clearing operation was done by an organization established by the Department of Public Property of the City and was conducted as an unemployment relief project. All equipment, including tractors, was purchased by the Department. Labor gangs were well organized and worked a 30-hour week at the prevailing wage scale. The cost of clearing averaged $40 per acre of flooded area.

Parallel with clearing operations was a large construction program of physical changes made necessary by the project and subsequent improvements growing out of it. Two dams were constructed to impound the water. Six new highway bridges were completed. One railroad bridge was reconstructed. Twenty-five changes were necessary in existing highways, including the re-location of seven miles of State Route 126. Numerous changes were made in telephone and power lines. Twenty-five miles of new marginal roads were constructed. Approximately eight miles of sewers to serve the marginal area of the lake have been completed. Municipal water lines and light and power service serve the region. A large bathing beach and bathhouse were constructed. Numerous items of bank protection in the form of riprapping have been completed. A large nursery has been established, and now contains over 300,000 young trees, consisting of native hardwoods and conifers which will be used for reforesting denuded areas. A definite plant-



One of six new bridges necessitated by the project ing plan for the marginal area is now in operation.

The plan did not originally include the immediate construction of a purification plant and electric pump station but, because of "the offer of money at low interest rates and due date after all lake bonds were paid off and the fact that a $500,000 addition to the Electric Power Plant was imperative," the plant was constructed as an integral part of the project.

In general, marginal roads were located back from the shore line in order to permit platting all lots with a water front. Certain locations are reserved for large estates while more modest developments are provided for elsewhere.* Because of sanitary requirements, the lower section of the lake extending approximately one mile upstream from the water works intake is zoned for restricted use. In the upper section the lake area and the marginal land is restricted only in a nominal way.

At Recreation Point, located near the center of the lower half of the lake, a park center has been developed for bathing, boating and other water sports. Baseball, tennis and golf facilities have also been provided for. This use of the area is considered consistent with the most efficient sanitary control of the area.

The principal source of revenue from the marginal and recreational development of the lake comes from the leasing of the shore for residential purposes. Although planned as a summer colony 75 per cent of the residential development to date is permanent because of the ease with which city facilities such as water, light and sewerage can be provided. There are now over 100 tracts leased and more than one half have dwellings and cottages thereon, and more activity is anticipated in the building of homes and cottages. There are 1,000 acres in parks and in the Wild Life Sanctuary. Land is leased on long-term leases. Complete restrictions as to the character of construction have been imposed in order to preserve land values and protect building investments.

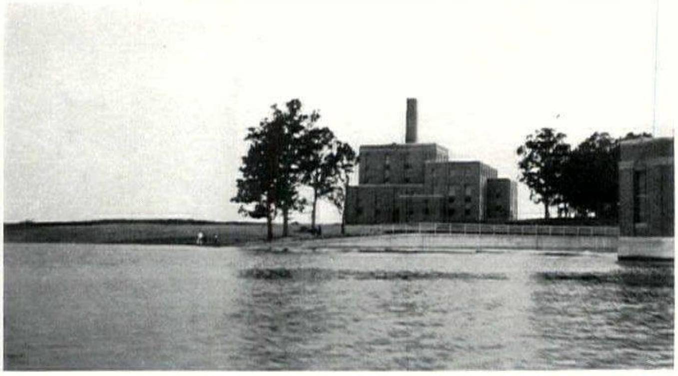
Control and development of Lake Springfield to its fullest extent has been assured through municipal ownership of the marginal land, and already a comprehensive plan of improvement is under way so that in years to come the lake will retain all its initial attractiveness as a residential district and recreational area.

Private ownership would make control impossible

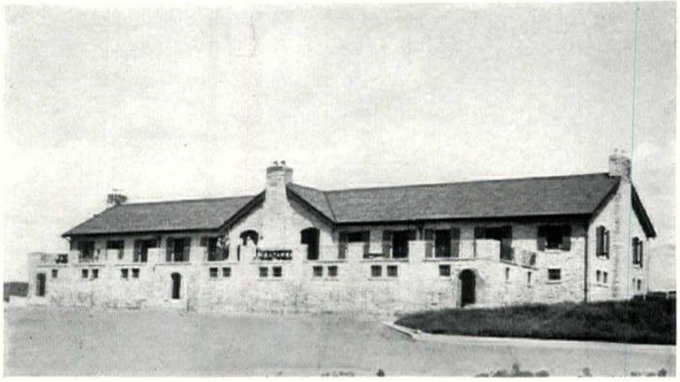
Realizing that private ownership of the shore land would frustrate attempts at adequate lake protection, thwart any comprehensive plan of improvement, and hinder the development of recreational values, the city procured the passage of an act of the legislature permitting the making of leases for not to exceed sixty years to persons of good reputation and character.

In preparing the form of lease, care was taken to include only such provisions as would be desirable from the viewpoint of those lessees who wished to improve and maintain the premises as home sites. Accordingly, the lease contains many clauses, not found in the restrictive covenants of real estate subdivisions, giving the lessee substantial rights calculated to encourage the development of the area for permanent all-year homes and to maintain a high-class neighborhood with maximum privacy. To this end a provision has been made to exclude the general public not only from the leased tract but from the waters of the lake within one hundred feet from the shore line, and an ordinance was drawn up to limit

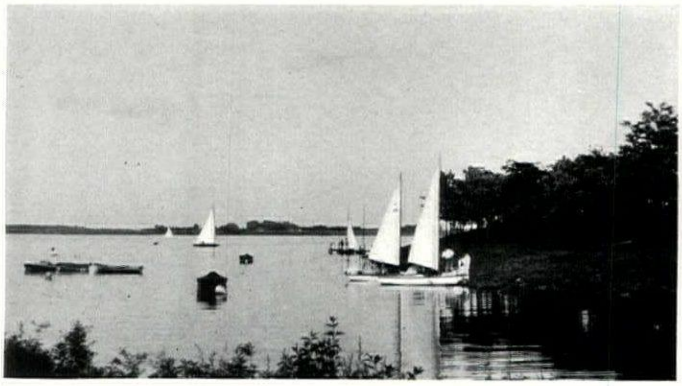
*More than sixty per cent of the marginal land will be reserved for use by the general public.



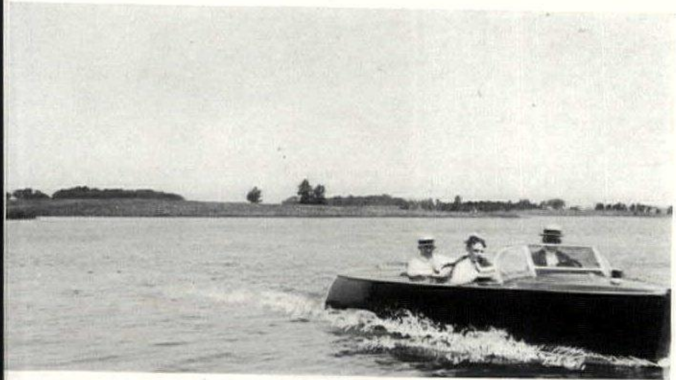
A $500,000 power and water plant is part of the project



A large beach and modern bathhouse where corn once grew



Springfield now goes sailing



Speeders are warned: 5 m.p.h. within 400 feet of shore

One of the many year-'round residences on the lake shore

the speed of boats within 400 feet of the shore to five miles per hour.

Group leasing of adjoining tracts of land by friends has been encouraged through a provision that, in the case of the sale of a leasehold to one not a relative of the seller, the neighbors shall have the option to substitute their own nominee either at the proposed price or at an arbitrated figure.

Any proper determination of the amount of rent or sale price for leaseholds and the time and manner of payment must take in consideration the need for and the use to be made of the money. Large expenditures are required to install the various public services and improvements necessary to make the shore land available for modern homes. If these services such as water, sewer, electric lines, roadways, trails, parks and public lands in the environment of the home site are to be maintained and further improved, the city must have a constant and dependable source of income available for such purpose throughout the term of the lease.

Thus the price of the leasehold has been divided into two parts —one, an immediate payment into capital costs, and the other, a continuing contribution to a maintenance fund. The form of lease adopted carries a plan of payment, based upon the estimate that three-fourths of the price for the whole term will be required during the first nineteen years of development. To make such improvements the city needs and must obtain as soon as practicable this three-fourths of the price for the whole sixty-year term; and to obtain it promptly a 10 per cent discount is allowed for immediate payment.

The remaining one-fourth of the sale price for the entire sixty years will be required to maintain such public services as roadways, etc., and to police and care for the neighboring public lands. This part of the sale price is not subject to prepayment but must run through the entire term, and for convenience is fixed as a sum equal to six per cent on such remaining one-fourth of the sale price, without ever requiring payment of the principal sum.

That part of the development used for residential purposes is zoned to permit different price classes and different sized properties. "The price of lots ranges from $50 a year up to $224 a year; of course, after 19 years have expired the payments reduce to approximately one-fifth of original payments." The minimum price limitation on houses runs from $1,000 to $6,000. Plans for all new structures must be approved by the City Commission. Restrictions as to size and location of buildings guarantee against adverse influences in the future.

Credit as well as cash

While immediate payment of three-fourths of the sale price of the leasehold would be the ideal arrangement to enable the city promptly to make improvements to serve the home sites, yet such a requirement under present economic conditions would prevent many very desirable persons from acquiring leaseholds. The city has therefore adopted a credit, as well as a cash plan. On the credit plan three-fourths of the price is paid in installments, extending for nineteen years, but with the privilege of prepayment and conversion to the cash plan at any time in accordance with a liberal discount table printed on the lease. On the cash plan the three-fourths price is paid in a lump sum, less 10 per cent discount. On either plan the remaining one-fourth of the price or maintenance payment runs in quarterly installments throughout the sixty-year term.

To illustrate—on a $1,000 site, under the credit plan, three-fourths (or $750) must be paid in 19 years with interest figured at 5 per cent. This is equal to a down payment of $70 and $44 per year thereafter in quarterly installments for 19 years. The remaining $250 is never paid but in lieu thereof a maintenance payment of $15 per year is required throughout the whole term, resulting in a total payment of $70 per year for 19 years and $15 per year for the remaining 41 years of the sixty-year lease, all in quarterly installments.

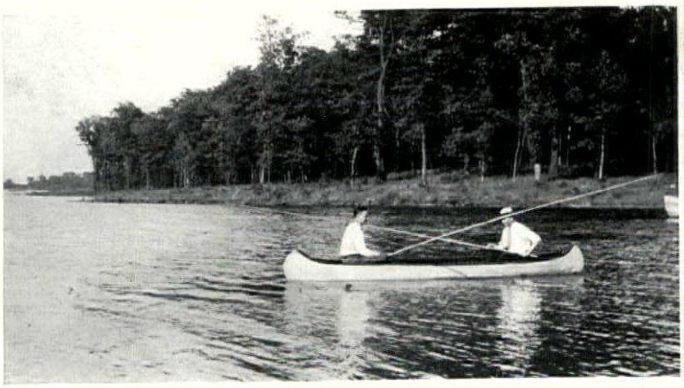
Under the cash plan the down payment would be $750 less 10 per cent discount, or the net sum of $675, and thereafter $15 per year in quarterly installments during the entire term of the lease.

When not in default, a lessee may at any time remove his improvements or may surrender or sell his leasehold and be relieved of all future liability. He may also mortgage his improvements and leasehold in like manner as long-term leaseholds in cities are commonly mortgaged. At the end of the sixty-year term the lessee or his family has the preference in renewing the lease. As a practical matter, after a substantial part of the term has run, the lease may be surrendered and a new one made for 60 years from that date on then prevailing terms.

This development illustrates the possibility of intelligent planning in community problems. From the plot plan it is apparent that the Department faced a number of problems, not the least of which was the adaption of a very irregular development to the rectangular platting pattern so typical of this part of the midwest. The size and shape of the development were necessarily determined by the topography of the lake site. The acreage of the land had to recognize the limitations of rectangular platting: and a new system of drives surrounding the lake had to be tied into the existing road pattern; moreover, several important highways had to be re-routed with the construction of the lake.

Despite these limitations, the finished project is well integrated with the already-determined pattern of the community. The project is served by existing schools in the neighborhood and various shopping communities are available at different points. Bus service to the city is already available. The roads, both finished and projected, are of a permanent character with loose gravel finish. They are maintained by the township and county to which the residents of the project pay taxes. The park system, which constitutes over 60 per cent of the total marginal area, is maintained by the city. The entire area is policed by the city and fire protection will be available from the municipal water system. After the lessee or custodian completes a home, then it becomes subject to township and county taxes. Home owners on lake property at present vote as township residents. This probably will be changed in the future.

The entire development of the Lake Springfield project has been from the start under the direction of Willis J. Spaulding, Commissioner of Public Property, Springfield, Illinois. The original engineering studies for the project were made by him. Major construction work was under the direction of the Burns & McDonnell Engineering Company. Myron H. West planned the development of the marginal land.

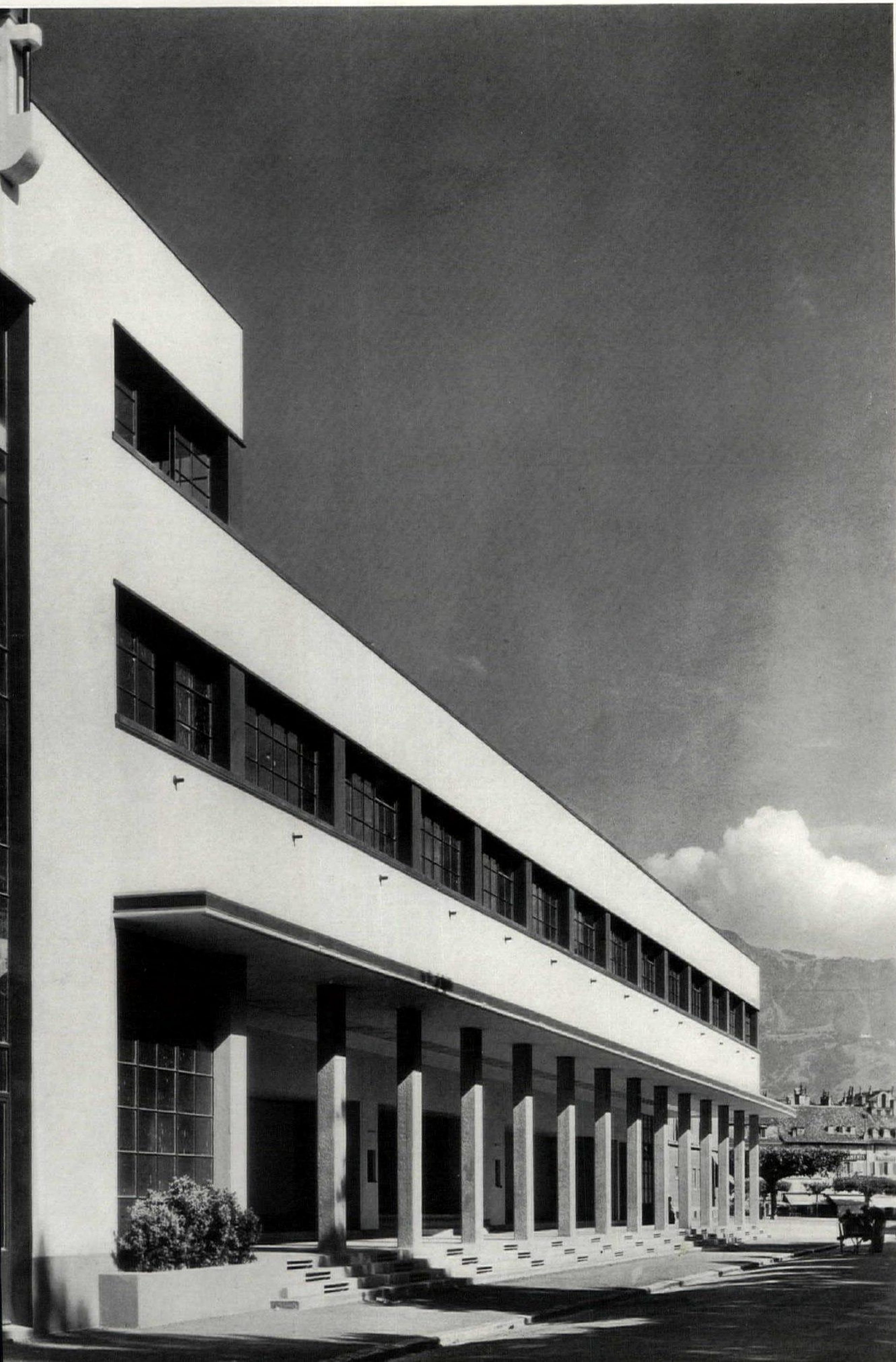


The lake is well stocked with fish

The City Boat and Barge Dock is popular

PORTFOLIO

CURRENT BUILDING TYPES



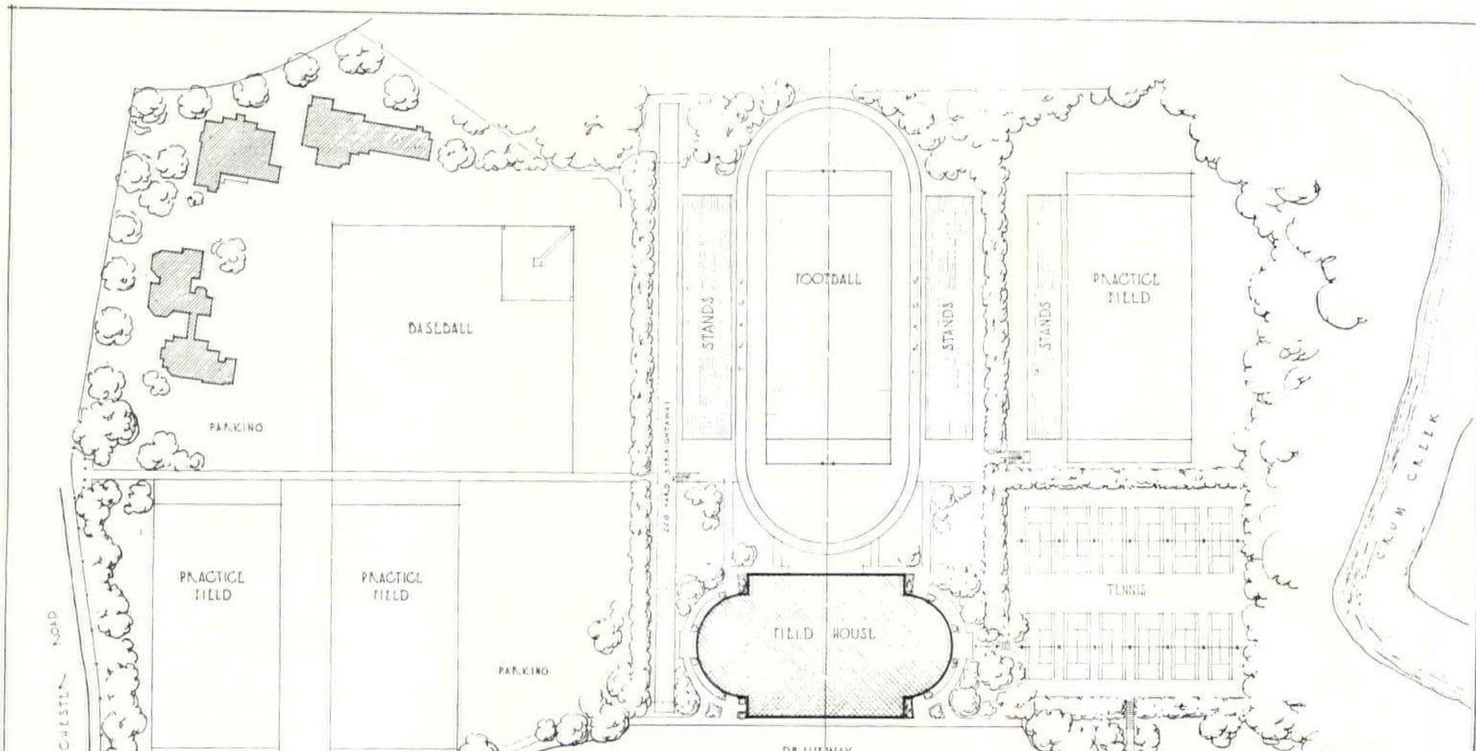
Photograph by de Jongh

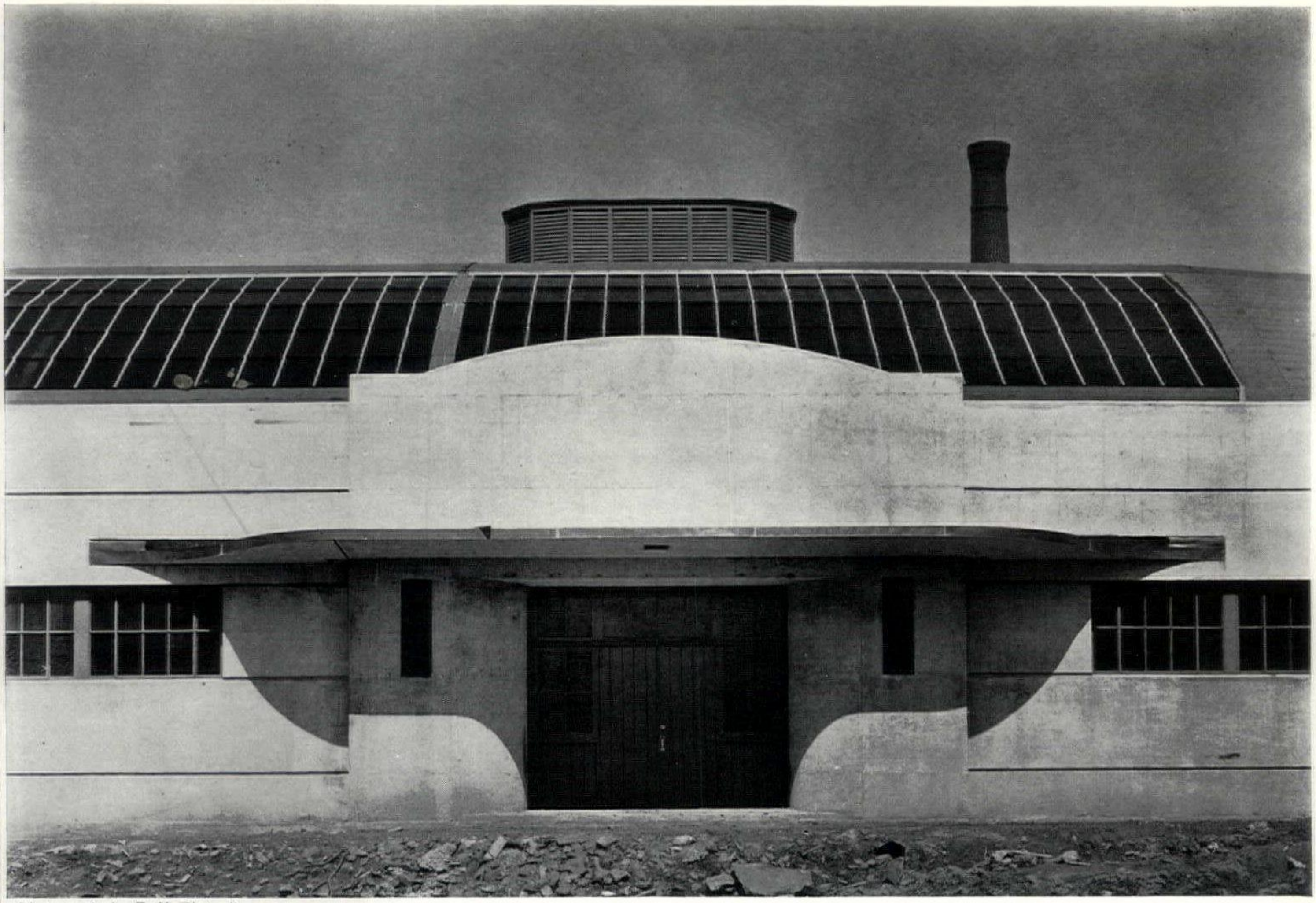
The new Field House at Swarthmore College is "modern," both in plan and in exterior, not because this staid, conservative college has any reason to advertise its wares or to catch the eye by an unusual picture, but rather because the radical plan of the new building represents a strictly logical solution of the problem it was designed to solve. This old Quaker College, nestling in the rolling hills near Philadelphia, has stressed the doctrine that though past conclusions must be learned and digested, it is by this very process that new thoughts, more valuable because of their legitimate parentage, will be produced. Expression of the new thoughts will take its own sane form when the basis is solid.

Swarthmore has no need or desire for the stadium effect, but has instead stressed outdoor sports in natural surroundings. Comprehensive plan studies were made several years ago for the future campus development. More space was needed for college buildings as well as additional fields for athletic sports. Accordingly, in developing the comprehensive plan here shown, advantage was taken of other college land to the south of the campus. The new tract required careful study as the ground was quite hilly and uneven. However, this extreme contour variation was turned to advantage, for three major levels were determined on, and the result produces a most unique and unusual athletic field development.

On the highest of these three levels were located the baseball field and two practice fields for lacrosse, football, hockey and other outdoor sports. Plenty of space for parking was found. Five feet lower was placed the football field while the Field House was kept to the upper level, with its cross axis on the field. Ten feet lower than the field were located the tennis courts and another practice field. From the level of the courts the ground drops off rapidly through the woods to the beautiful Crum Creek.

This disposition of levels based on the economic use of cut and fill will produce an unusual result. The slope of the





Photographs by E. V. Wenzell

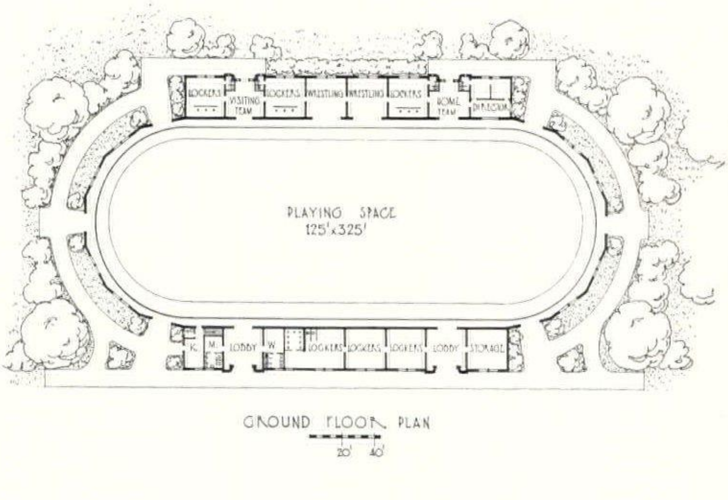
ENTRANCE DETAIL

terrace on the east side of the field will produce a natural grandstand—the permanent grandstand will be on the west and the whole field and Field House will be surrounded by trees. This latter is made possible by an endowment from Scott Foundation for horticultural study and landscape development. One phase of this operation has been the continuous planting of trees and foliage about the College buildings and campus, so that the atmosphere of the whole group will have little in common with the usual cold college athletic set-up.

A great deal of study and experimentation were devoted to development of the exterior concrete walls. Concrete was used for economy, but the last thing desired was the usual typical gray uninteresting wall or a painted surface. The strong horizontal lines in the external walls were obtained by inserting wood strips in the forms, but for the forms it was decided to use four-foot wide boards of plywood, care being used to stagger accurately the vertical joints. This latter point was important, for while these vertical joints are relatively small they give an heroic scale to the wall. The surface of the concrete was left as it came from the centering. Extreme care, of course, was required in the pouring.

Color here seemed to be out of the question when the cost of the manufactured pigment was considered. But after weeks of experimenting, with the assistance of Mr. McMullin, Research Engineer of the Cement Manufacturers' Association, a simple method was developed and used. Instead of a manufactured pigment that could not be afforded there was discovered within trucking distance a highly colored clay; experiments developed the formula for the mix and a rich pink buff integral color was obtained with very little quantity of the clay and no detriment to the strength of the concrete. The result was highly successful. The same color was used throughout the interior concrete walls as well. For the roof covering of felt, a rich maroon was selected and the same maroon was used for painting the few bits of wood or metal on the exterior.

The result of this intensive study was a building that cost approximately ten cents a cubic foot.



GROUND FLOOR PLAN

Photographs by E. V. Wenzell

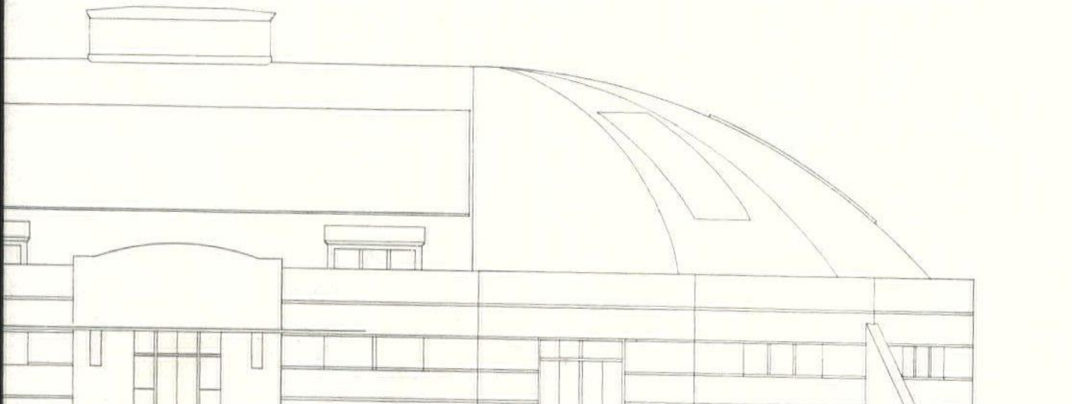
FIELD HOUSE **SWARTHMORE**

COLLEGE

SWARTHMORE, PENNSYLVANIA

KARCHER AND SMITH, ARCHITECTS

ROBERT E. LAMB
DESIGNER



ELEVATION

Photographs by E. V. Wenzell

FIELD HOUSE SWARTHMORE

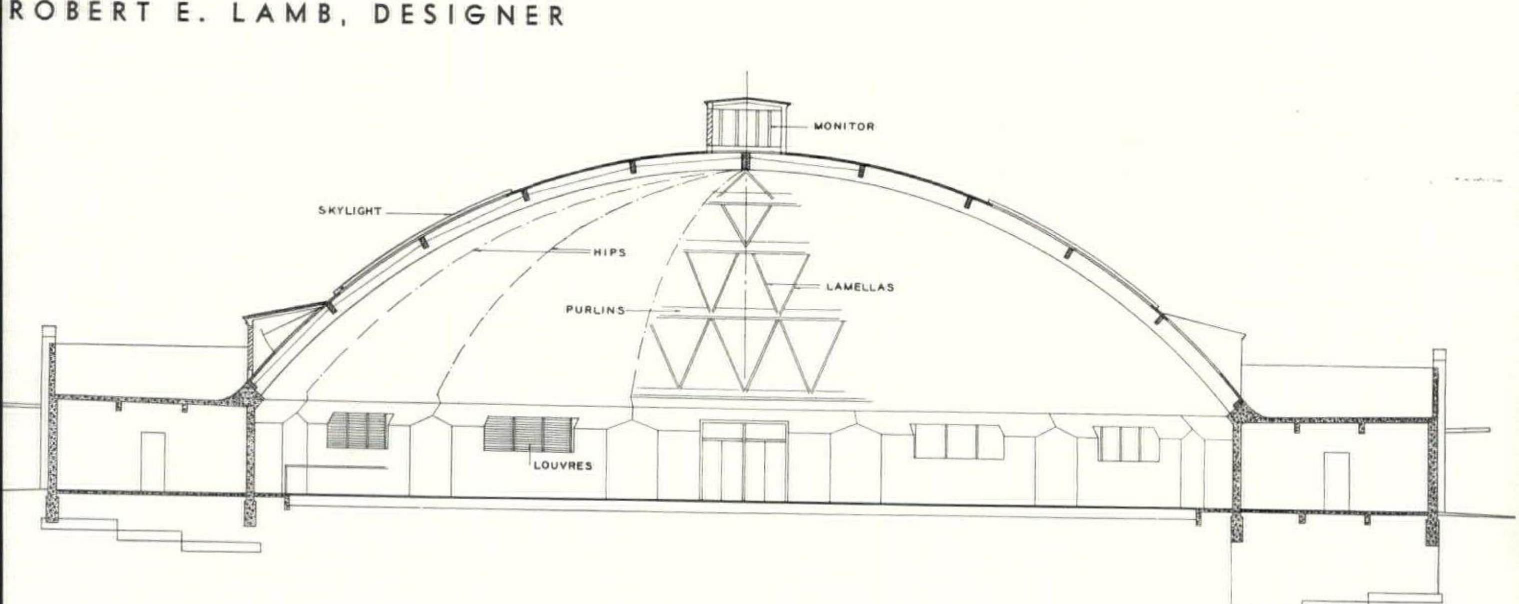
KARCHER AND SMITH, ARCHITECTS

The Field House contains a running track; a wooden floor for tennis, basketball and other sports requiring a hard floor; and a dirt floor for baseball, lacrosse, soccer and football practice; a roof high enough (and unencumbered with trusses) for batted balls, together with all accessory rooms required for wrestling, boxing, fencing, and team dressing rooms. These requirements fixed the size and disposition of the plan.

The plan thus provides a clear playing space, one hundred and twenty-five feet wide and three hundred and twenty-five feet long. This gives a running track of one-seventh of a mile. If used as an assembly hall, this area will accommodate 6,000 persons. The height, clear of all obstructions is forty-one feet. Ample daylight without sun glare is obtained through the use of amber corrugated glass covering an area equivalent to 25 per cent of the floor area. All walls are of reinforced concrete, the cross walls between the small side rooms being utilized to take the thrust of the roof arches. This roof construction is a modern development in the use of straight I-beams, riveted at slight angles to form the great arc of the roof. By this method trusswork is eliminated and greater height and grace achieved. The Arch Roof Construction Co., Inc. New York, is the sole U. S. Licensee of the patents covering this type of construction.

COLLEGE **SWARTHMORE, PENNSYLVANIA**

ROBERT E. LAMB, DESIGNER

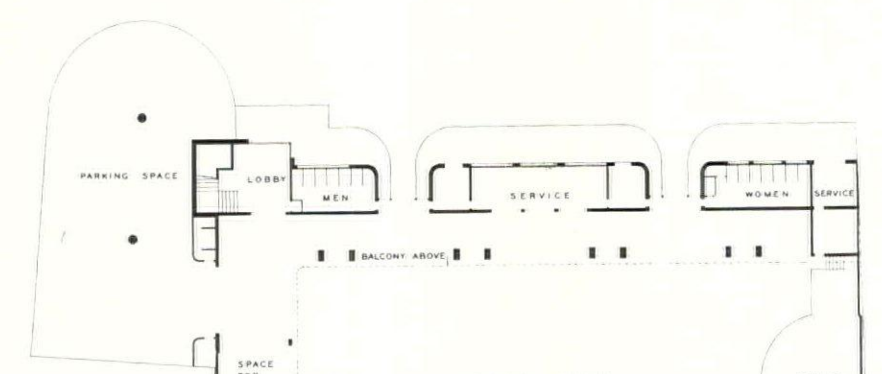


CROSS SECTION AT CENTER

Photographs by de Jongh

COVERED MARKET AT VEVY, SWITZERLAND

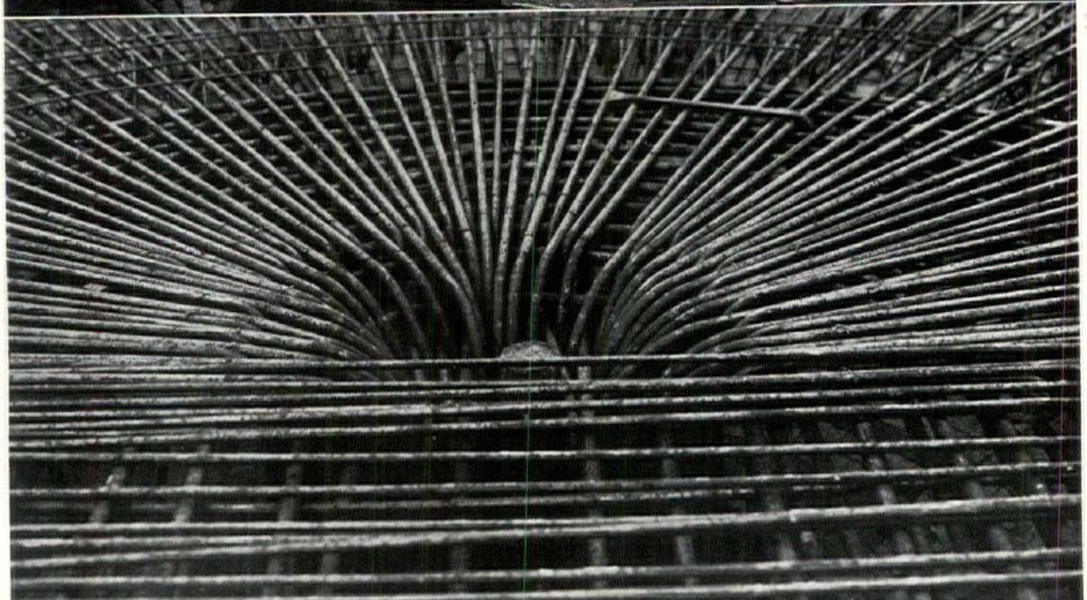
TAVERNEY, SCHOBINGER & GETAG
ARCHITECTS



A modern ferroconcrete structure recently completed in the center of the old city of Vevey. Besides being completely equipped for a public market, provisions are made for its conversion to any public use, such as wine fairs, concerts, dances, sporting events. Opening off the balconies on the second floor are a series of exhibition rooms. Perhaps the most interesting feature of the building is the fact that it is so designed and constructed that at any later date up to fifty apartments may be built on top of it.


RESTAURANT

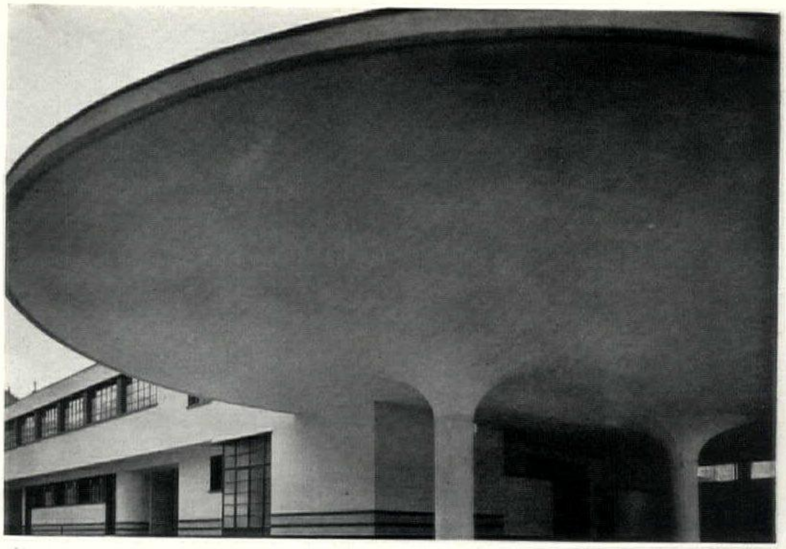
1



2

3

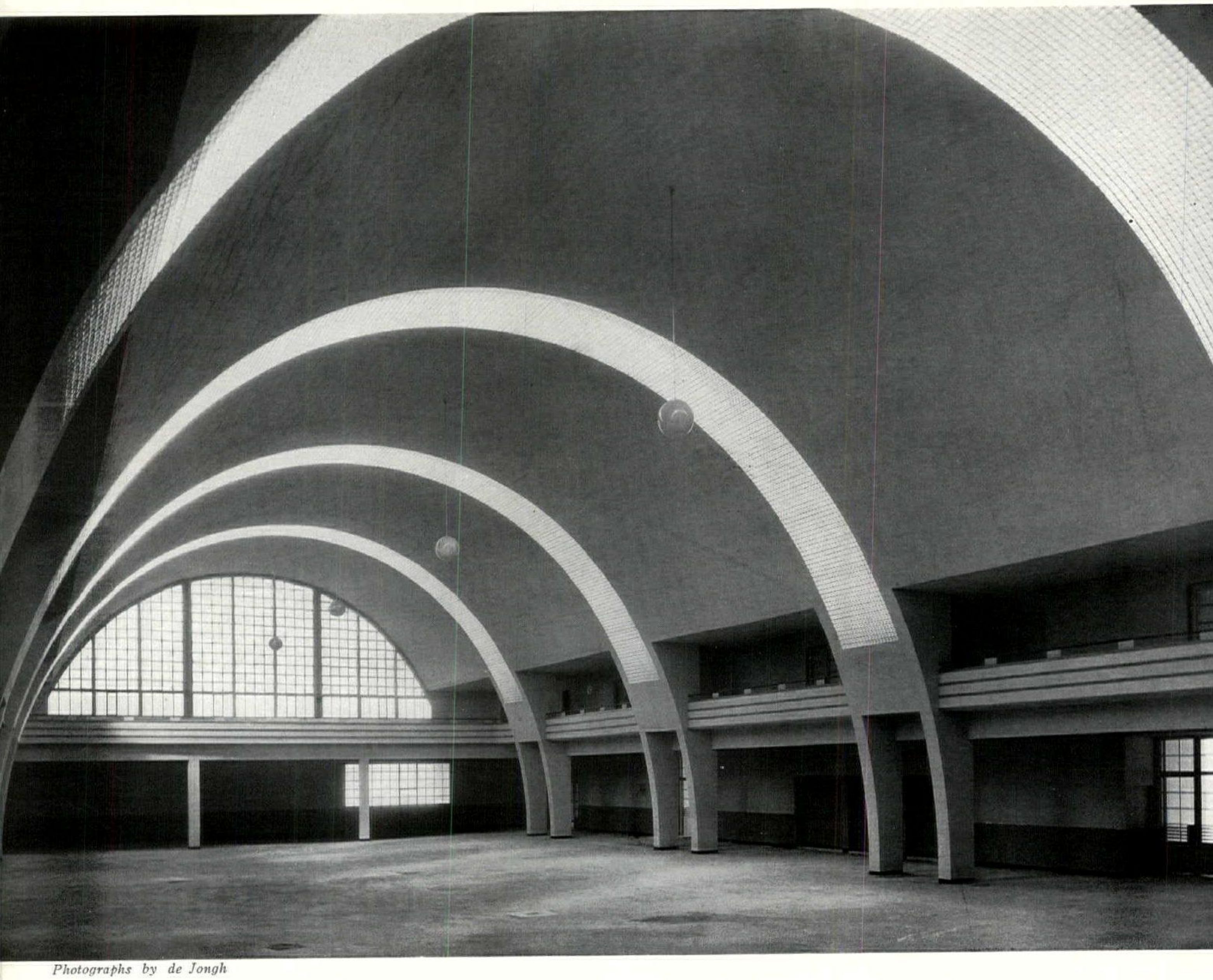
1 M. Sarrazin, Brussels engineer, was consultant on all concrete work. The parabolic arches of the Great Hall were cast in three separate sections by the use of special movable scaffolding. **2** Detail of the cantilevered vehicle shelter, showing care with which reinforcing was designed and placed. **3** Vehicle shelter ready for pouring. The entire structure reveals the accuracy and brilliance with which the concrete was handled; important economies were achieved by close figuring of the smallest structural detail.



TAVERNEY, SCHOBINGER & GETAG
ARCHITECTS

The provisions for in and out traffic are exceptionally well handled, vehicular traffic using one side, pedestrian traffic the other. Market stalls are provided under the porch of the opposite side, while larger merchants, requiring trucking, use this entrance to the Great Hall.

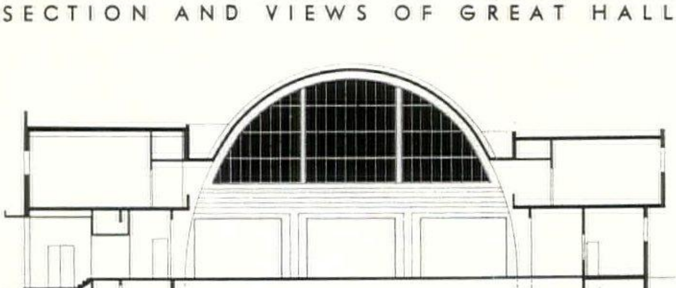
Photographs by de Jongh

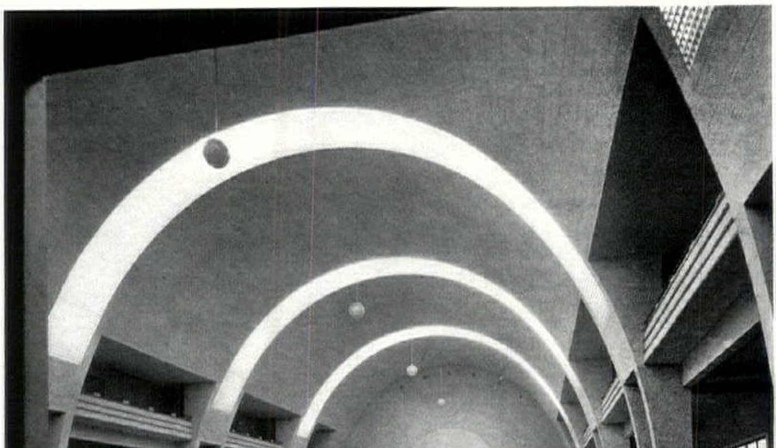


Photographs by de Jongh

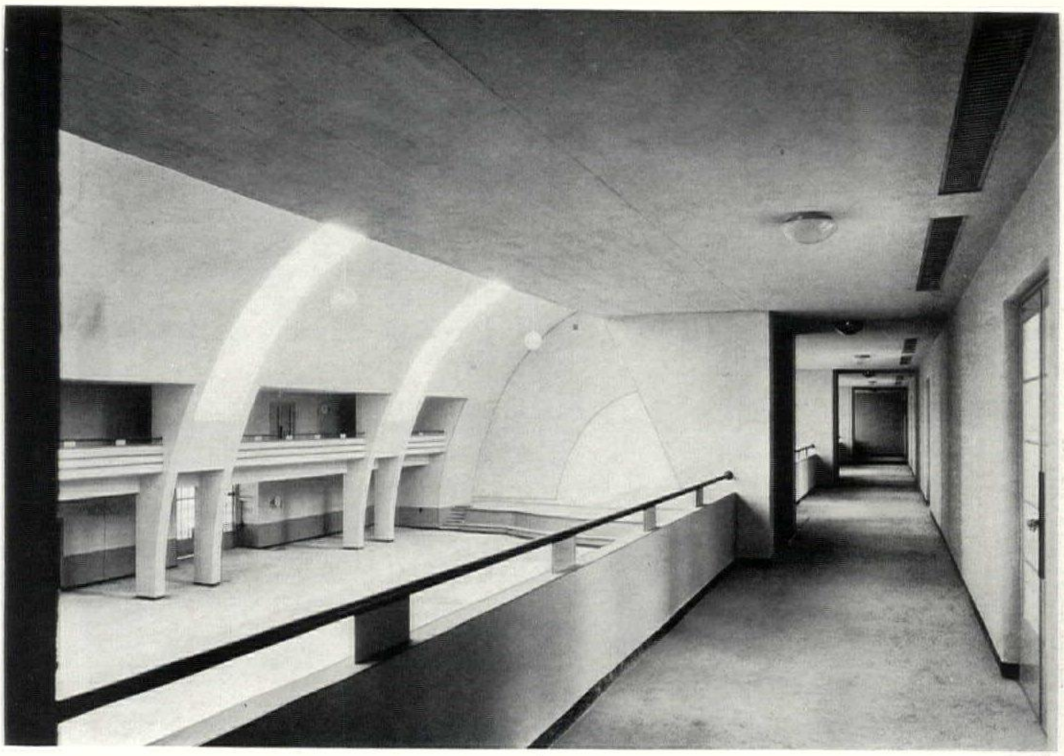
COVERED MARKET **VEVEY, SWITZERLAND**

SECTION AND VIEWS OF GREAT HALL





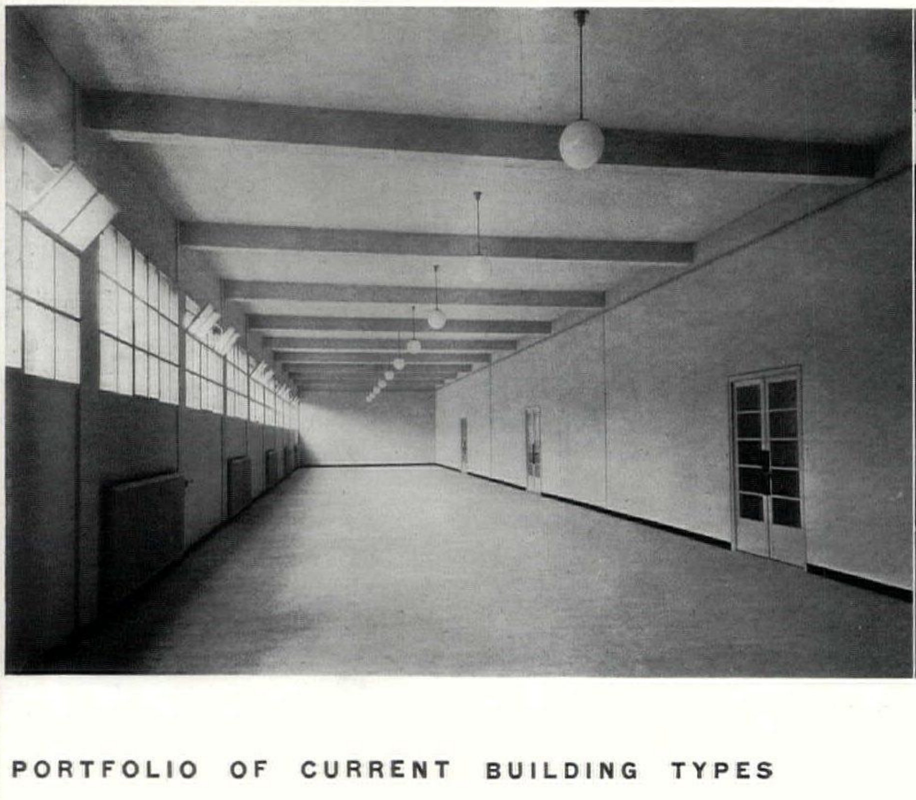
TAVERNEY, SCHOBINGER
& GETAG, ARCHITECTS



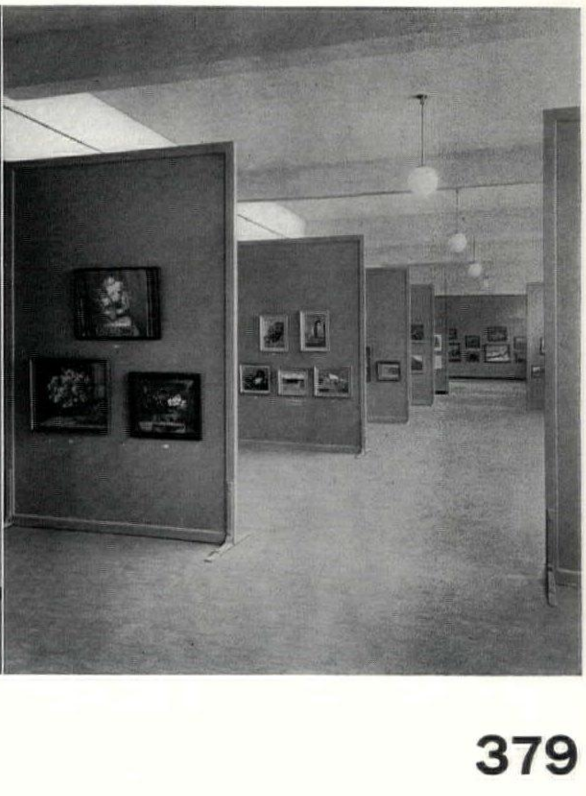
EXHIBITION ROOMS OPEN OFF THESE GALLERIES

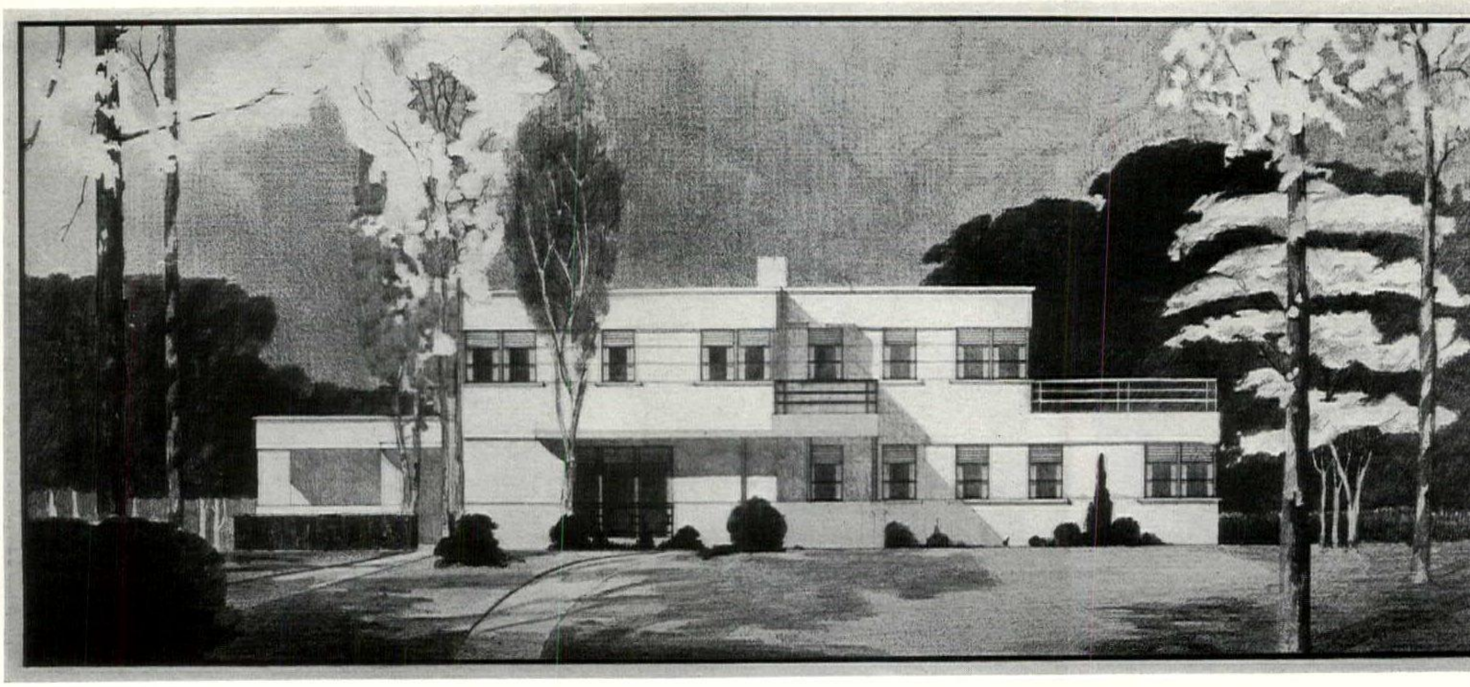
The Great Hall is ingeniously lighted by means of translucent slabs placed inter-axially between the twin arches; this lighting is completed by the large window at the end of the hall. Off the galleries on both sides of the hall open exhibition spaces which can be converted into a wide variety of shapes.

EXHIBITION ROOMS ARE WELL LIGHTED . . .



AND READILY CONVERTIBLE



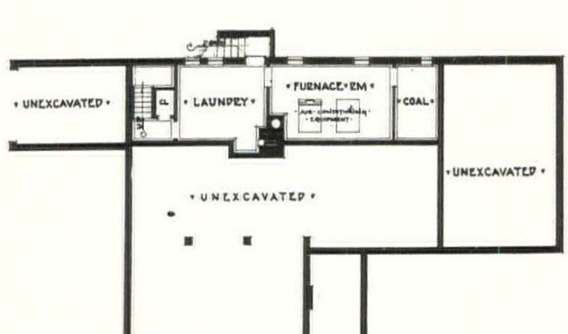


HOSPITAL FOR DR. W. A. BOYSON
MECHANICSBURG, PA.

EDMUND G. GOOD, JR., ARCHITECT

· SECOND · FLOOR · PLAN ·

· FIRST · FLOOR · PLAN ·

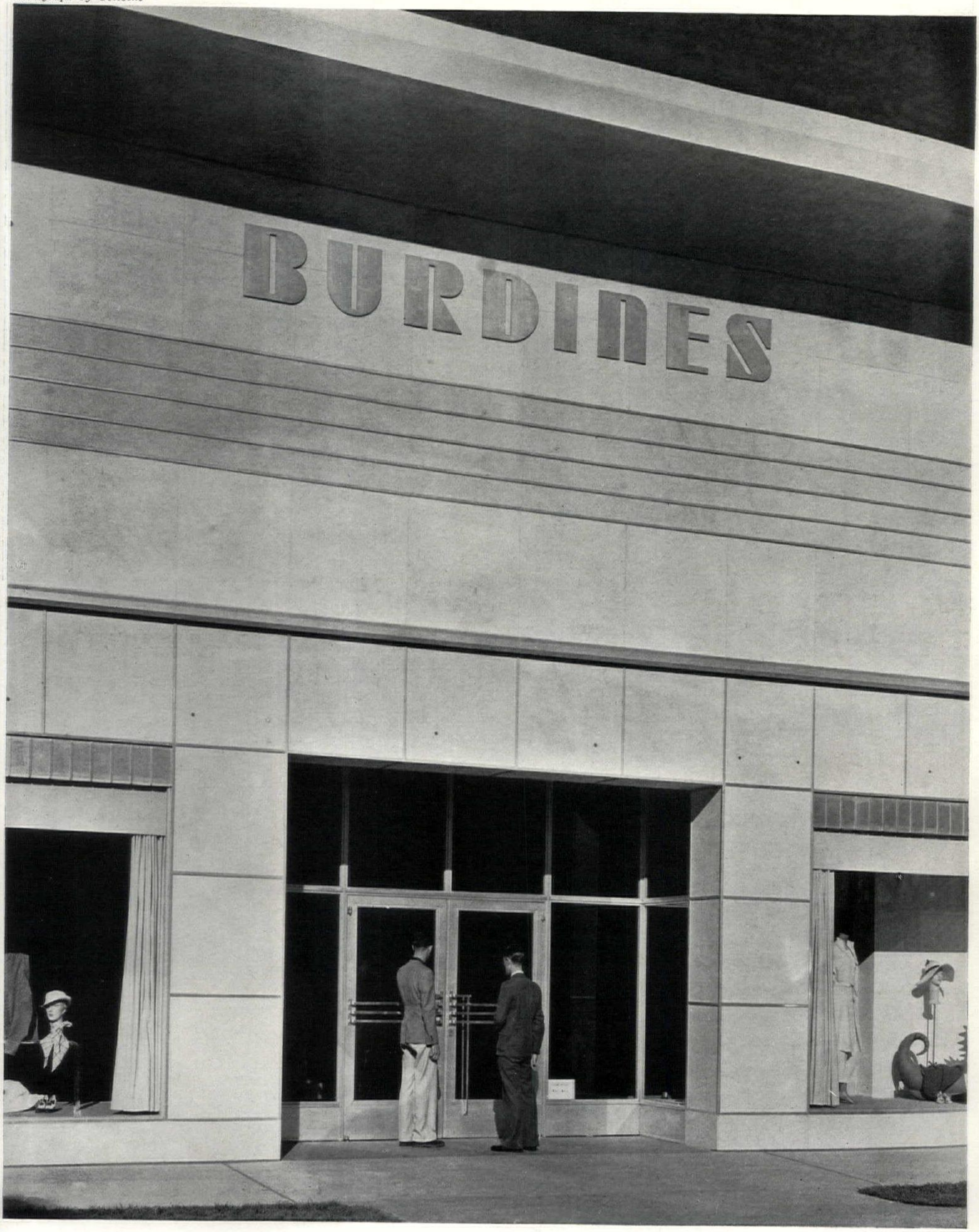


· BASEMENT · PLAN ·

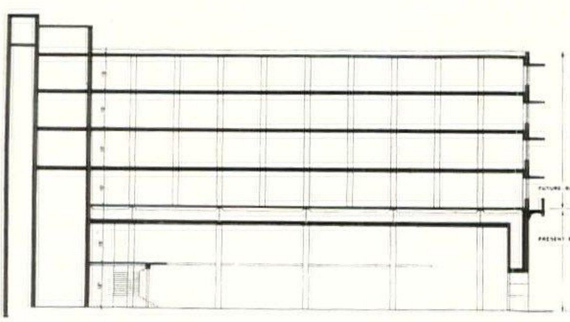
A small private hospital designed for Dr. William A. Boyson of Mechanicsburg, Pa., to meet the varied demands made upon a physician in a small town, the center of an agricultural region which is ten miles from the nearest general hospital. It was required that the plant be operated with a minimum of help. Parking was no problem, as an entire half block, with streets on two sides and an alley on the third, was available for the building. To eliminate an office girl, patients are directed to the waiting room from the porch and find chairs placed so that the door to the Doctor's office is in view. They enter the office in turn at the ring of a buzzer, and depart through the side door. The admission room for the hospital, almost directly off the garage drive, is readily accessible for emergency cases. Fourteen beds are available in private rooms and wards. Living quarters for Dr. Boyson and his family are on the second floor, entirely separated from the medical and hospital division of the building. Ample decks compensate for any lack of ground level outlets.

ROBERT LAW WEED ARCHITECT

Photograph by Gottscho



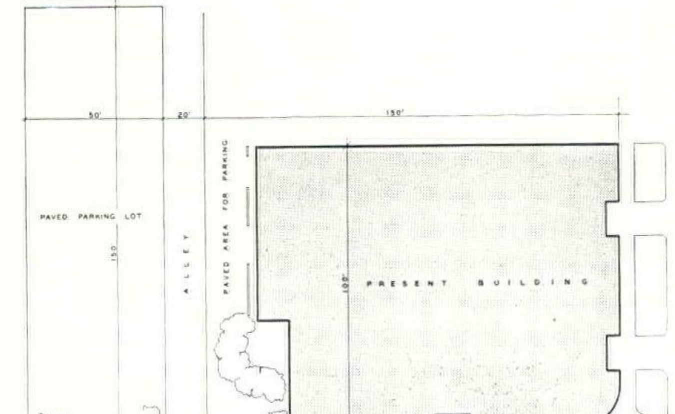
Photographs by Gottscho



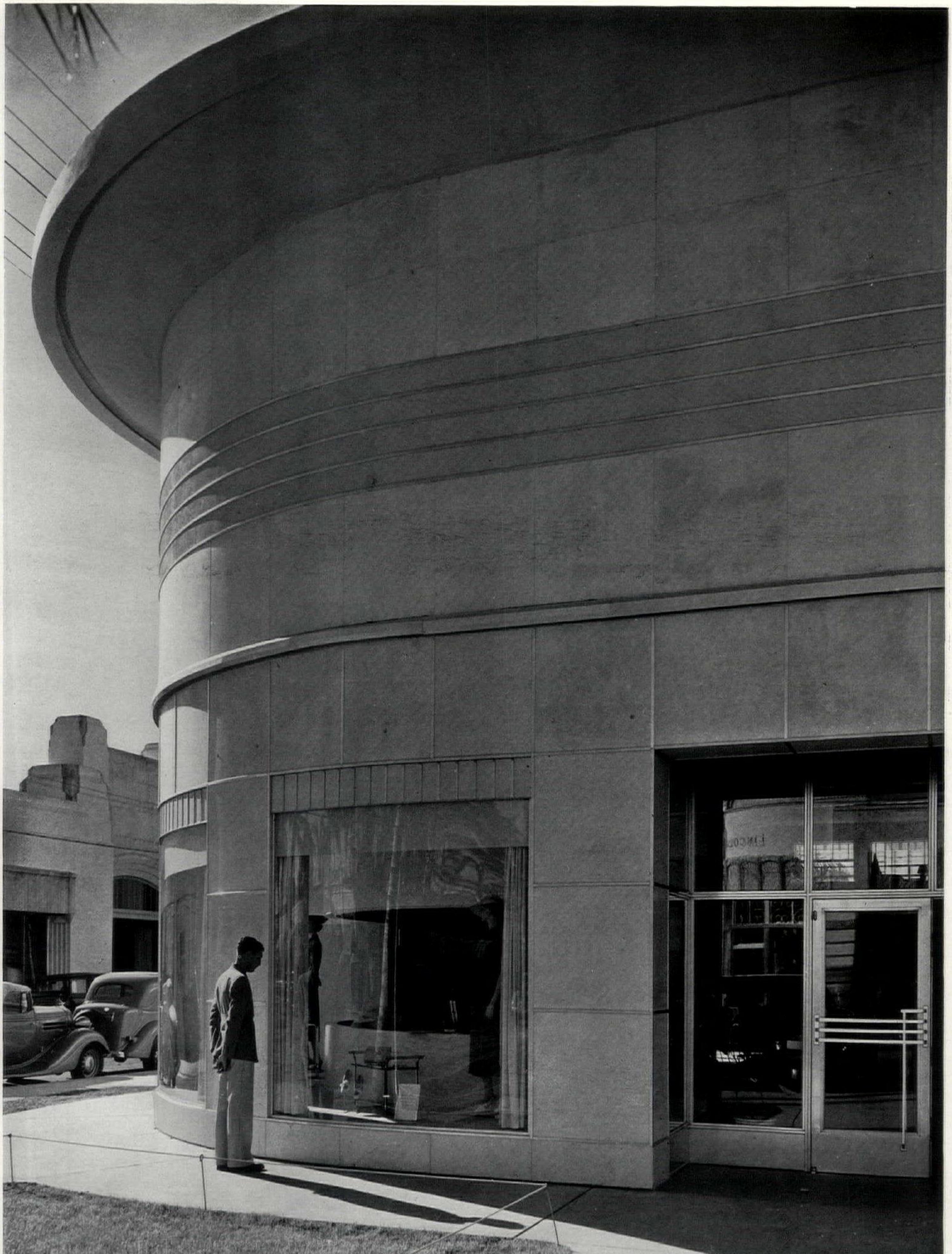
SECTION SHOWING PRESENT STRUCTURE WITH PROPOSED ADDITIONS

BURDINE'S — MIAMI BEACH, FLORIDA

ROBERT LAW WEED
ARCHITECT



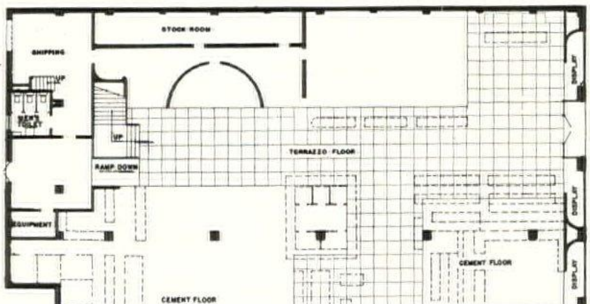
The owner desires the building to accommodate the tenant's present business as fully and completely as possible but, at the same time, increased land value or a necessity for expansion on the part of the tenant may require additional floor area; or, at the termination of the lease, a different division of the ground floor area may be desirable. Air conditioning may be required for additional floors, also elevators. Additional floors may be used for offices, or for store space, or even for living quarters.



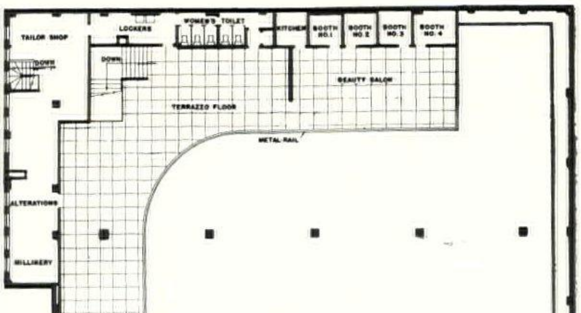
Photographs by Gottscho

BURDINE'S **MIAMI BEACH, FLORIDA**

ROBERT LAW WEED
ARCHITECT



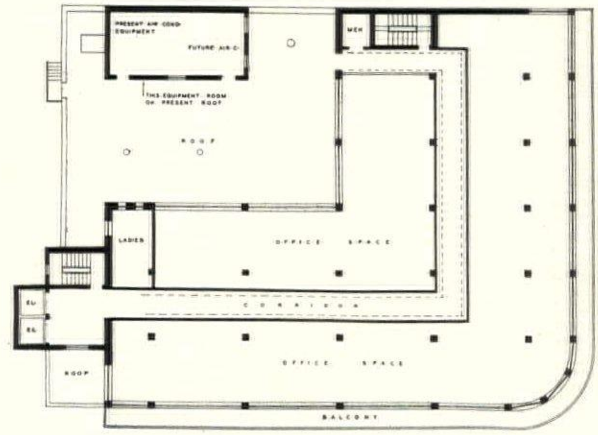
FIRST FLOOR PLAN



SECOND FLOOR PLAN

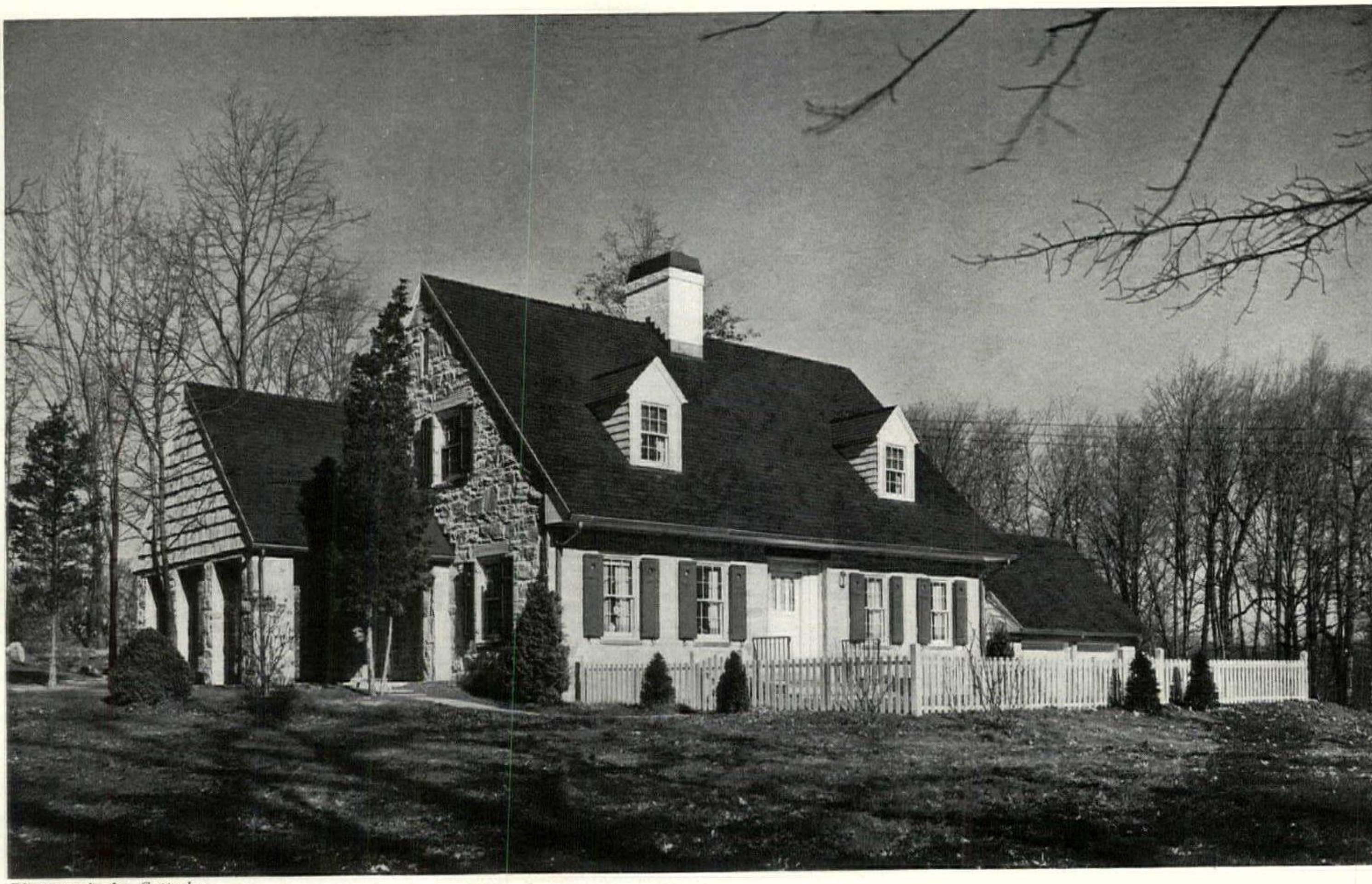
ROBERT LAW WEED
ARCHITECT

The tenants desired a store with a tropical feeling—light, open, cheerful. To achieve this the architect designed the floor plan very carefully. The least desirable floor area for sales purposes, under the mezzanine, is used for fitting rooms, toilets, locker rooms, shipping rooms, and so on. These parts are all fully air conditioned. All partitions, except permanent ones inclosing toilets, equipment room, and second floor workroom, are a part of the store fixtures and are easily removable. No store fixture or case or partition is over 7'0" high, making the whole effect very open.



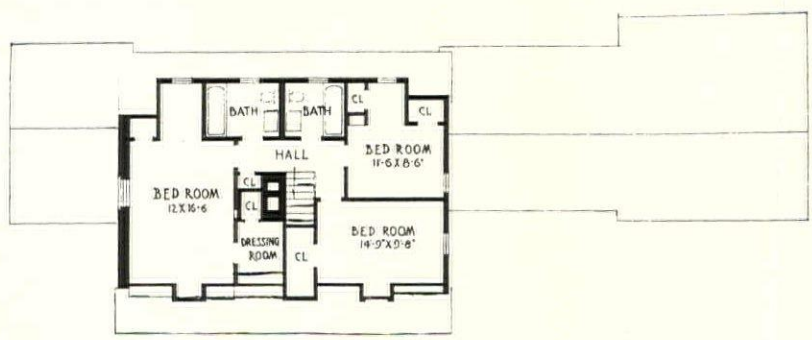
PLAN OF FUTURE VERTICAL EXTENSION

Photographs by Gottscho

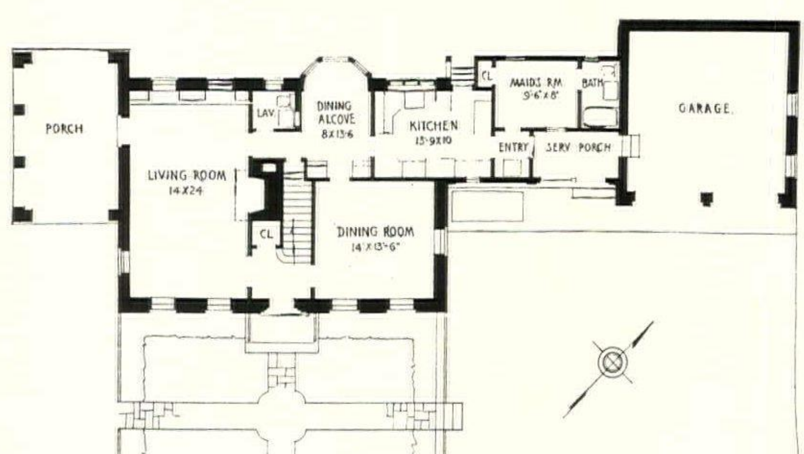


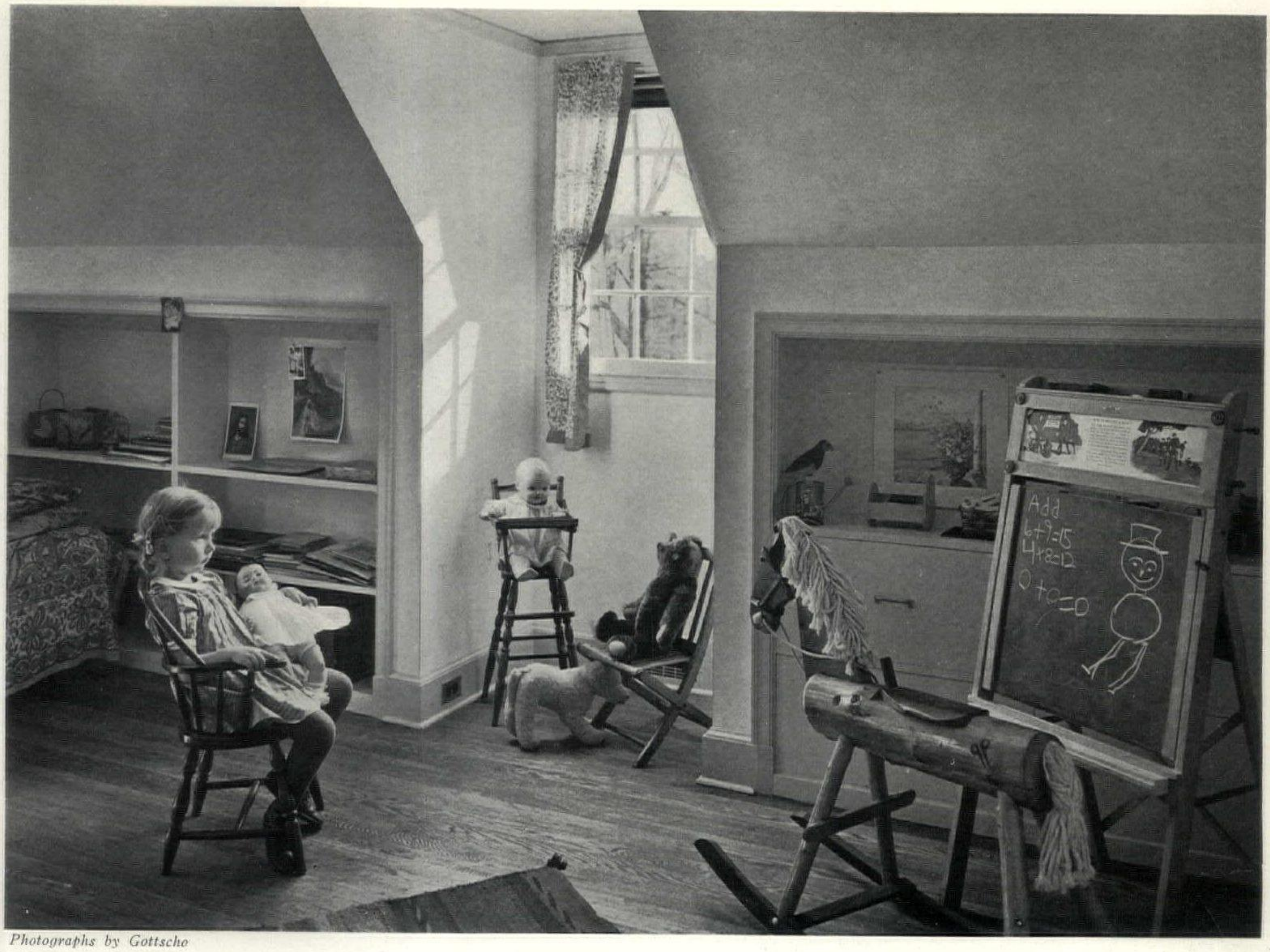
Photographs by Gottscho

RESIDENCE OF STEPHENSON M. BOBIS — DARIEN, CONNECTICUT



WALTER B. KIRBY
ARCHITECT



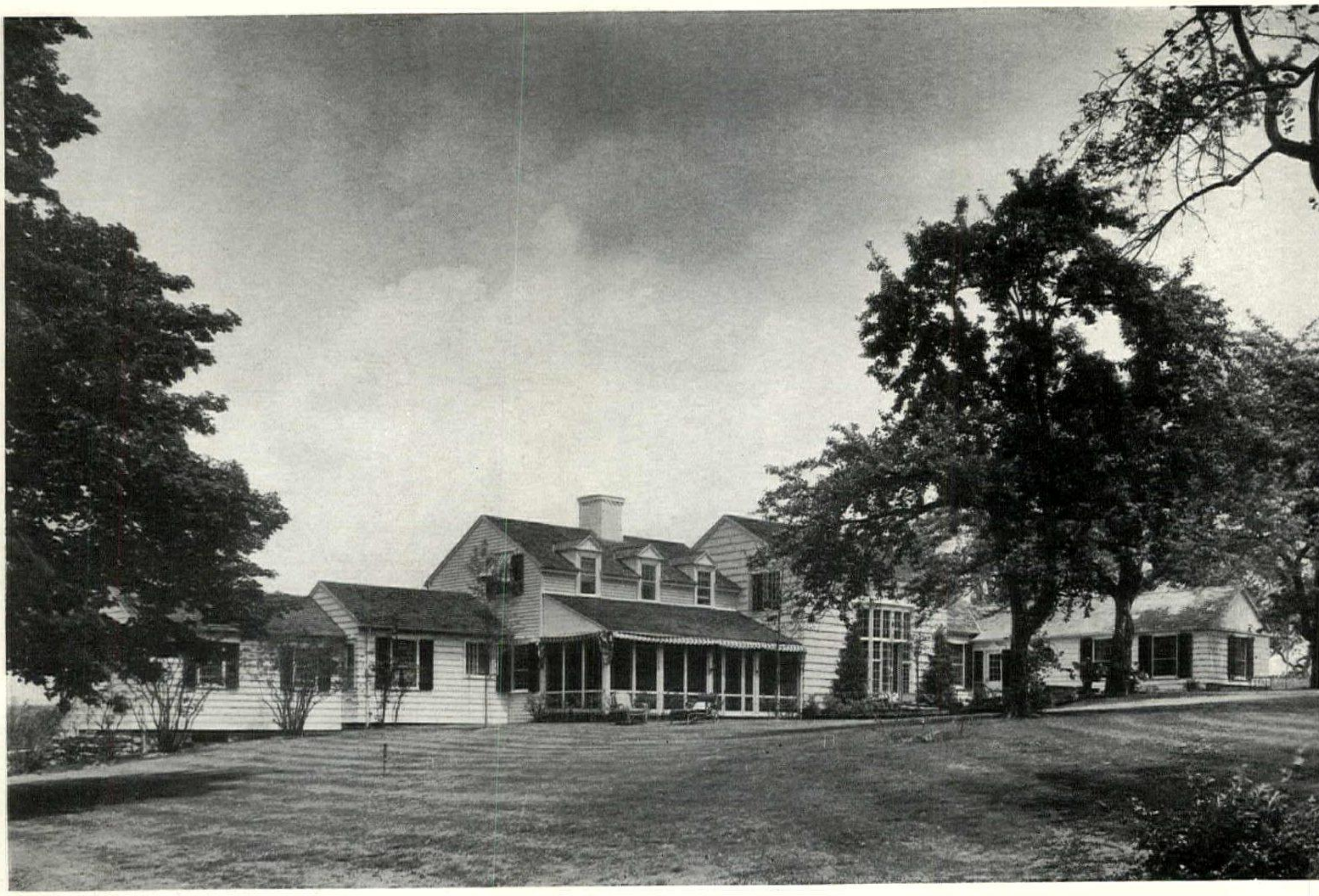


Photographs by Gottscho

RESIDENCE OF STEPHENSON M. BOBIS — DARIEN, CONNECTICUT

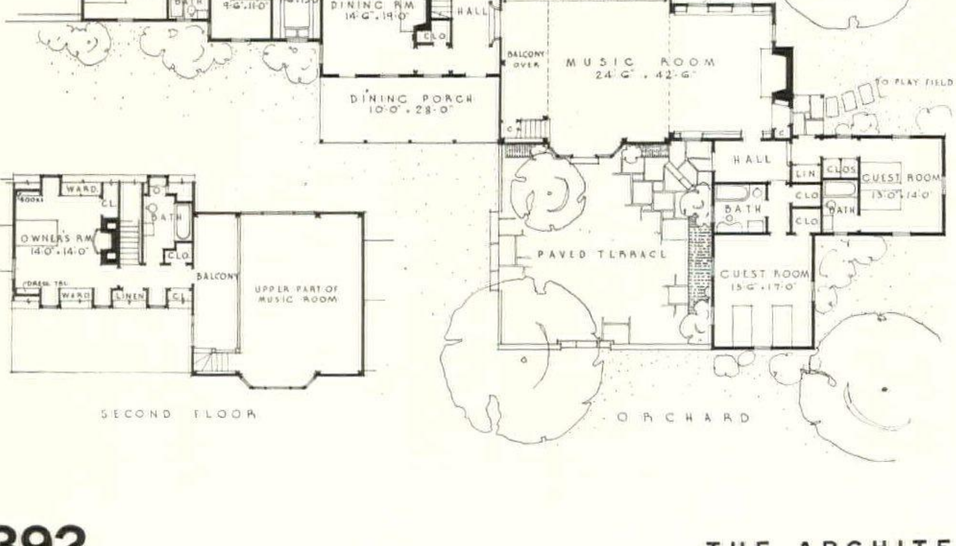
WALTER B. KIRBY
ARCHITECT

Built of native field stone, the entire first floor of this house is of concrete — Floroform precast beams and slabs, and poured footings. All first floor finishes (oak, rubber and asphalt tile) are laid in mastic. The heating is hot air, circulated and humidified. Rockwool insulation is provided in upper story. Double-hung wood sash are used throughout except in basement, where steel sash are employed.

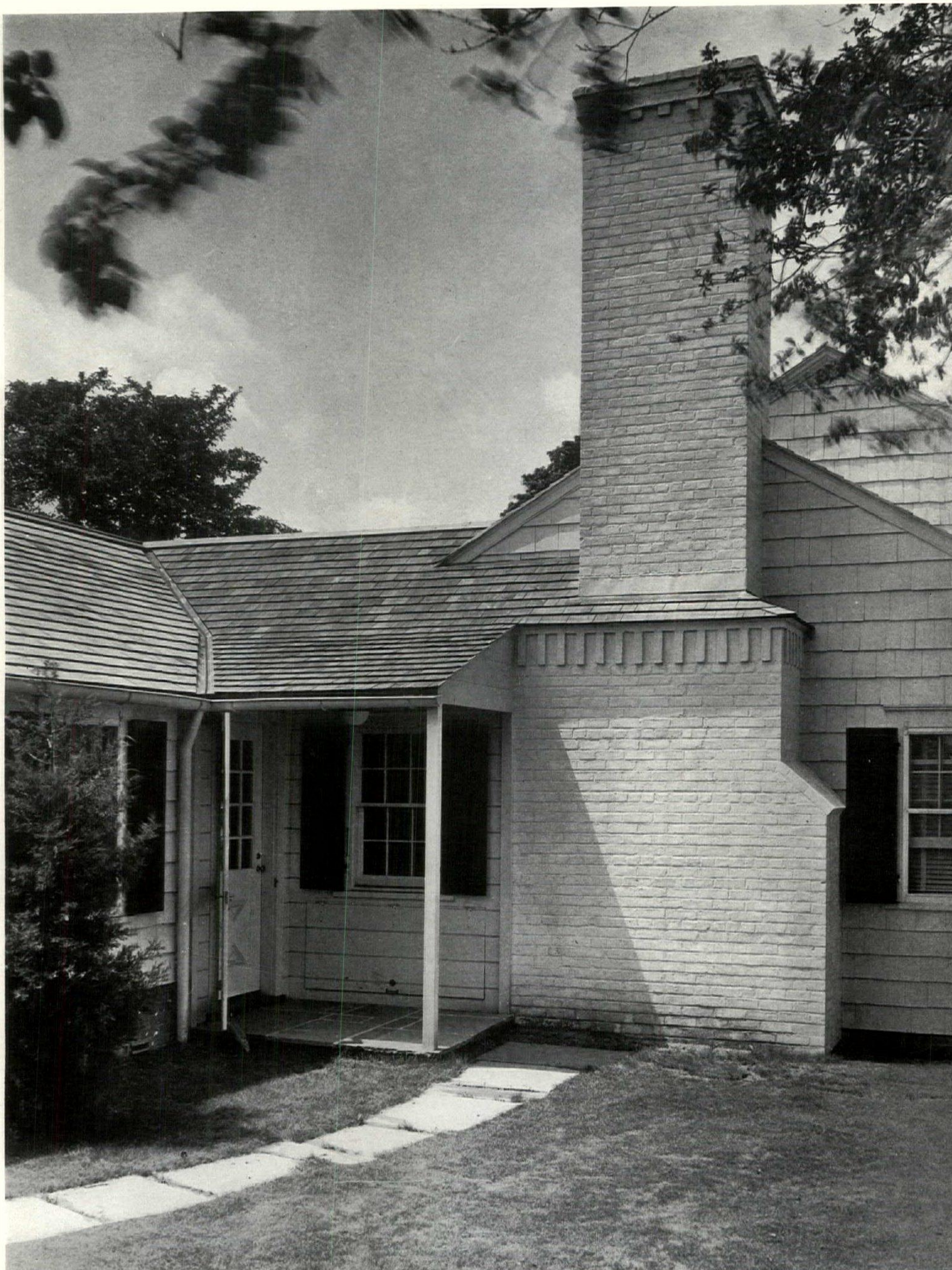


Photographs by Van Anda

COUNTRY HOUSE OF MRS. J. B. CASSERLY WILTON, CONNECTICUT



BURTON A. BUGBEE
ARCHITECT



Photographs by Van Anda

HOUSE OF MRS. J. B. CASSERLY

WILTON, CONNECTICUT

BURTON A. BUGBEE, ARCHITECT

This is a country house on a 32-acre Connecticut hilltop, designed for use in the warmer months and for winter week-ends. Effort was made to secure maximum sunshine and air — all major rooms have three exposures, the music room four. Prevailing summer breezes are from the southwest; views are to the southwest over the Norwalk River valley, and north to the Redding Hills. Immediately south of the house is an ancient apple orchard. The entrance drive is on the north side. The northeast doorway permits guest luggage to be brought in directly from the drive and also gives access to a play field east of the house.

The house was built about an existing barn whose fine oak and pine interior had valuable acoustic properties. This barn, provided with metal casement windows and a balcony, with an extension to the east, became the music room. The extension contains bookshelves, a fireplace and, south of the fireplace, a built-in wood storage cupboard filled from the outside. The exterior of the barn was sheathed with insulating board, cross-furred, and covered with heavy hand-rived shingles.

The rest of the house is conventional frame construction with quilt insulation, plastered interiors, and shingle or siding exteriors. The roof is of wood shingles. Flooring is oak throughout with oak plank, screwed and plugged, in the music room, carpeting in the dining room, and linoleum in kitchen, pantry, servants' hall, and all bathrooms. Kitchen and pantry cupboards are steel, with monel metal sinks and counter tops. In the owner's bedroom, the only room on the second floor, the space under the eaves between dormers is utilized by built-in wardrobes, sliding trays, dressing table, and shoe cupboards.

The basement, fully excavated only under the western half of the house, contains a one-car garage, laundry, wine cellar, storage, and boiler room. Heating system is by two-pipe steam, oil burner, with concealed radiation in all principal rooms. All piping is brass and copper. On another portion of the property are a chauffeur's cottage, and a four-car garage.

The house was built in 1934 at a cost of approximately 30¢ a cubic foot.

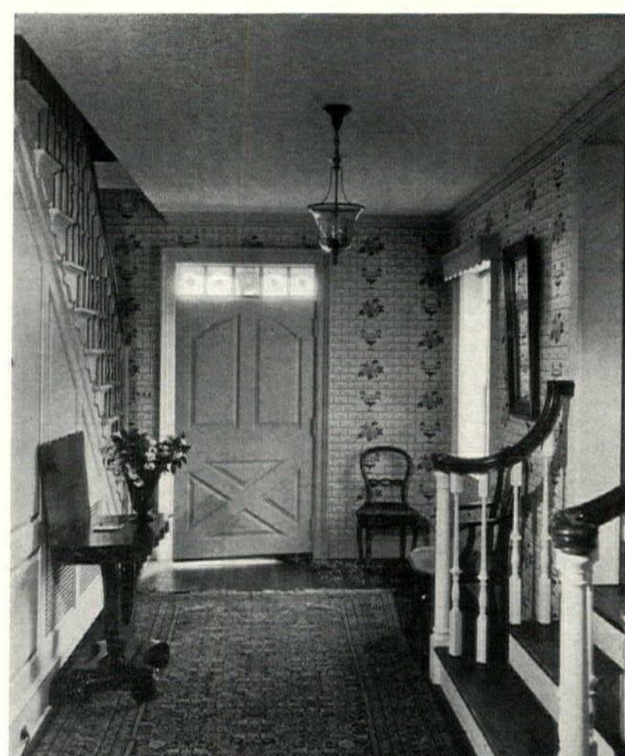
Photographs by Van Anda

Above: FIREPLACE END OF MUSIC ROOM

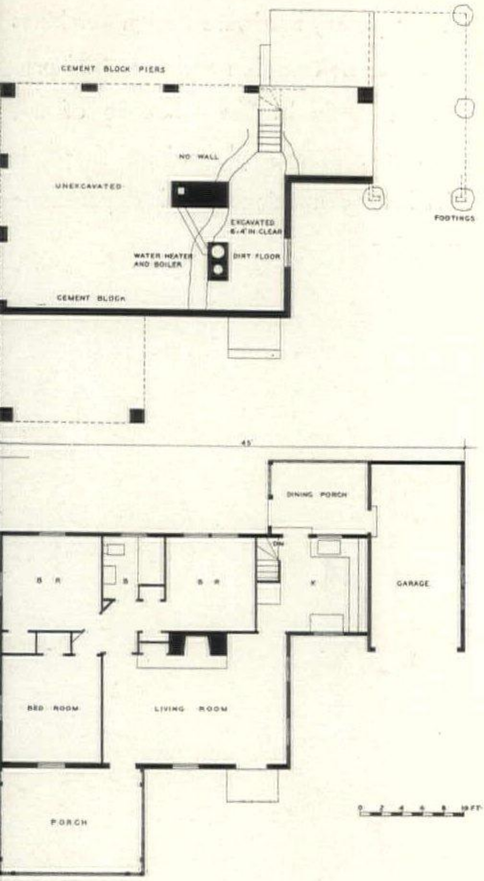
HOUSE OF MRS. J. B. CASSERLY

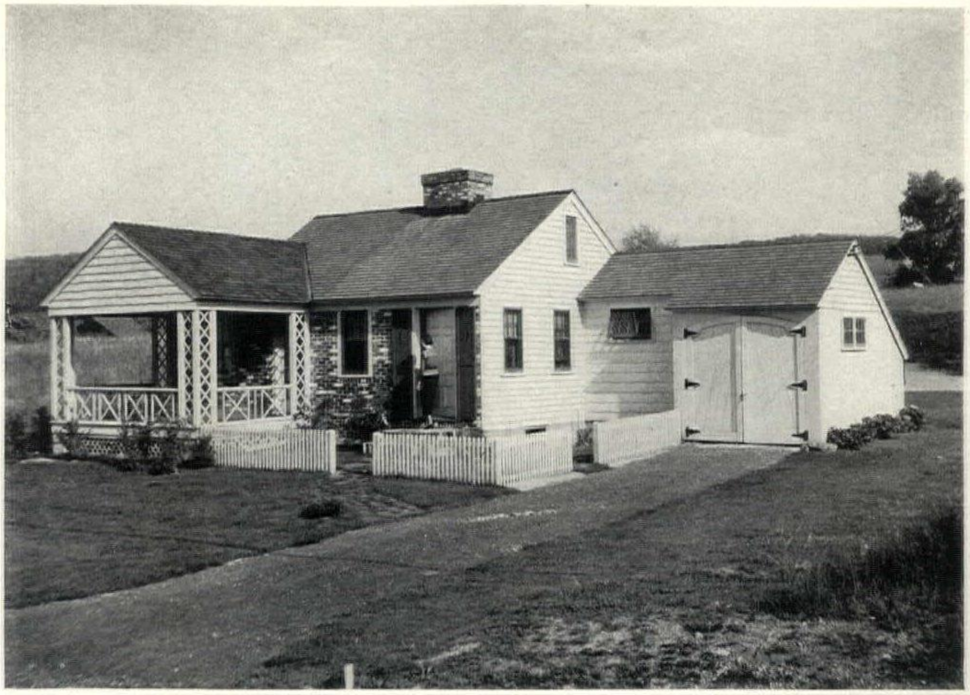
WILTON, CONNECTICUT

BURTON A. BUGBEE
ARCHITECT



Right: ENTRANCE HALL WITH MUSIC ROOM STEPS AT RIGHT



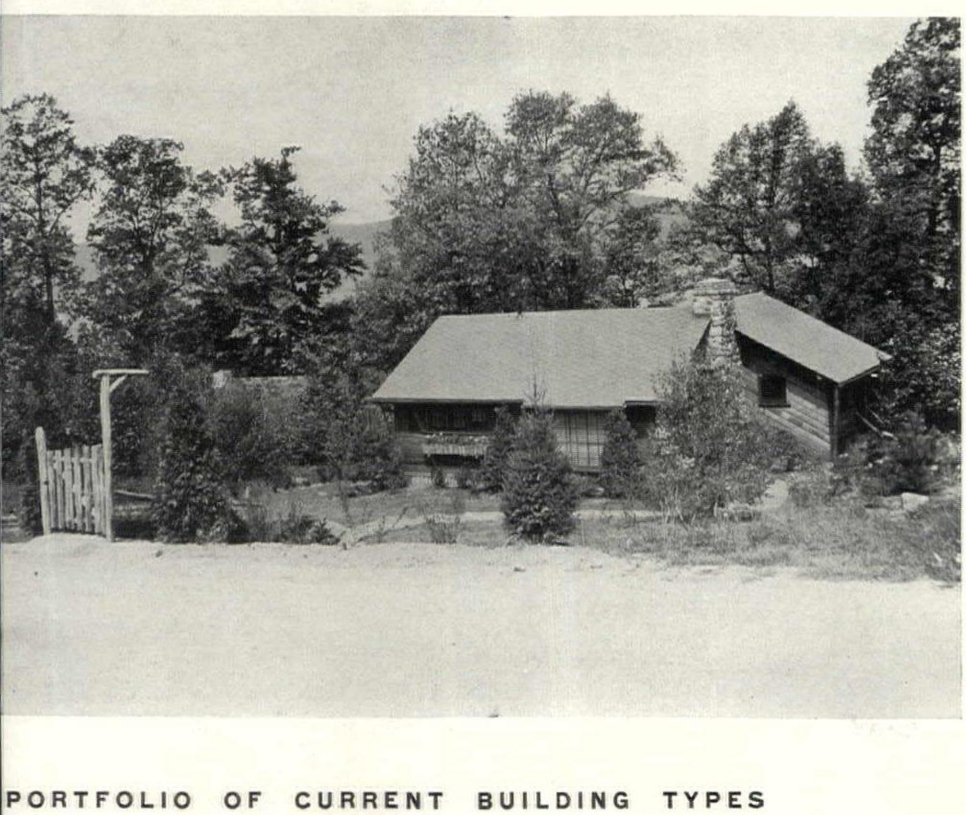


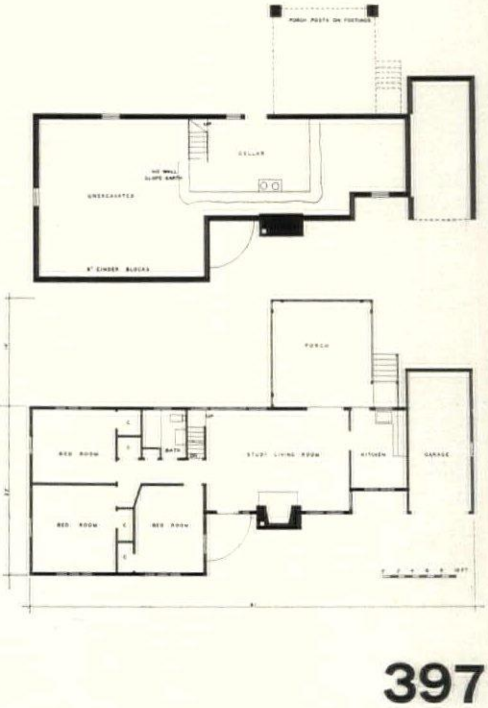
COTTAGE OF R. M. HAUCK

TWO COTTAGES AT LAKE MOHAWK SPARTA, NEW JERSEY

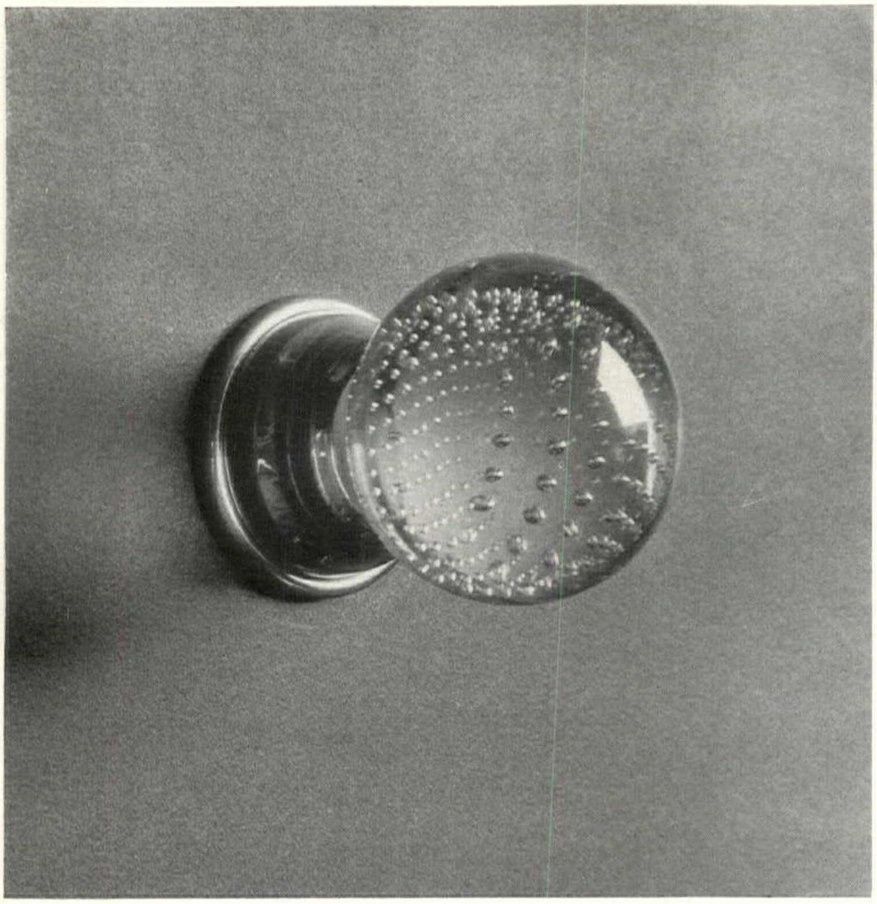
EDWIN R. CLOSS
ARCHITECT

COTTAGE OF J. H. GLOVER



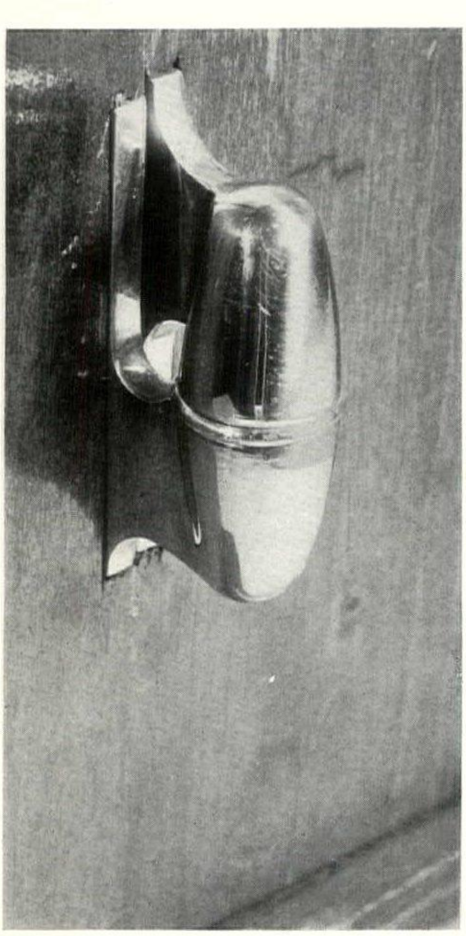


Contemporary hardware design combines influences of tradition and industrial production methods. The influence of use is evident in examples where shape is suited to convenience and dependable operation.

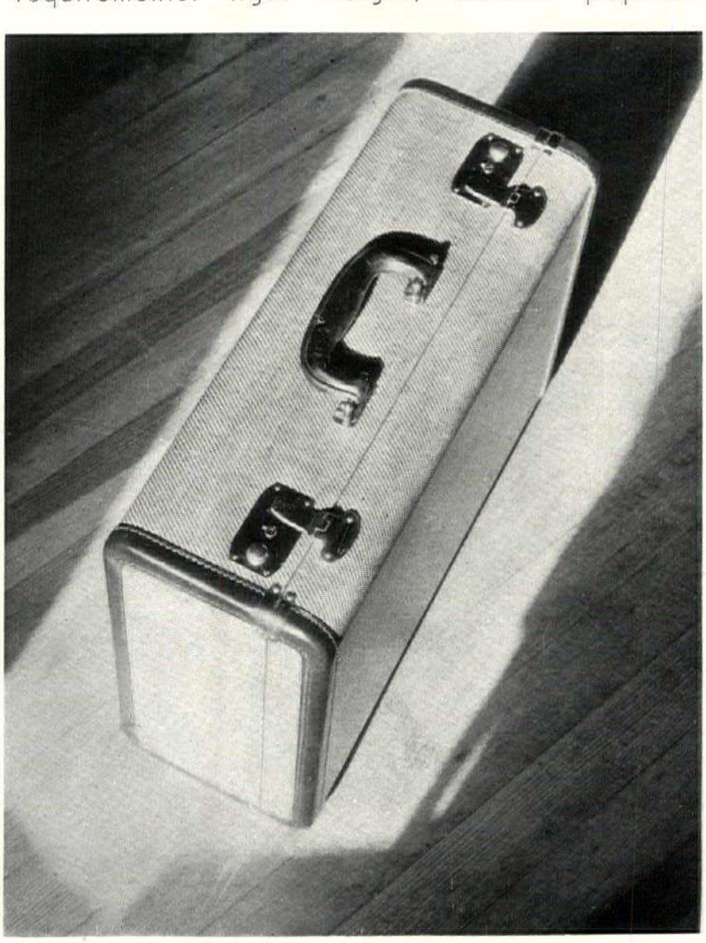


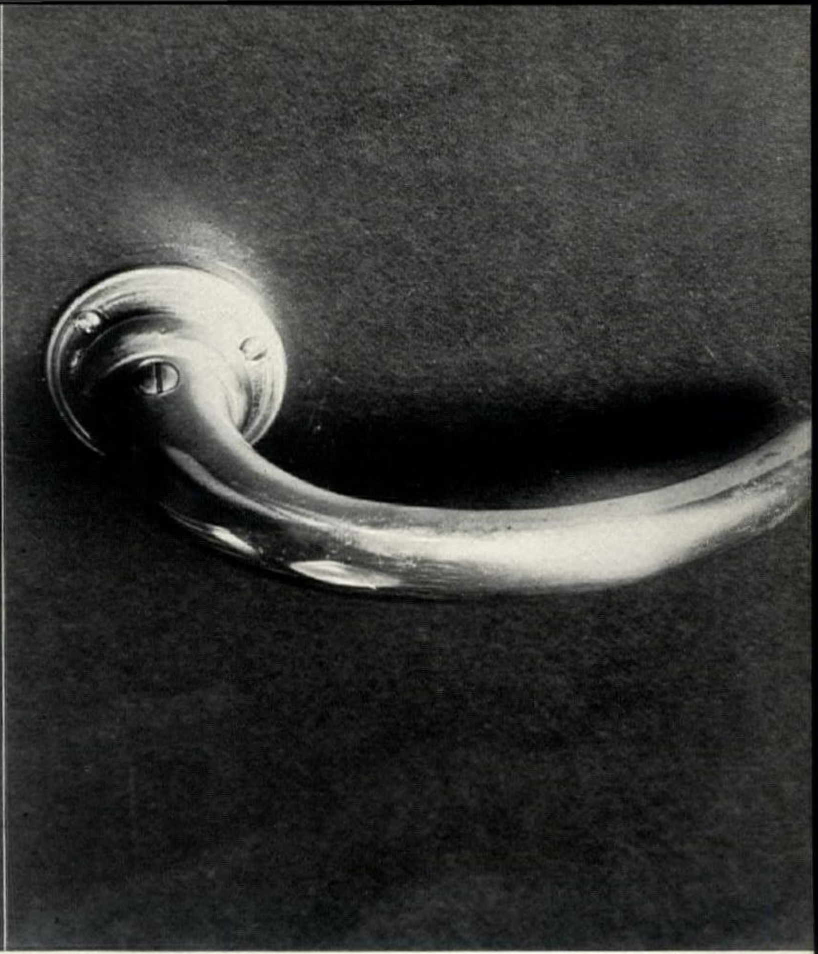
Glass door knob of special design.

Olive hinge.



Luggage hardware has been influenced by travel requirements: light weight, minimum projection

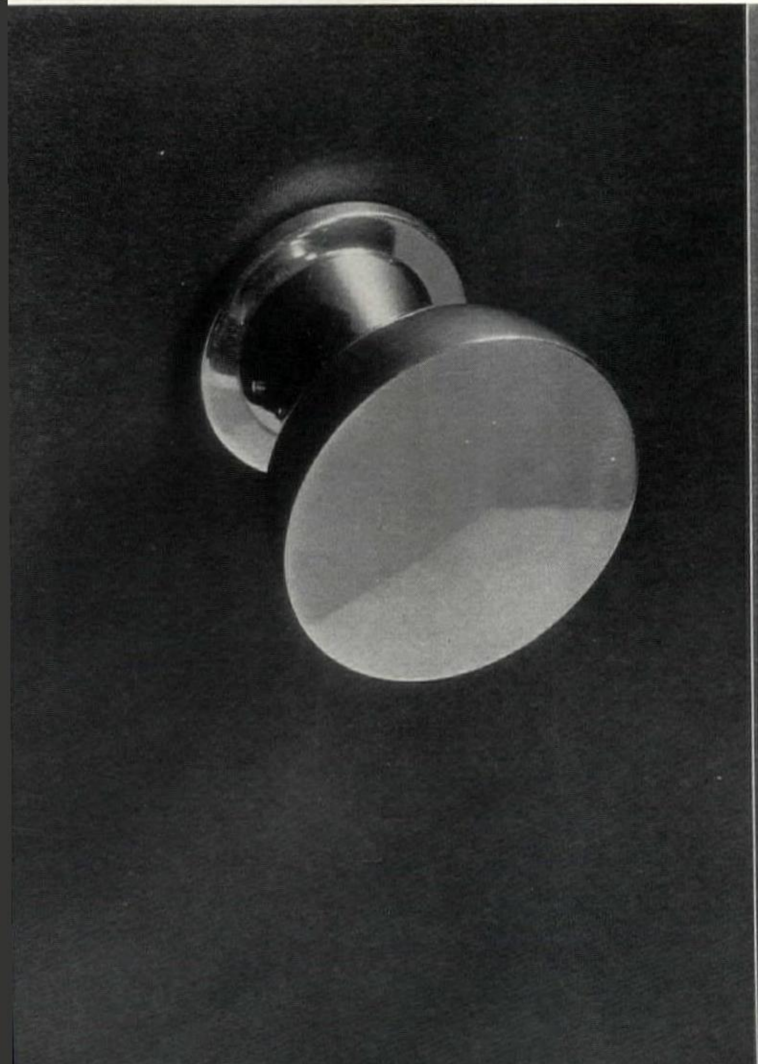


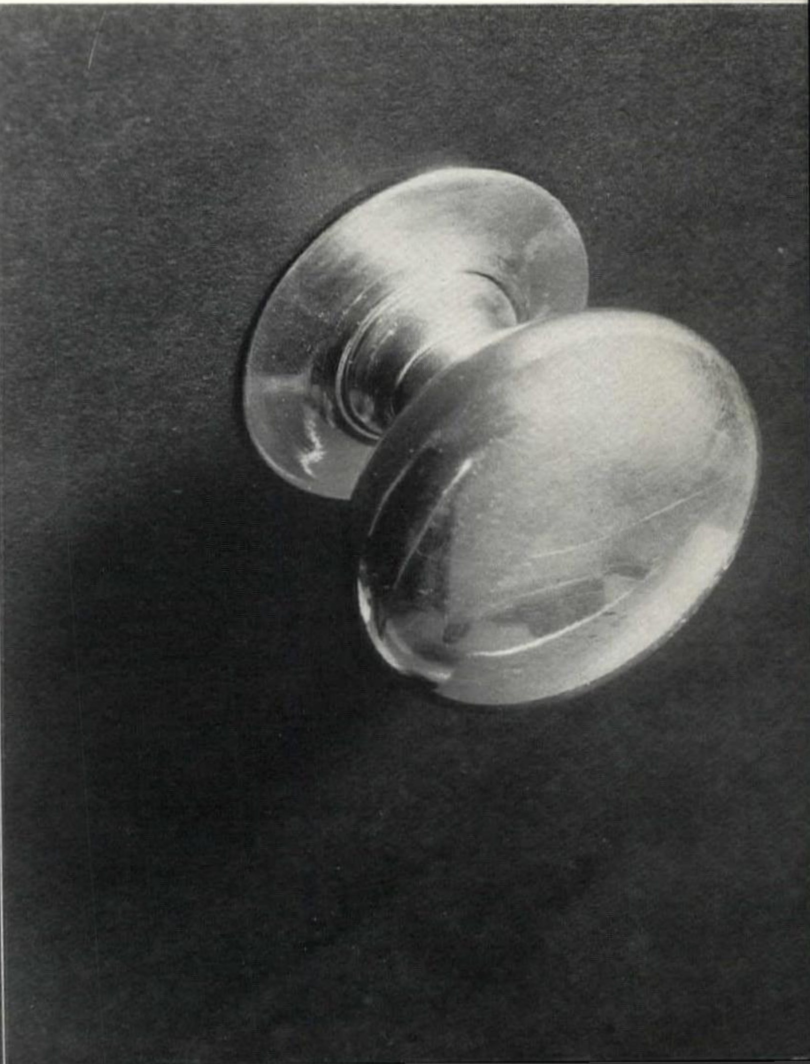


Door handles made in exact replica of sixteenth century hardware.

APPLIED DESIGN: HARDWARE

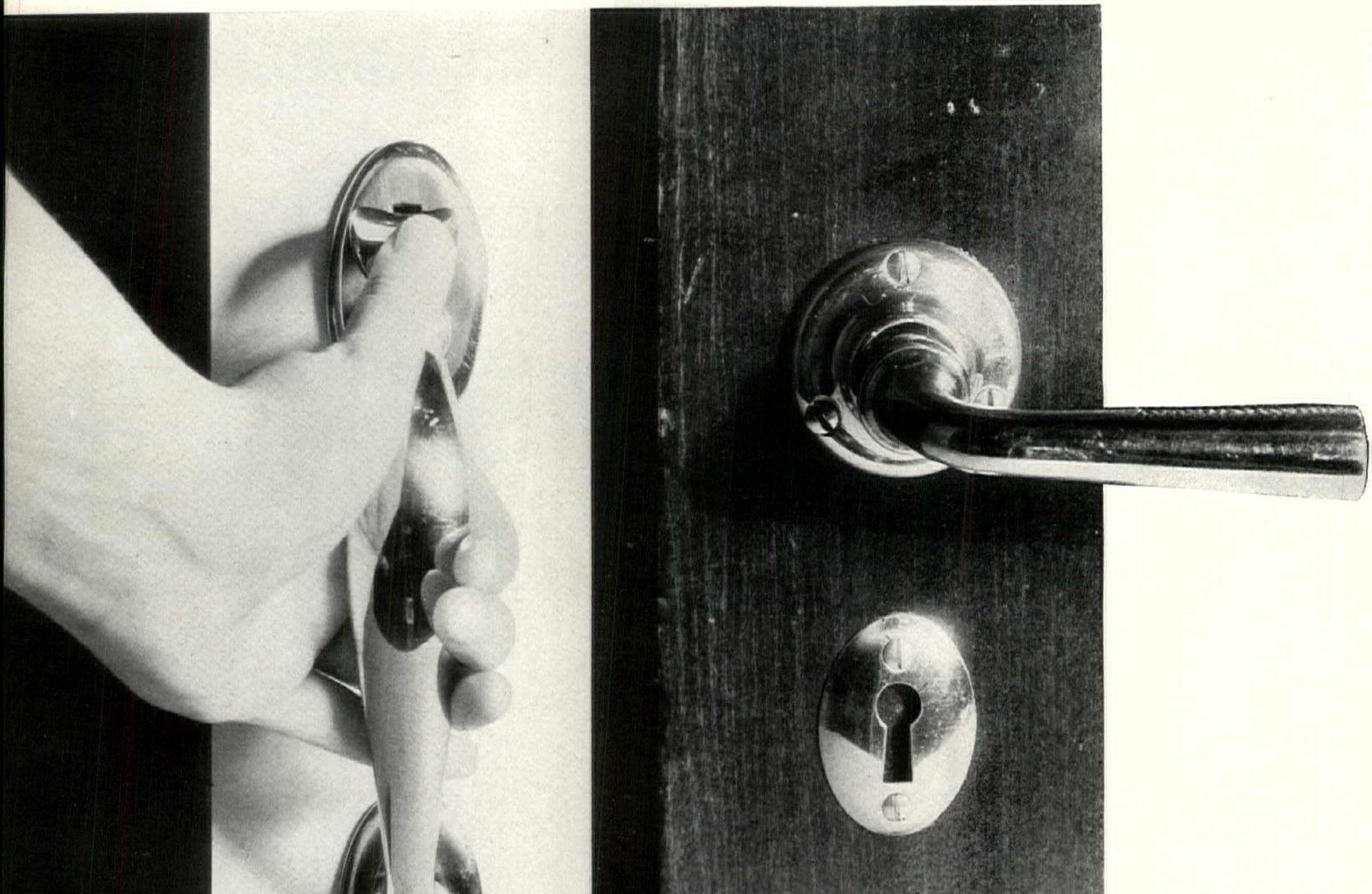
Door knobs: (left) a design by Gustav Jensen; (right) a standard shape.



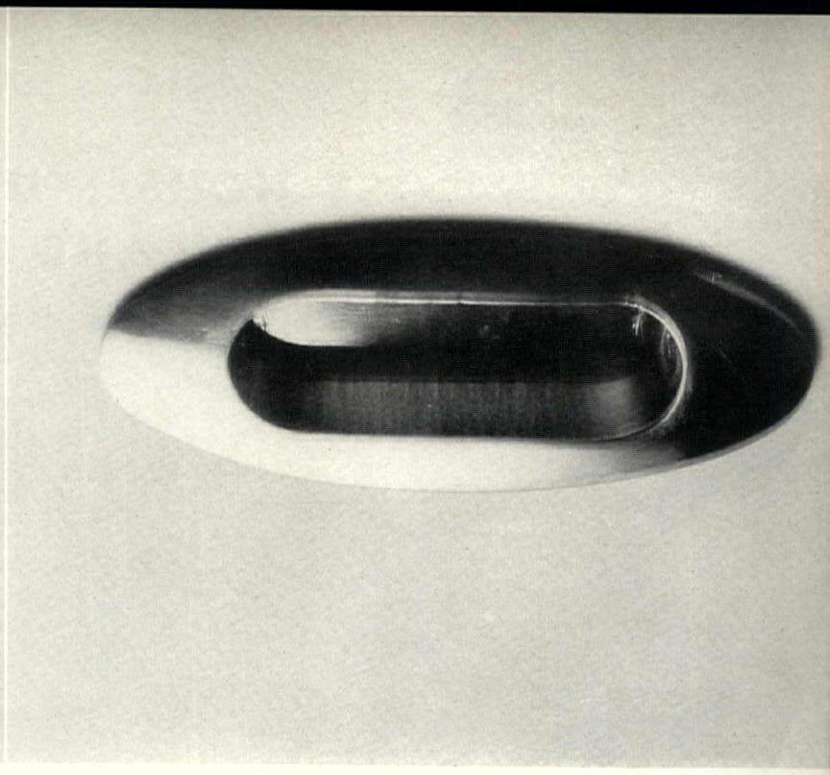


Photographs by Max Zimmerman

Standard moderate - cost door latches designed for machine production.



rawer pull correctly shaped for its purpose
nd suited to casting or stamping in metal.



A conventional window lift.

e design of automobile hardware has re-
onded to convenience requirements. Bumper
ows influence of safety engineering.

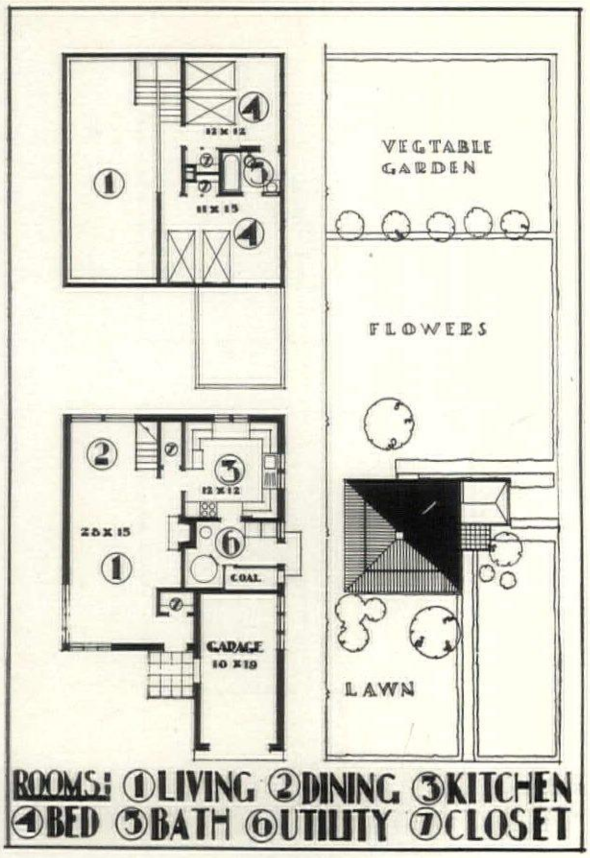
LOW-COST HOUSES UNDER CONSTRUCTION AT HIGHLAND PARK, ILLINOIS

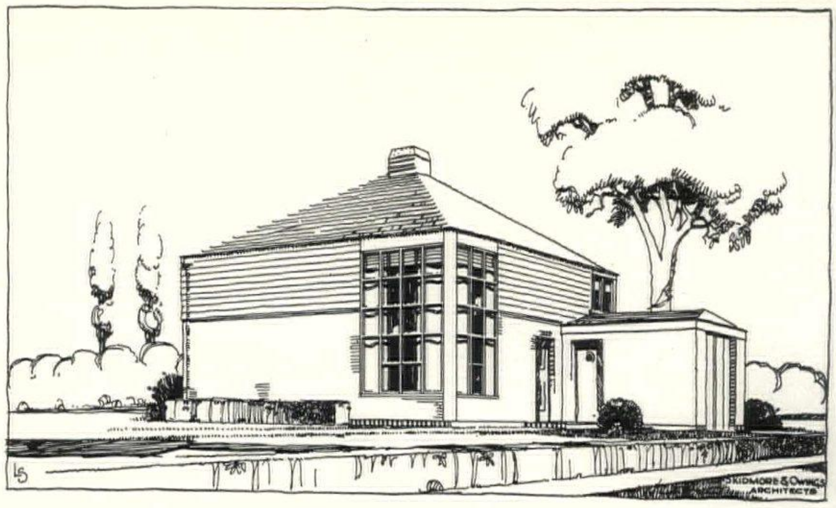
FOR THE FREDERICK H. BARTLETT REALTY COMPANY

SKIDMORE AND OWINGS, ARCHITECTS

• COMPARATIVE BREAKDOWN OF QUANTITIES AND COSTS •

HOUSE	NUMBER OF ROOMS	CUBAGE	SQ. FT. OF FLOOR	SQ. FT. OF GLASS	PERCENT. OF WOOD	PERCENT. OF BRICK	ESTIMATED COST
1	5 with BATH and GARAGE	15,040	1,265	247	40	60 FIREPLACE and CHIMNEY	$3,500
2	7 with BATH	13,775	1,275	237	75	25 FIREPLACE and CHIMNEY	$3,750
3	7 with BATH	14,840	1,400	165	30	70 FIREPLACE and CHIMNEY	$3,750
4	5 with BATH	11,100 670 cu. ft. more because of 9'-0" ceiling	930	150	100	FIREPLACE and CHIMNEY	$3,068



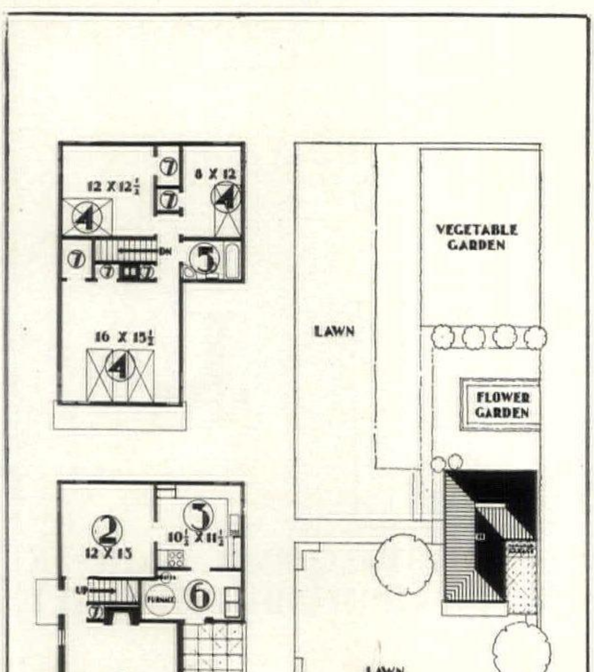


HOUSE NO. 1

5 rooms with Garage

15,040 ft. cubage

COST **$3,500**

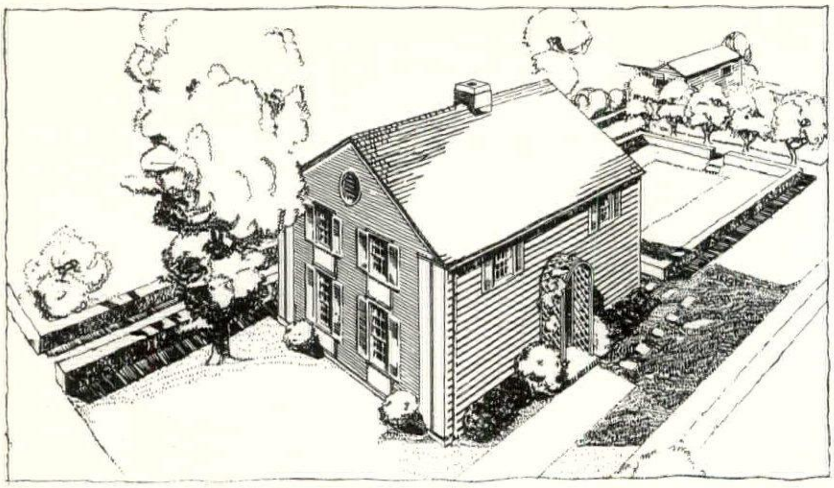


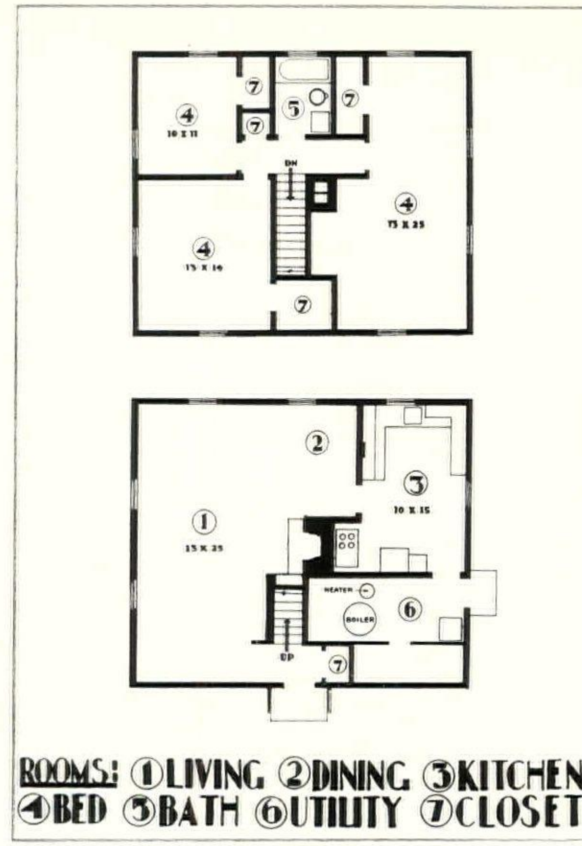
HOUSE NO. 2

7 rooms

13,775 ft. cubage

COST **$3,750**



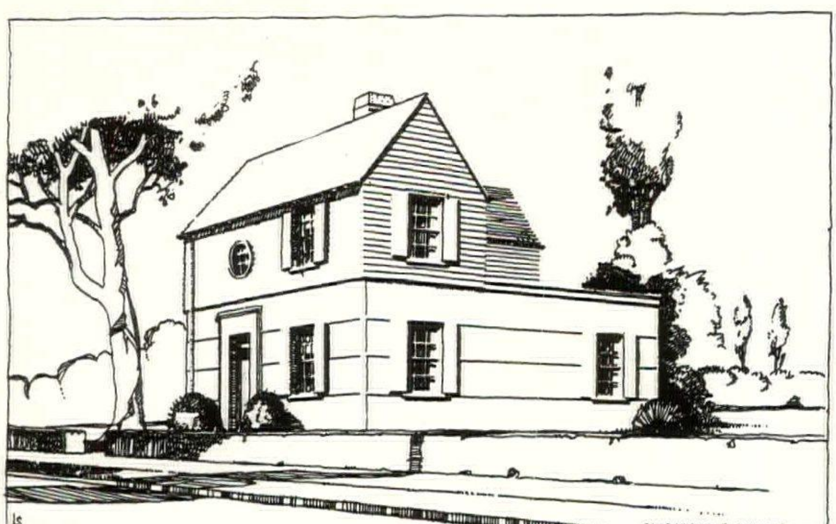


HOUSE NO. 3

7 rooms

14,840 ft. cubage

COST **$3,750**



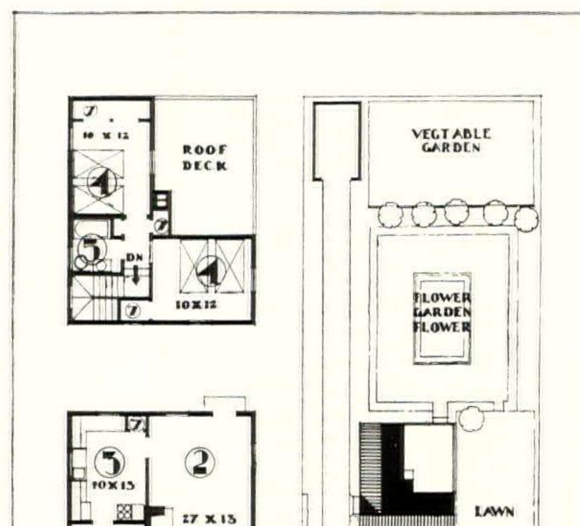
HOUSE NO. 4

COST **$3,068**

5 rooms

11,100 ft. cubage

670 cu. ft. more because of 9'-0" ceiling



Perspectives and plans photographed by Chicago Architectural Photographic Co.

new designs made possible by die casting

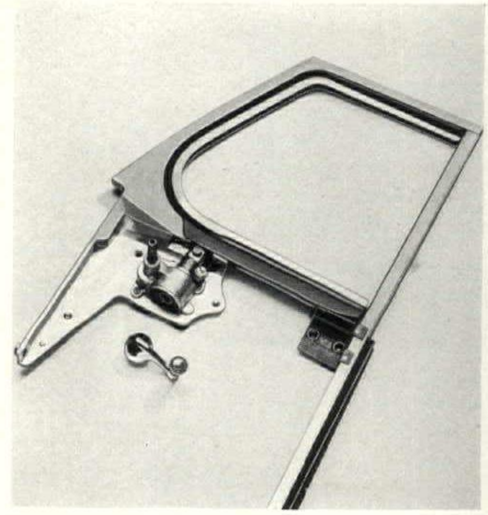
An exhibit of die-cast products has been installed under the sponsorship of the American Die Casting Institute at the Metal Products Exhibits (a permanent exhibition of metals, alloys, plastics, and finishes), located in the International Building, Rockefeller Center, New York.

Die casting—the fabrication of accurately dimensioned products by means of machines which force molten metals under pressure into steel molds or dies—has had a rapid growth in American industry within recent years. The astonishing productivity of this process and its versatility of performance permit quantity production at low unit cost. An immense number of castings can be made before the die wears out. Close dimensions are held. The fabrication of complicated shapes is simplified. Machining operations are eliminated. The work of many machines which otherwise would be required for the forging, tooling and assembling of separate parts is done by a single die caster turning out the same object as an integral casting. . . . Die casting is a comparatively young art. Hardware, plumbing fixtures, electrical equipment, furniture and other household items are typical applications in the building field. To the architectural designer, as well as to the product engineer, the process gives increasing freedom from the old restrictions of fabrication and opens the way to the development of new structural forms and designs.

Present limitations: Almost any form, no matter how complicated, can be produced, provided proper equipment and dies are obtainable. The smallest die casting now being made is the element of the familiar "zipper" type of slide fastener; this is cast directly onto the fastener tape at a speed of about 160 tiny castings a minute. The "streamlined" radiator grilles seen on new automobiles this year are zinc alloy die castings which weigh from 15 to 24 pounds. Windshield frames measuring 50 by 22 inches and weighing 33 pounds have been die-cast. Theoretically, size is no barrier, since the die casting machines can be made as large as necessary if the economic demand so warrants.

Materials: The development of die casting has been made possible by the development of special alloys which in turn have been made possible by advances in the science of metallography. Temperatures are kept under accurate control at all stages of the die casting process. The alloy must melt quickly at a low temperature; after it is forced under pressure into the die, it must solidify almost instantly. Zinc, aluminum, magnesium, copper, tin and lead are base metals commonly used in the alloys.

Finishes: The castings require little work in preparation for finishing. Sprues are usually broken off by hand and a punch press removes fins and flashing which are then smoothed off with a minimum of filing or grinding. Buffing will give a smooth natural finish. If desired, the castings can be electroplated with chromium, nickel, copper, brass, bronze, gold or silver, or they may be coated with paints, varnishes, lacquers and enamels. They can also be used in combination with molded plastics.



automobile window regulating mechanism

Y-branch pipe fitting of die cast zinc

faucet handle type

Photograph courtesy New Jersey Zinc Co.

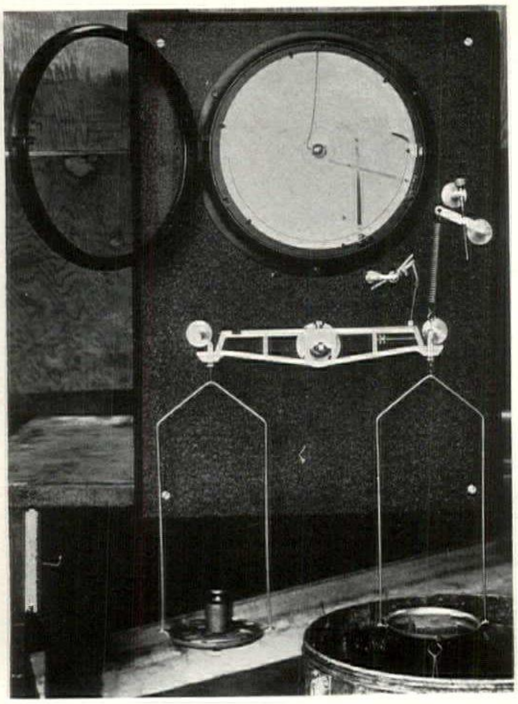


figure 1 —
absorptometer

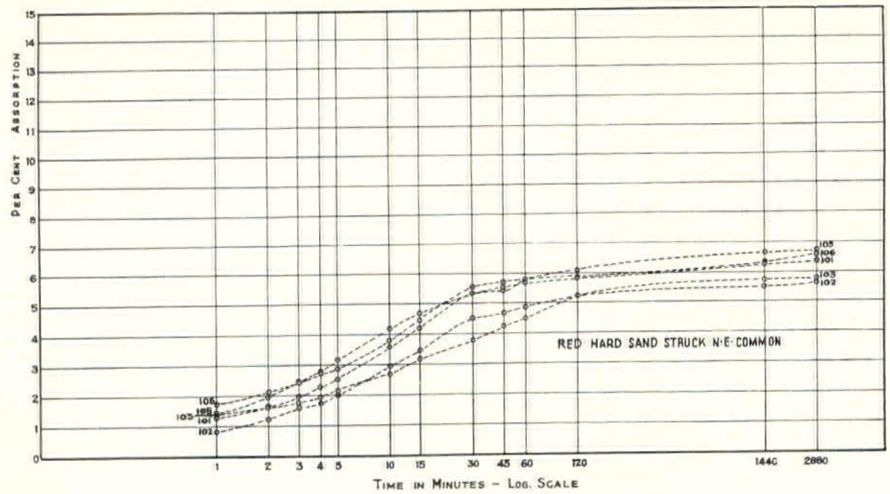


chart 1

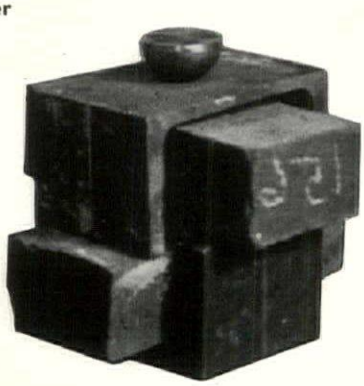


figure 2 —
tensile bond clip

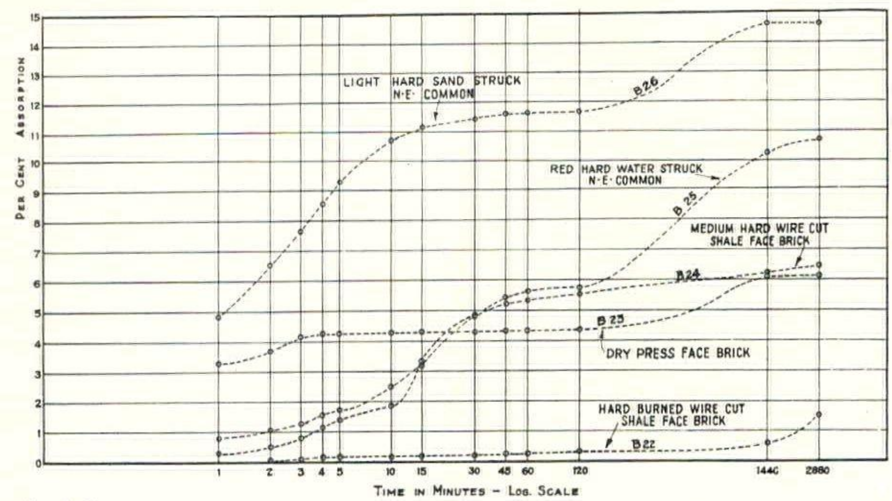


chart 2

Brick Type	Per Cent Absorp.	Spec. Mass Density Gms./c.c.	Porosity	Coef. of Saturation	Coef. of Density	Mod. of Rupture Lb./sq. in.	Compressive Strength Lb./sq. in.
101	6.30	2.04	.23	.56	.77	1185	8050
102	5.58	2.06	.22	.51	.78	1285	9640
103	5.75	2.07	.23	.52	.78	1365	11680
105	6.64	2.00	.25	.53	.80	1150	8780
106	6.42	2.03	.24	.55	.77	1320	7380
22	1.45	2.43	.07	.35	.93	3250	13720
23	6.03	2.28	.15	.93	.85	1560	8640
24	6.39	2.12	.16	.84	.84	2600	13100
25	10.70	1.98	.24	.89	.76	1150	4500
26	14.60	1.86	.29	.95	.71	835	3180

table 1

Coefficient of Saturation = Proportion of voids filled.

Coefficient of Density $= \dfrac{\text{Spec. Mass Density}}{\text{Spec. Gravity}}$

BRICK TYPE	MORTAR			TENSILE BOND LB./SQ. IN.	Per Cent Break		PER CENT EFFICIENCY OF JOINT
	CEMENT	LIME PUTTY	SAND		IN MORTAR	AT INTERFACE	
Same as 101to106	1	1	5	46	40	60	36
	1	1½	6¼	76	65	35	90
	1	2	7½	67	48	52	81
22	1	0	2½	31	0	100	10
	1	1	5	66	35	65	53
	1	2	7½	44	18	82	53
23	1	0	2½	27	50	50	9
	1	1	5	61	40	60	49
	1	2	7½	27	8	92	33
24	1	0	2½	125	73	27	41
	1	1	5	124	80	20	100
	1	2	7½	83	75	25	100
25	1	0	2½	56	62	38	18
	1	1	5	62	5	95	50
	1	2	7½	33	48	52	40
26	1	0	2½	9	10	90	3
	1	1	5	24	0	100	19
	1	2	7½	16	2	98	19

table 2

brick leakage

An "absorptometer" has been developed at Massachusetts Institute of Technology by Walter C. Voss, professor of building construction, as a means of studying the structure and strength of brick. In the following report, prepared especially for The Architectural Record, Prof. Voss describes his investigations and conclusions:

Brick walls, known for almost 7,000 years, still cause trouble by leakage and much more so in this day of thin walls, dense hard bricks, and equally strong dense cement mortars. The solution to the problem lies in matching the brick and mortar. Neither can be chosen at random or without respect for the other.

Brick porosity: The absorptometer (Figure 1) has been helpful in determining the physical characteristics of the unit. For any group of brick the values are plotted in rectilinear time-absorption curves, as illustrated. Chart 1 indicates 5 brick of the same type: note that they travel in a family. Chart 2 shows a group of brick of different types: note in this case how they vary in their tendencies. . . . The fundamental characteristics of all these brick are given in Table 1. High coefficients of saturation indicate an extremely open structure easily penetrated by capillary moisture. When combined with a low coefficient of density this may indicate under-burned brick, undesirable because they disintegrate in weather. An average value of .70 to .80 is not objectionable, but when the coefficient of saturation drops, as it sometimes does, as low as .20 the brick is one which will greatly aggravate possibilities of leakage with almost any mortar.

Adhesion tests: After the brick have been classified, assemblages such as shown in Figure 2 are made with three different mortars. These are selected by experience, one being assumed as probably correct, the other two being on either side, namely, too high in cement and too high in lime. . . . The results of the tests of such tensile bond specimens are given in Table 2. An assemblage should develop an efficiency of at least 50 per cent and the percentage of break in the mortar should exceed 40.

Bond layer: Petrographic examination of thin sections has revealed to us some extremely interesting and at the same time baffling phenomena. We are not, even now, certain of the constitution of this "bond layer." The interfacial layer is probably some form of calcium hydroxide, perhaps not the same form as we have in slaked lime or hydrated lime but nevertheless a chemical compound of this same material, and quite likely the carbonate. . . . The compounds which are formed by the hydration of portland cement are what the geologist terms "isotropic" and appear under the microscope as a dark gray and somewhat opaque substance. Likewise, the formation of any compounds such as calcium hydroxide or calcium carbonate (limestone) appear under the microscope as birefringent. These birefringent materials are highly reflective to light and appear as a definite pearly structure. . . . Generally, where high cement content mortars are used, evidences of this highly birefringent bond layer are absent or small in extent. When this layer is absent the mortar has often separated completely from the brick, showing that a destructive differential volume change was at work and has left a capillary plane which might later allow the entrance of water. Such a condition is rarely present where higher proportions of lime are used in the mortar. (See Figures 3 and 4.)

Capillary leakage: Not only must there be sufficient contact between the mortar and the brick at the interfacial plane to produce strength, but it is extremely important, for watertightness, that this contact be continuous and over the entire surface as nearly as possible. When the mortar is of such a nature as to build up the bond layer over the entire surface, we are more likely to obtain permanence of bond and less leakage in the wall. . . . In other words, although we are interested in the strength of the bond we are primarily concerned with its completeness. It is found that the leakage through assemblages where reasonably good brick and mortar are used is not through the mortar or the brick, if these remain intact, but through a ruptured interfacial capillary plane which is so small in dimension that it cannot be detected by the naked eye, but which induces capillary suction sufficient to carry water directly into the wall through the entire length of the brick contact with the mortar.

Water planes: Another factor resident in the physical nature of the brick itself is the possibility of water planes forming at this critical juncture because of insufficient absorption by dense brick or because the mortar is robbed of necessary moisture by too porous a brick. (See Figure 5.) The first danger may be present in either high cement or high lime mortars and must be guarded against when brick are selected for a project. The latter danger may be obviated by eliminating from use any brick which have absorptions of over 10 per cent where the lower lime content mortars are used or by resorting to higher lime contents in the mortar in order to get the advantages which lime has introduced, namely, that of water-retaining capacity. This again points in the direction, certainly for general use, of higher lime contents for mortar, and when coupled with the characteristic behavior of lime in producing a complete and continuous bond layer, will result in much better walls than we have had occasion to witness during the past decade or two.

Recommendations: Use uniform, homogeneous brick with an absorption of from 5 to 10 per cent in 48 hours. It will be safe to specify a mortar composed of 1 volume of cement, 1½ volumes of slaked lime putty, and 6 to 7 volumes of sand. Fill all joints. Insist upon the use of the shoved joint. Keep the joints as thin as practicable and tool with a concave surface after the mortar has had ample time to solidify.

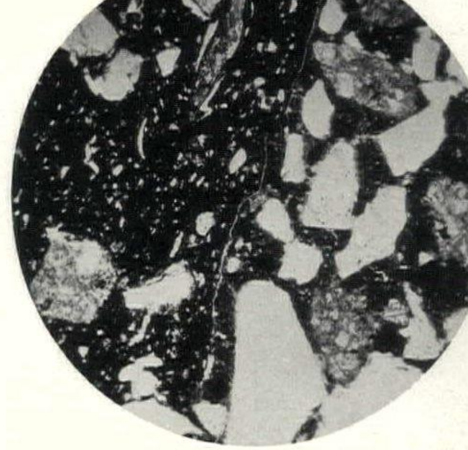


figure 3—shrinkage crack results from differential volume changes in the cement mortar and dense brick assemblage

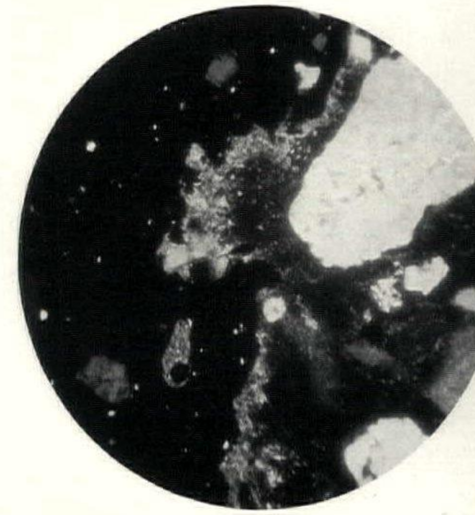
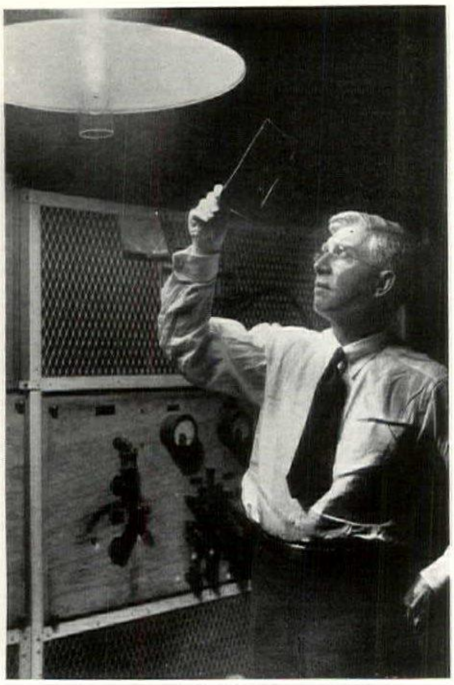
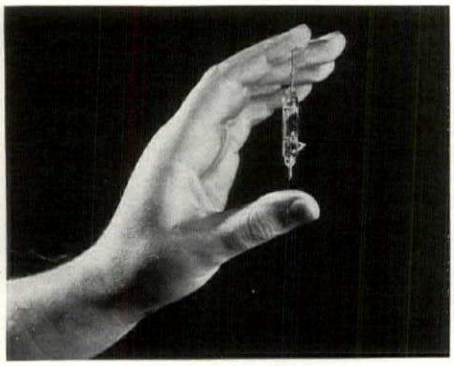


figure 4 — well-defined layer and intimate bond occur when lime is added and brick has reasonable absorption

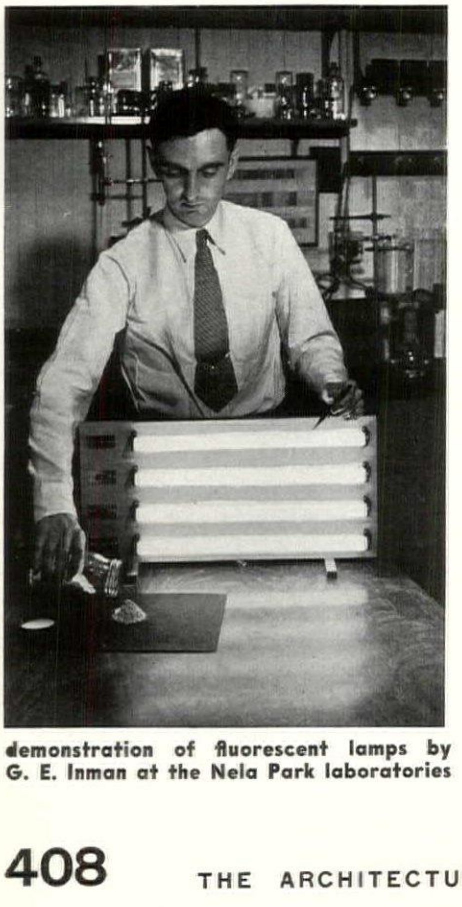
figure 5—effect of water plane at interface showing the possibility of leakage



new mercury arc light source being tested by Dr. John W. Marden (Westinghouse)



capillary lamp (G. E. Vapor Lamp Co.)



demonstration of fluorescent lamps by G. E. Inman at the Nela Park laboratories

midget suns

New mercury arc lamps were demonstrated March 25 for the first time before a joint meeting of the American Institute of Electrical Engineers and the New York Electrical Society. The lamps are not yet in production; they are being developed experimentally in the laboratories of Westinghouse Lamp Co., Bloomfield, N. J.—work is also under way at General Electric Co., Nela Park, and General Electric Vapor Lamp Co., Hoboken, N. J.—on the basis of preliminary research by The Phillips Incandescent Lamp Works, Ltd., Holland.

The brilliance and color of sunlight is approached in a special type of mercury arc lamp, known as the "capillary" or "peanut" lamp because of its relatively small dimensions. Metallic mercury in a tiny quartz tube vaporizes when submitted to an electrical discharge, and sets up a glow of light which becomes more brilliant as the wattage increases. The greater the amount of electrical energy sent through this vapor of metallic mercury, the nearer does the color composition of its light resemble that of sunlight.

Relative efficiency: The mercury arc lamps producing light by this method operate at unusually high efficiency. So much of the electrical input is converted into light that it is believed three times the amount of light can eventually be obtained for the same amount of electricity now utilized for lighting purposes. . . . In the demonstration, such a mercury arc, arranged to consume 2,000 watts of electricity, produced light equivalent to 150 filament lamps of the familiar 50-watt size or a total of 7,500 watts. Its 65 lumens per watt efficiency can be compared with the 3 lumens per watt efficiency of early carbon filament lamps as a measure of the progress in artificial illumination during the past fifty years.

Color quality: The light of this brilliant mercury arc approaches sunlight in its color characteristics, and perhaps more so than the light of any other single light source today, that is, with any degree of efficiency. The mercury light, however, is stronger in green and yellow colors, but this is an advantage because the human eye is most sensitive to light in the yellow region of the spectrum. According to Dr. John W. Marden, Westinghouse research scientist—"If in time we can further improve the quality of light from this mercury arc, we will be able to duplicate sunshine in every way, even to ultra-violet radiations; in fact, the ultra-violet content of this mercury light is proportionately greater than in sunlight."

Heat intensity: Temperatures produced in the mercury arcs are so high that no instruments now available can measure them. They must be calculated. The temperature of the sun's surface is about 6,500 degrees Centigrade (11,732 degrees Fahrenheit). That of the axis of the arc stream, a banana-like area of electrically-excited gas which produces the light of the mercury arc, reaches 14,000 degrees Centigrade (25,232 degrees Fahrenheit).

Types: Air-cooled lamps, in their present state, are only about 2 inches long and about ⅜ inch in diameter. They produce an amount of light equivalent to that given by a 200-watt filament lamp—a lamp which is about eight inches long and about 3½ inches in diameter. . . . Water-cooled lamps, although extremely small in size, can be made to give an extremely brilliant light. For example, the heart of a capillary lamp —only 1 inch long and ⅛ inch in diameter —produces as much light as the present 1,000-watt filament lamp. Raising the pressure within these little lamps increases the production of the red rays. At the highest pressures yet attained in the laboratory—equivalent to several tons per square inch—the brightness of the light produced exceeds that of the sun. When capillary lamps operate under very high pressures, they are apt to break from excessive heat; hence the need of an outer jacket to permit a flow of water to carry away this heat. . . . Because the quartz envelop is transparent to the shorter wave lengths of ultra-violet, the capillary lamp has been inclosed within an outer bulb absorbing the energy radiated within the erythemal region as well as the shorter wave lengths. This lamp, like other mercury vapor types, must be used in conjunction with a transformer.

Applications: The light from air-cooled capillary lamps, being rather deficient in red rays, is somewhat inadequate where color discrimination is important. It is possible, however, to put them inside bulbs whose inner surface is coated with fluorescent powder. Early experiments in this connection show that use of the fluorescent powder greatly improves the color quality of the light produced. . . . The compactness of the units permits their introduction into almost any type of lighting fixture and combination with incandescent units for the modification of incandescent light. Because of their high brilliancy, the units may also be adaptable to certain types of high intensity localized lighting, for example, highlighting in connection with the general floodlighting of a building. Other possible future uses include the floodlighting of golf courses, bathing beaches, stadiums, industrial yards, and the like.

fluorescent lamps

Demonstrated at the A. I. E. E. and N. Y. E. S. meeting. These lamps are not yet in production; they are being developed experimentally by General Electric Co., Nela Park, and General Electric Vapor Lamp Co.; also by Westinghouse Lamp Co.

Unusual effects in color are promised by these new low-intensity light sources. The lamps are designed to convert invisible ultra-violet radiation into visible radiation by activating a fluorescent coating on the inside of the bulb. A wide range of colored light is obtainable at low wattage. The efficiency is many times greater than the efficiency of lamps in which colored light is produced by the filtration of incandescent light.

Lamp construction: The lamp, tubular in design, is sealed at each end by a flat piece of metal. Within the bulb there is a trace of mercury, a small amount of argon gas at extremely low pressure, a suitable kind of fluorescent powder which clings to the inner surface of the glass. When electricity is passed into this lamp the argon gas serves as a "starter." In a moment or two, the lamp produces a feeble blue light and a great amount of ultra-violet radiation. The invisible rays excite the powder, causing it to fluoresce in the form of colored light. . . . Like most gaseous discharge lamps, these fluorescent lamps require special transformers which serve as valves in controlling the electrical flow. Unlike some mercury lamps, however, they take but a few seconds to get under way.

Color control: The visible radiation is characteristic of the fluorescent substance. Newly developed synthetic fluorescent materials sensitive to the extremely short ultra-violet of the kind that does not ordinarily pass through glass make possible the production of light of a desired color. . . . The fluorescent lamps should not be confused with the so-called neon lamps, whose color is a function of the specific gas used. While similar in many respects, the fluorescent lamps, owing to the mercury vapor they generate, are able to give far more ultra-violet for the current used than do the gaseous discharge lamps. The more ultra-violet rays, the brighter the glow from the fluorescent coating.

Relative efficiency: The conversion of the invisible radiation into visible radiation is the reason for the greater efficency of the fluorescent lamps as sources of colored light (including white light). Tungsten filament lamps produce light containing all colors of the spectrum, but to get any one color, all the remaining colors must be removed by filtering, which means wasting them. In a blue bulb, for example, only the blue rays of the tungsten light are seen by the eye: the rest are filtered out by the blue glass. The chemical reaction of the ultra-violet radiation and the fluorescent substance gives 50 to 120 times as much colored light, for the energy used, as do colored incandescent lamps. (All light efficiency comparisons, it should be noted, necessarily involve a definition of the desired color balance.)

Applications: According to Dr. L. J. Buttolph, engineer, General Electric Vapor Lamp Co.—"Since the fluorescent materials are placed on the surface of tubes or bulbs. the lamps are inherently low brightness sources requiring no diffusers. As such, they are suited for architectural use, particularly where it is desirable to have the tubular forms a basic part of the architectural design. Light sources of this type permit a variety of pastel shades in colored light, hitherto difficult to obtain by the use of colored filter glasses on incandescent sources. They are also suited to cove lighting in which continuous light sources are installed in continuous reflectors. It will be recalled, for example, that thousands of small incandescent lights are used on the *Normandie* to throw moldings, in many cases 20 or 30 feet long, into relief. In order not to run into a prohibitive wattage in work of this kind, inefficient individual incandescent units of very small wattage must be used and even then they must be placed so far apart that lighting is spotty. The fluorescent lamps with their low wattage and their uniform brilliancy per unit length are ideal for such use."

mercury-incandescent floodlights

Installed by General Electric engineers at a gasoline station in Schenectady, N. Y.

Mercury and incandescent lamps have been combined in street-lighting units and other luminaires (see "Technical News and Research, page 243, March issue), but this is the first time the two lamps have been used in a floodlight. One 400-watt mercury lamp is mounted between two 150-watt incandescent lamps in each unit. Because of the blending of the blue-green light of mercury and the yellow-white of incandescent the unit gives a quality of light not obtainable with incandescent alone. The mercury lamp gives twice as much light for the energy consumed as do the incandescents.

cove lighting

Information presented by C. S. Woodside, Westinghouse engineer, at the 1935 meeting of the Illuminating Engineering Society in Cincinnati:

Basically, cove lighting is a form of indirect illumination wherein the wall or ceiling becomes a secondary light source. This being the case, it is quite essential that the wall or ceiling reflecting surface should be of a diffusing nature. For best results, the ceiling or coffer should be vaulted, with the light source located just beneath the spring of the curve.

Projecting troughs: When the cove is constructed as shown in Figure 1 a continuous source of light, such as a row of Lumiline lamps, should be used. Individual lamps, spaced six bulbs or more apart, will produce an undesirable scalloped effect above the cove.

Recessed troughs: With this type of construction (Figure 2) lamps may be spaced on 16 to 18-inch centers and still produce a uniform appearance above the cove. This wide spacing makes it possible to use a smaller number of higher efficiency lamps, thus providing more illumination at no increased expense. The reflecting surface should be a mat surface using porcelain enamel, Alzak processed aluminum, white plastic, or plaster. . . . Figure 3 indicates an effective method of installing projector-type cove lighting equipment.

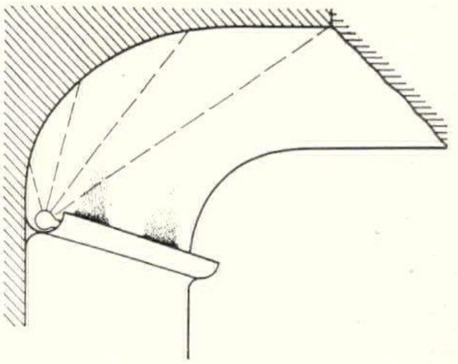


figure 1—projecting trough

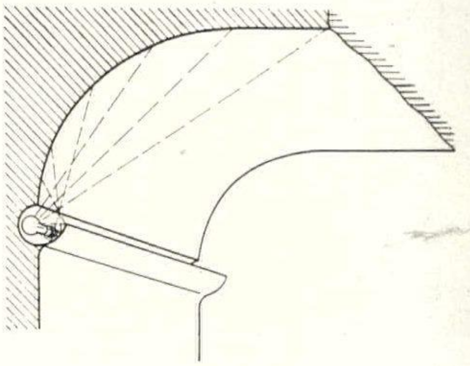


figure 2—recessed trough

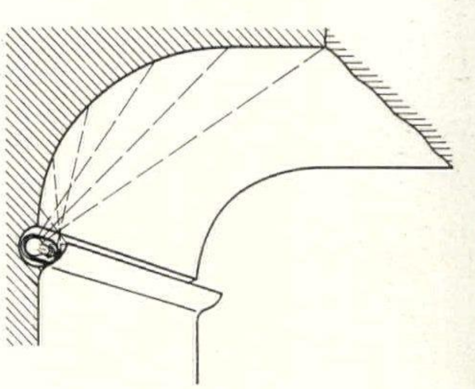
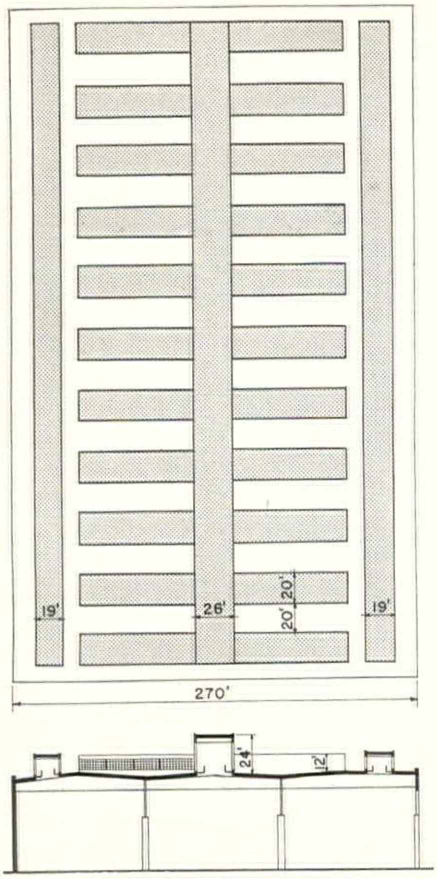
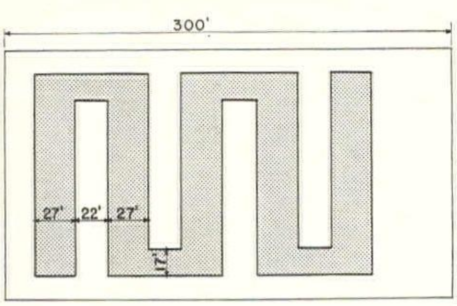


figure 3—recessed projectors

STRUCTURAL SYSTEMS . . . . . . roofs, elevators



two-way monitor system on Ford plant



snake pattern monitor system on Briggs shop

flexible roof monitors

Used in construction of the new cold finishing steel mills at River Rouge plant of the Ford Motor Company at Dearborn, Mich. Designed and patented by Giffels and Vallet, Detroit architects.

The new roof construction, known as the "two-way monitor plan," is designed to achieve a more even distribution of natural light and to overcome objectionable ventilation features. Three longitudinal monitors run the length of the building, one on each side and a larger one in the center. A series of transverse monitors run at right angles to the longitudinal members, from one side to the other, and are attached to the center monitor, opening into it. The monitor windows face all four directions, and by this simple arrangement it is possible to utilize the light rays and atmospheric currents to a greater extent than has heretofore been possible, regardless of the direction of their source.

Improved lighting: With other roof types there often are some points inside the building where the light is insufficient for effective work, while at other points illumination is three times as great. Roofs with butterfly or "A" frame monitors, all running parallel, admit outside light in varying quantity according to the time of day and shadows about large machines are inevitable. The two-way monitors insure admission of light regardless of the location of the sun; with light coming from four directions heavy dark shadows are avoided, . . . A strong uniform natural light of about 35 c.p. at the working-plane comes through the 108,000 square feet of window sash—nearly 2½ acres of glass—contained in the monitors. It is estimated that three months' accumulation of dirt on window glass cuts the lighting efficiency about 50 per cent; only 25 per cent of the full amount of available light penetrates a six months' coating of dirt. For this reason more than a mile and a half of walkways have been installed inside the monitors, making every inch of glass easily accessible. The high central monitor has an aluminum-alloy ladder and a movable platform on each side to facilitate washing. Outside panes are washed from adjacent roof areas by means of long-handled mops.

Improved ventilation: With butterfly and "A" frame monitor construction air passes into the mill through ground level windows; wind currents passing over the monitors, at right angles, create a suction on the lee side which permits bad air to be extracted from the building through the leeward-opened windows. This ventilation system is satisfactory as long as wind currents flow across the butterfly and "A" frame monitors. Should the currents be parallel to these monitors, however, the suction effect is counteracted by a subsequent inward suction which tends to pull the bad air back into the building. With the two-way monitor system air is pulled out the lee side of the monitors—either transverse or longitudinal—at all times, whether the wind be at right angles to one group of monitors or the other. If wind currents are diagonal, both the transverse and longitudinal monitors are effective. All monitor windows are motor-operated in groups. A large variety of window openings is available to meet varying atmospheric conditions. Air can be brought in and discharged at almost any desired point. A wide range of air changes per hour is possible.

Snake pattern monitors: The same basic design appears in the roof system of the new press shop of the Briggs Manufacturing Co. in Detroit (likewise developed by Giffels and Vallet). Because of the building's relative narrowness and its extensive glass wall area, the need for long lengthwise monitors was less great, and consequently the transverse and longitudinal monitors have been combined into a continuous pattern.

automatic elevator signals

Developed by Westinghouse Elevator Co. Clyde R. Place, consulting engineer. Installed in the new 41-story International Building, New York; designed by Reinhard & Hofmeister; Corbett, Harrison & MacMurray; Hood & Fouilhoux, architects.

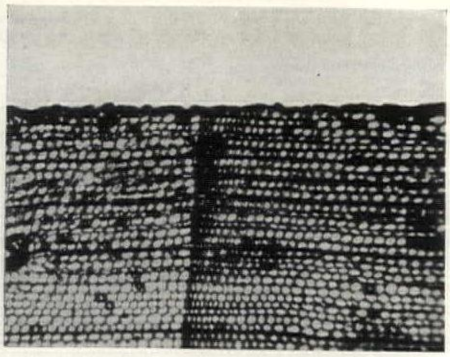
A new signaling and dispatching system has been designed to speed up vertical transportation service in the latest addition to Rockefeller Center. This project—one of the largest entertainment and office-building developments in the world—already boasts elevators that can be run as fast as 1,400 feet a minute when traffic so demands. During performance tests a speed of 1,500 feet a minute—a record for passenger cars—was attained.

Dispatching system: Each car has four lights—two yellow, one green, one red. If the cars run on a 30-second schedule, the operator gets a flash from one of the yellow lights 30 seconds before the green start-up light or the red start-down light comes on. In this way he knows he is next in sequence.

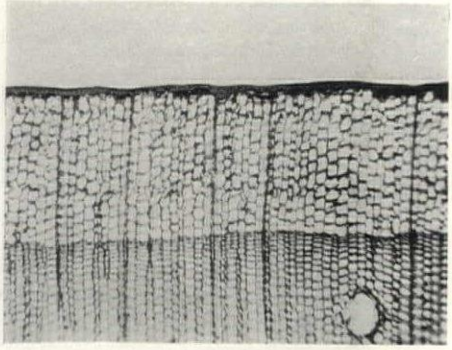
Hall signals: As soon as the operator gets the next-start signal, the terminal hall lights flash likewise and passengers are notified that the car is next to leave the landing. When a waiting passenger presses a hall button, the floor signal for the car that will answer the call flashes immediately. A low-toned single-stroke bell sounds simultaneously and attracts the passenger's attention so that he will go to the proper entrance and be ready to board the car as soon as it reaches the landing.

Automatic quota system: Hall calls are answered in quotas and in sequence. When one car has received its quota of calls, the floor-call zone is automatically transferred to the next following car. In this way the cars are kept equally spaced in the hoistways. Quotas may be changed to suit traffic conditions by throwing the proper switch on the dispatcher's panel on the ground floor. If a car should become loaded before its quota is complete, the operator presses a bypass button which automatically transfers the unanswered calls to the next car; when this happens, the floor signals are also changed so that waiting passengers can go to the right entrance.

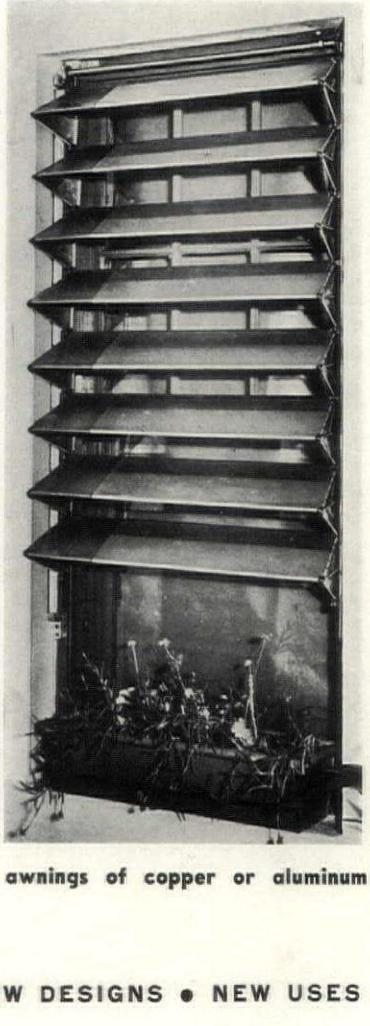
MATERIALS, PARTS . . . finishes, insulation, windows



microscopic view of cross-section of wood shows penetration of ordinary paint oil



a definite line marks extent of controlled oil penetration in a new type of paint



awnings of copper or aluminum

controlled penetration paint

Process developed by Dr. J. S. Long, research technician, in laboratories of Devoe & Raynolds Paint Co., Louisville, Ky. (Sweet's Catalog File 16/16)

By this new method of processing oils for house paints, control is gained over the extent of oil penetration into the surface upon which paint is applied. A certain amount of the oil in the paint must penetrate into the wood grain to give good adhesion, while enough oil should remain in the surface paint to give protection against extreme conditions of temperature, moisture and dryness. Theoretically, with an oil of good penetrating qualities, the surface of the paint would have inferior resistance to weathering, whereas with a non-penetrating oil the under coat would not have good adhesive qualities. By chemically combining the two types of oil—known as the "penetrative ingredient" and the "sealer ingredient"—the penetrative characteristic of the final product is controlled in direct proportion to the ratio of the two ingredients which compose it. . . . According to the manufacturer, two coats of the new paint suffice where formerly three coats were required.

metal sprayed like paint

"Mogul Gun" developed by Metallizing Company of America, Inc., 1218 *Long Beach Avenue, Los Angeles.*

Metallizing is a process of spraying molten metal so that it will adhere to almost any solid base. Wood, brick, tile, glass, plaster, concrete, cement, fabrics, paper, leather, stone or metals can be surfaced, regardless of size, to prevent corrosion, to offset effects of abrasion and erosion, and to obtain decorative effects. . . . The new metallizing unit has been designed for high production work. It is light enough—5½ pounds—to be used as a hand tool.

Finishes: The steels, nickel and copper alloys, bronze, zinc, aluminum, lead and tin are typical applications. The metallized coating looks like cast metal, and is usually wire brushed and oxidized. . . . The average cost of spraying non-ferrous metals on concrete is $1.50 a square foot, on steels $1.25 to $1.50 a square foot.

improved sheathing

Developed by Insulite Co., Minneapolis. (Sweet's Catalog File 13/19)

"Bildrite Sheathing" is intended to provide insulation as well as bracing strength. It is impregnated with a special asphalt emulsion during the manufacturing process to give increased strength and resistance to moisture absorption and air infiltration. Tests show the bracing strength of the sheathing to be four times that of 8″ ship-lap and its insulation three times that of ordinary lumber.

Application: Panels are shipped with light scorings on the surface to indicate proper nail spacing. Including the time needed for job preparation, 132 square feet of the material can be applied per man per hour.

Economies: For a heating season in the northern zone, where the record was kept, the saving in fuel amounted to approximately $10 per thousand square feet of wall area over ordinary sheathing (fuel costs figured at $13 per ton for coal and 7c per gallon for fuel oil).

smooth-finish insulating board

Announced by Armstrong Cork Products Co., Lancaster, Pa. (Sweet's Catalog File 13/43)

The coarse textured surface has been eliminated in the new board, known as "Temlock De Luxe." A smooth finish is obtained by an exclusive surface treatment and the full insulating value of the board is retained. It is available in standard size boards, 4′ x 8′ to 12′. In addition to the natural golden buff color, the new board also is furnished in white, cream, ash and walnut.

air-pad flooring

Produced by Voorhees Rubber Mfg. Co., Inc., 125 *East* 46 *St., New York. Cost: slightly more than* ⅛″ *hand-made inlaid linoleum.*

Sponge rubber and reinforcing fabric are vulcanized to the back of rubber flooring material to provide a quiet and resilient floor surface. The fabric prevents stretching of the rubber under traffic. The sponge rubber yields when the air-pad flooring is walked on, so there is less likelihood of slipping. The material is produced in 6-foot widths and in lengths ranging from 60 to 90 feet; there are 9 marbleized and 7 plain patterns. The flooring is suited for residences and for commercial and institutional buildings where a quiet work space is desirable.

prefitted windows and frames

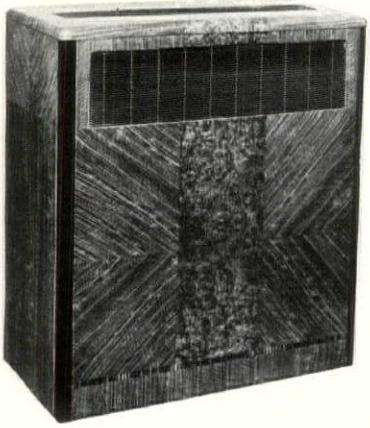
Fabricated by Farley & Loetscher Mfg. Co., Dubuque, Iowa. (Sweet's Catalog File 11/16)

Two types, known as "Unipak Unique" and "Farlo," are available as complete window units, consisting of wood frame, double-glazed sash, weatherstripping and hardware. The wood sash are grooved and fitted with the "Unique Sash Balance" (see Sweet's Catalog File 18/6), which permits the elimination of weight boxes and pulleys, and results in narrow mullions and trim.

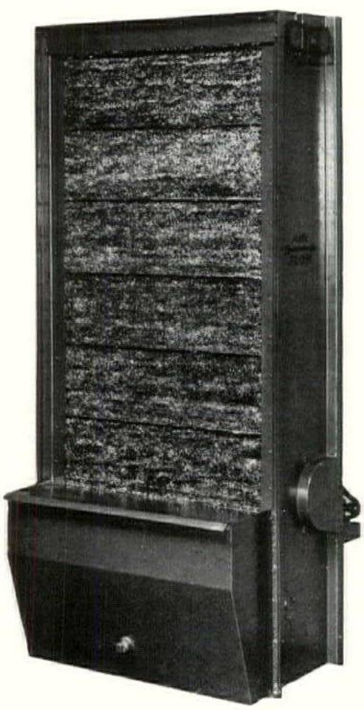
fireproof metal awnings

Manufactured and distributed by Burns Metal-Lite Awnings, Inc., 52 *Randolph Ave., Brooklyn, N. Y.*

The awnings are made of rustproof Anaconda copper and aluminum. Standard sizes are furnished for 30 to 48-inch windows; other sizes are made to order. Natural metal or special colors are available. . . . Strong sunlight is diffused into the room through reflection on the louvers. The awning construction prevents the formation of heat pockets. Adjustments of position are made by means of a crank.



summer air conditioner



automatic air filter

portable summer air conditioner

Produced by Carrier Engineering Corp., 850 Frelinghuysen Ave., Newark, N. J. (Sweet's Catalog File 26/3) for the lower-priced field.

A single unit has ample capacity for spaces from 1,500 to 3,000 cubic feet; multiple units take care of larger areas. The refrigerating machine and evaporator coils, fans and controls are all contained within the cabinet (40" high, 36" wide, 18" deep), which may be equipped with castors for moving from room to room. Location beneath a window is required; by means of a duct connection outside air is brought in for condensing purposes and for ventilation. Aside from this, an electrical connection from a standard floor or baseboard outlet is all that is necessary. A number of standard household voltages, including direct current, may be used. A centrifugal type fan circulates cooled dehumidified air at the rate of 250 c.f.m.

automatic air filter

Developed by Staynew Filter Corp., Rochester, N. Y.

Four successive stages of filtration are provided in the form of two endless curtains arranged to rotate in such a manner that the face of the curtain on the dirty air side is thoroughly cleaned before returning to the clean air side. The first stage collects the heavier part of the dust and breaks up the air flow into intimate contact with the adhesive surface. The curtain passes through an oil bath which releases the surface tension of the oil film, thus allowing the dust particles to settle by gravity to the bottom of the reservoir. Leaving the oil bath the curtain enters the second stage, where it traps finer particles of dust that may be left in the air stream. The second curtain—stages three and four—operates in a dry state and arrests both oil and dust that may have escaped the first two stages; it is cleaned by an air line. . . . The filter curtain consists of panels of wire cloth to which are attached successive layers of knitted copper mesh. Average current consumption of the filter motors is between 2 and 3 kw.-hr. a month, with the automatic control operating continuously.

electric heating unit

Announced by The Electric Air Heater Company, Division of The American Foundry Equipment Company, Mishawaka, Ind.

The "Electromode Convection Heater" utilizes the natural rise of warm air for circulation. It is a ¾ kw. unit, self-contained and 4½" wide, 9½" long and 16" high. The unit is available in any finish. Completely insulated throughout, it may be placed flush with the wall with safety. It can be used for heating chilly bathrooms or as a temperature booster in rooms hard to heat. . . . The element is cast aluminum construction. Heating is by means of a calrod, around which the aluminum is poured. Shrinking of the metal in cooling causes the calrod to become an integral part of the heating element and eliminates all hot wires and dead air space.

high-speed air circulators

Announced by Emerson Electric Manufacturing Co., St. Louis. (Sweet's Catalog File 26/63)

The fans are suitable for large rooms requiring high-velocity air circulation. They can be furnished with four styles of mountings—ceiling, wall bracket, counter column, and adjustable floor column. A 24-inch single-speed fan has an air delivery of 3,600 c.f.m. with 185 watts input. A 30-inch two-speed fan has an air delivery of 6,000 c.f.m. on high speed with 355 watts input.

automatic coal burners

Five models introduced by Kelvinator Corp., Detroit. (Sweet's Catalog File 26/12)

Each model may be used with warm air, steam, hot water, or vapor heating systems. Through underfeeding and controlled forced draft, the coal burners provide for the complete combustion of fuel. Coal is brought in under the fuel bed and pre-heated; the volatile gases are distilled off and, passing up through the fire bed, are ignited, eliminating smoke. Air is delivered to the fuel bed by means of a specially designed tuyere block. Five speeds and neutral permit proper feeding for the prevailing weather. Coal feed capacity per hour of the five models ranges from 7 to 150 pounds of coal. The smallest size has a hopper capacity of 350 pounds; the other models have hopper capacities of 500 pounds.

protected oil burners

Announced by Harvey-Whipple, Inc., Springfield, Mass.

New safety controls have been made standard equipment on the "Master Kraft" oil heaters. An electrical device, called "Borkontrol," automatically prevents the burner from operating in case of transformer failure. A thermo-release switch prevents damage to the motor in the event of a stalling overload.

streamlined boiler

Introduced by Fitzgibbons Boiler Co., Inc., 570 Seventh Avenue, New York. (Sweet's Catalog File 26/27.) Displayed for first time at Detroit Oil Burner Show.

The new model of the "Oil-Eighty Automatic Boiler" incloses the burner and all controls within a new jacket design.

new gas heater

Designed by Harold Van Doren. Marketed by Utility Gas Appliance Corp., Columbus, Ohio.

The new heater is fabricated of blue mirror glass, chrome metal and heat-resistant fireclay. All surfaces are easily cleaned with soap and water.

OUTSTANDING PERFORMANCE

PENBERTHY PRODUCTS

for removing seepage water

PENBERTHY AUTOMATIC CELLAR DRAINER
(Water or Steam operated)
Made in 6 sizes

PENBERTHY AUTOMATIC ELECTRIC SUMP PUMP
Made in 6 sizes

Advanced and rugged design, copper and bronze construction throughout, and careful workmanship are responsible for the demonstrated superiority of these Penberthy pumps wherever seepage water accumulates. Leading jobbers stock Penberthy products.

for modernizing hot water heating systems

PENBERTHY WATER CIRCULATOR
Made in 3 sizes

PENBERTHY PRESSURE & RELIEF CONTROL
Made in 2 Models

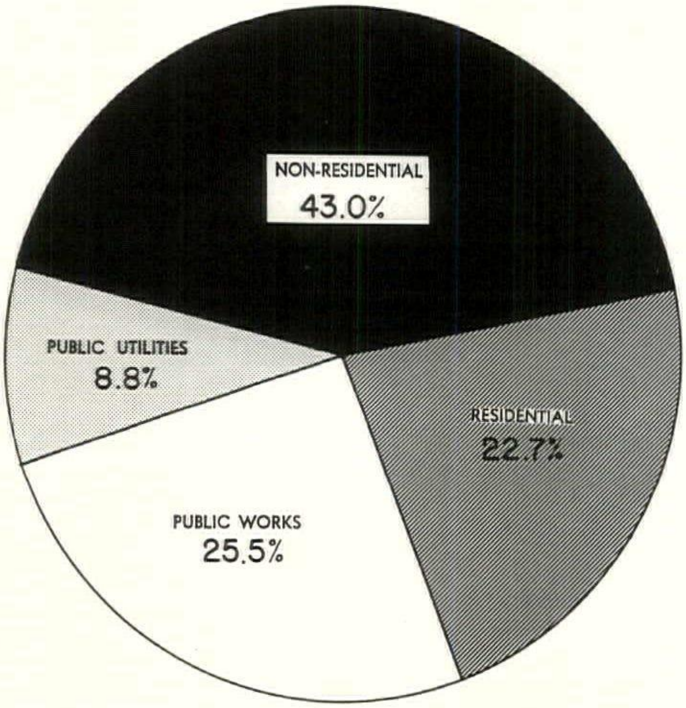
Relief valves and pressure reducing valves are other items in the line of Penberthy Hot Water Heating Specialties. All are constructed of high grade steam bronze; design and workmanship are also of exceptional quality. Your jobber will gladly give you complete information and supply your needs.

PENBERTHY PRODUCTS

PENBERTHY INJECTOR COMPANY *Manufacturers of* QUALITY PRODUCTS *Since 1886*
DETROIT, MICHIGAN • *Canadian Plant,* Windsor, Ont.

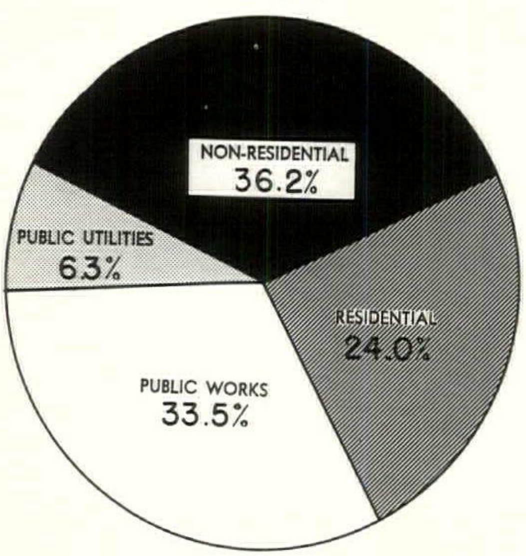
MARKED ADVANCES IN CONSTRUCTION ARE REPORTED IN FIRST QUARTER OF 1936

1936



FOR THE FIRST QUARTER OF 1936 a total of $546,000,000 of construction work was undertaken. This chart pictures the distribution between major branches of work. A similar distribution for the first quarter of 1935 is shown below.

1935



FOR THE FIRST QUARTER OF 1935 the construction total was only $298,000,000. Besides a large gain in total work in the first quarter of this year a comparison between the two charts indicates an appreciable realignment in the importance of major classes of construction.

By L. SETH SCHNITMAN,

Chief Statistician, F. W. Dodge Corporation

Hitherto laggard, construction has become more active than at any time since 1931. This improvement was due about as much to gains in private projects as in public undertakings. The contract value for all classes of construction undertaken in the 37 eastern states during the first quarter of 1936 was 83 per cent higher than the total for the corresponding period of 1935 and was almost three times the total for the first quarter of 1933, the low point of the depression.

For residential building alone the first quarter total recorded a 75 per cent gain over the volume for the like 1935 period; increases were well distributed geographically and as between small and multiple-family dwelling types.

By far the largest quantitative as well as relative gain over 1935 has thus far been recorded for nonresidential building types. In this category, a first quarter increase of almost 118 per cent occurred. Educational buildings, factories, and commercial types showed the largest quantitative improvement, though gains also occurred in hospitals, public buildings, religious and memorial structures, and social and recreational types.

For public works of engineering descriptions, a first quarter increase of only 40 per cent was reported as contrasted with the total for the first quarter of last year. Public utility types, due chiefly to expansion in airport facilities and railroad work, recorded a first quarter total about 2½ times as large as the volume for the first quarter of 1935.

The outlook for the second quarter of the year, covering all classes of construction, is encouraging. The total should not only exceed the volume for the first quarter of 1936 but will likely exceed the figure for the second quarter of 1935 by at least 40 per cent. Residential and nonresidential building will probably account for about two-thirds of the second quarter construction total, the remainder going into engineering descriptions, such as highways, bridges, sewage systems, water supply systems, and the like.

The percentage distribution covering the first quarter of 1936, as between major branches of work, is given in the upper chart. For purposes of comparison the results for the initial quarter of 1935 have also been charted. These charts have been drawn to scale, their respective sizes indicating, at a glance, the improved conditions of 1936. The chart on the succeeding page gives the first quarter construction record by major geographic territories.

All charts cover data for the 37 states east of the Rocky Mountains only.

★

Let's talk about AIR CONDITIONING

★

THE planning of an air conditioning system is not, in itself, a particularly technical job. It is concerned with the distribution of air, in and out of rooms, or buildings. This passing of air through ducts has been quite well understood for some time.

One element was lacking

The idea sometimes implied that air conditioning is a mystery may go back to the days when it was an unsolved idea. For a long period the notion of controlling the heat and moisture content of air within buildings had attracted thoughtful attention. The chief difficulty lay in the absence of a safe, economical refrigerant. Since summer air conditioning is basically cooling and dehumidifying, this lack of a suitable cooling medium was serious.

To advance the application of electric refrigeration for use in air conditioning, General Motors sponsored a search for a new and better refrigerant. After thousands of experiments the searchers discovered a new liquid. They called it FREON. So brilliantly has FREON met every hoped-for requirement that the whole air conditioning industry adopted it almost overnight. Not until the perfection of FREON did air conditioning, for business places and homes, become really practicable. And with this discovery, the last mystery faded from the air conditioning picture.

Refrigeration is the basis

Summer air conditioning basically is cooling and dehumidifying. The accepted method is by electric refrigeration. Obviously, then, the factors which determine the effectiveness and economy of an air conditioning system go back to the manufacturer of the refrigeration equipment used. Consider his experience in the design, manufacture and application of this equipment. Delco-Frigidaire, through its General Motors background, represents such experience to the greatest degree of any organization in the field.

We welcome opportunities to confer with architects. On such occasions we strive not to beat the drum of sales talk. Rather we offer such suggestions as have come out of our long experience in the fundamentals that have made air conditioning possible.

2 ACCEPTED FACTS ABOUT AIR CONDITIONING THAT POINT TO ONE CONCLUSION

1 Summer air conditioning is basically cooling and dehumidifying.

2 The accepted method of accomplishing this is by electric refrigeration.

CONCLUSION

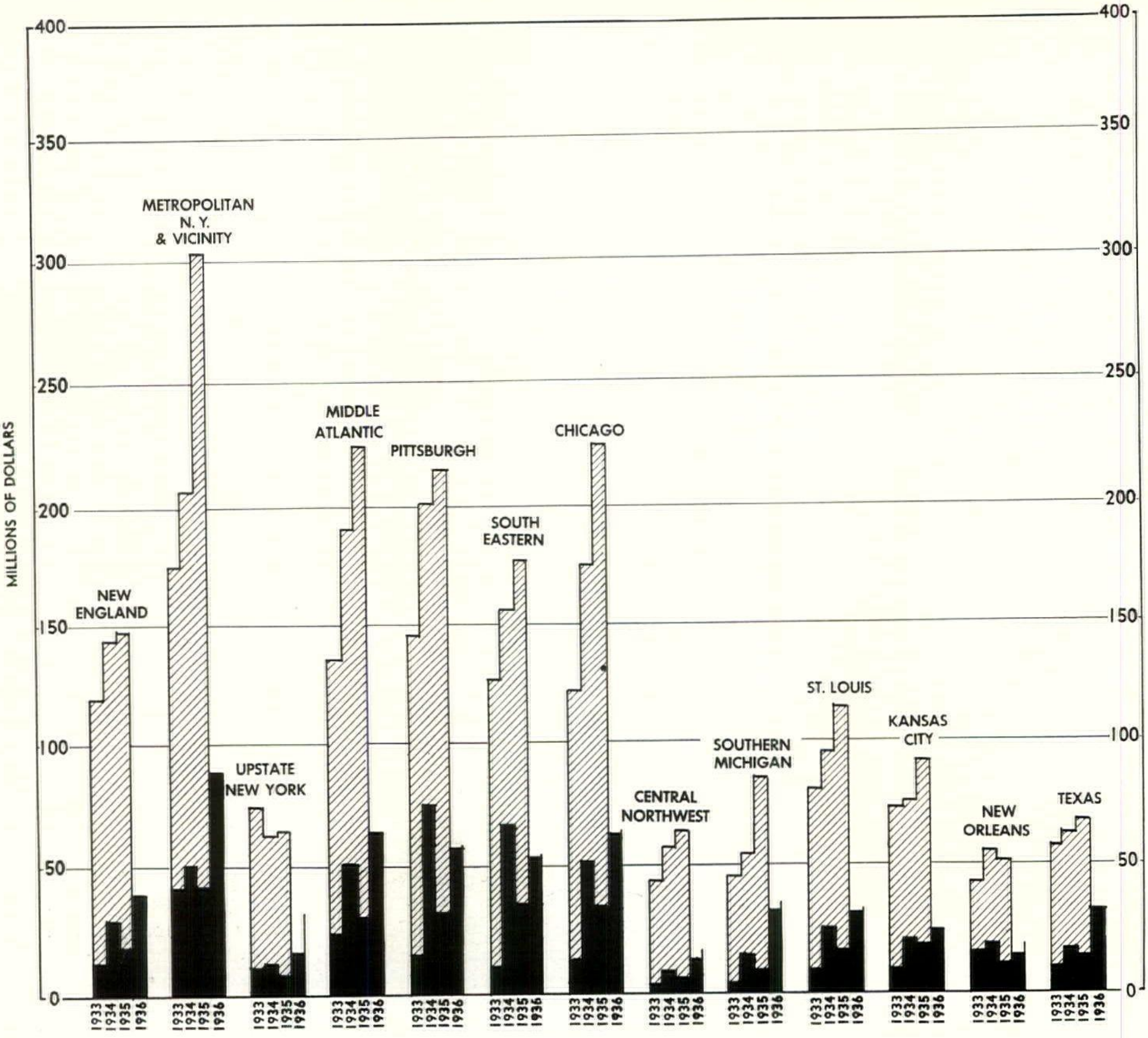
Buy air conditioning from Delco-Frigidaire—the organization representing most experience in electric refrigeration.

See Sweet's Catalogs File (Section 26/7) for details on our air conditioning equipment. Write our headquarters at Dayton, Ohio, or telephone our New York office at BRyant 9-0452

DELCO-FRIGIDAIRE CONDITIONING CORPORATION

AUTOMATIC HEATING **DAYTON, OHIO** *AIR CONDITIONING*

PRODUCTS OF GENERAL MOTORS



CONSTRUCTION CONTRACTS BY TERRITORIES

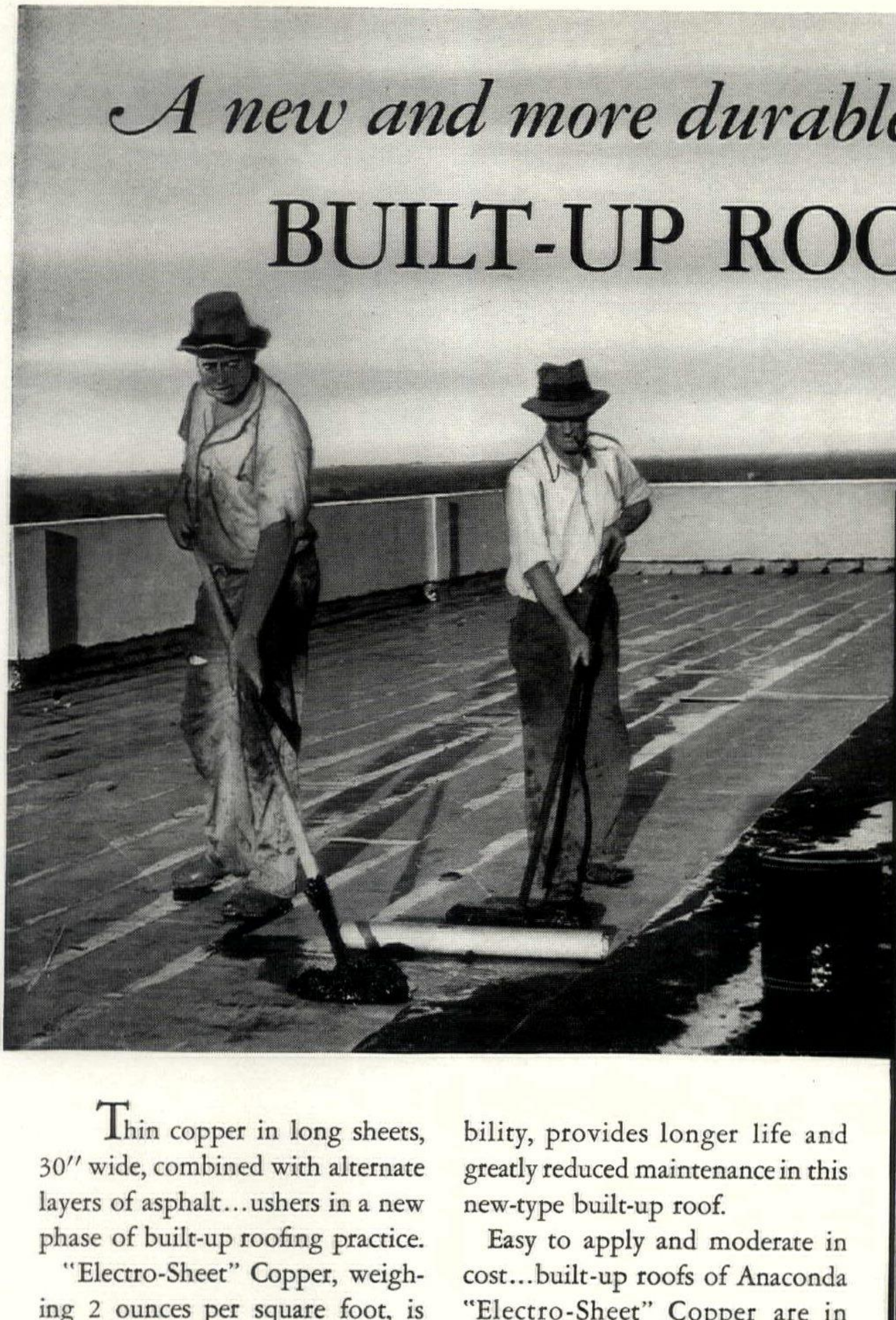
With only three exceptions construction work undertaken in the 13 major geographic territories east of the Rockies was larger during the first quarter of 1936 than for any similar charted period. Heights of bars indicate annual totals for designated years; black portions show totals through March of each of the charted years.

CONSTRUCTION CONTRACTS BY TERRITORIES

FIRST QUARTER TOTALS: 1936 AND 1935 COMPARED

TERRITORY	RESIDENTIAL BUILDING		NON-RESIDENTIAL BUILDING		PUBLIC WORKS		PUBLIC UTILITIES		TOTAL CONSTRUCTION	
	1936	*1935*	*1936*	*1935*	*1936*	*1935*	*1936*	*1935*	*1936*	*1935*
New England	$ 8,559,500	$ 4,673,900	$ 17,360,900	$ 10,386,200	$ 9,844,400	$ 5,609,000	$ 6,231,800	$ 894,500	$ 41,996,600	$ 21,563,600
Metro. N. Y.	28,866,900	17,299,300	29,813,300	15,639,100	15,864,400	7,717,200	15,161,500	5,852,100	89,706,100	46,507,700
Upstate N Y.	1,215,200	715,100	7,223,800	6,015,700	8,987,200	1,986,700	911,300	169,300	18,337,500	8,886,800
Middle Atlantic	18,797,900	10,438,800	28,892,200	11,559,300	13,409,000	7,101,500	5,323,900	2,103,900	66,423,000	31,203,500
Pittsburgh	12,650,700	6,662,200	30,086,600	14,952,700	8,986,600	9,064,300	6,097,000	1,278,400	57,820,900	31,957,600
Southeastern	14,393,300	12,523,300	23,163,900	11,132,100	12,777,500	11,437,500	3,200,000	1,222,000	53,534,700	36,314,900
Chicago	8,721,400	3,326,100	28,813,600	12,323,900	25,705,100	15,948,800	2,134,100	2,839,700	65,374,200	34,438,500
Central Northwest	1,890,800	815,400	5,213,000	2,495,900	6,673,600	4,090,700	1,703,000	335,400	15,480,400	7,737,400
Southern Michigan	7,017,700	2,332,200	19,078,600	4,298,000	5,584,800	3,778,100	1,626,000	314,000	33,306,500	10,722,300
St. Louis	6,107,700	4,702,800	10,419,300	4,922,100	13,158,200	8,080,200	1,403,200	1,097,700	31,088,400	18,802,800
Kansas City	5,486,100	2,405,100	8,385,400	6,292,300	10,996,900	10,049,500	1,561,600	2,016,000	26,430,000	20,762,900
New Orleans	2,044,000	1,155,200	4,710,100	2,295,900	5,968,700	8,922,900	830,100	139,500	13,552,900	12,513,500
Texas	8,134,400	4,187,000	21,390,900	5,734,600	1,507,600	5,624,000	1,787,200	804,400	32,820,100	16,350,000
37 EASTERN STATES	$123,885,600	$71,236,400	$234,551,000	$108,047,800	$139,464,000	$99,410,400	$47,970,700	$19,066,900	$545,871,300	$297,761,500

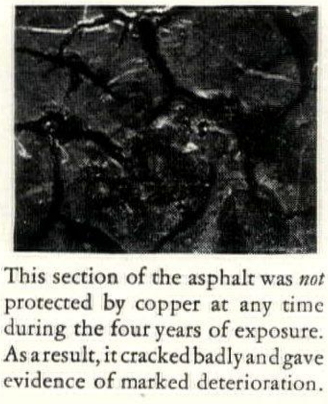
A new and more durable type of
BUILT-UP ROOF



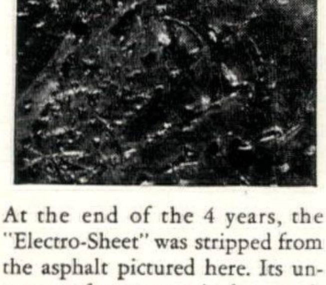
A 4-YEAR TEST

Proves the Durability of "Electro-Sheet" Copper

These photos (actual size) illustrate continuous 4-year exposure test on small board, coated with asphalt and covered with 2-oz. "Electro-Sheet."



This section of the asphalt was *not* protected by copper at any time during the four years of exposure. As a result, it cracked badly and gave evidence of marked deterioration.



At the end of the 4 years, the "Electro-Sheet" was stripped from the asphalt pictured here. Its uneven surface texture is due to adherence of asphalt to copper. It has fully retained its original softness and pliability — clearly indicating the exceptional service obtainable from copper-asphalt roofing.

Thin copper in long sheets, 30″ wide, combined with alternate layers of asphalt... ushers in a new phase of built-up roofing practice.

"Electro-Sheet" Copper, weighing 2 ounces per square foot, is *rust-proof* and *weather-proof*. It prevents deterioration of the "undercoats" of asphalt by providing a seal which eliminates air, moisture and destructive light rays. Thus the copper, firmly bonded to asphalt which retains its original pliability, provides longer life and greatly reduced maintenance in this new-type built-up roof.

Easy to apply and moderate in cost... built-up roofs of Anaconda "Electro-Sheet" Copper are in tempo with the times, offering more service per year per dollar of cost. Roofs applied to date in all sections of the country afford ample confirmation. For further details on this durable roofing, write for Anaconda Publication D-2.

ANACONDA from mine to consumer 3637

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Connecticut
Offices and Agencies in Principal Cities

ANACONDA COPPER & BRASS

MARKETING NEWS OF THE BUILDING INDUSTRY

drafting machine

New model (Wrigraph E-272) developed by L. G. Wright, Inc., 5713-49 *Euclid Ave., Cleveland. Price:* $17

This device can be used in making drawings up to 20" x 26". It is a complete unit, mounted on a 22" x 30" cleated, white pine board. It may also be obtained with a special base plate for fastening to any flat wood surface without screws or clamps.

steel scaffolding

Developed by Uecker Equipment Co., Wauwatosa, Wis. Available on lease as well as by purchase.

Hollow seamless tubes are welded together to form sections which fit into each other in telescopic fashion through couplings. Thirty feet of framing can be created in 30 minutes.

lightweight brick

Manufactured by Illinois Clay Products Co., Joliet, Ill.

"Thermo-O-Flake" insulating brick weigh only 18 oz. in the standard 9" x 4½" x 2½" unit. They can be used for temperatures up to 2,000° F. without shrinking or disintegrating.

adjustable sash balance

Produced by Pullman Manufacturing Corp., 46 *Ford Street, Rochester, N. Y. (Sweet's Catalog File* 18/4)

A compact lightweight Sash Balance, unbreakable and completely incased in a pressed steel housing, is designed to take the place of bulky sash weights and pulleys. Any necessary adjustment to insure satisfactory window operation at all times is made with an ordinary screw driver while the sash and balance remain in place.

extension hinges for casements

Produced by Casement Hardware Co., 406 *North Wood Street, Chicago. (Sweet's Catalog File* 18/33)

The new steel "Win-Dor" hinges for wood casements are designed to extend the sash 4 inches away from the frame when the window is opened. The outside glass surface can thus be cleaned from inside the room. The opened sash also acts as a baffle for breezes, deflecting air into the room.

safety window device

Introduced by Howard Safety Window Co., Inc., 2101 *W. Purdue Street, Milwaukee. Cost: about* $8.30 *for a standard* 24" x 24" *window.*

The fixture, attached to any standard window frame, has a metal shoe supporting the sash. This shoe slides in a metal channel. A releasing mechanism permits the two sashes to be adjusted in a variety of ventilating positions, adjustments being possible both up and down and inward. Windows may be left open in rainy weather. When they are open they are locked at the bottom, preventing entrance without breaking the glass. Both sashes may be folded inward for washing the outside, and both may be withdrawn completely from the frame, separately and independently of the sash weight cords. Screens and storm sash may be removed from inside the building—another safety feature.

darkening shades

Manufactured by Cincinnati Fly Screen Co., Cincinnati. (Sweet's Catalog File 19/4)

A ball and slot mechanism secures the "Cinmanco Darkening Shade" in side channels, making the windows light-tight even under varying wind pressure. Shades may be installed with lightproof ventilators at either top or bottom, or both. Readily applied to all types of windows; for large installations the shades may be electrically operated. Suitable for hospitals, schools, laboratories, auditoriums, museums, factories, studios.

plaster base insulation

Manufactured by Milcor Steel Co., Milwaukee. (Sweet's Catalog File 14/7)

"Milcor Silvercote" consists of a heat-reflecting corrosion-proof insulating medium, backed up by a waterproof asphalt film, and attached to metal lath by staples. Plaster is easily applied.

flat wall paint

Announced by Fabrics and Finishes Department, E. I. DuPont de Nemours & Co., Inc., Wilmington, Del. (Sweet's Catalog Avenue, Los Angeles

The new paint, known as "Du Pont Casein-Lithopone," has been designed to fill the gap between non-washable cold water paints and more expensive flat wall paints. It dries in two hours and gives a dull, washable coating. One coat is generally sufficient for walls that have been previously painted. It may be applied successfully over fresh plaster. White and nine pastel shades are available.

building cleaner

Model G Hypressure Jenny produced by Homestead Valve Manufacturing Co., Coraopolis, Penn.

Surfaces are cleaned with a combination of water vapor, hot water and cleaning chemicals, which is applied through a hose and nozzle at a pressure range of 50 to 150 pounds to the square inch. The equipment, available in either stationary or portable types, is fully contained, carrying water, solution and oil tanks, oil burner, vapor generator, water and solution pump, electric motor and a specially constructed vapor hose with a variety of shaped nozzles. A saturation selector enables the operator to change the spray and have a wetter or dryer vapor as needed; thus paint may be stripped by using very hot water containing a strong alkali, or by adjusting the spray and pressure, tar or very heavy grease may be blasted off.

THE ARCHITECTURAL RECORD

VOLUME 79 • NUMBER 6 • JUNE 1936

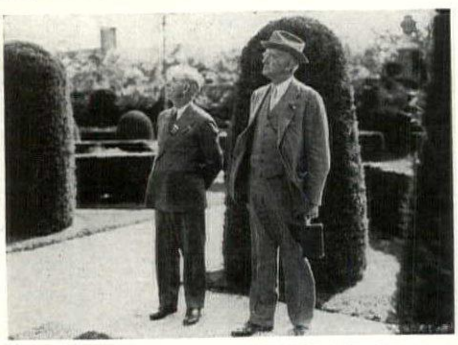
• NEXT • MONTH •

For most popular games international competition has done much to fix standard horizontal dimensions for the playing areas. However, except in a few cases, nothing has been done to establish standard vertical dimensions for the headroom over these areas. Almost every game requires a particular headroom, which is not necessarily uniform over the entire floor area. If the designer provides too little headroom the usefulness of the unit is destroyed; if he provides too much, needless cost is incurred. Mr. Gavin Hadden draws upon fifteen years of experience as an engineer designer of indoor and outdoor play areas to present in plan, section or elevation, and perspective the space actually required for participation in recreational activities, including tennis, badminton, paddle tennis, basketball, swimming pools with high and low springboard diving, hockey, ping pong, billiards, bowling, pole vaulting, etc. Mr. Hadden also points out how the shapes of the clearance solids influence the structural design of recreation buildings.

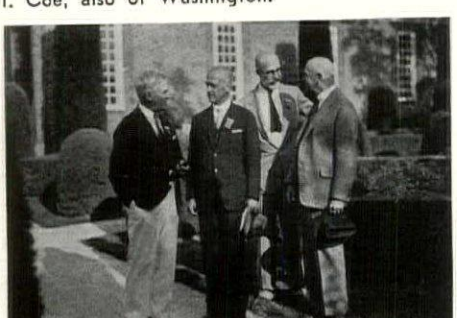
The semi-annual index, covering the contents of numbers 1 to 6, volume 79, will appear in the July issue.

A.I.A. CONVENES IN WILLIAMSBURG

"FOR HIS VISION, DIRECTION AND GENerosity" in restoring Williamsburg to its Colonial splendor, John D. Rockefeller, Jr., was presented this testimonial by A.I.A. president, Stephen F. Voorhees.



ARTHUR B. HEATON, PRESIDENT, WASHington chapter, inspects the topiary in the garden of the Governor's Palace with Theodore I. Coe, also of Washington.



REELECTED PRESIDENT VOORHEES CAUGHT with William G. Perry and Thomas Shaw, of the firm of Perry, Shaw and Hepburn, architects for the Restoration; Louis LaBeaume, St. Louis, A.I.A. first vice-president, is seen on the extreme right.

PITTSBURGHERS VIEW THE PALACE GARdens: chapter president, Raymond M. Morlier with Mrs. Morlier, followed by Charles M. Stotz, former chapter president and Charles T. Ingham, Institute Secretary.

In the romantic setting of the Williamsburg Restoration, the American Institute of Architects met May 5-8 in its sixty-eighth convention. Besides members of the Institute were builders, producers of construction materials, members of allied arts and student delegations from twenty-six schools of architecture. Discussions covered "world problems in the field of domestic shelter, the future of the architectural profession in the United States and the relationship of architects with government and industry."

The setting of the convention largely set its keynote. John D. Rockefeller, Jr., who made the Restoration possible, was presented a testimonial by the Institute. Of Mr. Rockefeller, William Perry, senior member of the firm which supervised the Restoration, said "there was no American to whom the architectural profession might turn with more kindly feeling." Vernon M. Geddy, of Colonial Williamsburg, Inc., described the method by which high prices were avoided in acquiring land. Secrecy, in which the aid of the press was invaluable, surrounded all operations until the land purchase was complete.

CONTINUANCE OF WORK RELIEF

Expenditure of a "reasonable" amount of work relief money for permanent improvements was asked of President Roosevelt in a letter from the Board of Directors. "Such action would give employment to those groups and individuals in the building industry who are now maintaining themselves independently in private work. For the immediate future they are in real need of work which will arise from Federal aid to permanent projects."

FOR HOUSING: A DOUBLE STANDARD

Housing occupied an important position in the convention. In a letter in which he regretted his absence, President Roosevelt said that "the architects could render great service in this field. Is not housing," the President asked, "the greatest potential market for the unused resources and idle facilities of our mines, forests, factories and railroads?" But a report by the Institute's Committee on Housing warned that housing "must be attacked primarily as a social problem and not as a means of stimulating industry or reducing unemployment."

The Report said that the Wagner Bill indicated "a possible government pro-

(Turn to page 420)

TWO MEDAL WINNERS RECEIVE AWARDS from President Voorhees. John Joseph Early (left), architectural sculptor, Washington, gets craftsmanship award for "original work in application of color to masonry"; Robert Edmund Jones (right), New York designer, recognized for "conspicuous attainment as a designer for the theater."

A.I.A.'s BOARD OF GOVERNORS ON THE steps of the Williamsburg Inn. Front row (left to right): first vice-president, Louis LaBeaume, St. Louis; Mr. Rockefeller; president, Stephen F. Voorhees, New York; treasurer, Edwin Bergstrom, Los Angeles, Calif.

IN THE SUNNY PALACE GARDENS ARI seen John R. Fugard, Chicago, with N. Max Dunning and G. W. Murchison, Jr., of Washington.

HOBART UPJOHN AND LORIMER RICH both of New York, caught in the clipped ye of the Palace Gardens.

F. A. E. C. T. CONVENES IN ROCHESTER

"For a group of men who have mastered the application of science to industry," said National Secretary Jules Korchien, "we have been neglectful of applying that approach to our own problems." Federation Architects, Engineers, Chemists and Technicians' Second National Convention in Rochester, April 17-19, took that statement to heart. For three days the delegates plodded through a long, complex and important agenda in which every phase of their social and economic problems was discussed. Notable from the first for its frankly trade union approach and for the recognition of the employee status of its members, the convention moved through a steady progression of decisions to the final one of affiliating with the American Federation of Labor.

National Secretary Korchien, reporting on the past year's work, said "Our experience in the Federation has taught us that no matter what part of our program we develop, it must fit into the pattern of our national life. It must benefit not only ourselves but society as a whole; our program is sound because it does just that." The convention followed the procedure of hearing and discussing reports on all the major points on the agenda. Action later took the form of resolutions based upon these reports, and these resolutions form the directives for the Federation's coming year.

Convention work was lightened by a ball on the opening night and by several open meetings at which various speakers were guests. Mayor Charles M. Stanton, of Rochester, formally opened the convention hoping "that it would progress towards its goal," and calling attention to the fact that Rochester parks boasted some 250 varieties of lilacs. Francis Bonn, president of the Rochester Newspaper Guild, spoke at one session on the similarity of the problems facing all white collar workers, and the necessity for unity of action between them. Dr. James D. McGill, president of the Rochester Board of Education, spoke on "Liberty and the Constitution." Said Dr. McGill: "Abstract liberty is not to be found. Political freedom nowhere exists without economic liberty." The Hon. Julius Hoesterey, City Councilman of Rochester, at the same session denounced the confusion now existing between education and intelligence.

Excerpts from some of the important resolutions of the convention follow.

AFFILIATION WITH A. F. of L.

"**Whereas** only a small fraction of the technical employees of the country are organized in associations for their economic betterment, and **Whereas** the exigencies of the present situation in our country make it imperative that their unified collective strength be hastened to improve and protect their economic condition, **Resolved** that the Convention approve affiliation with the International Federation of Technical Engineers, Architects and Draftsmen."

PRIVATE INDUSTRY

"**Whereas** the technical professional workers are confronted with curtailment of WPA and public works in general, and **Whereas** independent private architects and consulting engineers are rapidly disappearing and finding it increasingly difficult to pay a wage commensurate with the training, abilities and requirements of their employees, and **Whereas** large chain stores, mail order concerns, corporations and utilities are doing a greater and greater percentage of their planning architectural and engineering work, **Resolved** that in general the Federation's aim is a 100% union-made product—whether it be a building, a machine, or a chemical product—from the inception of the idea and the design to the finished product and, further, that we favor the 30-hour week."

MARCANTONIO WORKS STANDARD BILL

"**Whereas** there exists a persistent drive to eliminate or reduce the WPA program, and the need for jobs and relief still exists (a recent A. F. of L. census shows 12,600,000 still unemployed), and **Whereas** the Marcantonio Bill is designed to meet the needs of the present situation until genuine unemployment insurance is established, **Resolved** that this Convention indorse and support the Marcantonio Federal Relief and Works Projects Standards Bill, HR. 11, 186."

SOCIAL SECURITY

"**Whereas** technical workers self-employed and employees continue to suffer from continuous or periodic unemployment, **Resolved** that the Federation work for the liberalizing of the present Social Security Act along the lines suggested by the Frazier-Lundeen Bill."

NATIONAL YOUTH ACT

"**Whereas** the attention to our youth is a prime responsibility of the nation for its future well-being and **Whereas** youth today finds it difficult to continue its training for its place in society, and even after school finds no employment, and **Whereas** those finding employment in our professions today do so at greatly reduced wages, thus threatening the standards of the entire professions, **Resolved** that the Federation indorse and actively support the National Youth Act."

LICENSING

"**Whereas** there is a decided tendency towards limiting the number of future licensed professionals as a solution to the present limited opportunities for licensees, and the institution of an apprentice system harking back to an outgrown medieval guild system, **Resolved** that every chapter study the professional licensing provisions within its state and those chapters faced with the immediate problem of licensing

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MAYOR CHAS. M. STANTON

"Rochester has 250 varieties of lilacs"

HUGH B. JOHNSON

The Rochester Chapter was host

FRANCIS BONN

The Newspaper Guild wants unity

President Robert Sentman and Elizabeth Bradford, of Chicago, caught with Jack Spinner, editor FAECT's "Bulletin"

Discussing the photos (left to right): Frank Kornacker, Chicago; Ray Weber, New York; Elizabeth Bradford, National Secretary; Jules Korchien, New York; Hugh B. Johnson

NEWS OF THE MONTH


© House and Garden

Complete to the pansies in the garden.


Photo by H. H. Costan

The principals pose.

FOR THE HYPOTHETICAL FAMILY IN BETTER CIRCUMSTANCES

To the clink of cocktail glasses and the scraping of liveried manservants, *House and Garden* opened its "essentially public-spirited undertaking," Ideal House. Special cars took guests to Scarsdale, N. Y., where FHA's Stewart McDonald presided at the preview. Left to right: Conde Nast, publisher of House and Garden; Verna Cook Salomonsky, architect of Ideal House; Stewart McDonald, FHA; Margaret Dorgan, decorator; Richardson Wright, editor.

A BEAUTY CONTEST FOR BRIDGES

A jury of nationally known engineers and architects has been appointed by the American Institute of Steel Construction, Inc., to select the most beautiful bridges of steel built during the past year. The awards will be made at a meeting of the jury to be held in June and the bridges chosen will later be decorated with a stainless steel plaque. This will be the eighth consecutive year that such awards have been made.

There will be three prize winners, selected from bridges of three different groups.

17 OUT OF 100,000 HAVE 'EM

March was the nation's best home-building month since 1931, according to FHLBB. However, the rate of small dwelling construction lagged shockingly behind demand, the average number of dwellings constructed per 100,000 being only 17.

AUTO MEN EYE HOUSING

An exploration into industry to search out jobs for the unemployed led President Roosevelt into a series of conferences which may prove profoundly significant for the building industry. In a talk with Walter P. Chrysler, motor car magnate, he asked Mr. Chrysler "how much it would cost to produce a cheap automobile, one costing about $600 under mass-production methods, if the car were built piece by piece in a machine shop. He said that Mr. Chrysler estimated the cost at about $3,500. Mr. Roosevelt then pointed out that all house construction is still done by the machine-shop method, and home owners go without the benefit of the economies of mass production."

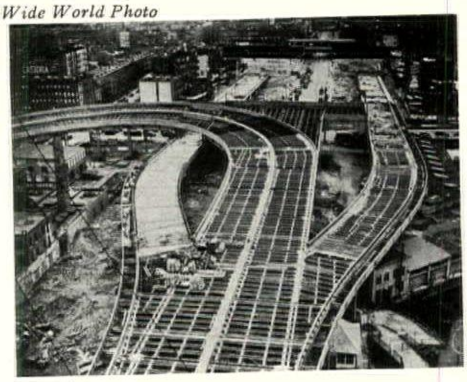
The President is convinced that between 500,000 and 1,000,000 small homes could be sold immediately if the quantity-production methods of automobile factories could be employed to turn out such dwellings at a cost not exceeding $2,500. The Chrysler conference is one of a series with industrial leaders, for whose products there is a potential demand "if prices and purchasing power can be brought into proper relation to one another." No solution for this problem has been found, but Mr. Roosevelt "indicated a strong determination to pursue studies already begun."

OFF TO AN EVEN START

America's rival "World Fairs of 1939" moved towards actuality this month. Creation of the made land on which the San Francisco Exposition will be held has begun with U. S. Army dredges, while work on the Golden Gate and Oakland Bridges proceeds ahead of schedule. By a unanimous vote, U. S. Senate passed a bill authorizing President Roosevelt to invite participation of all foreign nations in the Fair. This, it is pointed out, "means that the San Francsco Bay Exposition is the only 1939 Fair to be given official governmental sanction and approval."

However, with the City of New York authorizing the expenditure of $7,000,000 on improvement of the Flushing Meadows site, the New York World's Fair of 1939 appeared ready to enter the construction phase. This appropriation is contingent upon a $4,000,000 grant from the state. The board of the Fair corporation, expanded recently to include city, state and Federal representatives, plans to float a $20,000,000 bond issue.

Wide World Photo



PLANNING TO ELIMINATE TRAFFIC SNARLS

Approaches to modern bridges are no longer simple affairs, as is indicated by this view of the Manhattan end of the new Tri-Borough Bridge in New York. The approach veering off to the left connects with the new East Side Highway, a link in the high-speed motor road which will eventually girdle the Island.

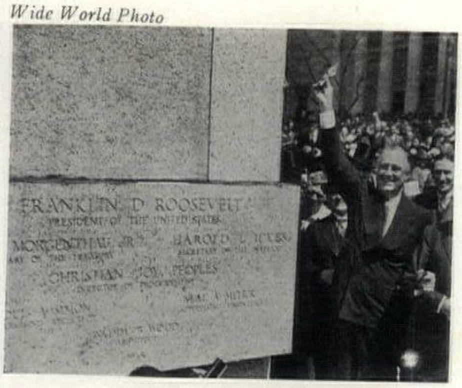
PUBLIC WORKS PIERS FOR PUBLIC WORKS SHIPS

Like the Pyramids and the Parthenon, the "Queen Mary" is a public works project; and when she docks in New York this month, she will tie up to another public works project—the new PWA Pier No. 90 in the North River. The new pier, together with its twin No. 88 (for the "Normandie," likewise something of a works project), will constitute "the most modern ship terminal facilities in the world." Of fireproof construction, the piers will contain heated passenger quarters, rest rooms, elevators and escalators and even incinerators for garbage which heretofore accumulated on shipboard and which cannot be dumped in the harbor.

RA'S "RED" PROJECT AT RED HOUSE, W. VA.

Widely denounced as "communistic" because of its cooperative factories is this subsistence farms project in a quiet West Virginia valley. A community of 150 new homes, complete and occupied, Red House Farms still lacks one essential—reliable sources of employment.

Wide World Photo



F. D. R. WITH HISTORIC TROWEL

Although cornerstones have long ceased to have any structural function, their political value was exploited recently in Washington when President Roosevelt laid the cornerstone of the new Interior Building. He is seen here using the same trowel that George Washington used on the Capitol cornerstone in 1793. Although separated by a century and a half, the buildings are of much the same architectural style.

ENGLISH ARCHITECTS ESTABLISH SCHOOL FOR POLITICO-PLANNERS

Against the day when national planning will be a fact and not a dream, a new School of National Planning has recently been opened in London under the auspices of the Architects' Association. F. E. Towndrow, writing in *Architectural Design and Construction*, explains that the school is a post-graduate one intended "to produce a type of planner who is not only equipped in respect of statutory town-planning, but one who will be able to deal with wider issues in social and economic life."

The course takes two years and includes "the study of such related subjects as economics, social science, public administration, local government, and law, in so far as they generally affect planning. Of course, it would be impossible in such a short time to study, with any thoroughness, all these related subjects, for they would comprise almost the whole of human knowledge. Yet in the future they must form an essential part of the *general education* of the planner, the administrator, and politician.

"Logically, in order to plan a new street one ought to plan the whole city, in order to plan the city one must plan the region, and then not only the region, but the whole country. And apart from these factors there are the more diffused, yet more intimate, factors of an unplanned legal system—the laws of land and property, and unbalanced financial and economic system, a state of poverty in the midst of plenty, a mental condition of medieval ignorance and prejudice."

"DISCREET PALETTE" FOR CLEVELAND FAIR

Otto Teegen and Irvin L. Scott, New York architects and associates of the late Joseph Urban, are developing the color scheme for the Great Lakes Exposition, which opens in Cleveland June 27. Both men were engaged with Mr. Urban in a similar capacity for Chicago's Century of Progress.

"While considerable experimentation has been engaged in, the color scheme for the Great Lakes Exposition has not yet been established," said Mr. Teegen. "I can say, however, that regardless of the general similarity of purpose governing the plans, the color scheme of this Exposition will distinctly differ from that employed at the Chicago Fair and a more limited palette will govern. There we had to contend with a tremendous array of heterogeneous structures without relation to each other in plan or mass and the only thing they possessed in common was the color, the common denominator. A palette of ten or twelve colors will suffice for the Great Lakes Exposition because of its more orderly arrangement. There will be a single basic tone, white, with colors used for supplementary purposes in small areas rather than on a huge scale, as at Chicago.

"Three years have elapsed since Chicago's great effort and we contend with entirely new conditions, and pleasing the current era is our objective. Materials used for such structures no longer possess decorative features in themselves, so interest must be supplied to these large flat surfaces through a discreet employment of colors used in pleasing combinations, and in the right places."

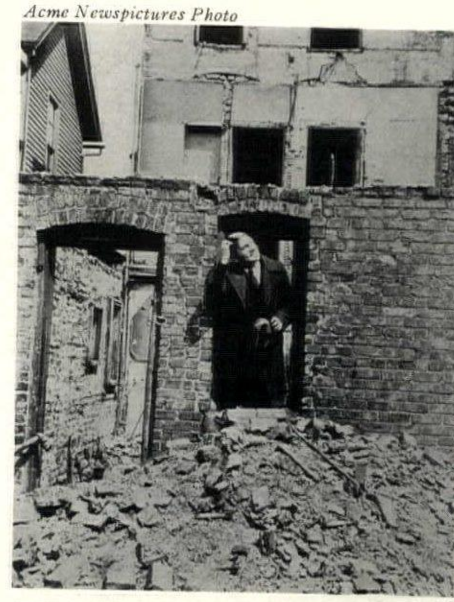
CARPENTERS HAMMER, COURT ADJOURNS

As scaffolding around the New York Criminal Courts Building rose higher and higher, the noise from the hammering forced Judge C. F. Collins to order the workmen "to cease and desist." The District Attorney, relaying the Court's message from a window above the workmen, met with a bedlam of increased hammering.

The jurors yelled: "We can't hear a word (of the testimony)." The Judge said: "Either those carpenters will have to stop their hammering or we'll have to stop this trial." The carpenters replied: "We've got a time limit on this job and can't stop."

Court was adjourned until such a time as the rising scaffold carried the workmen out of hearing.

Acme Newspictures Photo



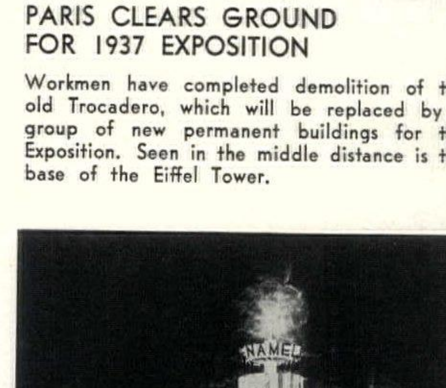
BUT THIS POOR LANDLORD GOT NONE

When Oscar Oschatz, Chicago landlord, went to this building to collect his rent, he found the tenants evicted and the building half demolished. The wreckers, halted by court order, showed a wrecking permit giving this address. Oschatz, who hasn't yet found who made the mistake, insists somebody will pay for it.

Wide World Photo

PARIS CLEARS GROUND FOR 1937 EXPOSITION

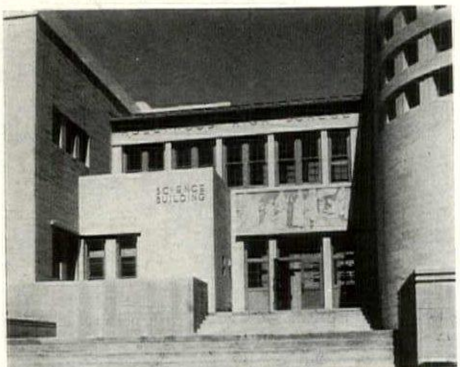
Workmen have completed demolition of the old Trocadero, which will be replaced by a group of new permanent buildings for the Exposition. Seen in the middle distance is the base of the Eiffel Tower.



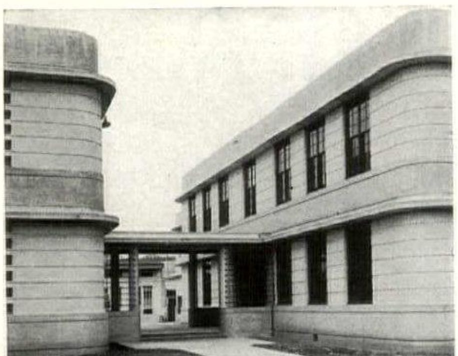
DEMONSTRATING THE USES OF ENAMEL is this new structure now being constructed at Cleveland's Great Lakes Exposition.

NEWS OF THE MONTH

IT TOOK AN EARTHQUAKE TO START THIS SCHOOL-BUILDING PROGRAM



1. Science Building, Hollywood High School.



2. Manual Arts High School, Los Angeles.

3. Hamilton Junior High School, Los Angeles.

Three of the schools in the $40,000,000 California - PWA program to rebuild the state's educational plants. Legislation passed as a result of the last earthquake makes tremor-resisting structures mandatory.

U. S. COMMISSIONER OF EDUCATION ATTACKS FASCISM IN AMERICAN SCHOOLS

"Let those who want to protect the people from what is considered a dangerous doctrine, advocate such control not in the name of democracy but as part and parcel of a fascist program," declares John W. Studebaker, U. S. Commissioner of Education in his new book, *Plain Talk.* In discussing freedom of thought and instruction for the American schools (academic freedom), Dr. Studebaker writes: "Freedom of speech, of press, of assembly, and of teaching, go hand in hand. These freedoms are not primarily for the protection of the individual rights of speakers, or publishers, or organizers of meetings, or of teachers. They are fundamental to democracy because they protect the masses of people in their essential right to hear, to read, to assemble and discuss, and to learn. Once any one of these freedoms is successfully suppressed, we are in danger of losing all of them."

Dr. Studebaker, who is regarded as the outstanding American advocate of public forums, is the father of the nationally-known Des Moines forums, and director of a Federal Government educational project which has set up 10 demonstration public forum centers throughout the United States (see page 430). Dr. Studebaker insists that people must be taught "not what to think but how to think through public issues; not what is true, but what alternatives there are to choose from; not what to believe, but how to get understanding."

COURT FINDS RA "SATELLITE TOWN" ILLEGAL

Rexford Guy Tugwell, Resettlement Administration Head, was specifically enjoined from proceeding with the Bound Brook satellite town now under construction in Franklin Township, N. J., by a recent decision of the Federal Court of Appeals in Washington. The decision was the result of a suit brought against RA by property-owning individuals in Franklin Township, who maintained that the new project would result in a loss of valuable taxable property and would become a financial burden because the township would have to furnish utilities. Their suit further questioned the legality of the entire Federal Emergency Appropriations Act of 1935, under which RA is set up.

According to administration spokesmen, construction work on the other satellite towns (which are not directly affected by the decision) will be rushed to completion by fall. "By that time almost all current work relief funds will have been spent, in addition to a large part of the new appropriation, and the Supreme Court will be faced with a fait accompli, as in the case of gold devaluation."

PWA AND THE NATION'S SCHOOLS

School construction has been one of the major accomplishments of the public works program, according to a recent report by Administrator Ickes. Thirty thousand classrooms providing accommodations for over 1,000,000 students have been added to the nation's school system in more than 4,000 buildings. At a cost of $120 per student, the PWA has been responsible for at least 75% of the school construction during the last 2½ years, Mr. Ickes reported.

Elementary Schools	
New classrooms	13,825
Number of students	550,729
High Schools	
New classrooms	10,948
Number of students	435,803
Combination Elementary and High Schools	
New classrooms	4,863
Number of students	195,198

In addition to loans and grants made directly to public bodies for school construction, PWA allotted $30,000,000 to schools under the supervision of the Federal government, such as Indian schools, the Naval Academy at Annapolis, and the Military Academy at West Point.

Wide World Photo

LIGHT WEIGHT ON THE "HINDENBURG"

Limitations of size and weight in the furnishings of the new German airship have resulted in excellent modern design, as in the dining room above. Although the "Hindenburg," which made its initial trip to New York last month, was designed and financed before the Hitler régime, the Nazi swastika was prominently displayed on its hind-quarters.

AMERICA'S LARGEST BATTLESHIP COULD BERTH HERE

One of the two spillways of the recently completed Boulder Dam. These great channels protect the dam against sudden rises in the Colorado; together they can by-pass 400,000 second feet of water.

STUDENT BRIDGE DESIGNS JUDGED

Clarence H. Rosa, University of Michigan student, won first prize in the eighth annual bridge design competition held by the American Institute of Steel Construction. A. W. Millington, a student of Rensselaer Polytechnic Institute, won second prize. First honorable mention went to Russell E. Madsen of Rensselaer Polytechnic Institute and second and third honorable mentions, respectively, to John A. Grove and Frank R. Streba of Carnegie Institute of Technology.

The problem was to design a steel highway bridge having a span of 300 feet, with 30 feet minimum vertical clearance over a river. In addition to giving the students certificates of award, the first prize carries a cash compensation of $100 and the second prize $50.

PRIX DE ROME AWARDS IN ARCHITECTURE, LANDSCAPE ARCHITECTURE

A twenty-five year old Georgian, Richard Ayers, is winner of the Prix de Rome in architecture, the American Academy in Rome announces. Robert Kitchen, twenty-three, of Dayton, Ohio, is winner of the landscape award. Kitchen is the ninth winner from Cornell in the fifteen years the landscape prize has been awarded.

EUGENE F. STOYKE

ILLINOIS STUDENT BAGS PLYM AWARD

Eugene F. Stoyke, graduate student at Illinois' School of Architecture, is the winner of the 23rd Francis J. Plym fellowship. The award, which entitles the winner to a year's study of architecture in Europe, is only open to American citizens who are graduates of the School of Architecture. Mr. Stoyke, whose winning problem was *A Stop-over on a Transcontinental Highway*, was born in Germany in 1912 and came to this country in 1923. He studied architecture at Armour Institute and the University of Illinois, where he received his Bachelor's degree in 1935.

M. I. T. STUDENTS BUILD HOUSE FOR SALE

Under a new plan at Massachusetts Institute of Technology, undergraduate students of the School of Architecture will now be able to combine theory and practice, according to Professor William Emerson. A revolving fund has been established whereby a house—designed, located and supervised by the students—will later be marketed and the proceeds put into another and similar project. The prize-winning design for the year is shown above with its student architects, Samuel Scott, freshman, of Weymouth, Mass., and Thomas Akin, sophomore, New Bedford, Mass.

PROGRESSIVE PLANNING RECOGNIZED AT COLUMBIA

Winner over seven competitors, James S. Atkins of New York has been awarded the F. Augustus Schermerhorn traveling fellowship of Columbia's School of Architecture for 1936. The fellowship, open to graduates of the School within the past ten years, carries a stipend of $1,700 for study abroad.

The Schermerhorn competition called for designs of a progressive country day school "especially adapted to the new education, which is based on complete time-freedom for the children."

Atkins's design, according to the jury, excelled in its provisions for air and light and in its ingenious arrangement of outdoor classrooms. "The classrooms form wings on either side of a long corridor. Each classroom opens out into an individual garden space between wings, which may be used for outside study. Two large art studios, a science laboratory, and offices for twelve teachers are provided for. The gymnasium and auditorium compose a separate unit, which may be closed off. A manual training and crafts room adjoins. Kitchen, lunchroom, cafeteria, and dining terrace connect the auditorium and classrooms, while a kindergarten and nursery school with covered playgrounds are in still another division. The school is planned for 250 children of both sexes."

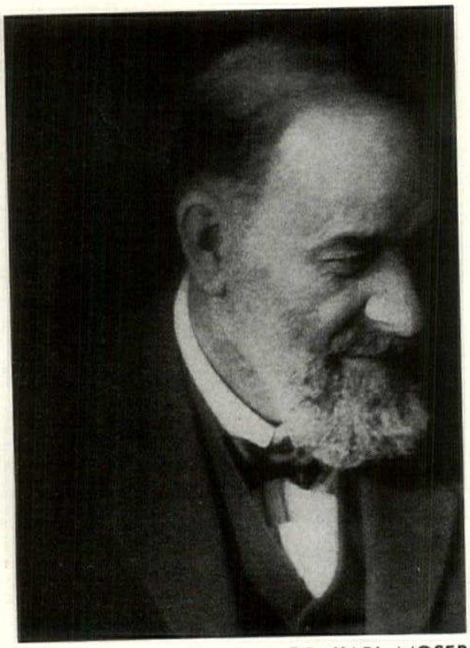
THE SUNNY SOUTH: BEFORE AND AFTER

1. Can those who lived here . . .

2. . . . afford this?

Wide World Photo

Two views of the PWA slum clearance project for Negroes in Atlanta, with Atlanta University in the background. The new housing project, which will be ready for occupancy this year, provides 675 modern living units, at prices considerably higher than those paid by the former tenants.


Hubacher, Zurich, Photo. from "Das Werk"

DR. KARL MOSER

Dr. Karl Moser, famous Swiss architect and one of the founders of the modern school of architectural design, died February 23 at the age of 75 in Zurich, Switzerland. Although born in 1860 and himself a product of the academic Ecole des Beaux-Arts in Paris, Dr. Moser displayed throughout a long life a constant alertness to new developments in architecture. Himself a successful architect in Zurich and southern Germany, where he did many notable buildings, he distinguished himself even more as a teacher. "He could, as one of the few of his generation, place himself without effort in the philosophy of modern architecture and actively promote these new trends."

After an extensive education in Zurich, Paris and Wiesbaden, with later studies in Italy, he became junior member of the firm of Curjel and Moser in Karlsruhe. This firm did the famous Zurich Kunsthaus, as well as many churches in Basel, Bern and Zurich. Returning to Zurich in later years, Dr. Moser was architect for the addition to the Kunsthaus, Church of St. Anthony, Basel (*Architectural Record*, May 1929), and many other buildings. His activity and influence in architecture continued until his death.

A.I.A. CONVENES (from page 414)

gram" but demanded that control of all public housing agencies be decentralized. It recommended the acceptance of the principle "that the (housing) demands of those having ability to pay an economic rent be met by private enterprise, but that need caused by inability to pay be relieved by public aid." To this end, it suggested a dual standard of planning. "No effort can be broadly successful," it felt, "unless directed towards the greatest bulk of home building, the low-priced small house."

FOR STUDENTS: APPRENTICESHIP

Student delegates from twenty-six schools of architecture heard Dean William Emerson of M.I.T. read a significant Report in which he outlined an apprenticeship system consisting of "a sound background of education in a school of architecture or a careful training in an office, in each case supplemented by a supervised period of three years experience in the practical essentials of architectural practice."

IS GOVERNMENT IN THE ARCHITECTURAL BUSINESS?

Francis P. Sullivan, Committee on Public Works, made a Report on the work of his Committee. A definite basis for advancing the standards of planning, design and construction of public buildings has been laid in a series of conferences with the Secretary of the Treasury, according to the Report. One of the questions involved is whether permanent governmental architectural agencies are necessary and, if so, what their organization and functions should be. The method of selection of private architects, where they are engaged in government work, as well as of materials, are questions before the conference. What, if any, obstacles to architectural advance are raised by unnecessary governmental restrictions also are the objects of study.

F.A.E.C.T. CONVENES (from page 415)

loss inimical to the welfare of the technical employee, take the necessary steps to effect those changes it finds necessary in dealing with the proposed creation of an apprenticeship system."

FLOOD CONTROL

"**Whereas** floods in the U. S. have become a national menace, and **Whereas** it is possible to control such floods on a national scale, be it **Resolved** that all existing agencies of the Federal government dealing with phases of our water resources be consolidated, and empowered to plan and act accordingly to its own recommendations. That such a plan be national in scope so that resulting social and economic benefits may be integrated for the population as a whole.

HOUSING

"**Whereas** technical workers share with all other workers the evils of inadequate high rental and high-cost housing, and the problems thereby created have not yet been solved by private enterprise or the government, **Resolved** that the F.A.E.C.T. support housing legislation based upon the following principles of an adequate housing program. (1) A Federal housing fund to be created out of the Treasury of the United States of sufficient size to provide for the building of at least one million dwelling units per year over a ten-year period. (2) The availability of this fund to state and municipalities in the form of grants for the construction of high-standard housing, providing that these states and municipalities conform to certain standards established in this legislation. These standards are: A—A fixed maximum rental which shall insure that the housing shall be available to the low-income groups. This rental shall be not more than $5 per room per month depending upon average earnings in the localities of the low-income groups for whom this housing is intended. B—The payment of the union rate of wage, or in the absence thereof, of not less than the prevailing rate for all employees in any way engaged in the housing projects. Wherever possible, such employees shall be selected from civil service lists and the civil service scale shall be paid. The right of collective bargaining for all such employees. C—Democratic representation of workers and tenant groups in the initiation, management, and control of the housing project and in the direction of the social activities of the tenants."

CIVIL LIBERTIES

"**Whereas** the interests of every technical worker are directly affected by increasing attacks upon freedom of speech, upon the right to organize, and the right to assembly, by such oppressive measures as compulsory oaths, fingerprinting and the like, and legislation before the Congress such as the Kramer Anti-Sedition Bill, the Tydings-McCormack Military Disaffection Bill, the Dies Bill and the Dunkel-Baldwin Bill, **Resolved** that the Federation condemn all such measures designed to curtail the civil liberties of the people."

CALENDAR OF EXHIBITIONS AND EVENTS

- **June 6**—Opening, Texas Centennial Central Exposition at Dallas, Texas.
- **June 13**—Graduate Scholarship Competition, School of Architecture and Allied Arts, New York University, New York City.
- **June 15-19**—Semi-annual meeting, American Society of Mechanical Engineers, Dallas, Texas.
- **June 22**—Opening, Booth Travelling Fellowship Competition, College of Architecture, University of Michigan, Ann Arbor.
- **June 27**—Opening, Great Lakes Exposition, Cleveland, Ohio.
- **June 29**—Opening, Summer School, College of Architecture, University of Michigan, Ann Arbor.
- **July 6**—Opening, Summer School, Department of Architecture, Syracuse University, Syracuse, N. Y.

CONTRIBUTORS TO THIS ISSUE

WILLIAM G. CARR . . . . New Demands in School Housing

Ph.D., Stanford University, 1929. Director of research, National Education Association, since 1931. Also secretary, Educational Policies Commission. Visiting professor of education at Stanford University (1929, 1931), University of Michigan (1930, 1933, 1934), University of California (1935). Author of numerous books on education, including "School Finance," "Essentials of Taxation" (in collaboration with Harley L. Lutz), "Schools in the Story of Culture" (with Charles A. Beard).

LESTER DIX . . . . Housing America's New Education

Assistant professor and associate director of Lincoln School, the experimental school of Teachers College, Columbia University. Work has been largely in the field of administration, with particular interest in economics and in the arts. Author of "The Economic Basis for the Teacher's Wage" and "The Educational Personnel of the Chicago Schools," a section of the Chicago School Survey; and a number of articles on various issues in education for professional and general periodicals.

JAMES E. MENDENHALL . Housing America's New Education

Ph.D., Teachers College, Columbia University, 1930. Member of the research staff at the Lincoln School since 1928. At present editor of "Building America," a photographic magazine of modern problems for young people in junior and senior high schools, published by Society for Curriculum Study, Inc., 425 West 123rd Street, New York. Recent issues of this publication have covered such subjects as housing, men and machines, transportation, communication, power.

EARL F. SYKES . . A Modern Bibliography of School Design

M.A., School of Education, University of Montana, 1931. Awarded Teachers College Scholarship, 1935, and Teachers College Fellowship, 1936. Member of Phi Delta Kappa and Kappa Delta Pi, national honorary educational fraternities. Served 8 years as superintendent of schools in Montana. His bibliography in this issue represents original work and covers, in a highly selective manner, the field of recent publications on school design.

F. L. DEVEREUX . . . . Better Acoustics for the School

Vice-president, Erpi Picture Consultants, Inc. Author of "The Educational Talking Picture" and recognized as the originator of the educational talking picture. Organized a group of educational research experts and motion picture production experts which has been engaged for more than 7 years in the development of standards for the production of educational talking pictures; a large number of educational talking pictures have been produced, notably the Physical Science series.

ALSTON RODGERS . . . . . Better Light for the Classroom

M.E., Stevens Institute of Technology, 1925. At present lighting engineer, General Electric Company, Incandescent Lamp Department, Nela Park, Cleveland. Co-author with A. L. Powell of "Lighting the Non-Professional Stage Production" and "Engineering Features of Built-in Lighting." Also well-known as a lecturer and consultant on various phases of lighting, particularly schools, theaters, stores, offices, expositions and industrial safety.

Further Gains Likely

By L. SETH SCHNITMAN, Chief Statistician

F. W. Dodge Corporation

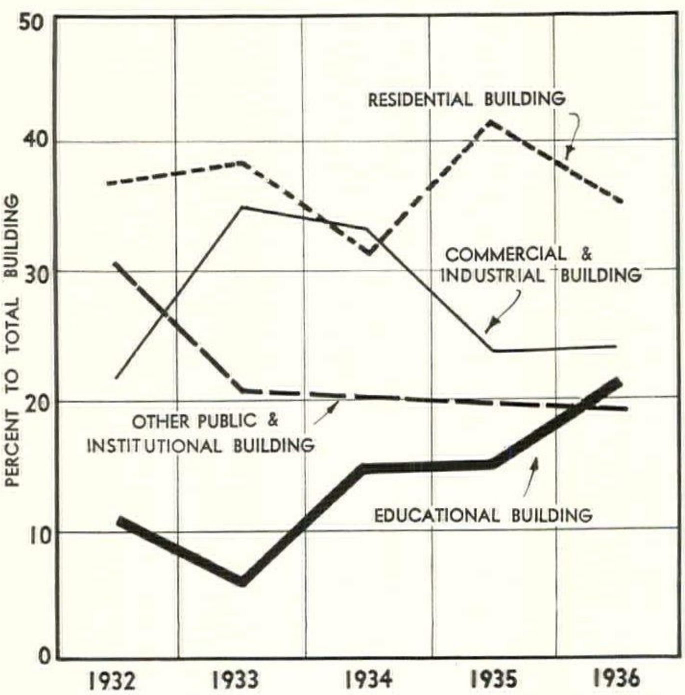


CHART I: In 1936, educational building has displaced all other public and institutional buildings in relative importance.

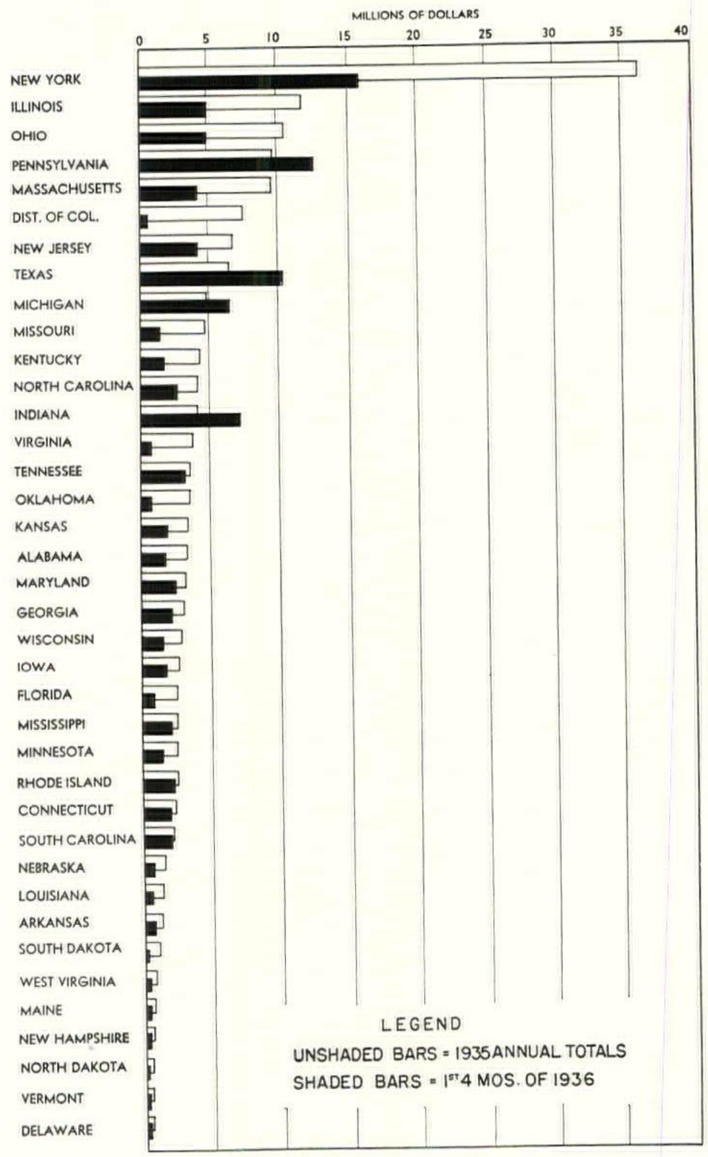


CHART 2: Four-month totals for educational building in 1936 already exceed full year 1935 totals in Pennsylvania, Texas, Michigan, and Indiana. Many other states will share this distinction within the next two or three months.

In recent months, educational building projects have taken on an enlarged significance. More important still, this favorable condition appears destined to be maintained during the next few months. As a result, the year 1936 should end with a construction total larger than for any other year since 1930 when some $333 million were expended for this specialized class of building in the area east of the Rocky Mountains.

During 1933 educational building accounted for only 6 per cent of all building operations undertaken in the 37 eastern states. Heavy engineering projects have been excluded in this consideration. Since 1933 the relative importance of educational building construction has advanced progressively so that for 1936, to date, such construction has not only accounted for virtually 22 per cent of all building, but is even more important, relatively, than all other classes of public and institutional building combined.

For the 37 eastern states the 1935 total for educational buildings of all descriptions amounted to $173 million, itself a larger annual total than for any year since 1931 when a total of $229 million was shown for the 37 states. New York, Illinois, Ohio, Pennsylvania and Massachusetts, in their order of rank, accounted for a combined total of $78 million or 45 per cent of all educational construction projects undertaken last year in the area east of the Rocky Mountains. Chart 2 shows the 1935 ranking of each of the states and the District of Columbia, together with comparisons covering the value of educational projects which have been started during the initial four months of 1936.

It is of interest to note from this chart: (1) that thus far this year, Pennsylvania ranks second only to New York, whereas for 1935 Pennsylvania was fourth; (2) that Texas in the initial four months of 1936 stood third against eighth in 1935; (3) that for the states of Pennsylvania, Texas, Michigan and Indiana the four-month contract totals for 1936 for educational buildings have already exceeded the state totals for the full year 1935; (4) that for virtually all other states, the totals for 1936 as a whole will exceed their respective figures for 1935, if the results for the first four months of the current year are any criterion.

A relatively large number of educational building projects—schools, colleges, gymnasium buildings, libraries, laboratories—is out for bids. A considerable number of projects is still in early contemplated stages. These factors presage continued gains in contracts as compared with 1935.

Last year publicly-financed projects accounted for 80 per cent of the total dollar volume of educational building. It is probable that substantially the same proportion will hold for 1936. With the funds of PWA and WPA all allocated and a large percentage of these already expended or committed and no indications of any appreciable additions specifically earmarked for building purposes to come from the appropriations of the current Congress, educational building prospects over the longer range appear somewhat clouded.

But an improving market for municipal bonds and further indicated gains in business generally, resulting in better tax revenues, should operate to sustain the flow of funds into educational buildings for some time to come having due regard for the social demand for such facilities.

The architect's influence in planning educational projects amounted to 93 per cent of a possible 100 per cent, i.e., 93 per cent of the value of all educational projects undertaken in 1935 was planned by architects. This proportion will probably be at least as high for 1936 as a whole.

Of the value of all educational building started in 1935, 65 per cent was for new facilities as distinguished from alterations and modernizations. For the initial four months of 1936 new work accounted for 80 per cent of the total volume of educational buildings. This latter percentage is more likely to be the pattern for 1936 as a whole than the lower ratio of 1935.

Each of the 13 major geographic districts in the area east of the Rocky Mountains has shown a larger volume of educational building operations during the first four months of this year than for any other comparable period since at least 1931. These results are shown on Chart 3, covering the years beginning with 1933. For most of the important districts the 1936 recovery in educational building, by any recent standards, has been almost spectacular. That the current rate of gain can be maintained is to be doubted but continued quantitative increases seem assured.

Altogether a review of current activity in the field of educational building and of the forces that motivated the large improvement of recent months brings the conclusion that the outlook for this field of building is reassuring.

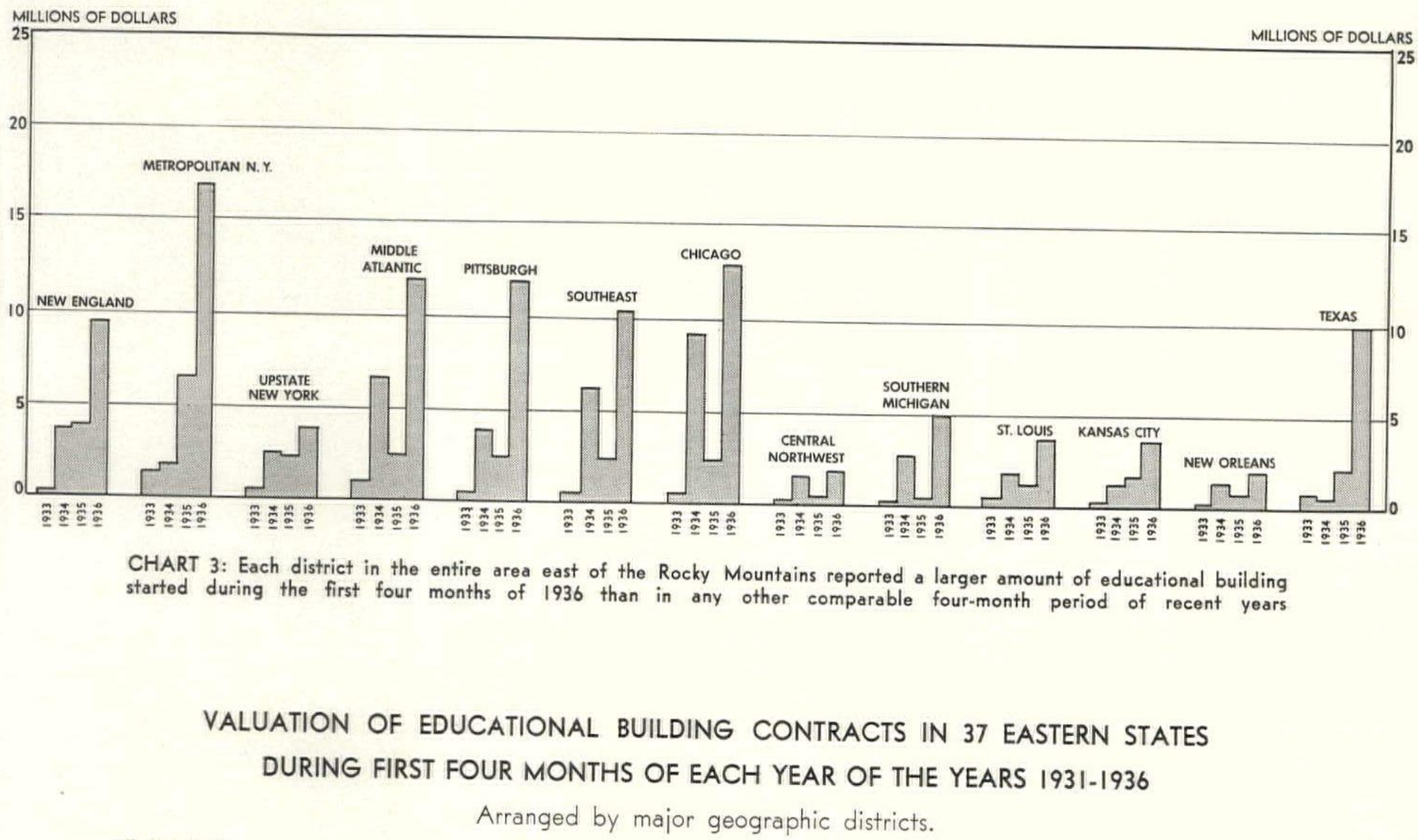


CHART 3: Each district in the entire area east of the Rocky Mountains reported a larger amount of educational building started during the first four months of 1936 than in any other comparable four-month period of recent years

VALUATION OF EDUCATIONAL BUILDING CONTRACTS IN 37 EASTERN STATES DURING FIRST FOUR MONTHS OF EACH YEAR OF THE YEARS 1931-1936

Arranged by major geographic districts.

TERRITORY	*1936*	*1935*	*1934*	*1933*	*1932*	*1931*
New England	$ 9,057,300	$ 3,879,700	$ 3,628,100	$ 213,800	$ 4,833,900	$ 9,466,300
Metropolitan New York	15,746,800	6,556,800	1,922,800	1,612,200	3,157,200	12,831,700
Upstate New York	4,792,800	2,375,800	2,443,400	407,400	1,930,600	4,710,500
Middle Atlantic	12,363,900	2,354,900	6,598,100	903,000	10,484,800	9,708,400
Pittsburgh	12,252,900	2,343,900	3,795,300	372,000	1,724,000	14,203,800
Southeastern	9,470,700	2,218,800	6,117,300	443,400	832,400	2,288,000
Chicago	12,863,000	2,265,200	9,195,700	363,200	4,129,400	8,899,300
Central Northwestern	2,045,200	281,700	1,536,800	118,400	1,362,200	2,557,400
Southern Michigan	5,002,800	258,900	2,576,400	15,000	653,200	8,551,400
St. Louis	3,823,000	1,125,600	1,714,700	410,900	763,000	4,688,500
Kansas City	3,722,700	1,613,600	1,058,400	247,900	238,900	1,928,400
New Orleans	2,135,900	744,000	1,240,300	67,000	503,900	1,748,900
Texas	9,679,800	2,177,400	560,000	807,100	5,014,600	1,875,100
37 Eastern States	$102,956,800	$28,196,300	$42,387,300	$5,974,300	$35,628,100	$83,437,700

SCHOOL-HOME FOR CHILDREN AT BALBUENA, MEXICO CITY GARCIA AND DE LA MORA, ARCHITECTS — PHOTOGRAPH BY HELLEN

SCHOOLS

"To provide better schoolhouses for our 2,7000,000 city children and our 5,000,000 rural children would require, at $400 each, about $3,000,000,000."

NEW DEMANDS IN SCHOOL HOUSING

By WILLIAM G. CARR

Director of Research and
Secretary, Educational Policies Commission
National Education Association

There are many signs suggesting that, given even moderately steady and prosperous economic conditions, the nation stands at the threshold of an extensive school building program. The situation is in some respects similar to that immediately preceding the school building activities of the period between 1924 and 1928. An accumulated shortage in school facilities, the improvement of business conditions, and a continually growing enrollment are factors which are common to both periods. However, the present situation differs from that of a decade ago in at least three important respects. First, there is now a rather general depletion of local tax resources and especially of local credit for financing new public buildings. Second, there is today considerable uncertainty as to the type of general economic organization which may be developed in the next few years. Finally, the problem ten years ago was acute in elementary and secondary schools; today, the effects of the previously declining birthrate are easing the pressure on the elementary schools, while the high schools and colleges present the areas of most acute need.

Pre-depression school building shortage

Contrary to some popular opinions, the schools were not in 1930 well prepared for the severe financial difficulties which were destined to afflict them. The reason for this unsatisfactory condition is to be found in the fact that the nation, as a whole, had not caught up with the building shortage which accumulated during and immediately after the war. Conditions of course differed greatly from one community to another, but between 1918 and 1924 the nation as a whole fell further and further behind in providing reasonable accommodations for its rapidly expanding school population. Beginning in 1925, a more active building program began slowly to reduce this deficit. But even in 1930 there still remained a need for at least four hundred million dollars' worth of new schools.[1]

The depression and schoolhouse construction

Since 1930, every year has seen this deficit grow larger until in 1934 it was approximately one billion dollars. In consequence of this neglect 42 per cent of the public schools are over 35 years old; 8 per cent are over 65 years old; 600,000 children can attend school only part time; 1,000,000 children are housed in temporary, portable, or rented quarters, 1,400,000 children attend in schools which have been condemned as fire or health hazards; 16,000 desired and needed rural school consolidations are held back for lack of funds; and an uncounted number of children are adversely affected by overcrowded classrooms, poor light, and various other phases of insufficient school accommodations.

[1]The statistical analyses on which these statements rest are described in the following publication: National Education Association, Research Division. "The Nation's School Building Needs." *Research Bulletin* 13: 1-36; January 1935.

GROWTH OF EDUCATIONAL ENROLLMENTS

Each symbol represents 20 per cent of each age period. Black figures proportion enrolled.

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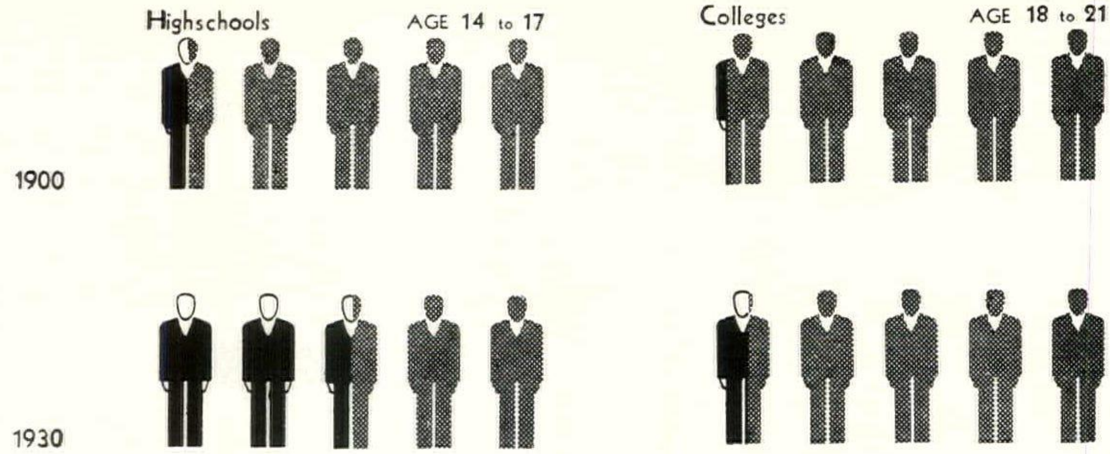

Future demands for school accommodations

The restoration of normally adequate school plant facilities is one of the major problems confronting public school systems. But this is only one aspect of the problem. We face the necessity not merely of overtaking past neglect but also of providing for still further growth.

In an address at Baltimore recently President Roosevelt announced an educational policy for his administration. This policy has important bearings on schools and school buildings. The announcement was, no doubt, based on a recognition of basic social trends in employment and in industrial organization. These trends are making the gainful occupation of young people increasingly harmful, not only for their own future welfare, but also for the immediate welfare of society as a whole. The recent gains in industry and business have by no means solved the problem of unemployment. The labor of young people is no longer needed. There are plenty of adults available to do the work of the world, leaving the period of childhood and youth free for growth, for play, for schooling. The facts have been recognized for many years by leaders in labor and in business, and by the spokesmen of political parties of all shades of opinion.

In this connection the President said: "We in your government are seeking to extend the school age in every State in the Union and to make it easier for boys and girls to stay in school. Work out for yourselves what would happen if all the boys and all the girls of 14 and 15 and 16 and 17 who are now working in industry found it possible to stay in school until they were at least 18 years old."

In 1930, this writer did "work out for himself," and published, figures on this very topic.[2] At that time the total number of employed children under 18 was estimated to be 2,120,000, a figure which proved later to be in substantial agreement with official census figures. Subsequent experience has lessened the number at work but, if the young people out of school and competing for jobs are included, the round figure of two million is probably not far out today.

The inexorable trend of the times is already bringing these new demands upon the schools. Secondary school enrollments are still increasing rapidly. Every year state school attendance laws cover a larger group of children and the exceptions to these laws are made fewer and are more rigidly enforced. We must offer these youths a worthwhile program of growth in our schools and colleges. Failing that, with the doors of opportunity closed against them, they will find the undesirable village pool-hall, the city streets, and the least desirable commercial amusements ready to take them in.

What provisions can be made for housing these new 2,000,000 students, most of whom will be enrolled in high schools? Some few of them undoubtedly could find places in the existing school plant. But we have already seen that the existing plant, generally speaking, is already overcrowded. The conclusion appears inevitable that most of the new enrollments in the immediate future will need to be met through additional construction.

The schools are thus to be confronted in the next few years with a fiscal problem of major scope. Its solution will have to be worked out gradually through combined local, state, and federal participation.

Social trends and the school building program

Assuming, as we must, that the financial side of the problem can be solved, we return to the conclusion that a major school building program is imminent. In such a time of reconstruction, it is the part of wisdom to take special thought for the guiding philosophy of American education and to examine current social and economic trends in terms of their implications for school building. Some of these trends and implications follow.

1. *Age-distribution of the population.* The number of younger children is decreasing. In 1930 there were fewer children under 5 years of age than in the 5-to-9-year group. This condition did not appear in any census prior to 1930. This suggests that proposals for new elementary schools should, as a rule, be in terms of replacement of obsolete plant rather than in terms of expansion. Study of elementary enrollment trends may suggest in some communities a possibility of remodeling some elementary schools for high-school purposes.

2. *Geographical distribution of the population.* Among the various shifts in our mobile population, none is more significant than the movement of metropolitan populations to the suburban areas. This trend outward is producing new factors of importance to long-range educational planning. For example, in 1930, in all but four of the 96 metropolitan districts, there was a higher percentage of children under 15 years of age outside of the central city than within it. Thus school facilities are drawn into the suburbs, offering an opportunity for merging efforts towards integrated rural and urban school systems covering a large area and serving a large number of children.

[2] *New York Herald Tribune*, December 28, 1930.

AGE DISTRIBUTION OF POPULATION

Each symbol represents 3 per cent of total population.

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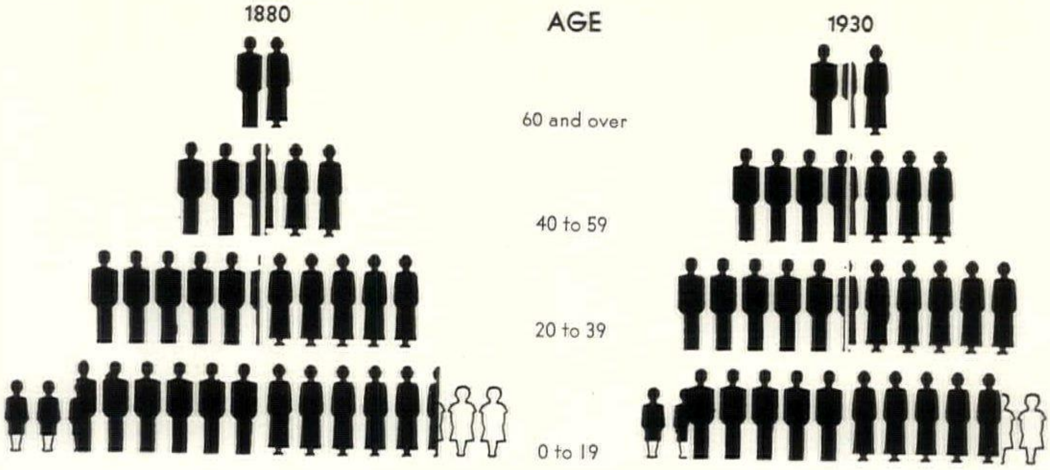


3. *Traffic safety.* Deaths of children from automobile accidents have increased until they are exceeded only by deaths from tuberculosis and heart disease. The location of schools with reference to traffic arteries, the construction of pedestrian subways, and proper fencing of school grounds are important preventive measures.

4. *Safety and sanitation in the building.* Schoolhouse planning will doubtless continue to profit by the scientific advances made in the fields of architecture, ventilation, heating, lighting, and sanitation. It will be found socially unwise in view of scientific evidence for pupils to continue to attend school in buildings which fail to meet health standards as to drinking fountains, play spaces, and toilet facilities, and which are not safe against fire, tornado, and earthquake hazards.

A major public works program such as is needed by the public schools is not a suitable vehicle for aimless experimentation with regard to design, materials, and construction. Nevertheless, all tested and worthwhile new developments should be used to the fullest possible extent.

5. *Adult learning.* The remarkable growth of general adult education, both in classroom instruction and less formal methods of study, suggests that schools should be designed with evening use and adult use in mind. This does not mean that the daytime needs of the younger users of the building must be disregarded. The fact that the use of most school buildings averages only about three hours per day is probably the greatest existing waste in American education.

In Des Moines, Iowa, public forums are now in their fourth year of operation under the management of the city school systems. Some 570 adult forums are held every year in the public school buildings. What has been done in one city through enthusiastic leadership can be done and needs to be done throughout the nation. Such forums, it has been estimated, reach no more than half a million out of our seventy-five million adults.[3] Properly designed, equipped, and lighted schools will help to expand and coordinate the adult education program and enable it to function more effectively.

6. *Invention.* The enrichment of classroom activities through the use of devices and inventions has lagged far behind practical scientific applications. Few schools have the visual aids to teaching which might be expected in a highly mechanized age. Recent improvements and lowered costs, however, have tended to increase the use of stereopticons, balopticons, and other devices for the projection of still pictures. Teachers have developed technics for using these machines, not only for commercially developed pictures, but to show to their classes the artistic and scientific achievements of individual pupils. That school systems will need to expand their libraries of flat pictures, motion picture films, and phonograph records in order to keep abreast of rapid changes, appears to be inevitable.

The improvement of communication also offers possibilities for the enrichment of education. In time, the radio will bring to every classroom the voices of statesmen, the languages of foreign nations, and descriptions of events of world-wide significance. Even today the radio places hundreds of children at one time under the instruction of master teachers and brings many small schools the musical satisfactions of great symphony orchestras.

All of these developments should be kept in mind in planning new schools. Space and outlets for installing, storing, and exhibiting modern teaching equipment should be provided.

TRENDS TOWARD LARGER RURAL SCHOOLS
(Figures from *School Life* and *Bus Transportation*)

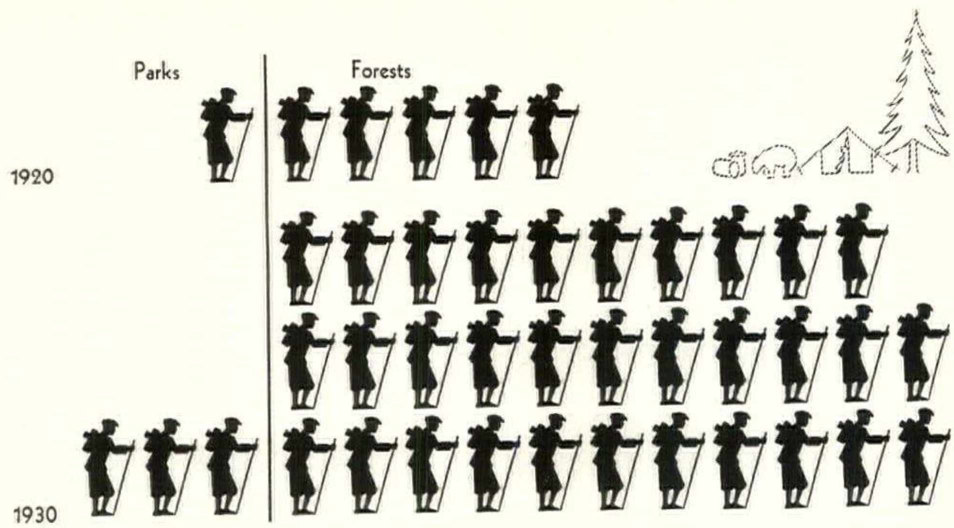
			Index numbers 1920 = 100	
Year	One-teacher schools	Amount spent for transportation of pupils	One-teacher schools	Amount spent for transportation
1	2	3	4	5
1919-20	187,948	$14,537,754	100	100
1921-22	174,945	21,814,744	93	150
1923-24	165,417	29,627,402	88	204
1925-26	161,531	35,052,680	86	241
1927-28	153,306	39,952,502	82	275
1929-30	148,712	54,823,143	79	377
1931-32	143,445	58,077,779	76	399
1933-34	138,542	53,907,774	74	371
1934-35	......	52,621,881	..	362

7. *Improved transportation.* Between 1904 and 1930 highway mileage increased 40 per cent and surfaced roads increased 360 per cent. This growth and many other improvements in transportation have accelerated the demand for larger units both of school attendance and of school administration. For rural school buildings this means great care in the selection of site and in the determination of the size of the area to be served.

The trend toward larger rural schools is shown in the accompanying table. While the number of one-teacher schools has *decreased more than one-fourth* since 1920, the expenditures for transportation *increased almost fourfold* by 1932.

[3]Studebaker, John W. Plain Talk. Washington, D. C.: National Home Library Foundation, 1936. pp. 74-76.

VISITORS TO NATIONAL PARKS AND NATIONAL FORESTS



Each figure represents 1 million visitors.

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8. *Outdoor learning and leisure.* There is a growing demand for active outdoor recreation for which the schools should assume some responsibility.

If schools are to encourage active recreation and games, they should have both indoor and outdoor play spaces. A survey in 1926-27 of 410 cities showed 48 per cent of the cities failing to report gymnasiums or playrooms. In 1929 a survey in cities of 30,000 to 100,000 population showed that 20 per cent of the elementary schools lacked playgrounds; half of the high schools did not have playgrounds or athletic fields. To meet this condition several states have passed legislation setting up minimum requirements for school playgrounds. It is likely that such standards will be widely adopted.

ARKANSAS[5]

The first part of this survey report is devoted to an analysis of status. This study covers:

1. Trend of the school population since 1920.
2. The number of schools of various sizes as determined by number of teachers and number and percentage of pupils in each size of school.
3. The number of schools of various sizes as determined by the number of pupils in each size of school and the total number of pupils in these schools.
4. The number and percentage of pupils who are of normal age, under age, and over age for their grades, in one-room schools and in schools having more than four teachers.
5. The number and percentage of pupils enrolled by grades in one-room schools and in schools having more than four teachers.
6. The number of schools with various term-lengths, and the number and percentage of pupils in these schools.
7. The number of schools of different classified ratings, both elementary and high schools, and the number and percentage of children in each classification.
8. The number and percentage of teachers receiving various amounts of training.
9. The number and percentage of teachers receiving various annual salaries.
10. The number and percentage of pupils living in districts having various assessed valuations of taxable property per child.
11. The cost of instruction per child in various schools.
12. The amount of assessed valuation of taxable property covered by various tax rates.

The second part of the survey plans a reorganized school system. The following preparatory steps were taken:

1. Maps of each county were made showing roads, streams, cities, towns and villages, boundary lines of school districts, locations of school buildings and the distribution of school population 6 to 17 years old, and the location of each child.
2. Centers of population were determined. A plan was made for the disposition of all present schools. The location of school buildings was determined and the school to which each group of children were to go was indicated.
3. The size and type of school to be maintained at each selected location was set forth.
4. The bus routes necessary to transport all children to the designated schools were determined.

KANSAS[6]

In November 1934, the Kansas State Planning Board, using relief labor, undertook a survey of the physical condition of school buildings. This project had the approval and support of the State Superintendent of Public Instruction. The survey covered 8,326 rural and third-class city districts. Usable reports were received on 8,217 districts.

The check list covered such points as areas available, buildings and equipment, and safety factors. A sketch of the building plan is to be made on the back of the sheet. The returns from this questionnaire are given in the report in tabular form, showing deficiencies in recreational equipment; age and general condition of the different buildings; and sanitary factors such as water supply and sewage disposal.

The details gathered for the 105 counties of the State have been laid before the Supervisor of Engineering of the Kansas Emergency Relief Committee. Through his office they will go to the local County Poor Commissioners with the suggestion that they cooperate with the County School Superintendents in the formulation of work projects to improve conditions. A sketch of a model rural school plant is included at the end of this report.

OHIO[7]

Two new studies are being conducted by the State Planning Board. One is a study of the "physical elements which enter into the plan of our present educational system."

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[5] Arkansas State Planning Board. *Preliminary Report.* Little Rock: the Board, September 1934. pp. 179-89. Typed. *State Planning for Arkansas: Second Report.* Little Rock: the Board, March 1935. pp. 231-37, 244-52. Mimeo.

[6] Kansas State Planning Board. *Progress Report.* Topeka: the Board, September 1934. pp. 5663. Mimeo. and *Rural Schools in Kansas: A Study of Their Physical Condition and Recreational Equipment,* Topeka: the Board, March 1935. 22 pp. Typed.

[7] Ohio State Planning Board. *Preliminary Report on a Series of State Planning Studies.* Columbus, Ohio: the Board, August 15, 1934. Section 8, "School Plant Planning," pp. 1-8. *Progress Report on State Planning in Ohio.* Columbus, Ohio: the Board, Part 9, pp. 291-95. *Progress Report.* Columbus, Ohio: the Board, April 1935.

Playgrounds, however, should ultimately be only a first step in broadening our concept of education so that it includes many worthwhile activities outside the four walls of the school. The school plant of the future may include summer camps, swimming pools, community houses, and playing fields as well as the school building itself.

Educational and social planning

Under the stimulus of the National Resources Committee, planning agencies have been set up in 45 states. These agencies were at first primarily concerned with such natural resources as land and water power. More recently their attention has been turning to problems in the conservation of human resources as well.[4] Their work thus offers an excellent opoprtunity for the coordination of social and educational planning. By way of illustration, summaries of a few state planning reports are given on pages 428, 429.

In the words of the Ohio planning board report, "There must be a relationship between the location, distribution, and organization of educational facilities in a county and the physical, social, and economic conditions obtaining therein. The standardized type of educational system, inherited from early days when economic and social conditions and the mode of living were more or less uniform and the state could not possibly fit the widely differing conditions that obtain at present in the various parts of the State either in point of school plant development or the education imparted, is inadequate. It is highly improbable that a school system and the kind of education appropriate in an urban-metropolitan county, for example, can be suitable in a sparsely-settled rural county containing largely submarginal agricultural land."

In summary, some of the new demands in school housing may be stated in question form as follows:

1. How serious is the existing shortage of school buildings?

2. At what educational levels and in what parts of the country is this shortage most serious?

3. What is the probable future trend with regard to school enrollment?

4. How can present shortages and future needs in school building construction be most adequately and yet economically financed?

5. What modern social and economic tendencies have implications for school plant planning?

6. How can school planning be most effectively integrated with planning in other social and economic areas?

[4]National Education Association and Department of Superintendence, Educational Policies Commission. *Activities of State Planning Boards Relating to Public Education.* Washington, D. C.: the Association, March 1936. 35 pp. Mimeo.

The second is a comprehensive survey of certain type counties.

In connection with the first study new school maps of Ohio are to be made. The second study is mainly concerned with the organization and administration of the schools of certain type counties. This survey has already begun in six selected counties. "It is hoped to be able to demonstrate by means of these studies the necessity of rationalizing the school plant of the state and the economies resulting from such rationalization."

A questionnaire relating to school buildings was directed to the 2,007 school districts in the state as part of the plan to develop a public works program. The State Department of Education circulated the questionnaire.

Analysis of the returns shows the total estimated costs for all new buildings, additions and remodelings. This figure is given as $64,378,458, the estimate of local authorities of cost of new buildings and improvements needed within the next five to ten years.

TENNESSEE[8]

This survey covers primarily the physical set-up of the elementary schools of the State, but includes incidentally the high schools of the counties when they are reported by the county superintendent.

Aim of the study:

1. To present the facts as they appear in the different source studies.

2. To show the financial ability of the various political subdivisions of the state.

3. To show the total investment in physical property per county.

4. To show the per capita investments per pupil enrolled and the comparative standing of each county with the state average.

5. The condition of the buildings and the estimated cost of rehabilitation.

6. The possibilities of consolidating plants and all pertinent information thereto.

Methods of procedure: Data were compiled for each of the 95 counties of the State. Buildings in use were classified according to age of building, material of which constructed, and type of school housed in the building. The questionnaire asked county superintendents to report on:

a. Any possible consolidations that might be made within their county.

b. Anticipated buildings, estimated cost.

c. Needs for repair work on buildings and estimated cost.

Replies were obtained from 80 per cent of the county superintendents. The information from the county superintendents was supplemented by data from the Public Works Administration which listed all projects that might be carried on under the Works Relief program soon to be instituted.

A report which is to follow will cover the following points: (1) legal provisions for financing schools, (2) training and certification of teachers; (3) statistical studies and interpretation of the fiscal administration of the educational system; and (4) suggestions for a planned efficiency in educational matters.

[8]Tennessee State Planning Commission. *Preliminary Survey of the Physical Equipment of the Schools of Tennessee.* Nashville: the Commission, June 20, 1935. 402 pp. Typed.

VIRGINIA[9]

The Virginia report contains two sections which deal with school buildings.

1. *County school buildings.* The Division of School Buildings of the State Department of Education, assisted by the Virginia State Planning Board, has made a survey of the county school buildings in the State. Twenty-six items of information were collected covering such points as number of pupils transported to the building, type of school, number of acres in site, adequacy of playgrounds, indebtedness, heating and sanitary equipment, etc. A series of 100 maps has been prepared showing the approximate locations of the schools and their use.

2. *City school buildings.* Future problems for Virginia cities are suggested:

a. In a few cases, the need for new or increased facilities, especially in the outer sections of the larger cities.

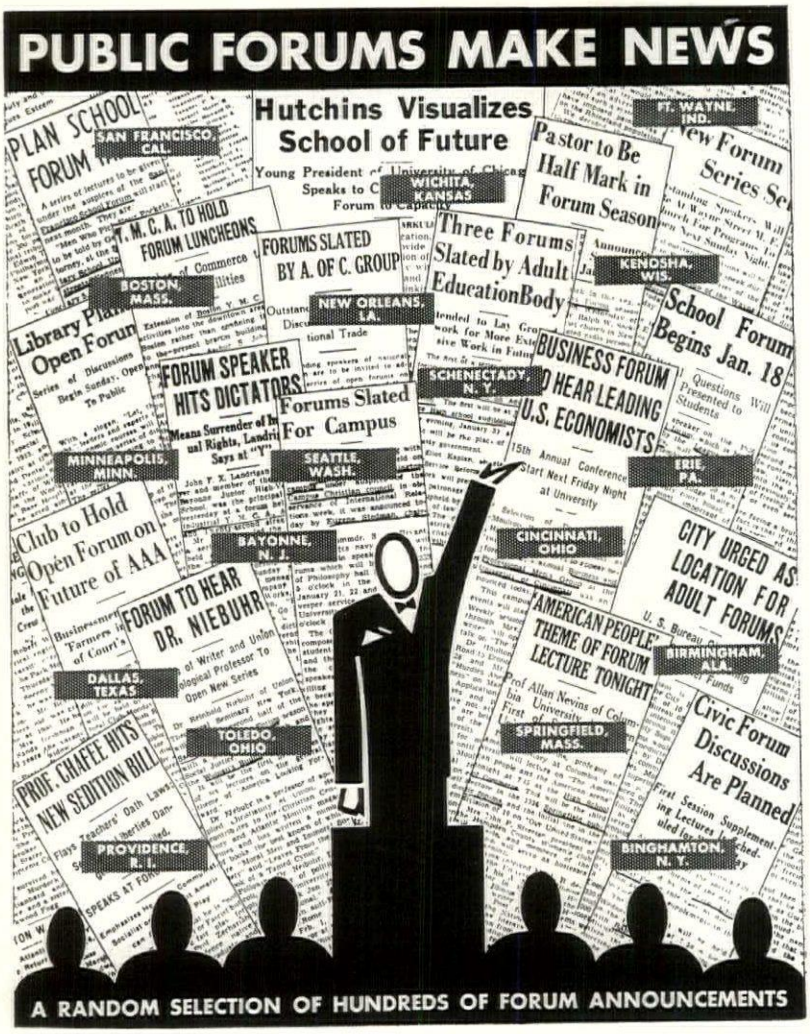
b. Readjustments as to basic facility types, for example, probable increases in high school accommodations and reductions in the provisions for the elementary grades.

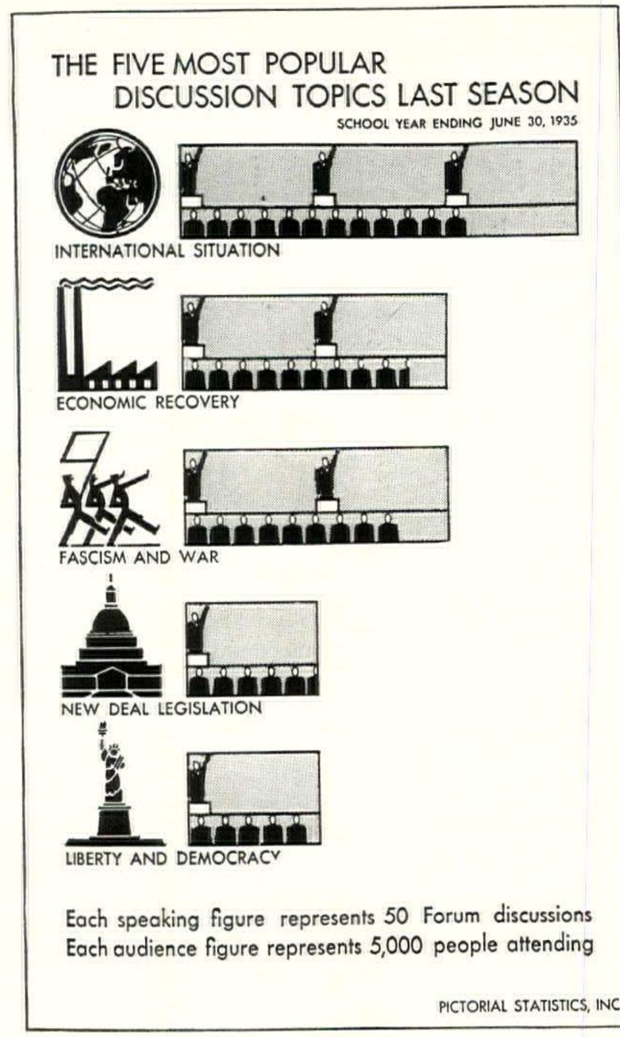
c. Replacement of obsolete accommodations.

d. Readjustments made necessary by annexations of the urban areas of the surrounding counties.

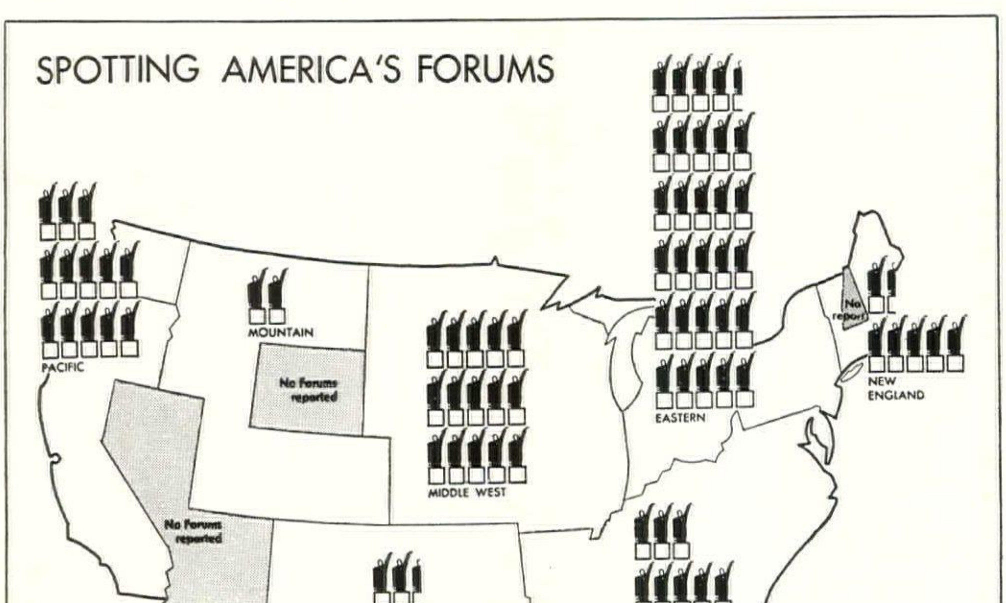
Future city school populations are predicted. A table shows enrollments and attendance for cities. This is illustrated by a figure. The number of school buildings in cities, 1933-34, is given for both white and negro schools.

[9]Virginia State Planning Board. *Report on Education.* Vol. VI. Richmond: the Board, September 1, 1935. 151 pp.





A NEW FACTOR IN THE AMERICAN SYSTEM OF EDUCATION



Illustrations courtesy of SCHOOL LIFE

The U. S. Office of Education reports in the April 1936 issue of School Life that a list of more than 1,000 public forums, large and small, has been compiled thus far in an investigation which is still in progress. The graph at the left shows the distribution of 700 of these forums reported by regions.

Newspaper clippings received daily by the Office of Education indicate an increasing national interest in public discussion. Some universities are already preparing special training courses for the new profession—public discussion leadership.

EDUCATION FOR ADULTS

HOUSING AMERICA'S NEW EDUCATION

LESTER DIX, Associate Director of Lincoln School

JAMES E. MENDENHALL, Research Associate

Part I—THE CHANGING FIELD OF EDUCATION

American education functions today in a complex cultural welter of exciting promises and grave threats. Basic scarcity of all economic goods is, in theory, disappearing. Fewer and fewer of the population are needed to supply the necessities of our living; more and more may be released to improve, to enrich, to enlighten, and to humanize our lives. Our social, economic, and political literacy is increasing as great technical improvements in various agencies of communication build a market for increased enlightenment. With the best newspapers in the world, the most complete system of common education, the most elaborate radio provisions and cinema coverage, and the richest development of voluntary associations to serve every sort of interest, we daily become more able to meet the demand for social intelligence, for entertainment, for cultural expansion and artistic satisfaction.

At the same time great problems confront us. We are not able efficiently to employ our magnificent industrial machinery, particularly that part for basic rebuilding, so-called "heavy industry." Equally, we cannot employ all our people —a problem of significant proportions for older people and an appalling one in the case of the several million never-yet-employed youth. With rapid obsolescence established in our technical processes, we have as yet no comprehensive and rational plan for salvaging obsolete materials or retraining the victims of obsolete occupations.

A changing school program

New educational agencies have lately arrived in response to the new demands. In our judgment, they are here to stay. Five of these should be considered together, for they constitute a single, rounded effort to meet definite needs thrust upon the school by environmental shortages. They are:

(1) nursery education beginning at three years of age;[1]
(2) the all-day school program including food, rest, and play;
(3) a general health program—developmental and preventive rather than remedial;[2]
(4) visual and auditory methods of instruction;
(5) generous provisions for art, handicrafts, and dramatics.[3]

It should be added that what remains of the traditional curriculum has already become broader, more interesting, and more informal in content, in method, and in setting. To the architect these provisions may be taken for granted in the future. No school whether urban, suburban or consolidated rural plant, will be complete without them.

[1]The White House Conference reported that in 1930 there were only 343 nursery schools with a total enrollment of some 6,500 children. By 1934, the Federal Emergency Relief Administration had increased the number of schools to 3,000 and the number of children cared for to 61,000. Yet 7,000,000 children of nursery school age today are not in school.

[2]According to the U. S. Office of Education, about 22 per cent of America's school children in 1935 were undernourished, inadequately clothed, and in need of medical and dental attention.

[3]See especially Art Education Today, 1936. Bureau of Publications, Teachers College, Columbia University, New York, 1936.

A changing school plant

Certain general architectural changes are already suggested for such a program. The plant will not be complete without a generous and adequately-planned land setting. Transition from indoors to outdoors should be as easy as movement itself. Motifs borrowed from the hospital, the office building, or the warehouse should give way to the restful atmosphere of an adequately-designed home with respect to such things as air conditioning, lighting, soundproofing, furnishing, and decoration. Elements of building flexibility such as movable walls, both interior and exterior; movable but complete technical units such as kitchens, photographic plants, stage lighting sets; in fact, any contribution to the possibility of a changing program, should be experimentally studied. The creative architect should be able to bring to the educator many suggestions of modern facilities for accomplishing these ends.

The emerging educational center

The type of school program just discussed will become increasingly evident regardless of conditions of population. As we build more adequately to meet all the needs of the young, we shall increasingly take certain natural next steps. Reasons for these steps are to be found in the general trends previously noted. Definite evidence exists that these new developments are just around the corner. They are:

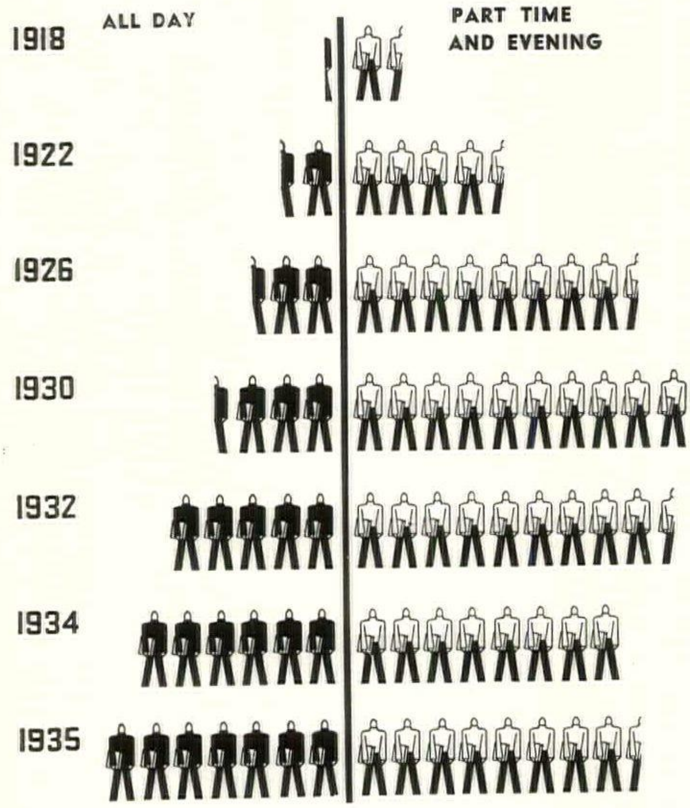
(1) widespread adult education;[1]
(2) publicly provided young people's centers;[2]
(3) a rapid growth of cooperative activities;
(4) closer integration of school and community;
(5) planned community life.

Taken together and including the replanned school, these all point to the school as a center of the people's living—as in medieval times the individual and common activities revolved around the church. Thus, the "child-centered school" leads to the "school-centered community."

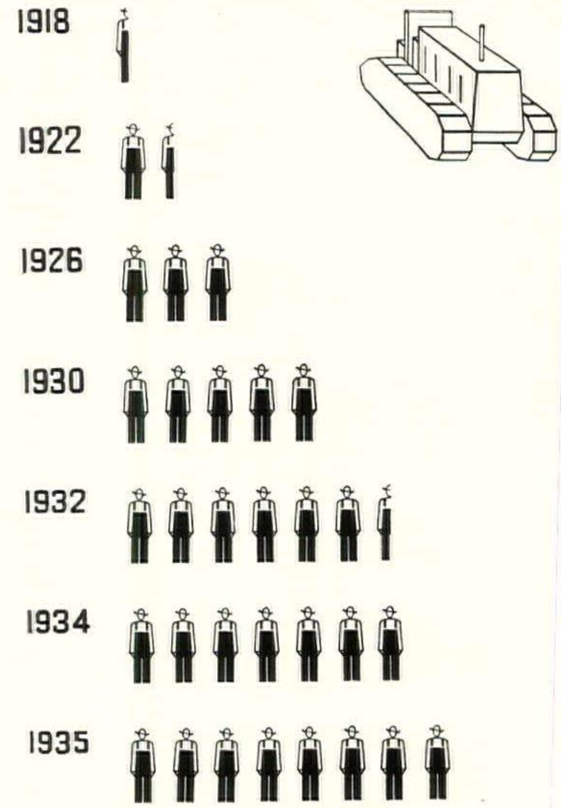
[1]The U. S. Office of Education in *School Life* for April 1936, reported it had compiled a list of 1,000 public forums scattered throughout the nation. See also John W. Studebaker, *American Way; Democracy at Work in Des Moines Forums.* McGraw Hill Book Company, New York, 1936.

[2]Such centers can help serve the 5,000,000 young people now unemployed, as reported by the U. S. Office of Education in *School Life* for December 1935.

PROGRESS IN VOCATIONAL EDUCATION



Total enrollment in vocational schools
Each symbol represents 80,000 students enrolled.



Agriculture
Each symbol represents 40,000 students enrolled.

The community of the future

Certain characteristics may be prophesied for such a center. It will draw to itself not only educational but recreational activity, and it will provide for people of all ages as family life and school activities tend to be reconstructed in terms of a living community. Young and old will again be brought together, as they were in the days when each home formed a more or less self-sufficient community. A part of parent education will be better to understand, to play and to live with the young, and the young will again have a significant part in adult activities.

This new community will be inclosed safely within major traffic lanes, and not divided by them. We shall face the fact of our increased mobility and our complex transportation and provide for them safely and adequately, and cease trying to live, play, and sleep in the same space we use for hauling freight and moving ourselves from place to place.

A required part of every such community will be a generous amount of open land, planned for rest, for recreation, and for that contribution to living made by the trees, gardens, and lawns. The servicing of such communities will be as well planned as their facilities for enjoyment. The family shopping need not involve a coarse adventure into ugliness, noise, and stupidity. Again, the architect should be able to expand and to complete this suggestion.

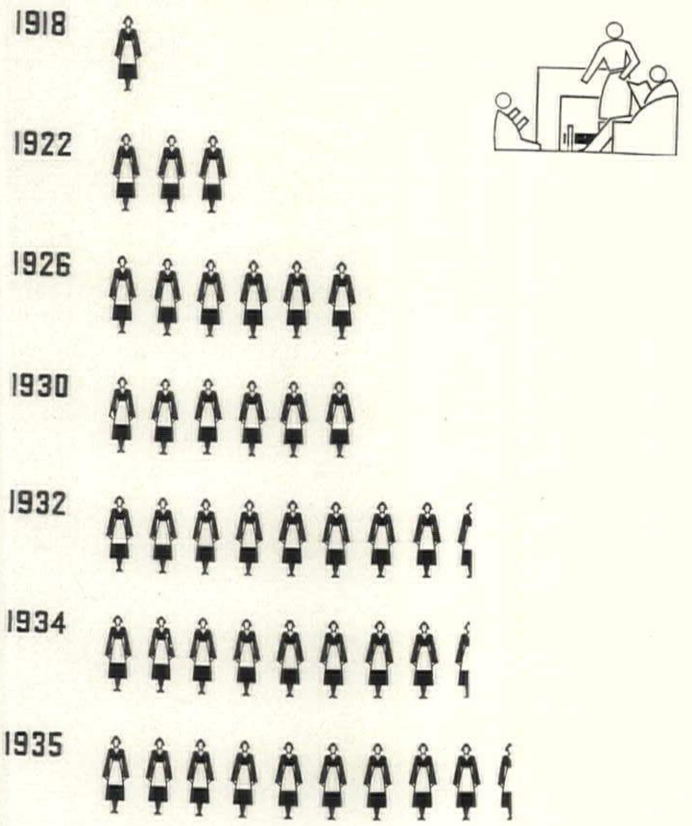
Tasks in community planning

Such communities as here suggested will exist in three major types of setting. It is altogether likely that they will first develop in suburban areas, for many reasons too obvious to be stated here, and there is already sufficient evidence of such a tendency. The regions of desperate need are our huge confused cities and our barren rural wastes. The great cultural needs of the rural population, if not their actual economic salvation, may turn upon planning and helping to consolidate them into recognizable nuclei for living. If any sense is to be made of urban living, the sprawling mass must be broken down and rebuilt into generously spaced neighborhoods which have some organic relation to the activities of their inhabitants.

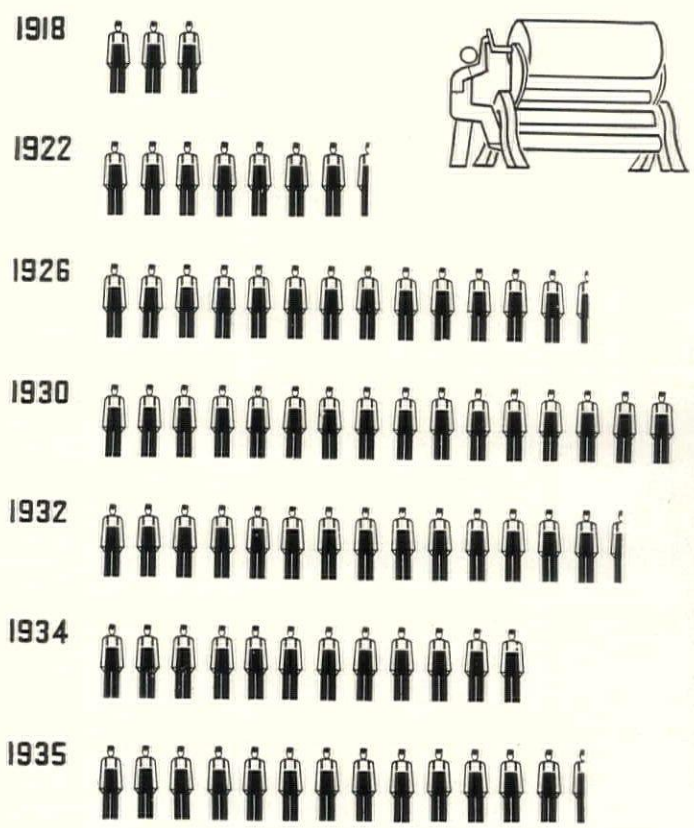
Many possibilities may aid in accomplishing this task. There is no longer any sufficient reason for crowding all industrial processes into the center of urban life. Facilities for transportation of goods, for distribution of power as well as specialization in industry, and the need for reducing huge overhead land values due to congestion, all point in the desired direction. City traffic is well nigh strangled today by too many and too constricted traffic routes. Fewer and better ones, spreading congested populations over wider areas, with modern transportation, will solve the city problem—if the planning, engineering, architectural mind can be freed from the domination of those interests which are best served by the present congestion.

We do not suggest that the architectural and engineering pattern of expression for the new communities be standardized. The widest possible variation is desirable. Conceivably such a community could be admirably designed in a single apartment structure in a congested area, if by such concentration generous surrounding space and adequate traffic facilities could be provided. This apartment community, because of cost factors and likeness to existing conditions, com-

Charts prepared by WPA Project 273 directed by Rudolf Modley, and reproduced from SCHOOL LIFE



Home Economics
Each symbol represents 40,000 students enrolled.



Trade and Industrial
Each symbol represents 40,000 students enrolled.

pares favorably with the suburban community as an opportunity to move in the right direction.

The architect needs to envisage the whole of the coming community, if he is to deal properly with the problem of school housing. He is already engaged in the reconstruction of housing for families, for trade, and for industry. No one of these types of housing can be well designed unless account is taken of the relationships among them. If we are to meet our major social, economic, and political problems with our accustomed democratic outlook, a greatly expanded and more significant educational program must be geared into all living activities and located in their midst. Our major suggestion is that the school architect utilize every favorable opportunity for interesting the policy makers in existing communities of optimum size and circumstance to experiment with this conception.

Part II—PLANNING THE NEW EDUCATIONAL PLANT

However necessary it may be to rebuild the school in terms of the coming community, it is imperative to recognize that there is an immediate necessity to replace our obsolete school plant. According to the National Education Association, "Additional building facilities for 2,700,000 pupils are required merely to replace condemned and temporary structures and to provide full-time accommodations for all pupils. Likewise about 16,000 consolidated schools ought to be established in the interest of some 5,000,000 rural children now attending poorly equipped, inefficient schools."[1]

In working out a building program for these millions of children, architects should carefully consider the changes which are taking place in the field of education. Otherwise, these new buildings may within a few years become as outmoded as many of the nation's buildings are today. For example, the National Education Association reports that about two-fifths of America's school buildings were erected before 1900. These buildings may have provided well for a curriculum made up of the three R's, but they do not furnish adequate facilities for arts and crafts, home economics, industrial arts, and science. They lack lunchrooms, medical quarters, rest rooms, gymnasiums, swimming pools, and adequate outdoor play space. The building sites were selected in an age of the pedestrian and the horse and buggy and, therefore, are poorly located for an age of automobiles. In short, these buildings are obsolete from an educational, technical, and social point of view.

[1] *The Nation's School Building Needs.* Research Bulletin of the National Education Association, Vol. XIII, No. 1, January 1935.

STATUS OF AMERICAN YOUTH-1935

Each symbol represents 1,000,000 youths, age 16-24

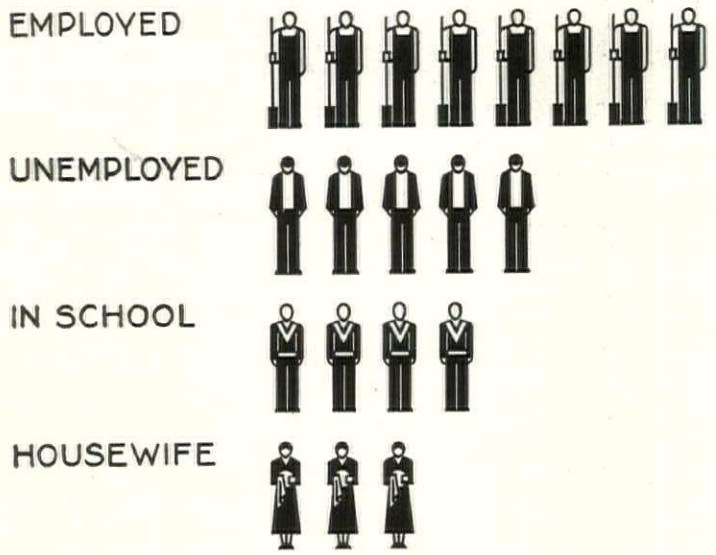


Chart Prepared by BUILDING AMERICA

Source of data: United States Office of Education

Schools designed as instruments

To meet the changing needs of education, architects should develop a new type of school building. Such a building should be primarily designed to serve its function as a place where children are learning and growing. This function should not be subordinated to the external appearance of the structure. All too many communities have built schools as monuments to civic pride and in doing so have overlooked the fact that above all the school should be a place where children are educated.

This new type of building should be designed for use during a relatively short period of time, say for 10 to 20 years, rather than for a period of 40 to 50 years, for which most of our present-day buildings are planned. Rapid obsolescence is particularly necessary in a time of great educational and social changes. Today many communities find themselves saddled with obsolete buildings because they spent heavily to pay for the structures and issued long-term bonds to cover these expenditures. While the school buildings are outmoded, they cannot be replaced because these communities have not yet paid for them. Had the communities erected structures which in 20 years had become obsolescent and paid for, they would have been in a financial position to build modern structures.

Schools designed for mobility

The modern type of school should be constructed of the best materials that science and industry have developed. It should make generous use of steel, glass, and other composition materials that can be manufactured in standard units and readily assembled on the spot at minimum cost.

There is no reason why architects and the building industry should not work out a type of building made up of a number of prefabricated units. As the school population grows and the curriculum changes, new units can be added. Units can be withdrawn from use as the need disappears.

Such prefabricated school buildings will be readily adapted to great geographic shifts in America's population. Some types might be of a light and portable nature, although far more comfortably made and far better-equipped than the tent, wooden, and tin structures now in temporary use in many communities. Such buildings would be easily adaptable to population shifts. They could, for example, be erected in the coal towns of Pennsylvania which are fast becoming obsolete. As these "sick" coal towns are gradually abandoned, and the inhabitants move to a booming industrial center like Detroit, it would be possible to dissemble the buildings and reassemble them in Detroit where needed, and at a very low cost. These portable school dwellings might also be used in the South where millions of children are badly in need of good school-housing. If and when the Rust cotton-picker displaces the labor of 10,000,000 or more Negro people, they together with their school buildings might be transported to regions of new and expanding industries.

Schools and national planning

The program for building schools must be seen in relation to the development of planned communities throughout America. School buildings represent a capital investment which may retard the decentralization of our overcrowded cities and the consolidation of farm homes in rich agricultural areas. When a community spends $1,000,000 on a new high school, this investment may accentuate overcrowding rather than reduce it. Therefore, it is highly desirable that the program for building new schools and that for developing new communities be closely integrated.

The need for federal aid

A rehousing program for the school children of America is not of interest solely to the educator. By common consent, "heavy industry" is the laggard in our economic recovery. Rehousing is at once the outstanding need of the people and the most promising opportunity for the reemployment of our industrial machine, our idle capital, and our unemployed labor.

To provide better schoolhouses for our 2,700,000 city children and our 5,000,000 rural children would require, at $400 each,[1] about $3,000,000,000. No substantial part of such a program will be financed by the independent efforts of communities, even with equalizing aid by states. Professor Paul R. Mort reported a variation of per capita expenditure for education in 1930, ranging from $36.88 in Nevada to $7.50 in Georgia.[2] These differences are the direct result of actual capacity to pay in the various states and localities, as is made clear by Mort.

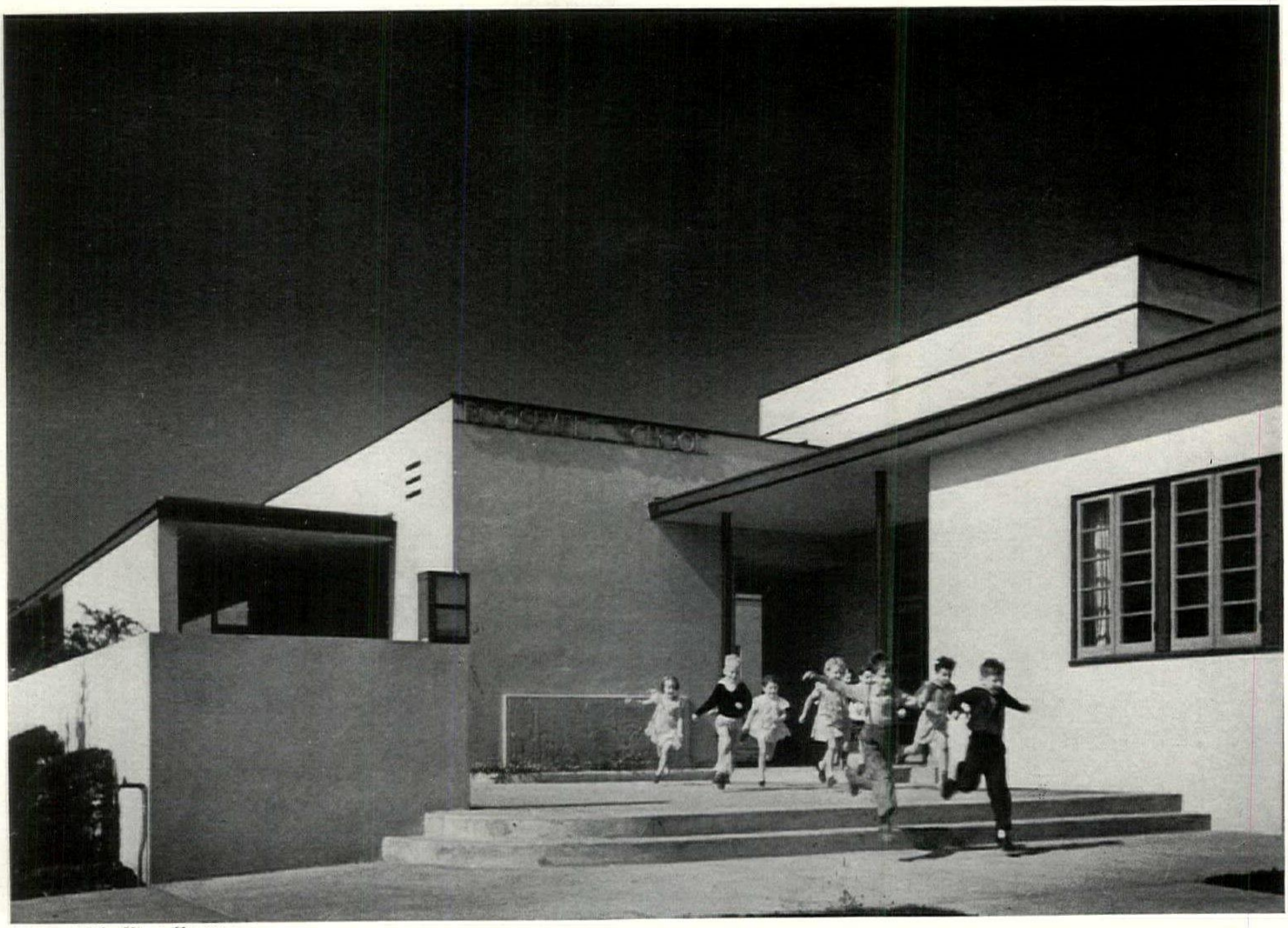
Federal aid is required for even a beginning of an adequate school building program anywhere in the United States. Only a national plan of school building would be capable of meeting the need. Economically, state and national aid are fully justified by the fact that the school building for Tulsa, Oklahoma, may cause the reemployment of idle labor in Longview, Washington; Toledo, Ohio; or Newark, New Jersey. The building industry, as every other, operates upon a national scale, and with national ramifications. Capital, plant, and labor may be affected anywhere by a substantial building program in any location. Thus our economic necessities and the bitter need of our school children both point to a courageous attack upon rehousing America's school children.

[1] This is considered to be a reasonable estimate for housing each school child, according to *The Nation's School Building Needs.* The National Educational Association, January 1935.

[2] Paul R. Mort. *State Support for Public Education.* American Council on Education, Washington, D. C., 1933.

PORTFOLIO

RECENT SCHOOLS



Photograph by Victor Haveman

ROOSEVELT SCHOOL — SANTA MONICA, CALIFORNIA

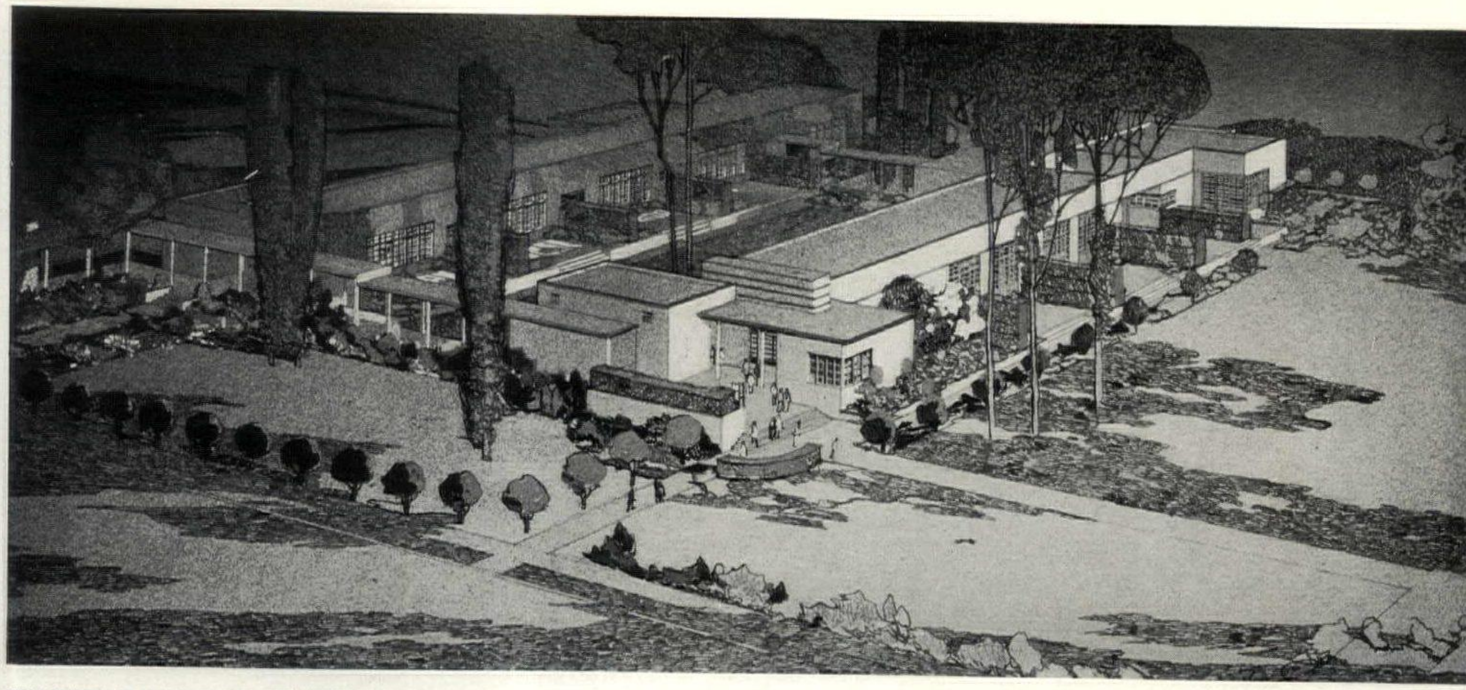
MARSH, SMITH AND POWELL, ARCHITECTS

In view of the fact that children spend more of their daytime hours in the school building than they do in their own homes, the elementary school classroom has been woefully slighted. Why should youngsters warp their sense of beauty by looking at three walls of funereal blackboard and one wall of windows, with a flat glaring expanse of plaster for a ceiling?

Why should teachers have to carry on an activity type of program in new schoolrooms that were designed for drilling? Lately, some tentative moves have been made toward adjusting the room to the program that is being offered within its walls. In fact, the walls are in some cases being moved, opened and otherwise altered, and the program of the classroom allowed to flow beyond their confines.

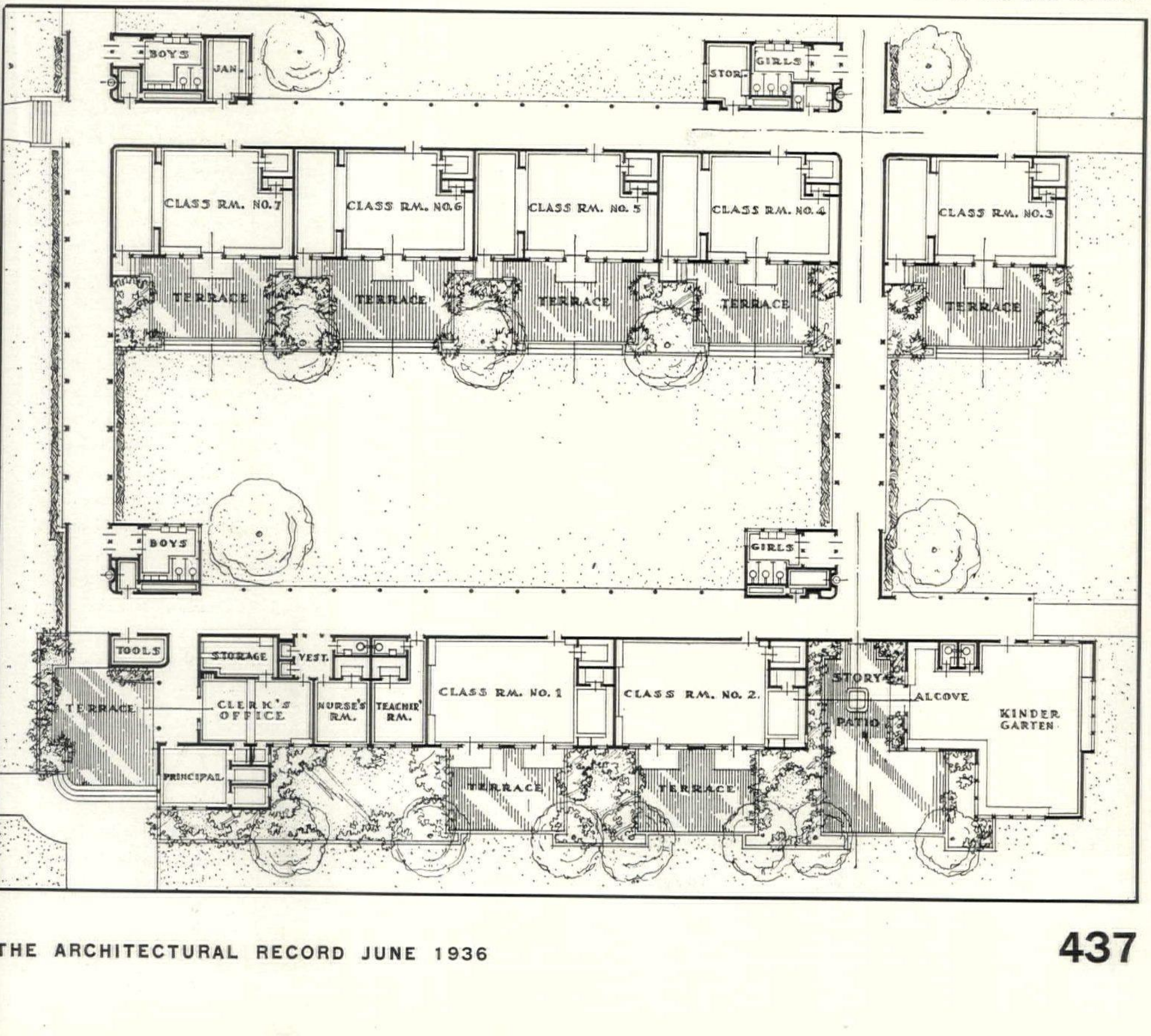
After the Long Beach earthquake, when a general rehabilitation of schools became necessary, the firm of Marsh, Smith and Powell set about reconsidering the problem of the elementary classroom. In this school, the architects met with the teachers and supervisors collectively and singly in "seminars" at which each individual wall, fixture, and case was freely discussed and "put on the pan." As a result, a classroom plan type for elementary pupils and a different type for primary pupils were developed. The cold hand of "standard practice" which has made the hideous elementary school classroom of California identical with the elementary school classroom of Maine and all states between, was not laid upon these classrooms, and some functions of classroom teaching hitherto neglected have been given a place in the planning.

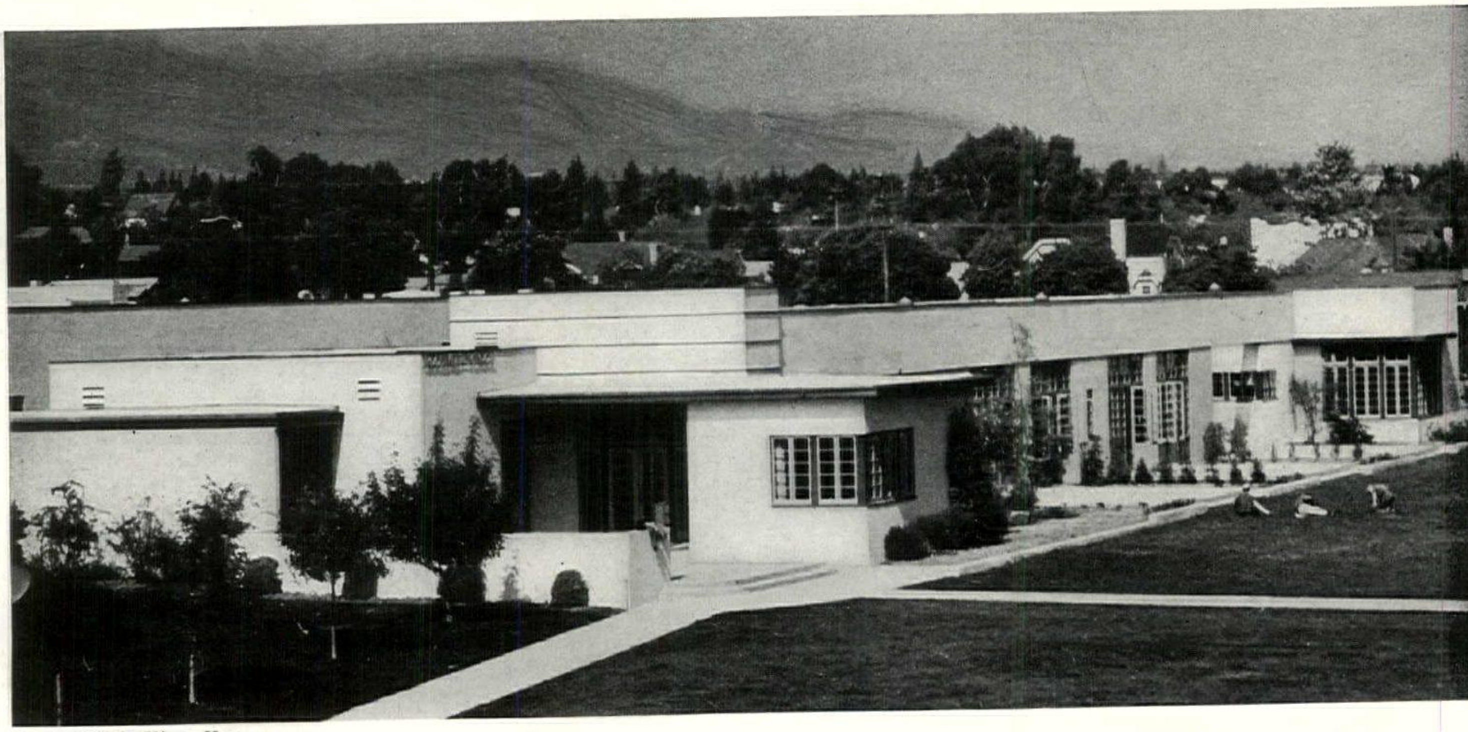
In Santa Monica, where the first of the new type of Southern California schools was developed, a distinction between age groups was attempted. Two new types of classroom were worked out—one for the primary group up to the third grade, and one for the age group from third grade to junior high school. These may be seen by considering the plan of the Roosevelt School at Santa Monica.



PERSPECTIVE SHOWING OUTDOOR CLASSROOMS

PLAN: PORCHES INSTEAD OF CORRIDORS IN THIS MILD CLIMATE





Photographs by Victor Haveman

ROOSEVELT SCHOOL

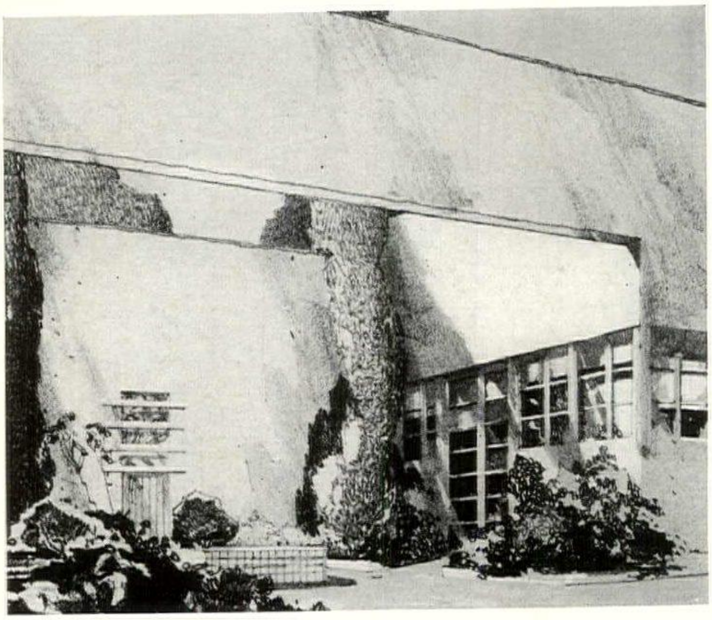
SANTA MONICA, CALIFORNIA

MARSH, SMITH AND POWELL, ARCHITECTS

THE SANTA MONICA PLAN

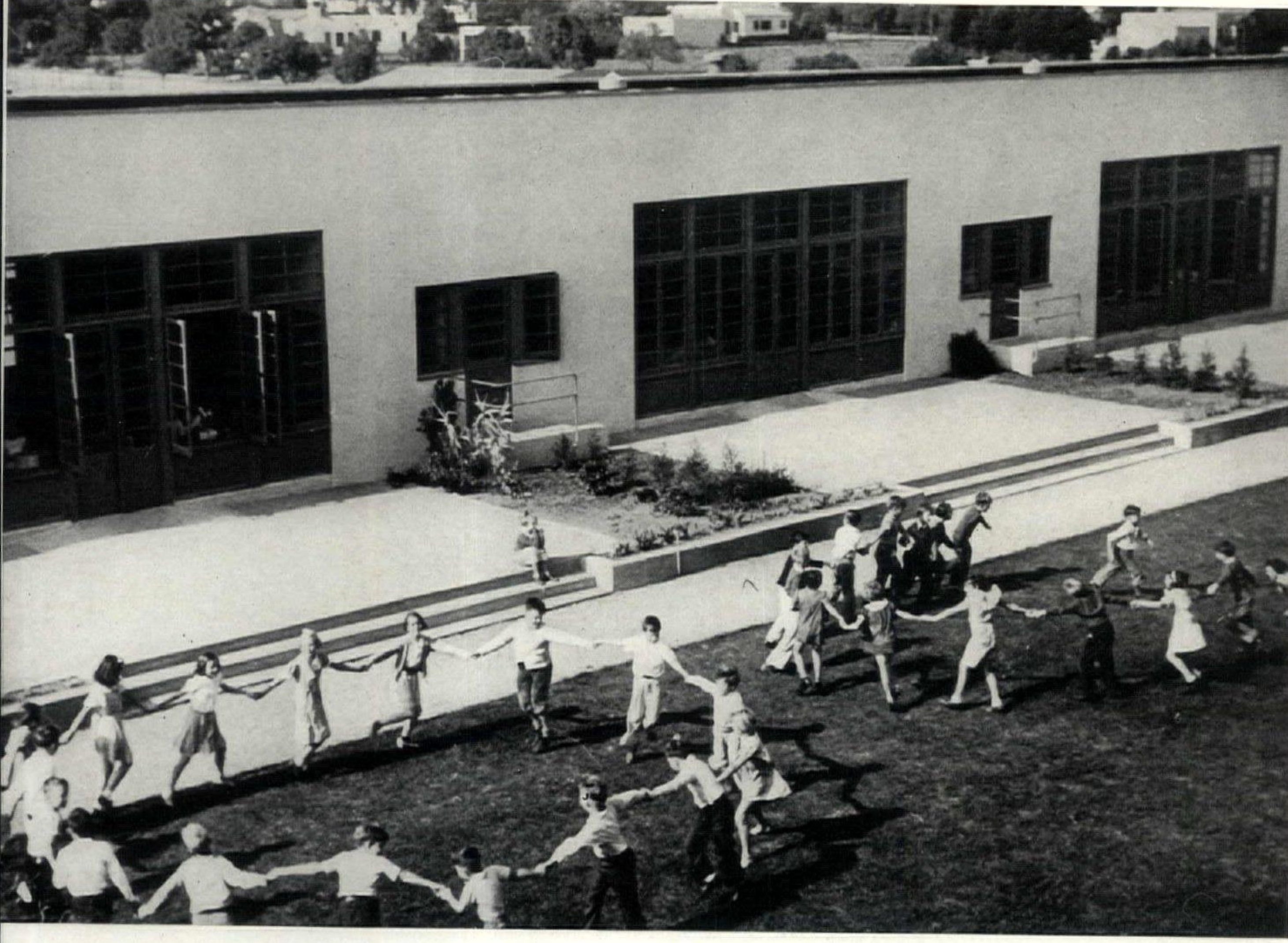
In the reconstruction of the Roosevelt School, several underlying principles should be recognized:

1. In an earthquake area, schools should be designed to protect their occupants as completely as possible.
2. In a California school, even more recognition of outdoor life should be given than heretofore.
3. In order that progress in educational methods may be made effective, the plan arrangement of the classroom should help, rather than hamper.
4. In recognition of new uses and of new materials available, the architectural appearance should be a direct expression, instead of a complement to tradition.
5. Expansion is recognized from the outset as a requirement of a growing population.



Taking these five basic assumptions in more detail, and starting with the earthquake factor in design, the building is kept one story high for the obvious reason that the possible hazard of a second story is thereby eliminated. An additional influence on this point, however, is that it is also possible to develop the combination of outdoor-indoor classrooms for all classrooms in a one-story building. This building is engineered to meet the rather rigid requirements of the new state schoolhouse construction code. Surplus architectural motifs, which have been considered aesthetically necessary in the past, are denied the conscientious architect and he must achieve beauty in his building by qualities of trimness, simplicity of mass and detail, and the studied use of color. Egress from each classroom to the outside is direct.

It is in the relation to outdoor living in California that this plan makes an important contribution. A dozen or so years ago, Santa Monica experimented with French doors in certain classrooms. This idea has been expanded and developed by the architects in conjunction with Dr. Percy Davis, Santa Monica Superintendent of Schools. A paved brick terrace, using brick salvaged



CLASSROOMS OPEN DIRECTLY . . .

from the existing Class C construction buildings, adjoins each classroom. Broad steps lead down to the lawn, and a sense of privacy is obtained by inserting a fifteen-foot-wide planted area between each terrace.

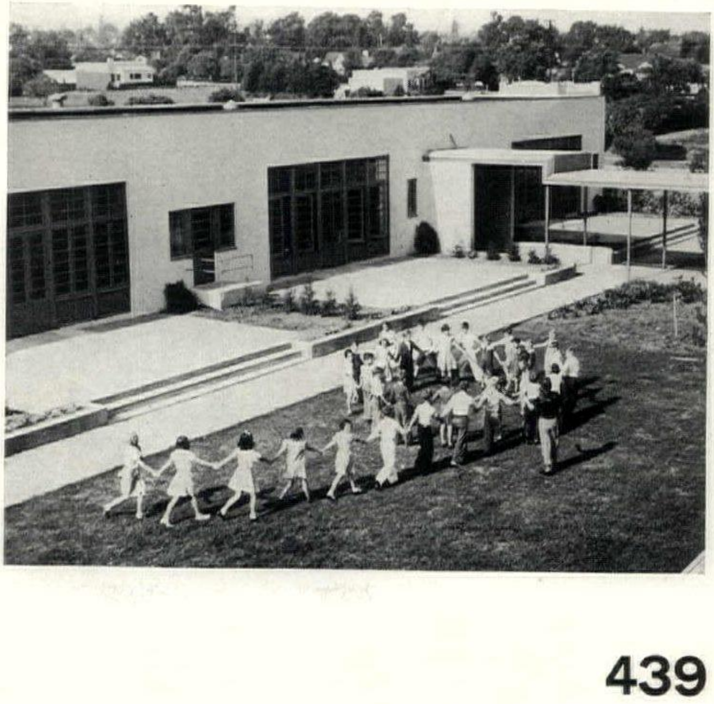
A maximum of light and air reaches each unit of the plan from all sides. Lawns between the wings of the school form a protected special play space for the younger children. It is this factor, perhaps, more than the others, which has caused this plan to be rather widely known as the "Santa Monica Plan."

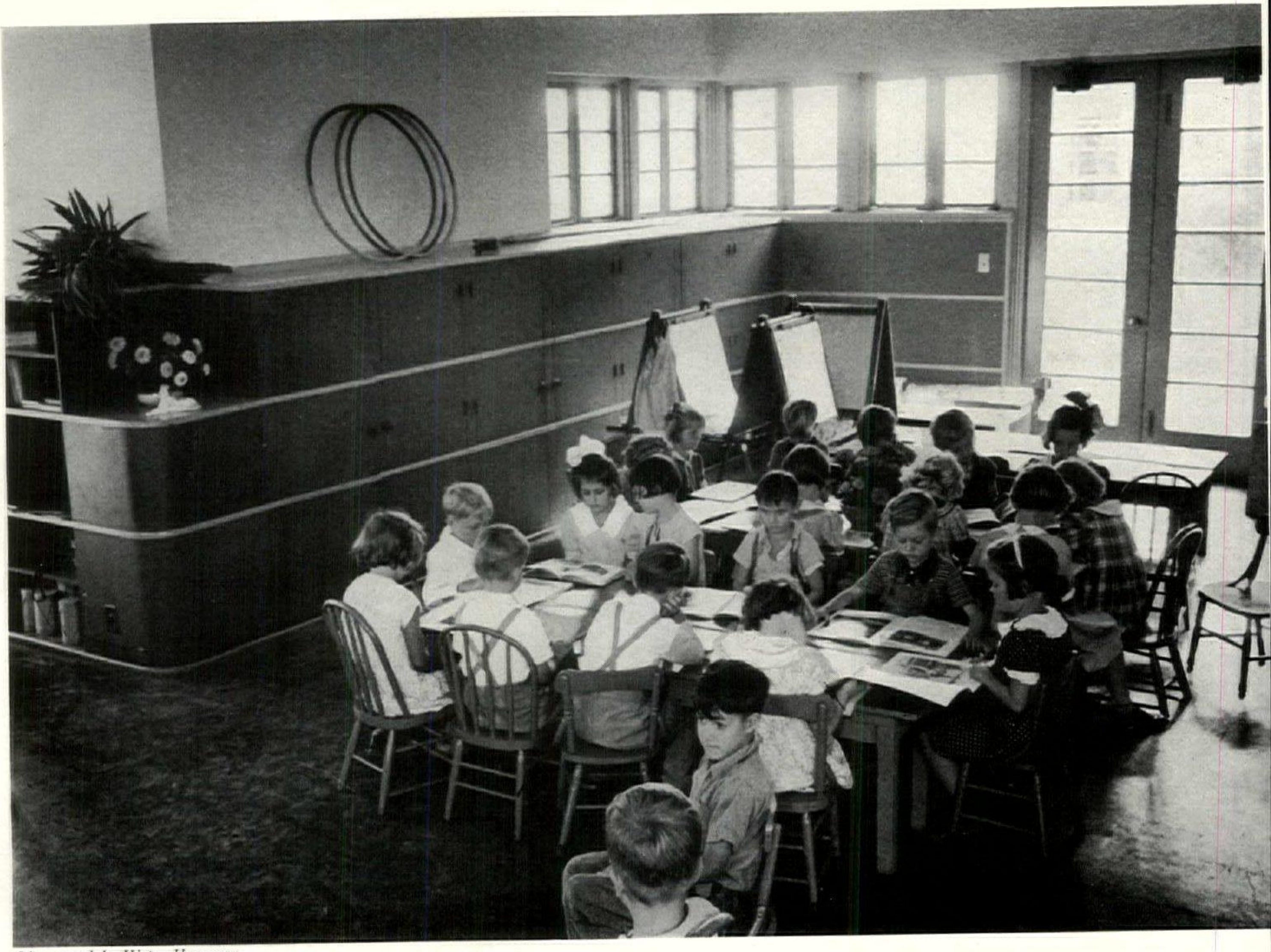
Architects all over the country and, indeed, all over the world are becoming increasingly aware of the vital importance of using the new as well as the old construction materials appropriately and of the importance of "functional" design—design that expresses, not conceals, the uses of the various portions of the building.

The last underlying principle involved applies principally to growing communities. That is, that expansion should be anticipated. Such expansion should require a minimum of change and expense for existing buildings.

The Roosevelt School is located off the center axis of the plot, and space for future auditorium, cafeteria, and other special rooms is allowed. Its strength in expansibility lies in the fact that the school is composed of self-contained units tied together by shelters, and as the community grows additional units of classrooms are built.

. . . ONTO THE PLAY AREAS

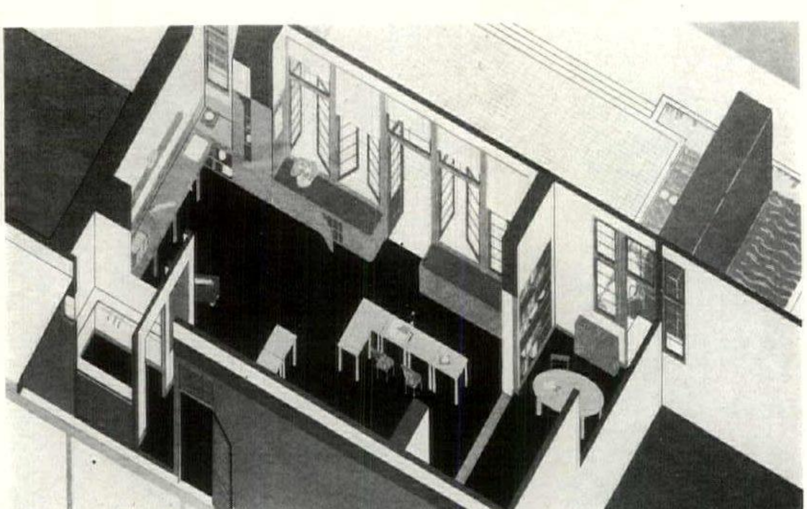




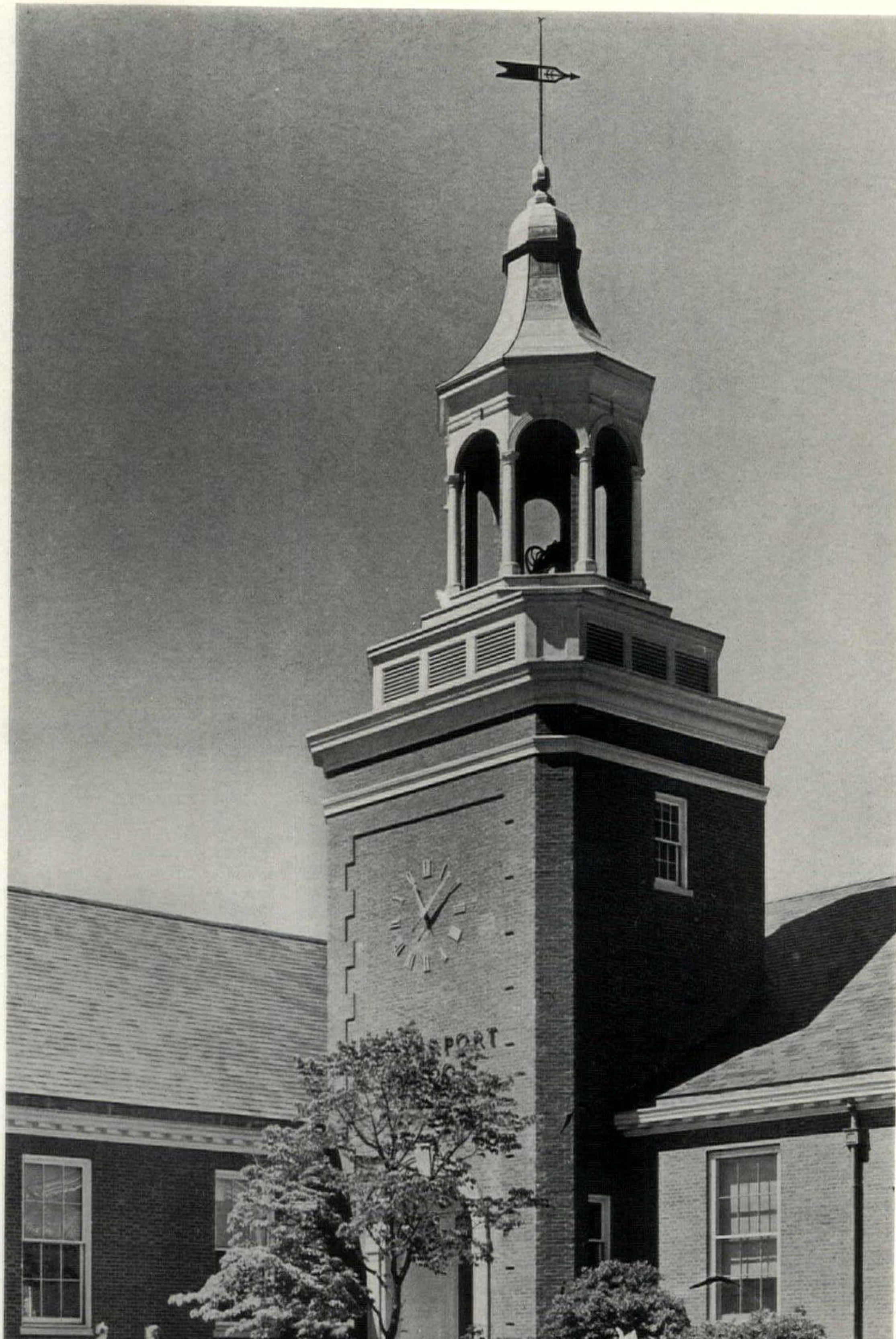
Photograph by Victor Haveman

ROOSEVELT SCHOOL **SANTA MONICA, CALIFORNIA**

ISOMETRIC VIEW OF TYPICAL CLASSROOM



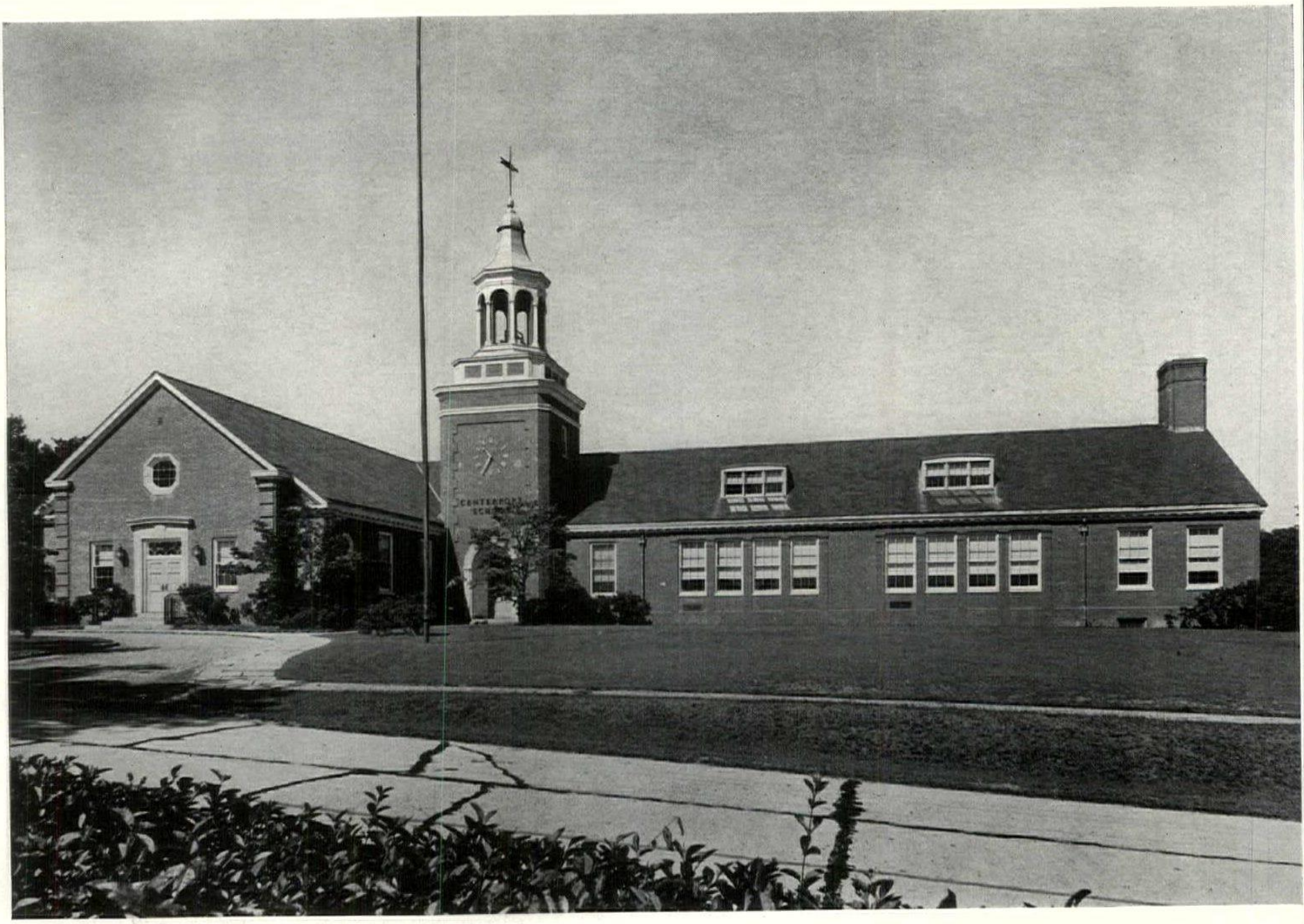
MARSH, SMITH AND POWELL
ARCHITECTS



Photograph by Murray M. Peters

CENTERPORT SCHOOL CENTERPORT, NEW YORK

JAMES VAN ALST, ARCHITECT

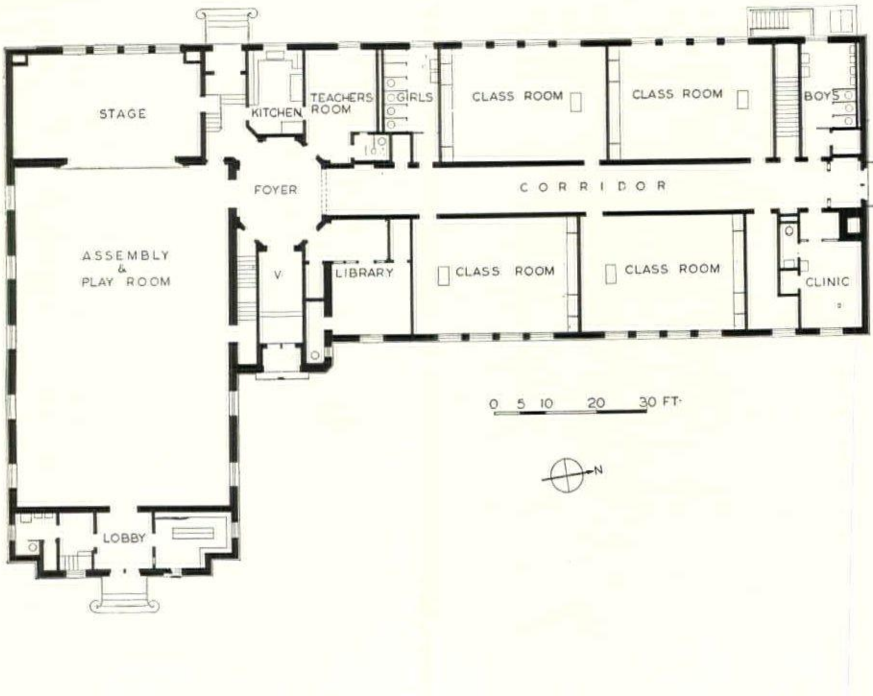


Photographs by Murray M. Peters

CENTERPORT SCHOOL

CENTERPORT, NEW YORK

JAMES VAN ALST
ARCHITECT



FLOOR PLAN


CENTERPORT
SCHOO

JAMES VAN ALST

ARCHITECT

This Long Island school was built in 1933 at a total cost, including furnishings and architect's fees, of $95,767.00, or a cubic foot cost of 30½¢. The architect designed all equipment, even down to the stationery and diplomas.

ASSEMBLY ROOM

Photographs by Murray M. Peters

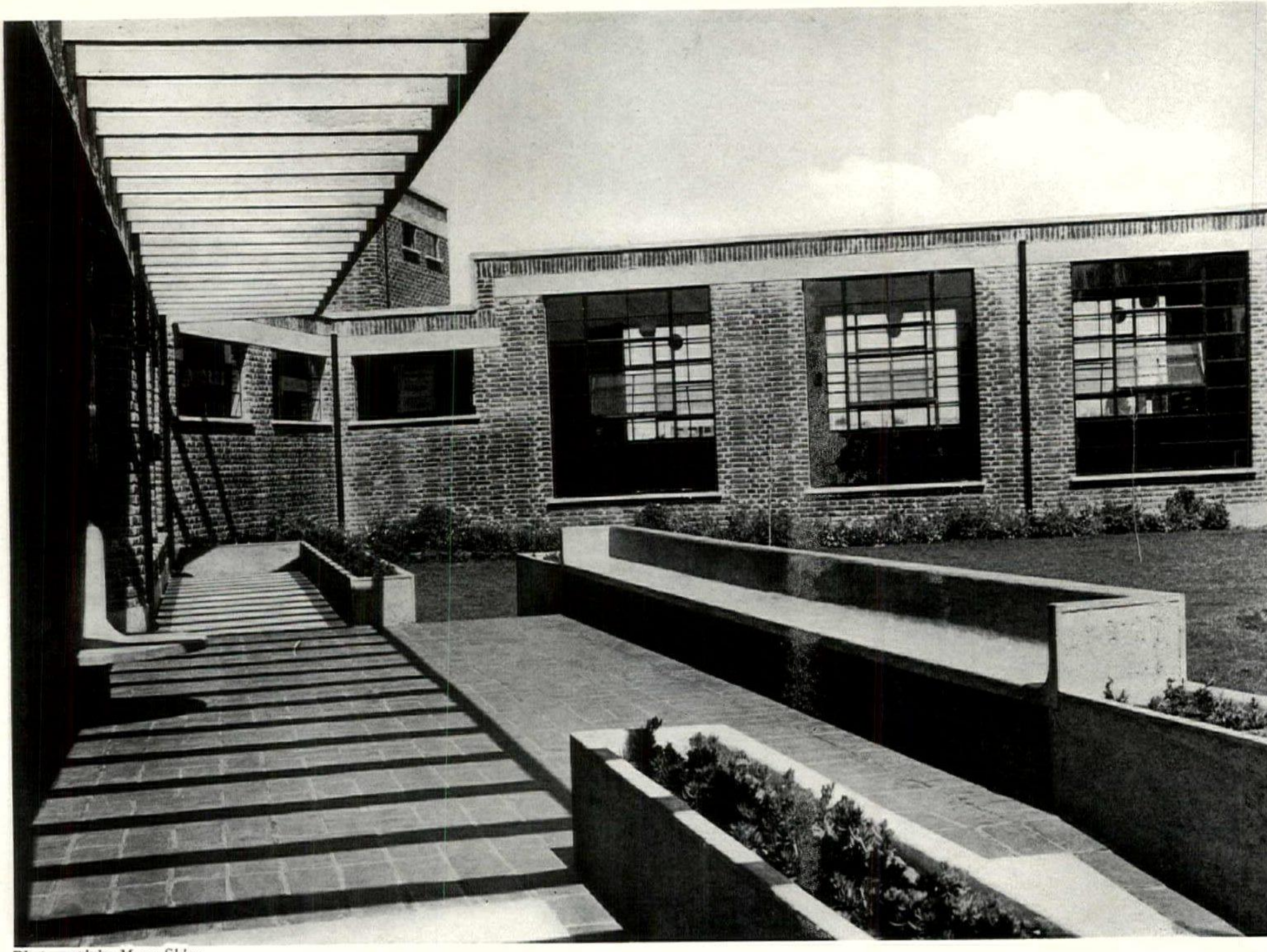
Photograph by Hellen Fisher

SCHOOL-HOME FOR SMALL CHILDREN — BALBUENA, MEXICO CITY

JOSE V. GARCIA AND
ENRIQUE DE LA MORA
ARCHITECTS

A new-type institution to fill a new social need: designed specifically for children both of whose parents work during the day, this new institution is located in Balbuena, an industrial suburb (of Mexico City). The school is one of a series now being constructed by the Health Department of Mexico City.

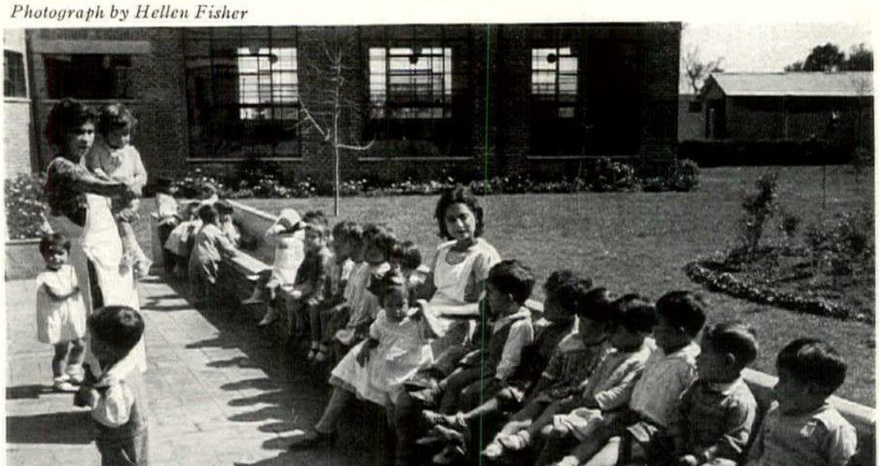
Like the housing development (also for industrial workers) which it adjoins, this school plant has been carefully designed to fit the most modern standards in nursery education. The children are under the care of teacher-nurses, who supervise their study, playing, sleeping, and eating. This new type of educational plant is only a part of the progressive educational policies now in effect throughout the Mexican Republic.



Photograph by Mary Sklar

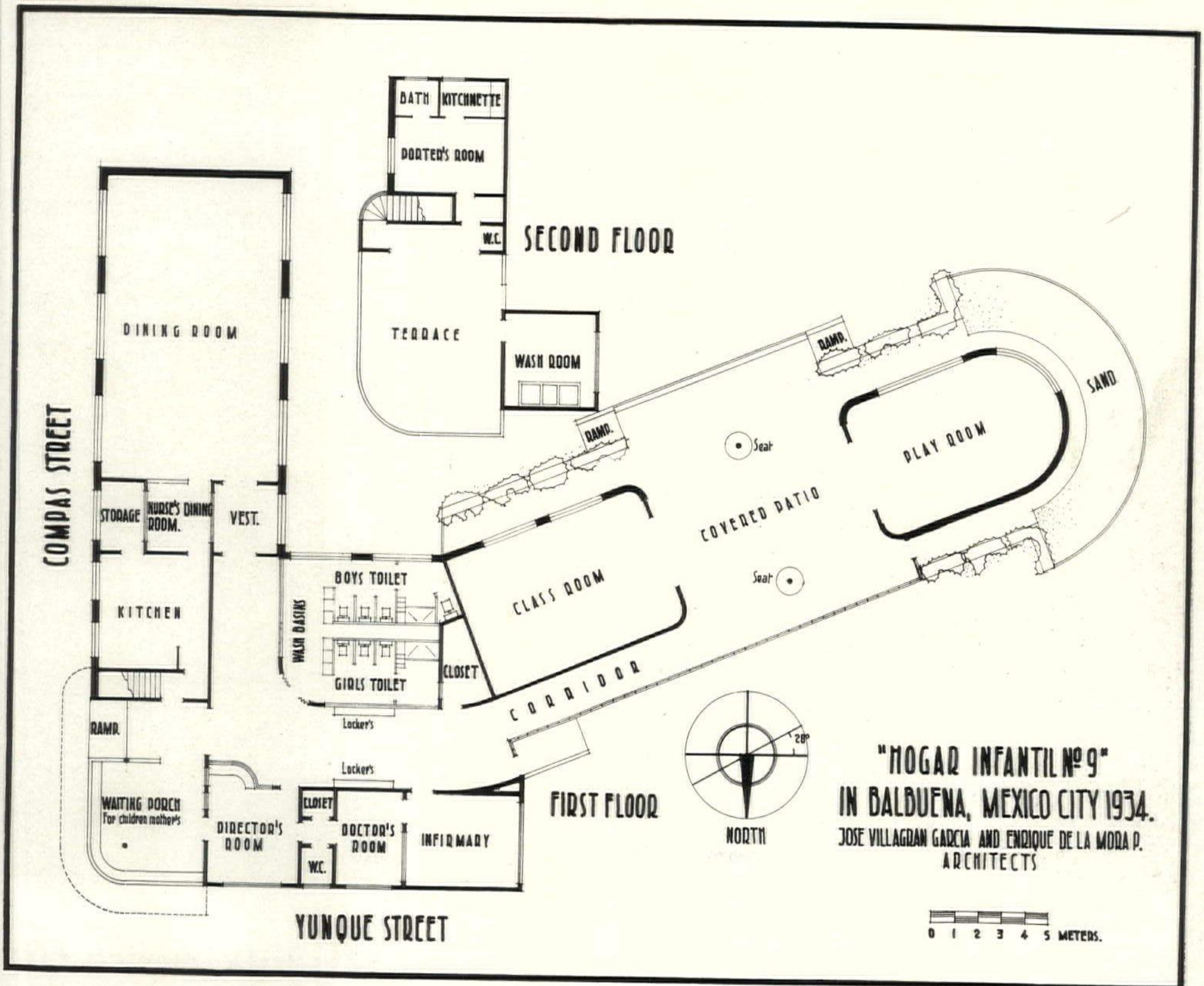
SCHOOL-HOME FOR SMALL CHILDREN BALBUENA, MEXICO CITY

Photograph by Hellen Fisher

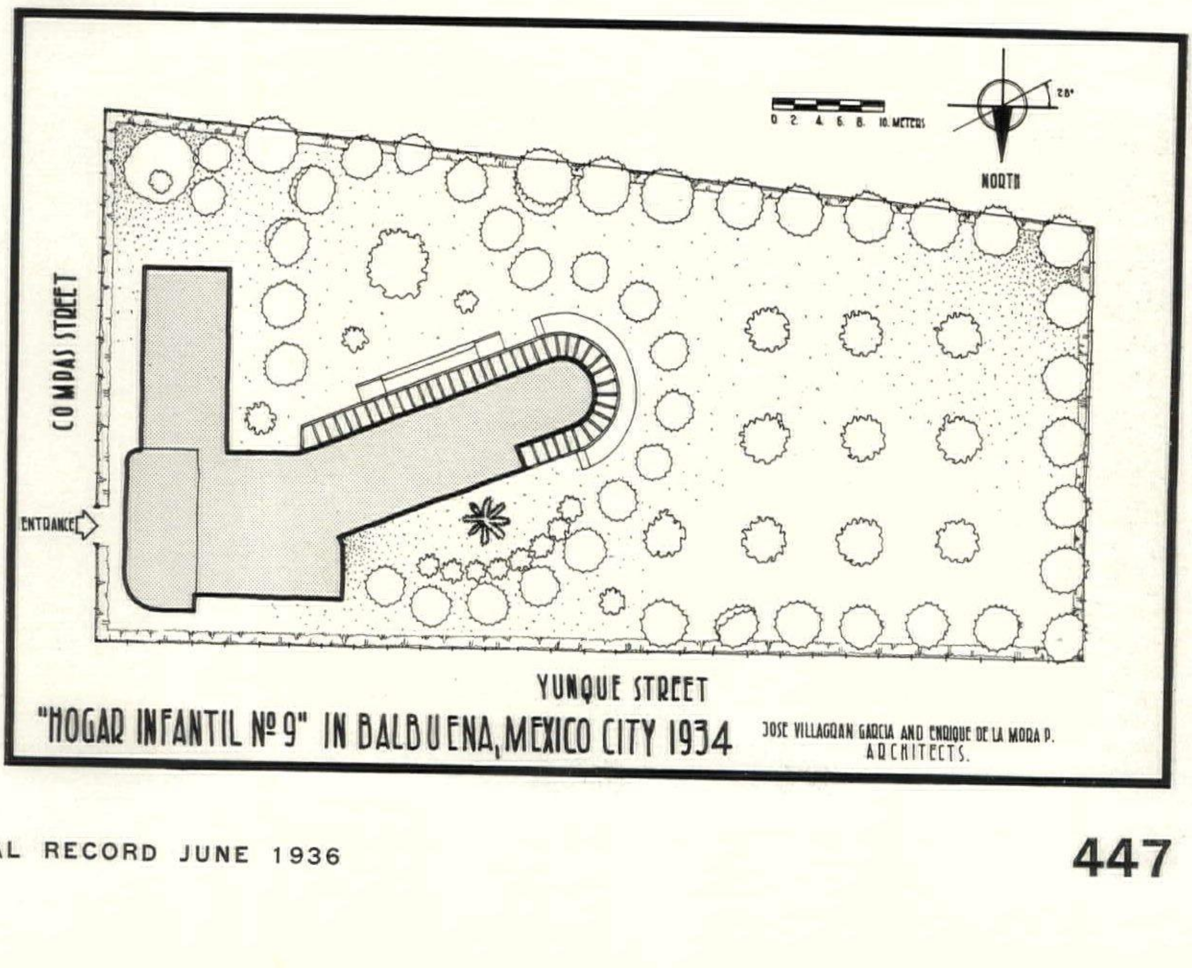


JOSE V. GARCIA AND
ENRIQUE DE LA MORA
ARCHITECTS

LEFT: THE CHILDREN GATHER ON THE SOUTHERN TERRACE; DINING HALL IN BACKGROUND



FLOOR PLAN

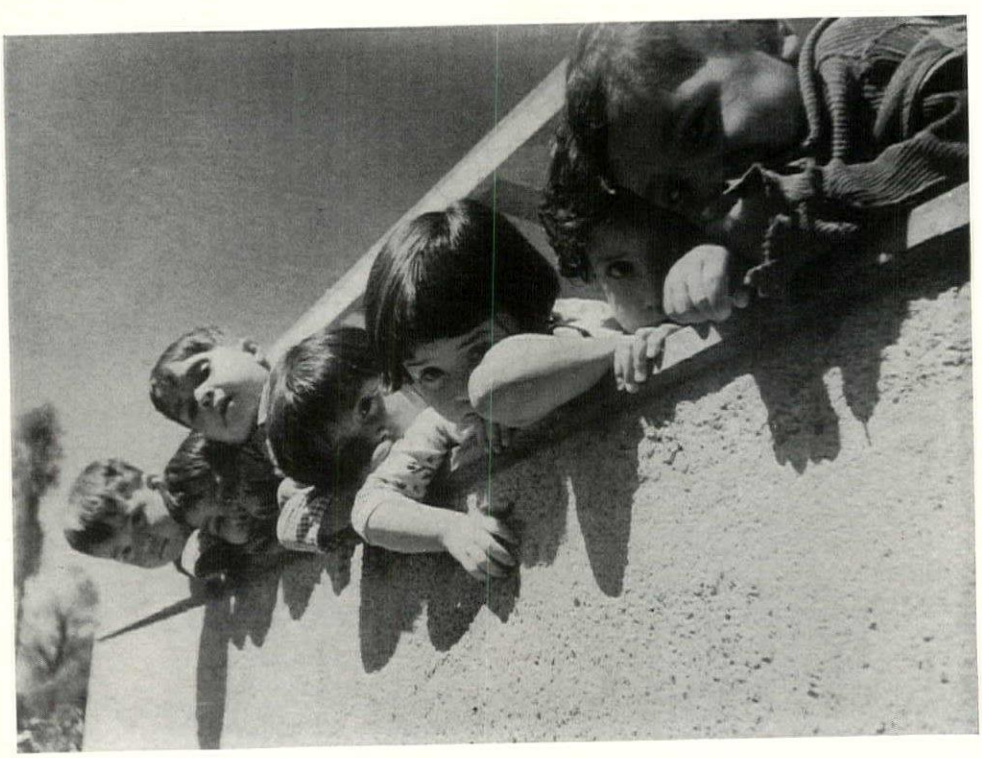


PLOT PLAN

Photograph by Hellen Fisher

SCHOOL-HOME FOR SMALL CHILDREN

BALBUENA, MEXICO CITY



ABOVE: THE PLAYROOM GETS THE SOUTHERN SUN

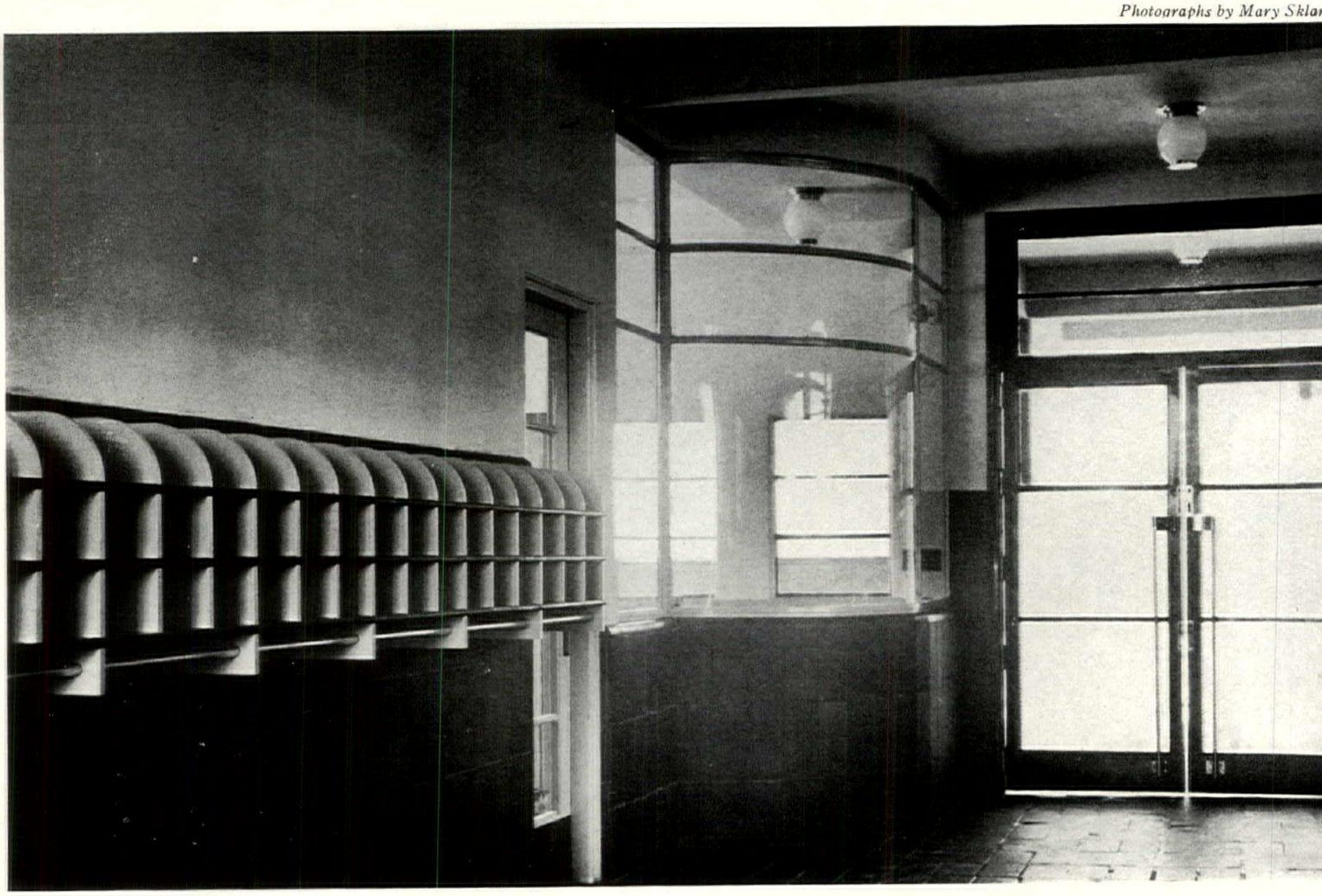
JOSE V. GARCIA AND ENRIQUE DE LA MORA, ARCHITECTS

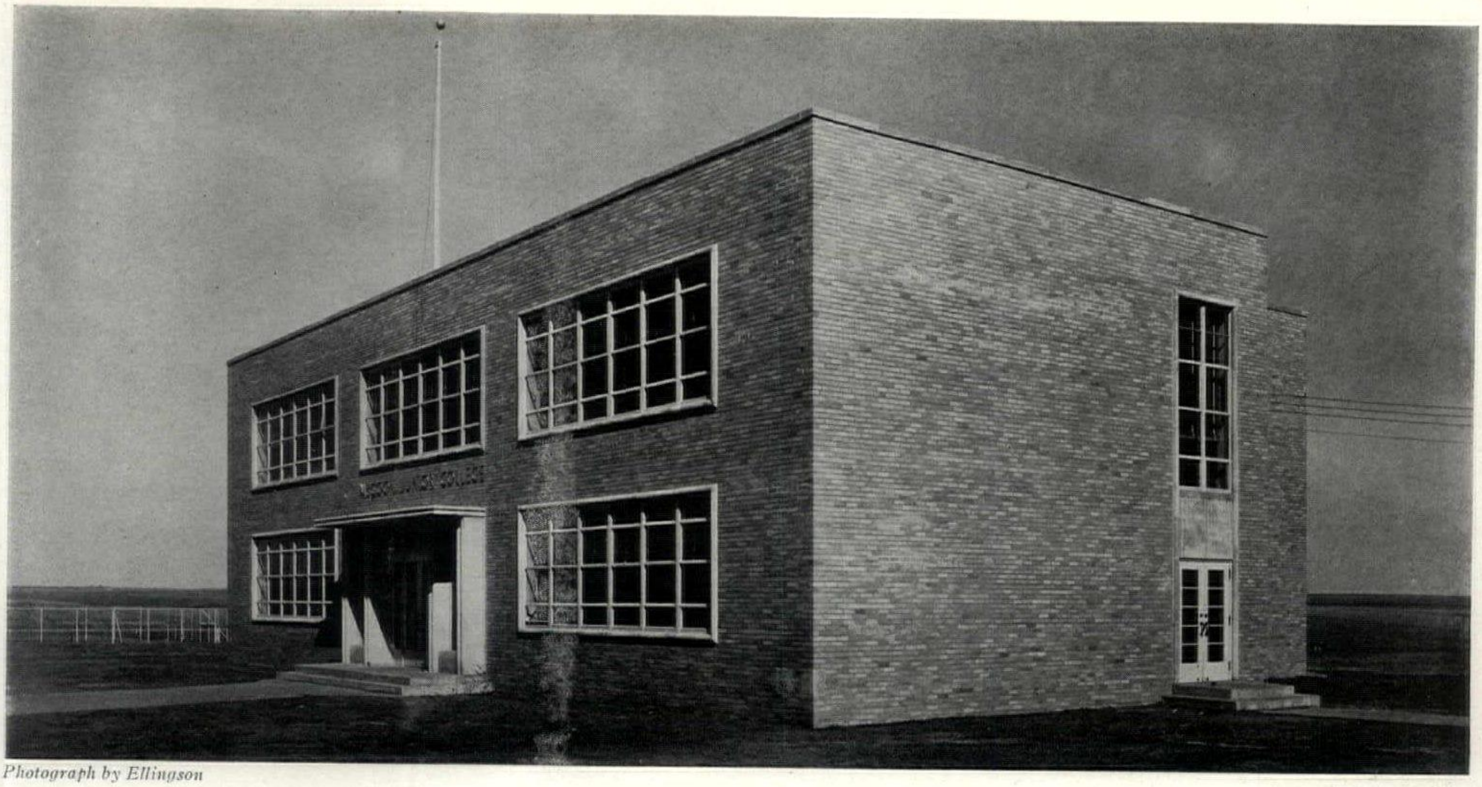
THE COVERED PATIO SERVES AS A PLAY SPACE IN INCLEMENT WEATHER

FURNISHINGS THROUGHOUT ARE DESIGNED FOR SMALL CHILDREN

JOSE V. GARCIA AND
ENRIQUE DE LA MORA,
ARCHITECTS

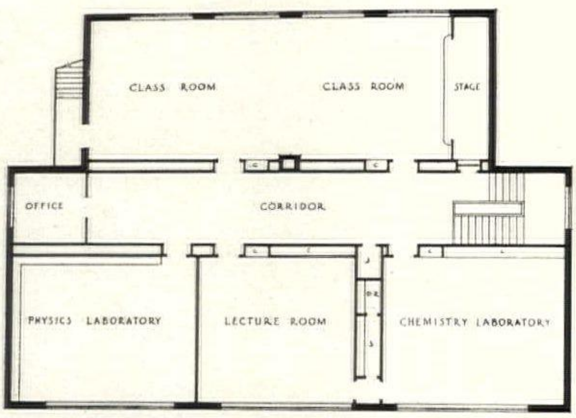
Photographs by Mary Sklar



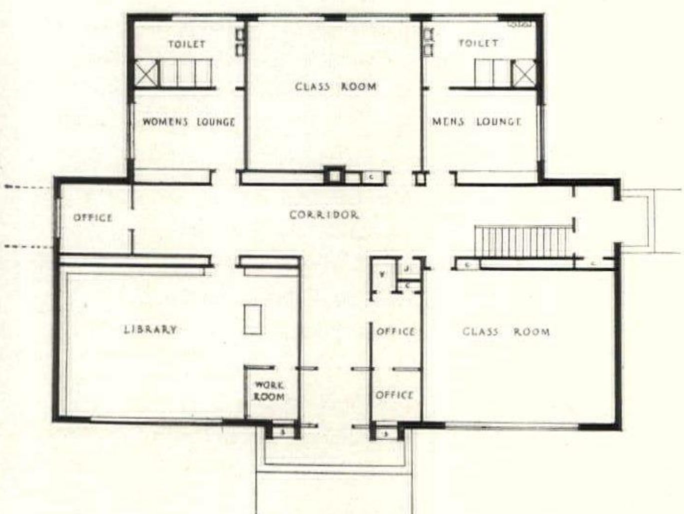


Photograph by Ellingson

McMILLEN HALL, McCOOK COLLEGE McCOOK, NEBRASKA



SECOND FLOOR PLAN



FIRST FLOOR PLAN

SHELDON BRUMBAUGH

ARCHITECT

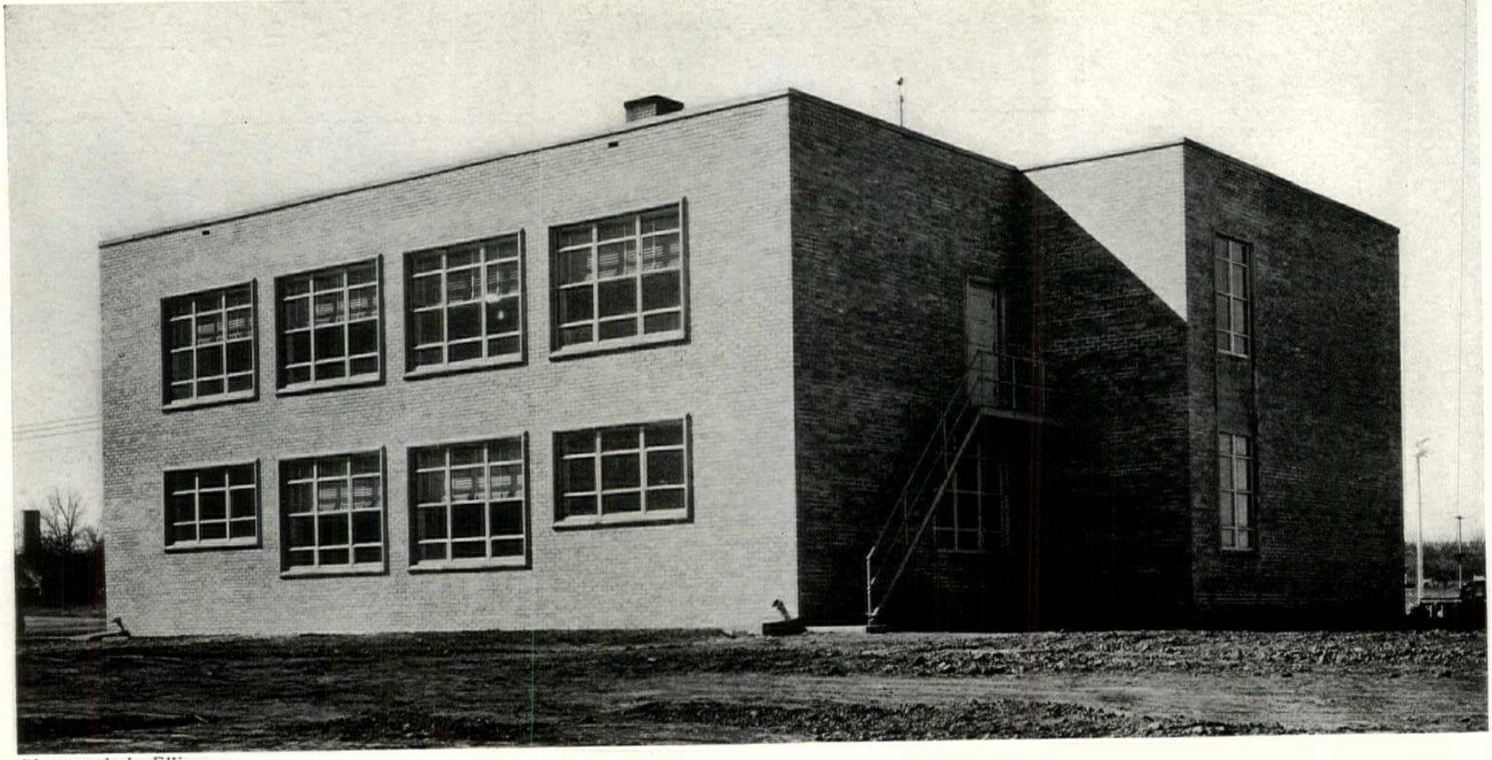
McCook Junior College was established in 1926 and has an enrollment of 125 students. The McCook Junior College building was designed as a memorial to Cecil McMillen, and is the first unit of a proposed future scheme that will include an auditorium, gymnasium, and dormitory.

It seemed desirable to design the building as a complete individual unit in order to preserve its memorial character. The future auditorium and gymnasium may be connected to this building by covered passageways.

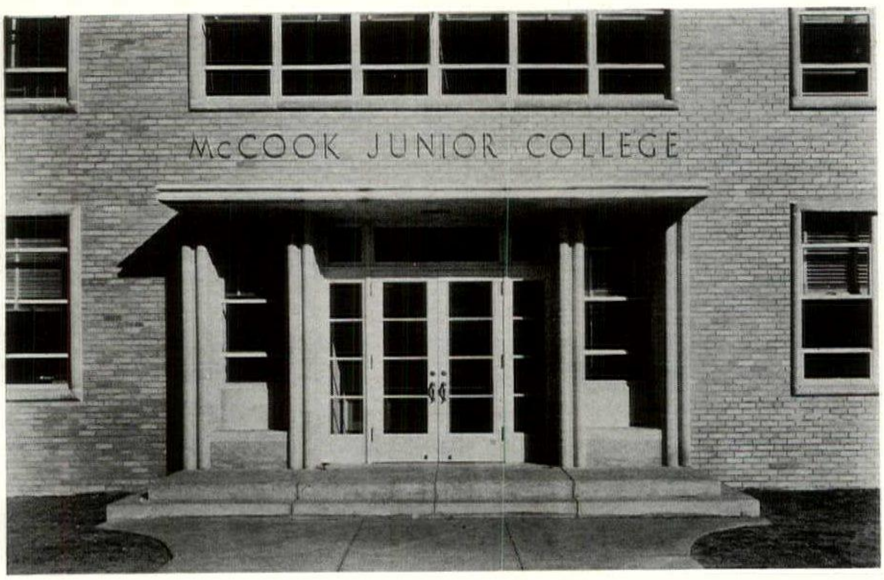
The temporary assembly room on the second floor is provided by opening the folding partition between the two classrooms. The teachers' offices at the north end of the first and second floor corridors will be eliminated when future buildings are constructed.

An 8-acre site was secured adjoining the 35-acre city park. Five acres of the site were a ravine that had been used for years as the city dump. The topography of this ravine lent itself to the construction of an athletic bowl. The débris was removed and the bowl constructed as a WPA project.

The design of the Kelley Park was practically completed before the site for the college was acquired, but an effort was made to arrive at a complete unity between park and campus.

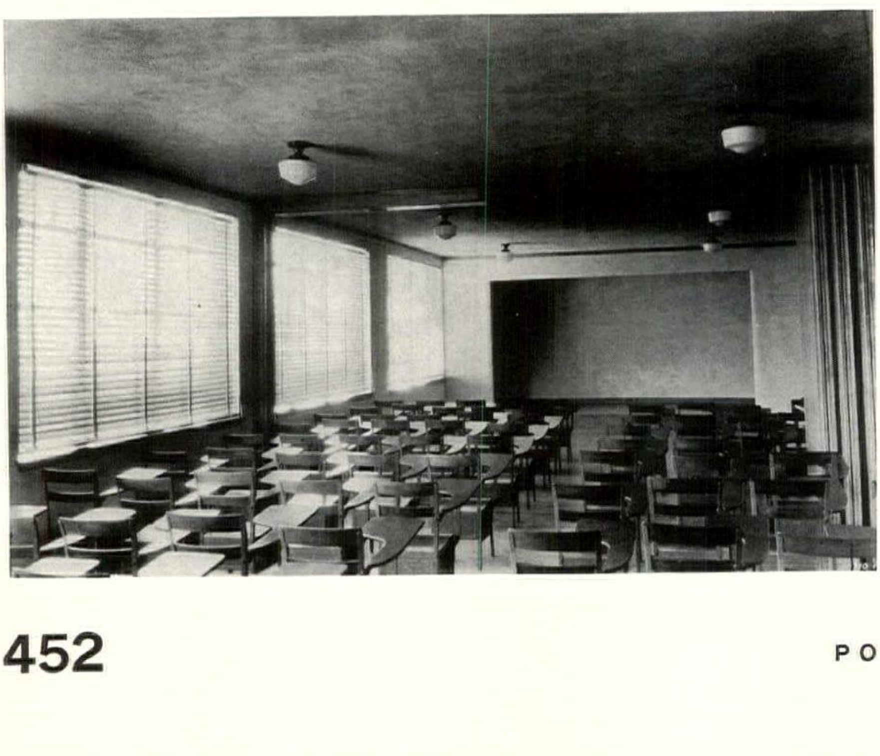


Photographs by Ellingson



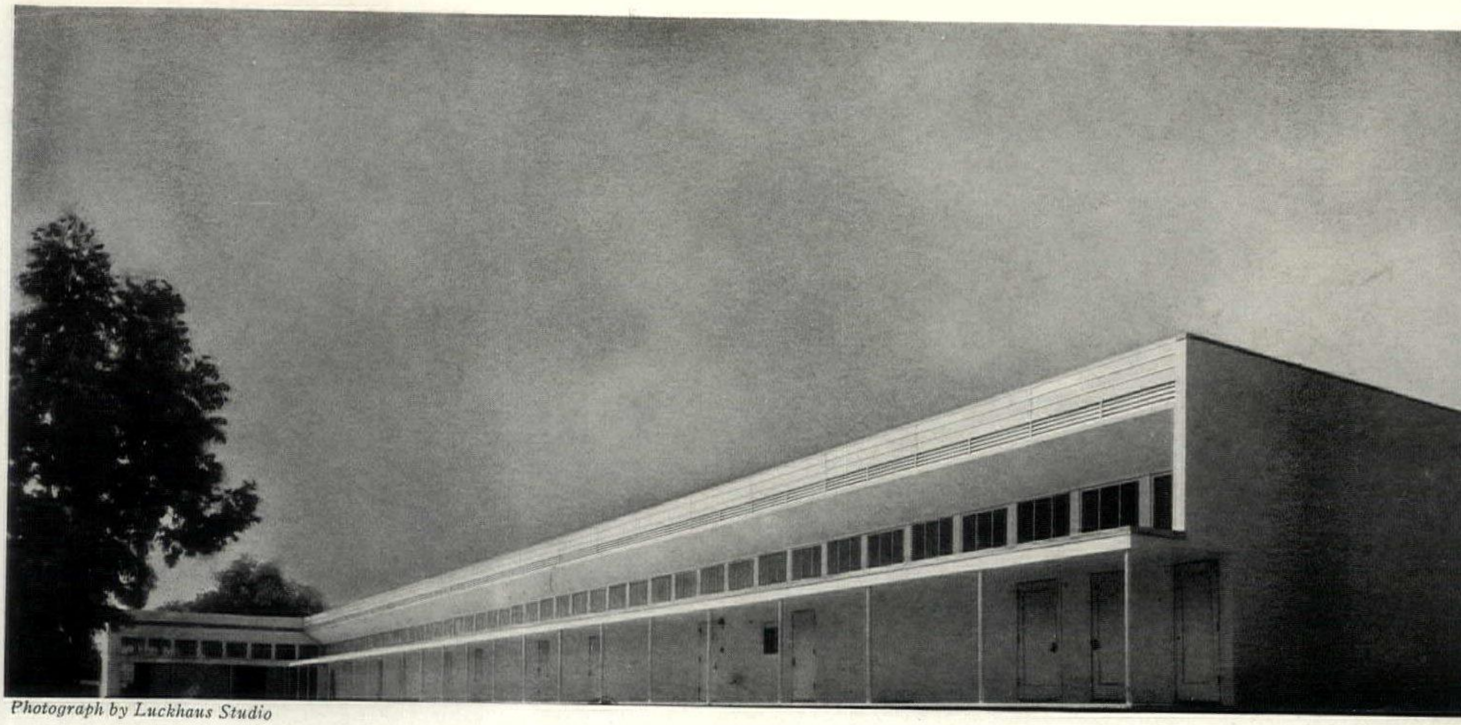
McCOOK JUNIOR COLLEGE
McCOOK, NEBRASKA

SHELDON BRUMBAUGH
ARCHITECT



BUILDING CONSTRUCTION

COST: $29,000, or 24¢ per cubic foot.
WALLS: 13" brick.
FLOORS: First floor 6" concrete slab laid on the ground. Second floor concrete joist metal pans.
ROOF: Wood construction; 10-year composition roof.
COPING: Stone. Top of coping 10" above roof line.
WINDOWS: Fenestra architectural projected.
SHADES: Venetian.
INTERIOR DOORS: Flush veneer.
HEATING AND VENTILATING: Campbell air conditioning system. Iron Fireman stoker.
INTERIOR PARTITIONS: 2" x 4" studs; metal lath and plaster.
TRIM: Indiana limestone.
FACE BRICK: Smooth tan hydraulic face brick.
CEILINGS: 10' high.



Photograph by Luckhaus Studio

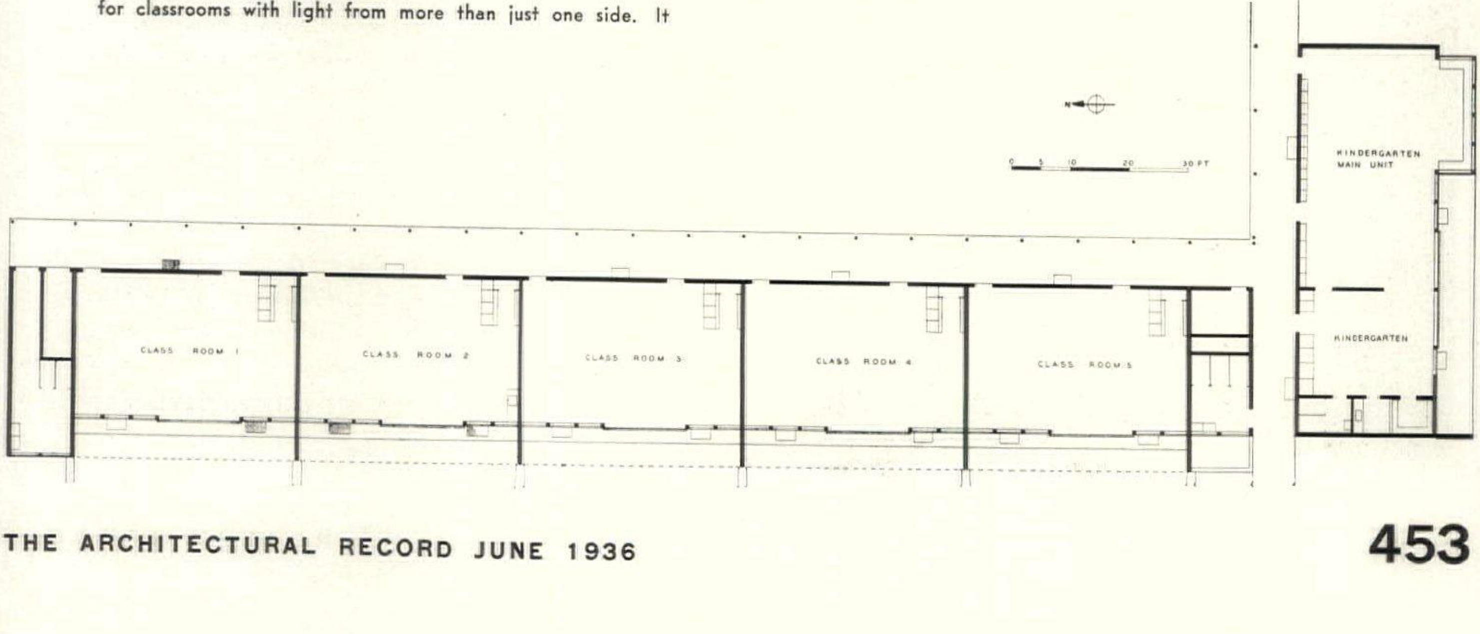
EXPERIMENTAL ELEMENTARY SCHOOL — BELL, CALIFORNIA

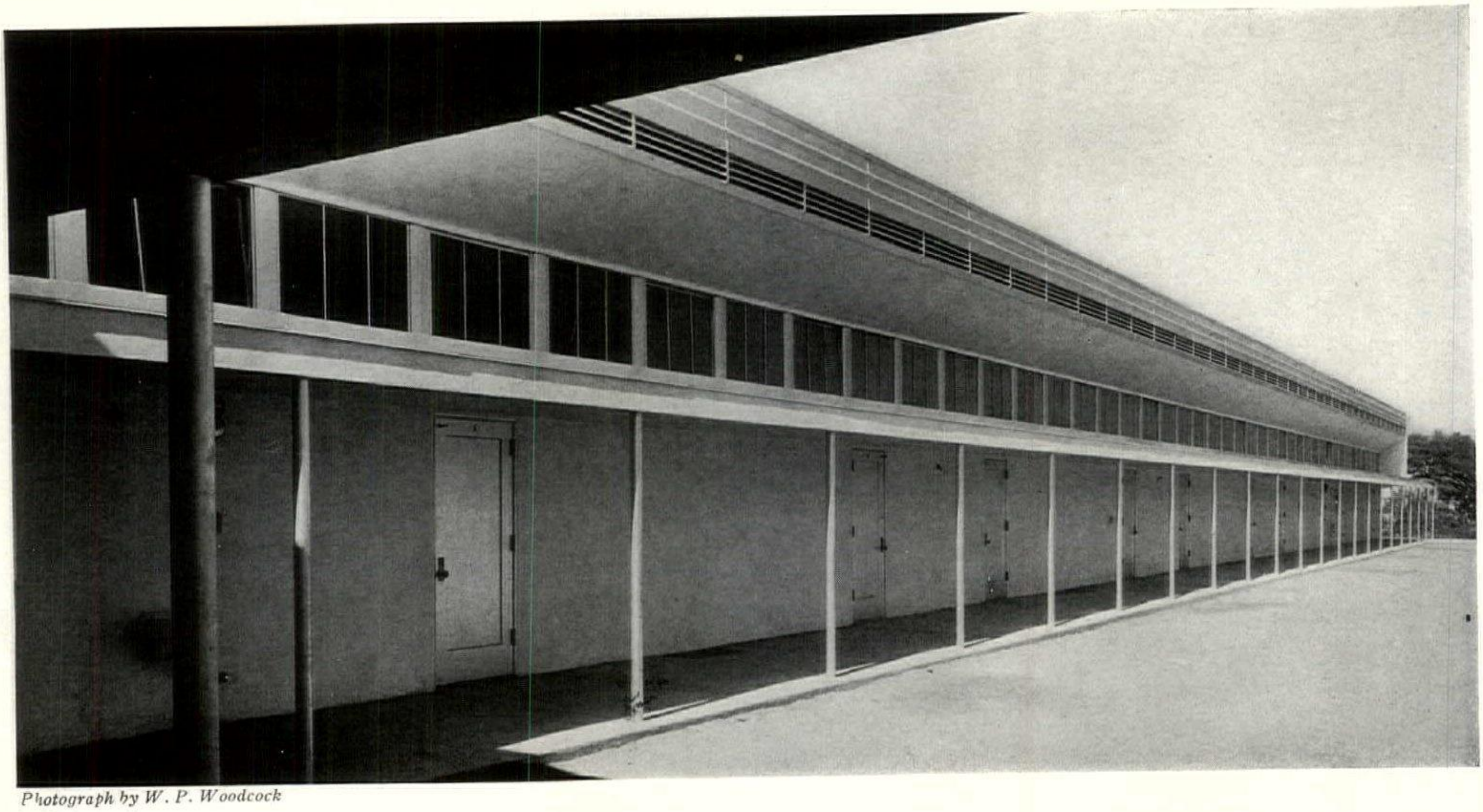
RICHARD J. NEUTRA, ARCHITECT

Richard J. Neutra has for many years studied the relation of the newer methods of education to the school plant. The old time listening school, where the three R's were taught in an academic way, could well get along with fixed seating arrangement and desks screwed to the floor. The teacher then faced the pupils and poured instruction into them. Now the teacher has become a member of an active group that freely works around in the classroom, constructs, builds, sews, dyes, handles all kinds of materials and tools as in the former manual training room, or performs in self-prepared costumes and in spontaneous dramatics. The academic subjects—reading, writing, arithmetics—are learned, while the children do their own research in illustrated books on the specific subject of activity, estimating the quantities of material used, writing reports on the work they have done, and preparing programs on the work they are going to do. The whole process holds the active interest of the children so that the problem of discipline becomes very much reduced. This is called unit of experience training. It calls for classrooms with light from more than just one side. It calls for material storage for small lumber, paints, clay, fabrics, for a sink with running water in each classroom, and so on.

Mr. Neutra studied the best public schools in most European countries and Japan as well as in the United States and tried to profit from these experiments. Eight years ago he developed the elaborate plans and ideas for the California Ringplan School; it was first published in his second book, "America, New Building in the World." The schoolhouse planning division in Sacramento became interested and the Los Angeles Board of Education felt sympathetic to the ideas incorporated there and commissioned Mr. Neutra to further research.

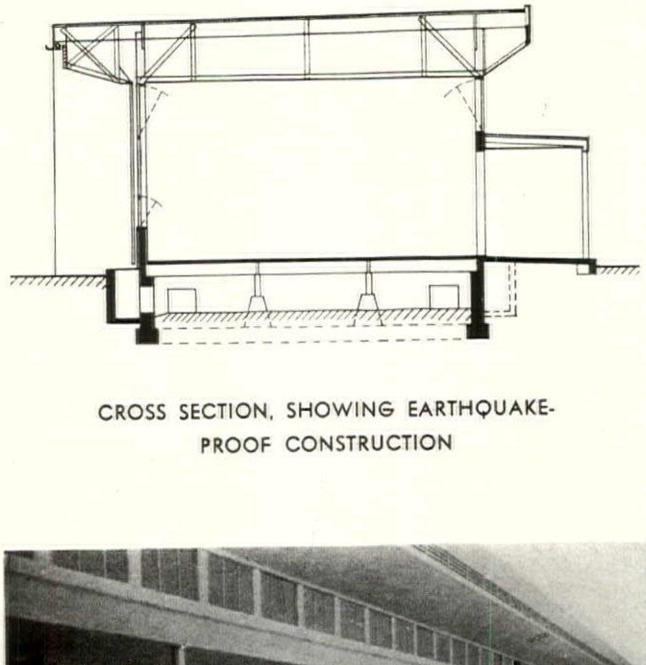
The experimental school plant at Bell, California, designed with the valuable cooperation of the experts of the Board's architectural division, is the fruit of all these studies from





Photograph by W. P. Woodcock

EXPERIMENTAL ELEMENTARY SCHOOL BELL, CALIFORNIA



CROSS SECTION, SHOWING EARTHQUAKE-PROOF CONSTRUCTION

which other cities of the country may profit. As costs could not be determined comparatively concerning the more irregular ingredients of a school plant, Mr. Neutra chose one activity classroom of his design, reduced to what he thought its bare essentials. This classroom, 23 by 38 by 12 feet high, is entered by two 3-foot doors from the open air corridor on the east wall, and is equipped with a sliding glass partition giving broad access to the westerly patio, which forms an integral part of each classroom, doubling its instructional area. All glazing is steel sash and frames. Thorough cost elements were then made on constructing it in six different methods:

1. Reinforced concrete skeleton, hollow walls executed with sliding metal forms and rib floors poured on metal pans, acoustic Celotex ceiling. Optimum post distance: 12 feet 8 inches.

   Glass area: 56% of floor area.

   Ventable glass area: 17½% of floor area, not including doors.

   Cost per classroom: 116% of wood construction.

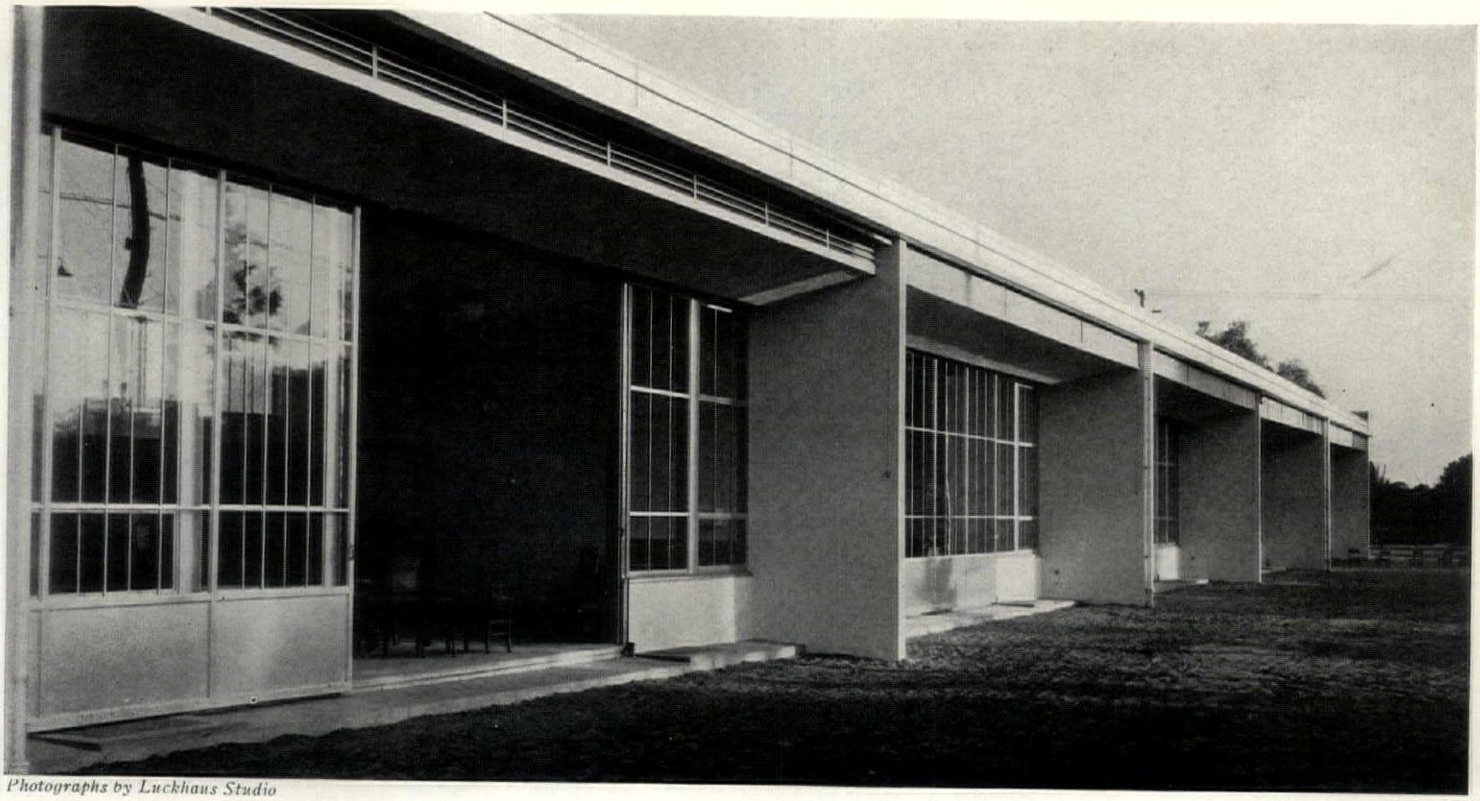
2. Concrete construction executed with air compression gun, without forms and with collapsible channel grillwork as furring (System Ruppel). Floor of reinforced concrete poured over hollow terra cotta tile. Thermax (Heraclith) roof sheathing by light steel trusses. Acousti Celotex ceiling. Optimum post distance: 12 feet 8 inches.

   Glass area: 56% of floor area.

   Ventable glass area: 16% of floor area, not including doors.

   Cost per classroom: 116% of wood construction.

3. Galvanized sheet steel skeleton floor and trussed roof construction. Acoustical ceiling of Pumicite plaster, wood roof sheathing and subfloor.



Photographs by Luckhaus Studio

RICHARD J. NEUTRA, ARCHITECT

Optimum post distance: 4 feet 9 inches.

Glass area: 51% of floor area.

Ventable glass area: 15 2/3% of floor area, not including doors.

Cost per classroom: 114% of wood construction.

4. Walls, posts, roof, of Robertson corrugated sheet-steel elements, floor construction of prefabricated, vibrated reinforced concrete joists bearing subflooring. Acoustical ceiling of Absorbex.

Optimum post distance: 12-13 feet.

Glass area: 56% of floor area.

Ventable glass area: 17½% of floor area, not including doors.

Cost per classroom: 114% of wood construction.

5. Skeleton assembled of braced, rolled channel framing units, floors and roof of lightweight Robertson corrugated sheet-steel sections on rolled steel beams. Exterior and interior surfaces, expanded metal and cement. Acousti Celotex ceiling.

Optimum post distance: 7 feet 6 inches.

Glass area: 56% of floor area.

Ventable glass area: 17% of floor area, not including doors.

Cost per classroom: 118% of wood construction.

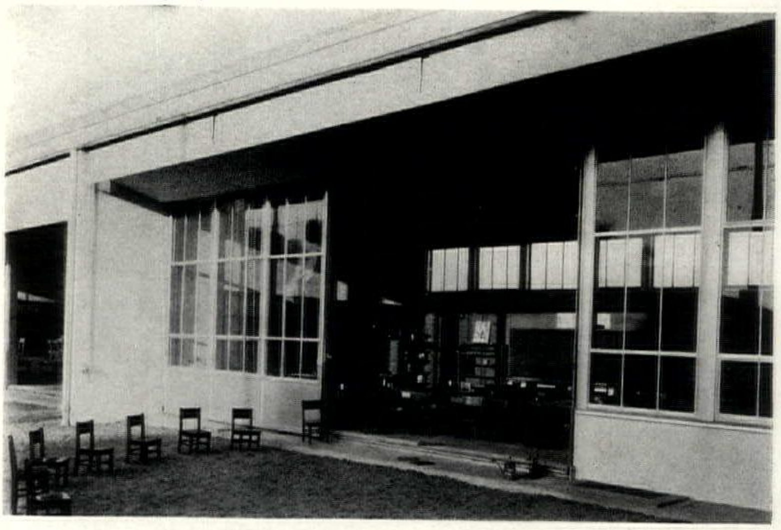
6. Standardized wood chassis with surfaced timber posts, floors borne by pressure infiltrated wood joists. Roof joists supported by continuous frontal trusses. Exterior and interior cement on metal lath. Continuous ventilation louvers for aeration of attic space.

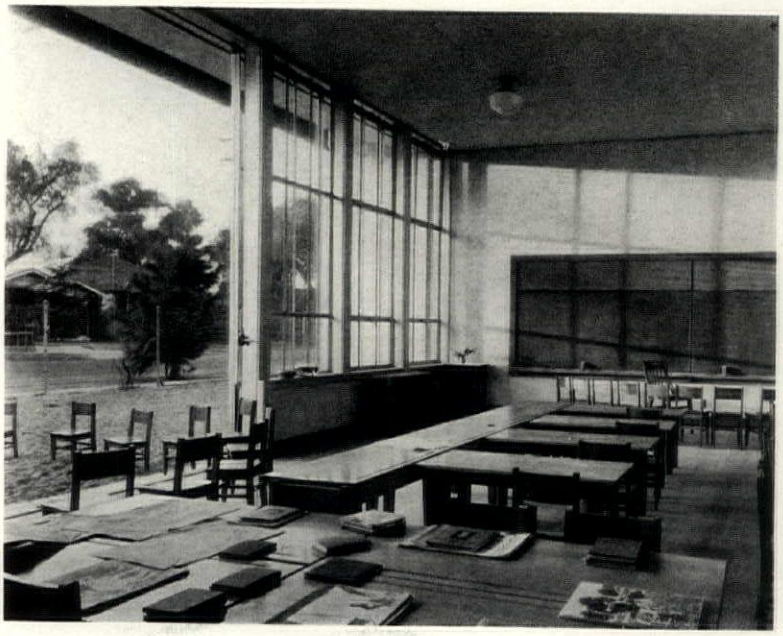
Optimum post distance: 4 feet 9 inches.

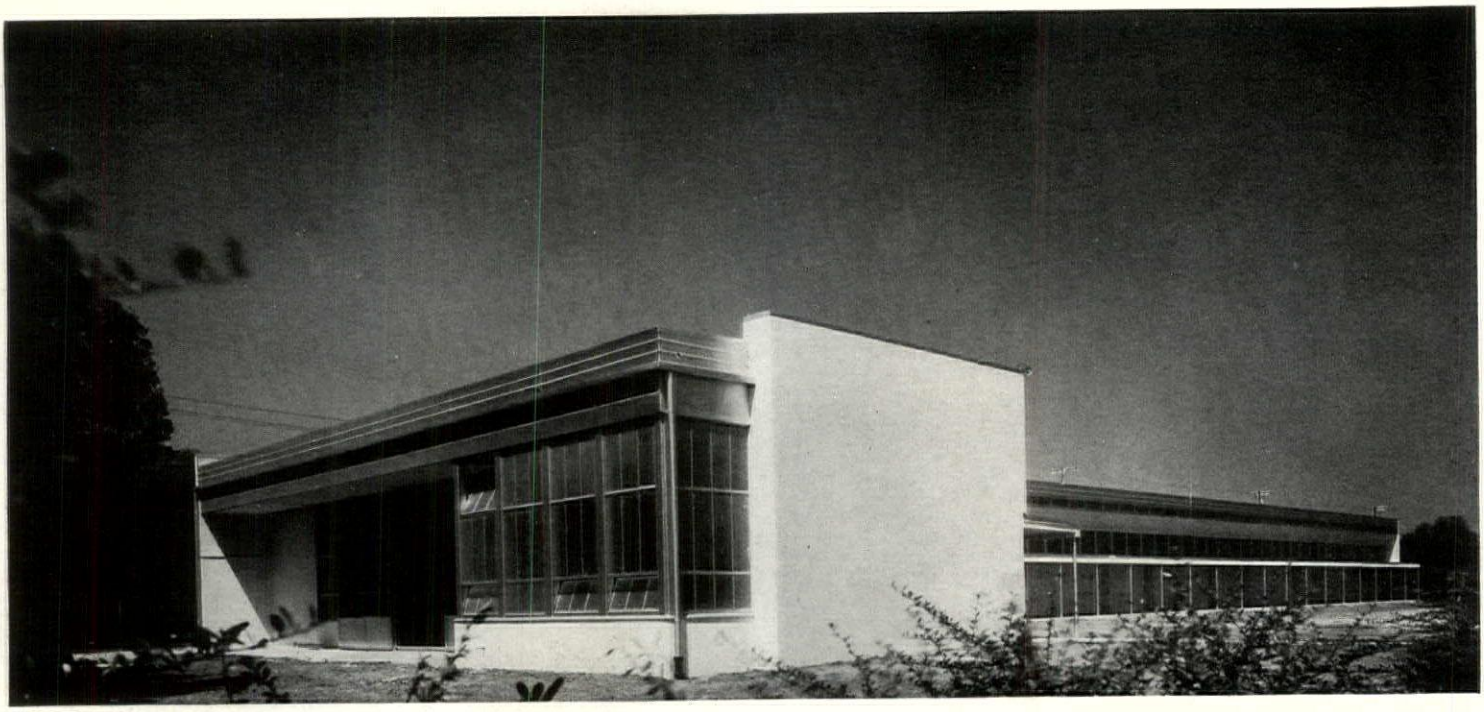
Glass area: 51% of floor area.

Ventable glass area: 16% of floor area, not including doors.

Cost per classroom: 100% of wood construction.



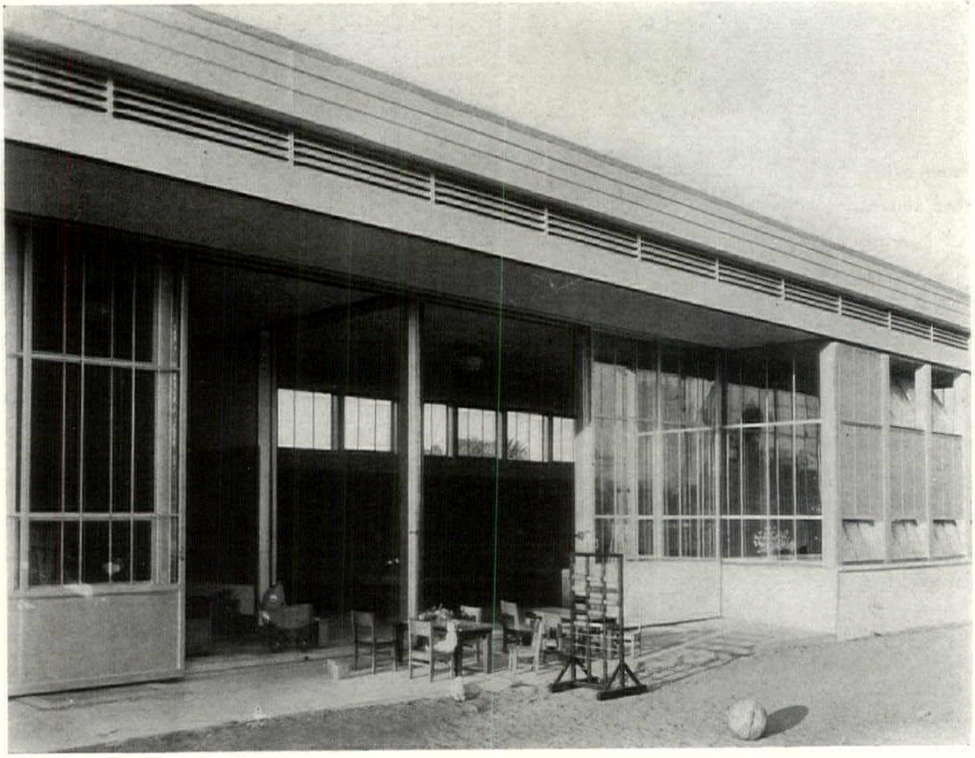




Photographs by Luckhaus Studio

EXPERIMENTAL ELEMENTARY SCHOOL
BELL, CALIFORNIA

RICHARD J. NEUTRA
ARCHITECT



Each classroom faces east and west, opens through a wide door into an outdoor classroom into which the pupils' activities can be extended. Inclosed corridors are eliminated. The kindergarten faces south and opens into the attached play patio. Roof overhangs, supplemented by vertical awnings, eliminate much of direct sun radiation, but permit an abundant influx of light.

HANOVER SCHOOL

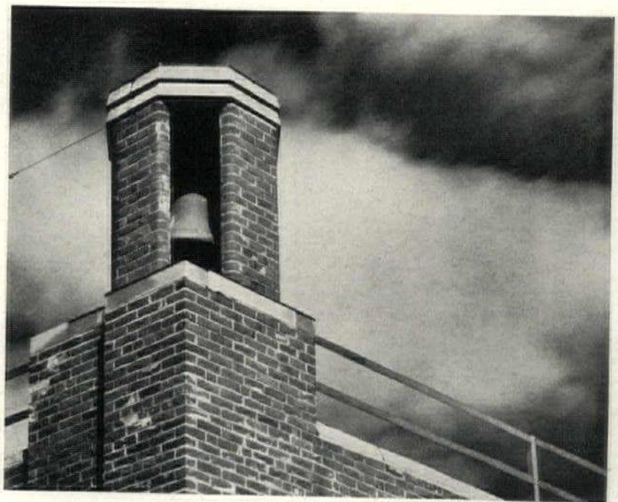
SOUTH MERIDEN, CONN.

LORENZO HAMILTON, ARCHITECT

The perennial problem of securing the maximum amount of space for the minimum amount of money was solved in the Hanover School building by a strictly functional design.

The cost of the building proper was $61,228; equipment, $5,200; land, $4,500. The architect's and engineers' fees and a few incidentals brought the cost up to just under the original $75,000 appropriation. In addition, the local relief administration graded the grounds and built the concrete walks. The per-pupil cost (220 pupils) was $306, and the cost per cubic foot (242,425) was 25 cents. Throughout the designing and construction the board of education, the architect, and the superintendent had enthusiastic and valuable cooperation from a lay committee appointed by the parents and residents of the school district.

The building is of Class B construction, except for the roof, which has wood joists over the classrooms and plank over the auditorium. Walls, except for the painted brick in the auditorium, are plastered.



Photographs by Ben Schnall

GENERAL VIEW FROM REAR

Photographs by Ben Schnall

TYPICAL CLASSROOM

HANOVER SCHOOL — SOUTH MERIDEN, CONN.

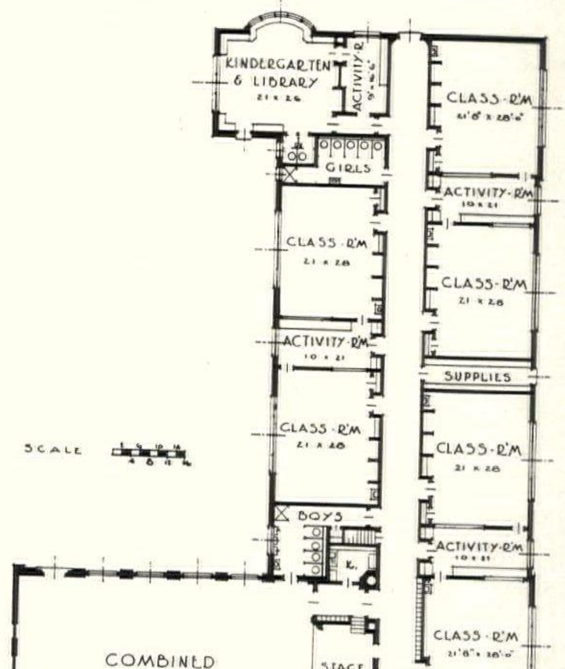
Two objectives were constantly in mind while the building was being designed and equipped. The first was to furnish every facility possible under the appropriation for a progressive type of education; the second was to provide community service and recreation. The first objective is responsible for the four workshops between the classrooms, the linoleum floors and acoustical ceilings, the tables and chairs, and the unusual amount of bulletin-board space. Both objectives are served by the comparatively large auditorium-gymnasium, the special stage with its scenery door, the kitchen, and the extensive playgrounds. For the convenience of the public a library has been combined with the kindergarten (which has direct access to the outside), a special clinic has been installed for the use of the visiting nurses, and the auditorium has been given separate entrances from the street.

The process of education depends far more on pupils and teachers than on buildings and their facilities, but that the latter can contribute has been shown by the happy use which teachers and pupils alike have made of the workshops, the movable furniture, and the auditorium in the new school. Success is attested by the number of teachers from other school systems who have come and come again to see the school at work. The community features have undoubtedly served their purpose. The clinic is well patronized once each week. The auditorium-gymnasium has been used on an average of four nights a week since the opening of school, for community card parties, minstrel shows, basketball games, and other meetings. (Public dancing is not allowed partly because of the danger of making the floor too slippery for athletics, partly because of the difficulty of keeping out undesirable elements from other sections of the city and state.) The only charge made by the board of education for use of the building is $1.50 a night for janitorial service. It is noteworthy that in spite of constant use the building has suffered no material damage.

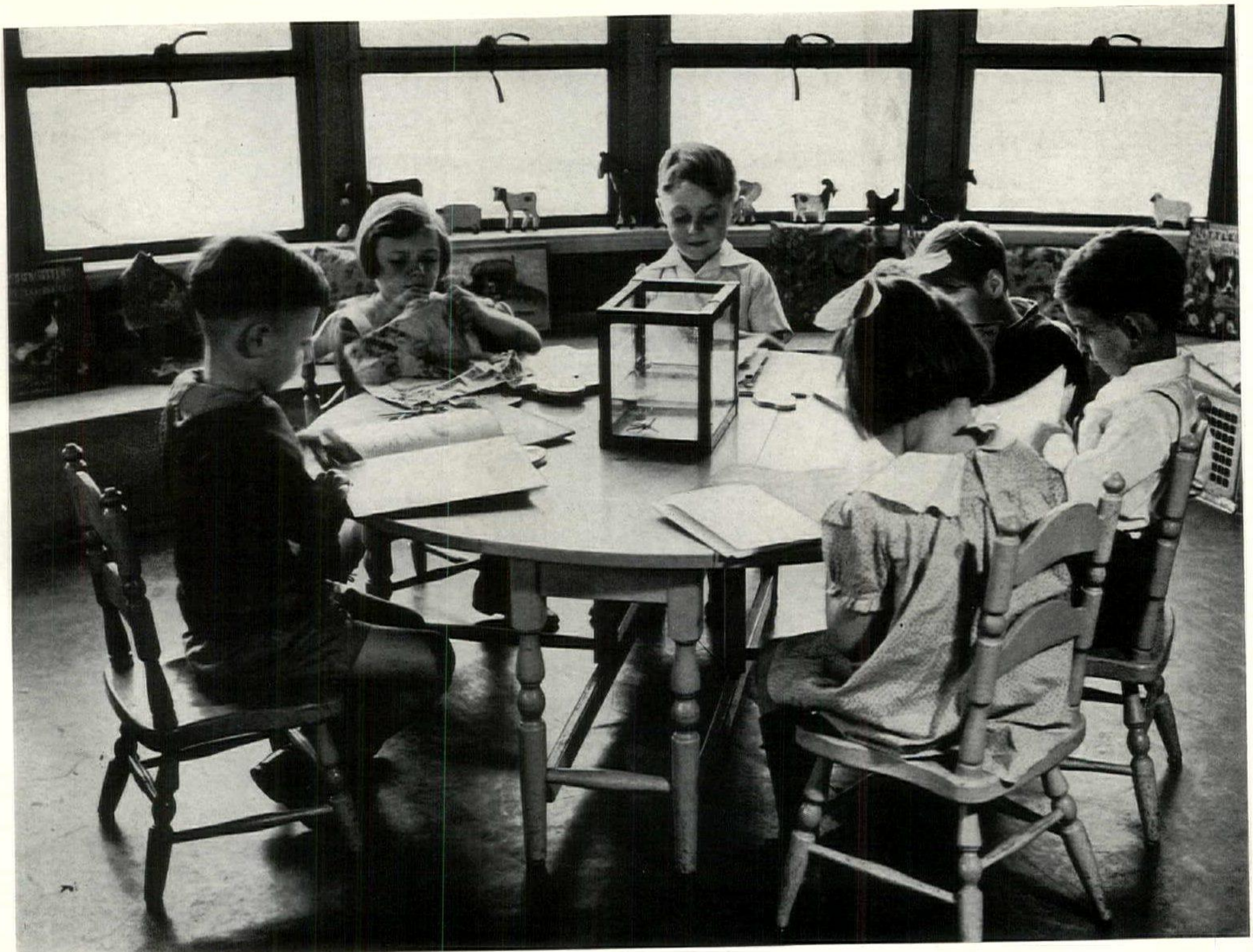
A WINDOW IN THE KINDERGARTEN

LORENZO HAMILTON, ARCHITECT

The steel sash used deserves mention; lower sections (or "hoppers") open in and make an effective substitute for the conventional glass deflectors sometimes used. Upper ventilators opening out give desired flexibility (with the "open window system") in all kinds of weather.



FLOOR PLAN



Photographs by Ben Schnall

YOUNG STUDENTS AT WORK

HANOVER SCHOOL

SOUTH MERIDEN, CONN.

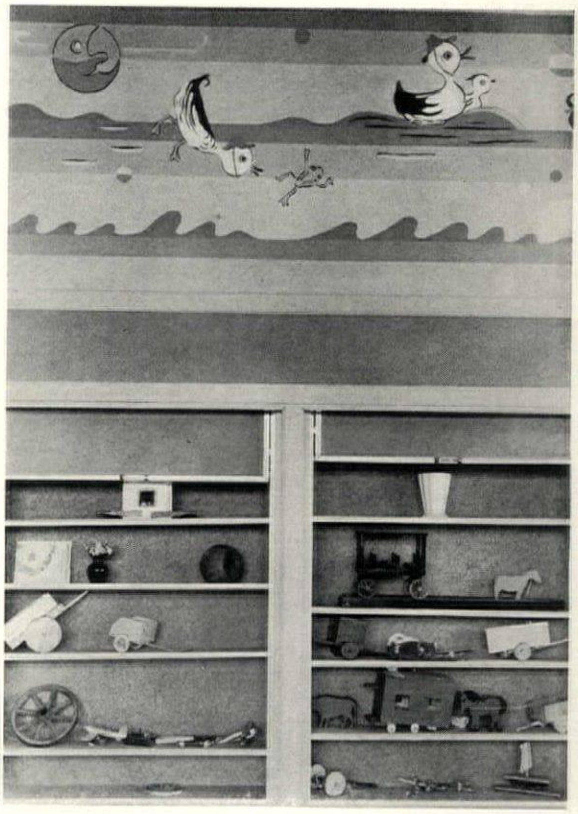
Heating is by forced-circulation down-feed hot water. A steel boiler is fired by oil burners, adapted to number five oil. The system is zoned into three zones —classrooms, kindergarten-library, and auditorium—so that different temperatures may be maintained at night or on holidays when only one or two sections of the building are in use. Ventilation is by the "open-window" (gravity) system, with outlets through the built-in wardrobes. All of the radiators are wall type with shields. Supplementary unit heaters are employed in the kindergarten and auditorium.

The School Board says: "If we were building over again, and had the money available, we should enlarge the kindergarten, install book shelves in all rooms, covered by bulletin boards like those in the kindergarten, and try to incorporate a fair-sized teachers' room. At present the teachers use the principal's office and clinic."

LIBRARY CORNER OF KINDERGARTEN

LORENZO HAMILTON, ARCHITECT

Above the chalk and bulletin boards each room has a frieze of washable wallpaper. The patterns are different and appropriate to the age level in each room, from the "crazy" duck, frog, and fish frieze on pale yellow, green, and rose strips in the kindergarten to a plain pattern in the eighth grade. The principal's office has wallpaper from floor to ceiling: a warm colonial yellow with blue figures. The woodwork in each room is colored to go with the wallpaper. The clinic is finished in white and gray paint. In the auditorium the brick walls are painted gray with maroon trim and the ceiling is acoustical Celotex of varying grayish brown natural shades; the window curtains are gray monk's cloth lined with maroon sateen; the stage curtains are a deep maroon velvet. This use of color has given each room individuality and the building as a whole real character.



MOVABLE BLACKBOARDS COVER THE SHELVES

GRADE SCHOOL

LAWRENCE, KANSAS

THOMAS LARRICK

ARCHITECT

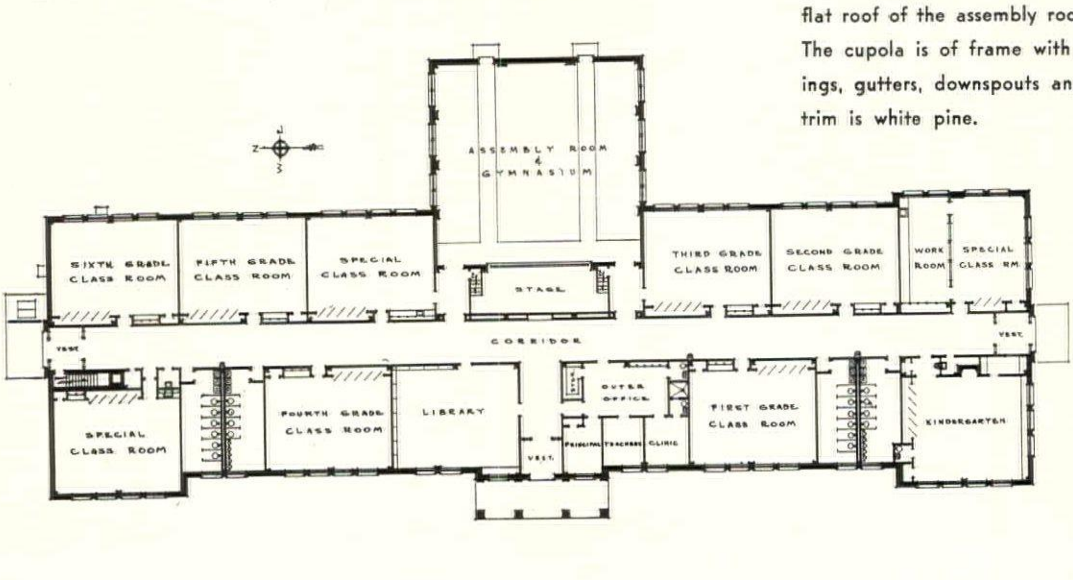
The building, a PWA project, contains approximately 379,500 cu. ft. and cost 23.8c per cu. ft. or about $90,000—including architect's fee and all fixed equipment. Cost of movable equipment such as desks, chairs, tables, etc., including architect's fees, was approximately $6,400. The cost of grading, sidewalks, and landscaping, including architect's fees, was approximately $6,150.

Lighting for all classrooms and offices is indirect. Each classroom has six lighting fixtures. An automatic clock and fire alarm system has been installed.

Classrooms are equipped with individual desks, tables and chairs of metal with wood tops and seats, and each classroom has a special reading table. All classrooms and special classrooms are equipped for 38 pupils with the exception of the small special classroom at the south of the building which is equipped for 20. The windows of the kindergarten and the special classroom at the south end of the building are of ultra-violet ray glass.

The building is constructed of reinforced concrete with the exception of the pitched roof which is wood framing built over a reinforced concrete ceiling slab. Spandrel beams were inverted making the heads of all windows even with the ceiling line.

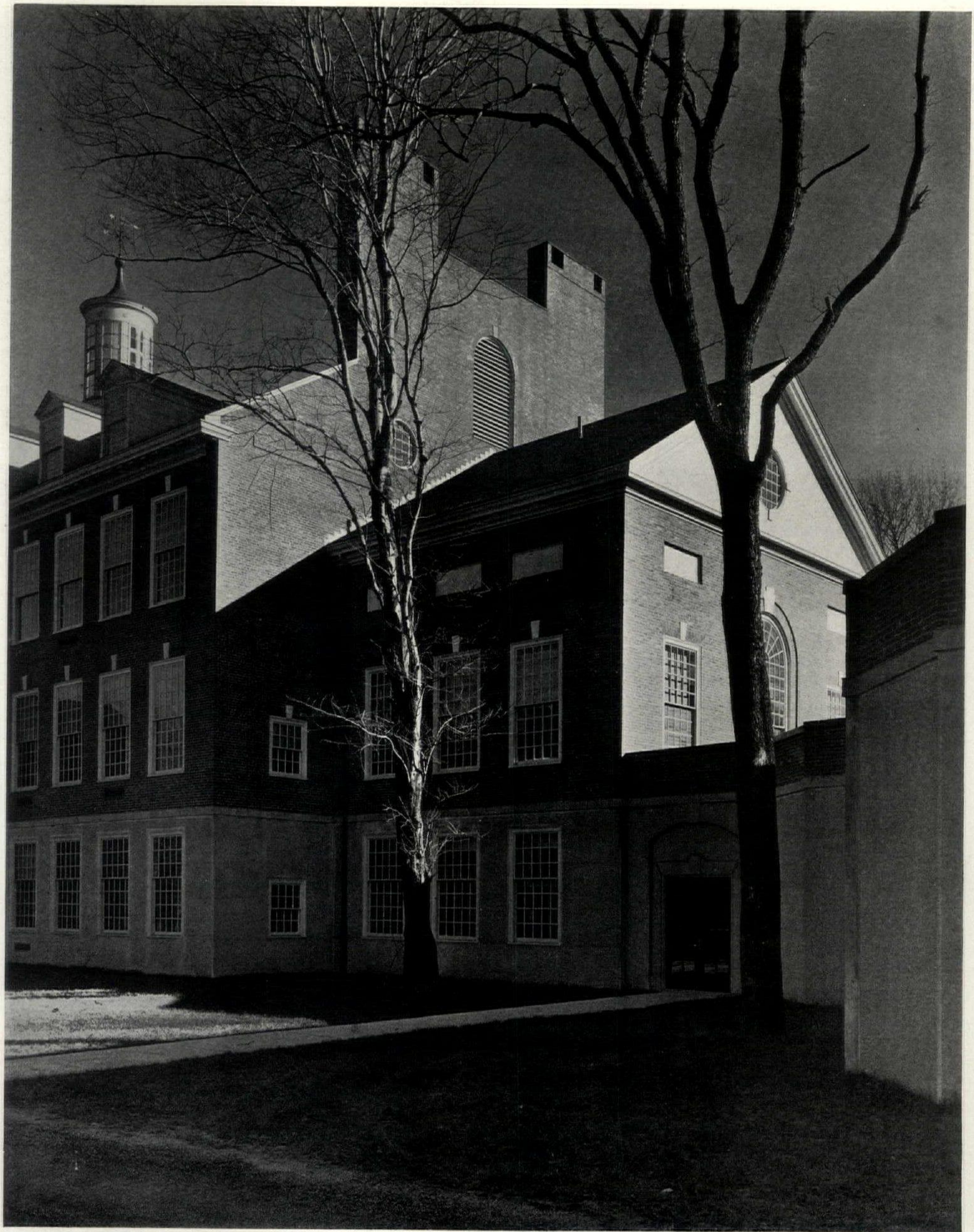
Exterior walls are sanded colonial face brick and backed up with interlocking hollow tile. The pitched roof is asbestos shingles. The flat roof of the assembly room is tar and gravel on concrete deck. The cupola is of frame with copper roof and bronze finial. Flashings, gutters, downspouts and copings are of copper. All exterior trim is white pine.



FLOOR PLAN

MILTON JUNIOR HIGH SCHOOL EAST MILTON, MASS.

RALPH HARRINGTON DOANE, ARCHITECT



Photograph by A. C. Haskell

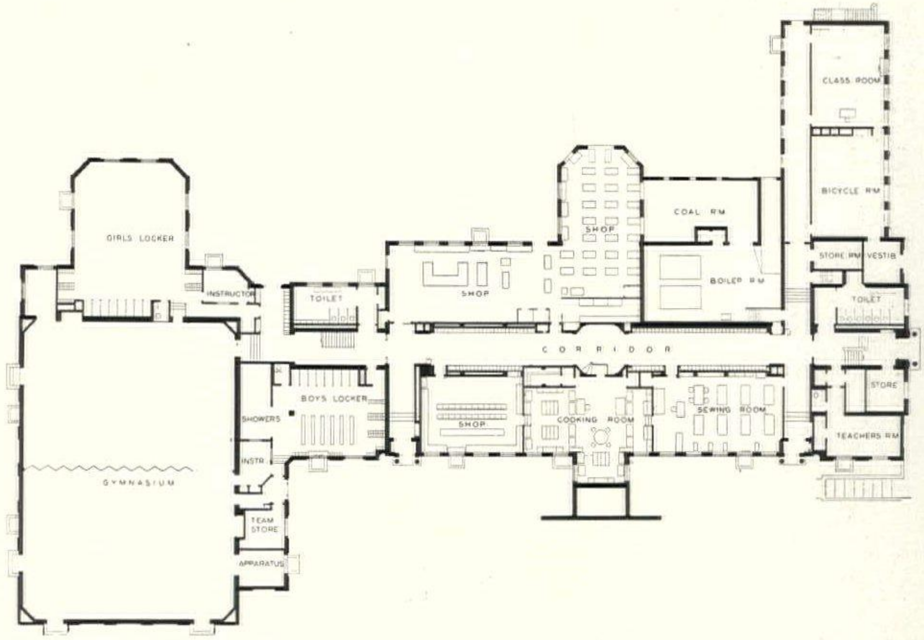
MILTON JUNIOR HIGH SCHOOL — EAST MILTON, MASSACHUSETTS

ONE OF THE STAIR HALLS

The school building is located on Edgehill Road, East Milton, adjoining the existing Collicot School, and opposite Cunningham Park. It is designed to accommodate six hundred pupils, and by the addition of classroom units at a later time the capacity can be raised to twelve hundred. The plans for the building provide, in the future, for the addition of such a classroom wing, as well as an auditorium. The main part of the building contains a basement and three stories, and is of fireproof construction with a wing to the rear two stories high. The following accommodations are provided: three shops, one cooking room, one sewing room, two science laboratories, one library, and thirteen classrooms. The gymnasium is divided into a boys' and a girls' section by a folding partition, with adjoining boys' and girls' locker and shower rooms. A cafeteria is located at the top of the building. Administration offices, teachers' rooms, storerooms, bicycle room, toilets, and a boiler plant are also provided.

Photographs by A. C. Haskell

RALPH HARRINGTON DOANE, ARCHITECT

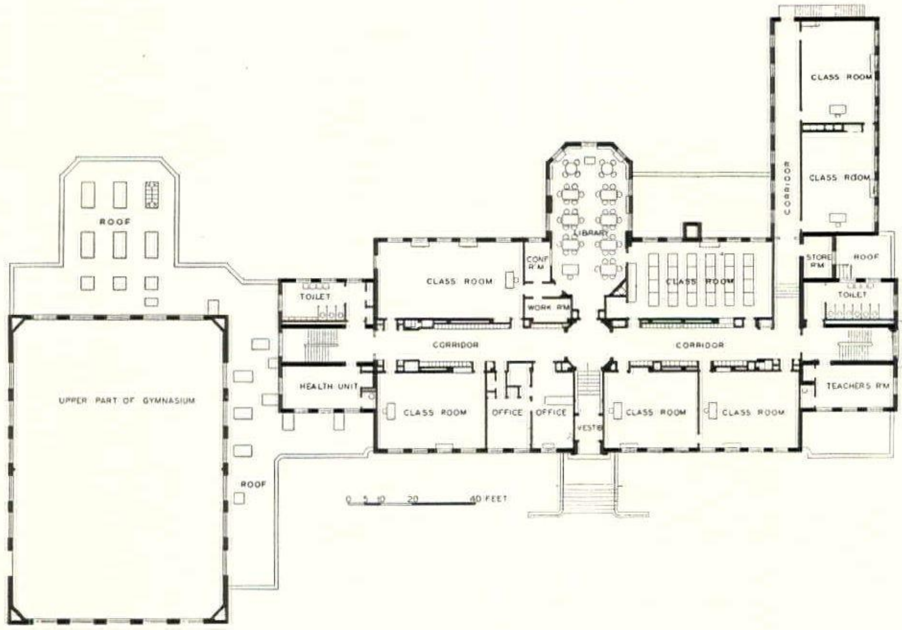


FIRST FLOOR PLAN

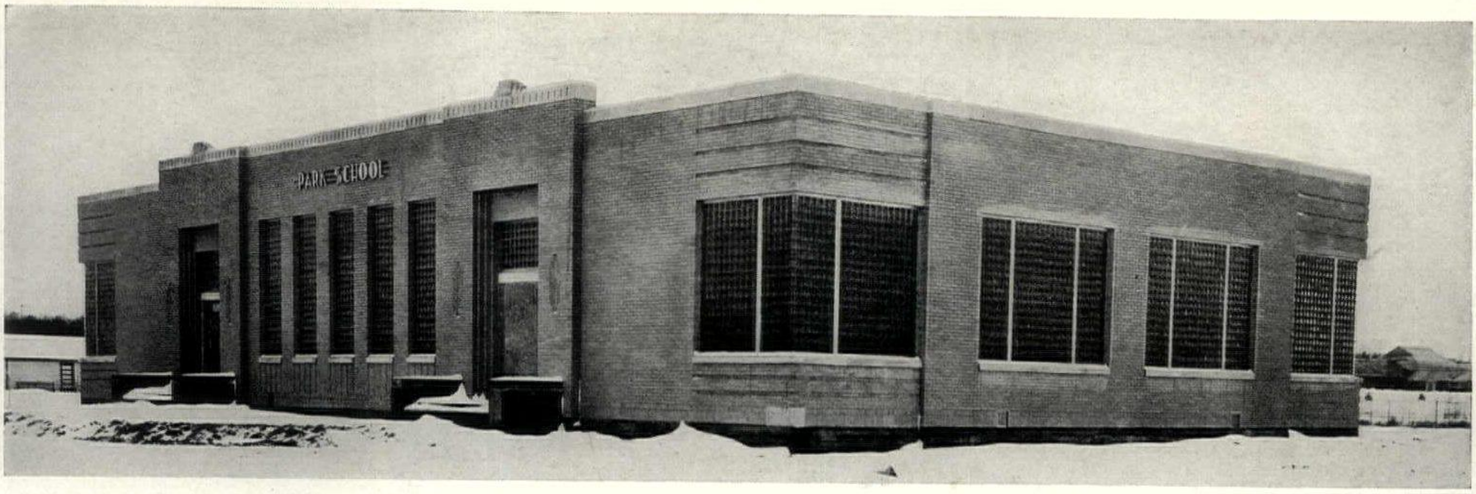
Photograph by A. C. Haskell

MILTON JUNIOR HIGH SCHOOL EAST MILTON, MASSACHUSETTS

RALPH HARRINGTON DOANE
ARCHITECT



SECOND FLOOR PLAN



PARK SCHOOL

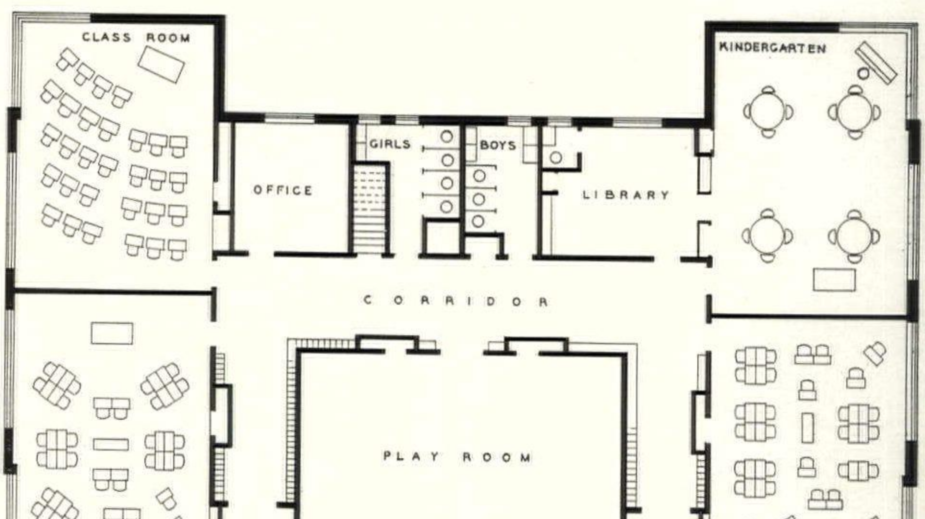
HIBBING, MINNESOTA

The new school has an appropriate setting in the southeast corner of a municipally-owned park. The lot contains about three acres which amply provide for a large playground in the rear. The front portion will be landscaped in a modern design, using such types of shrubbery as will best harmonize with the building.

Each classroom has more than twice the glass area ordinarily used in regular classrooms or required by state regulations. The east and west walls are practically all glass, continuing around the corners about 8 feet or a little more than 1/3 the width of the room. There are no movable windows in the building, as the air conditioning is designed to provide fresh air to each room throughout the day at a rate of 30 cubic feet per minute per pupil.

The glass-brick walls average a 65% vacuum which serves as an insulator to heat, cold, and sound, but they do not carry any structural loads. Cost of the completed structure was $33,000, or 26c per cu. ft.

J. C. TAYLOR
ARCHITECT



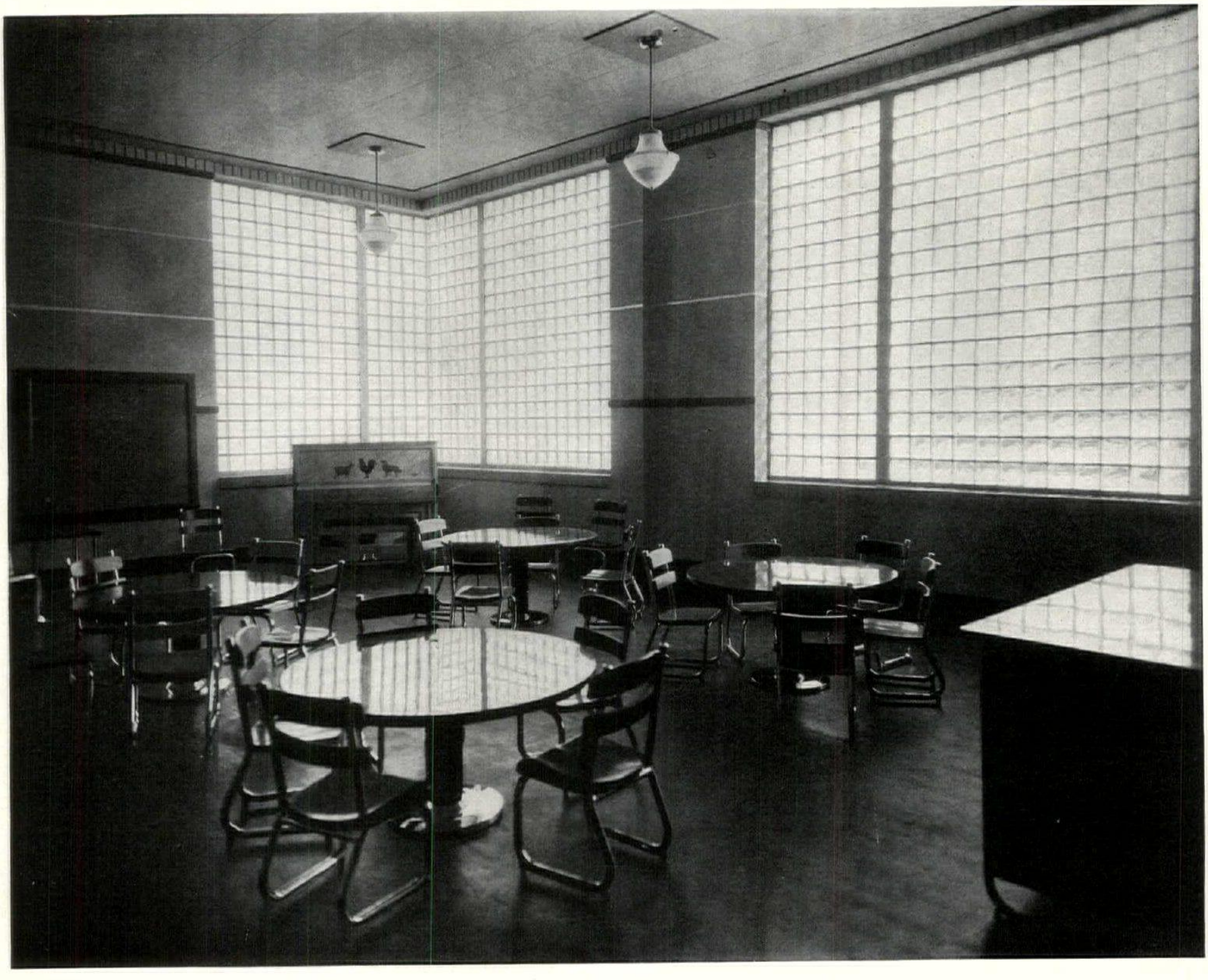
FLOOR PLAN

J. C. TAYLOR, ARCHITECT

The illumination is the semi-indirect, closed unit, prism type, with reflecting liners to reflect light upward and at the same time provide enough transmission to illuminate the lower bowl. All lighting fixtures in classrooms are automatically controlled with a photo-electric relay or eye which actually turns the lights on or off at certain stated foot-candle standards. The electric eye is set for an average of 15 foot-candle light intensity on a horizontal plane 30″ above the floor. When the sun's illumination gets below this point, the lights are turned on, and if the sun's light should increase, by reason of cloud action, the lights will turn off. This feature insures proper illumination at all times. In the same way a heat thermostat provides a uniform heat.

The heating and ventilating equipment, located in the basement, is designed to recirculate from 75% to none of the foul air. This type of design takes anywhere from 25% to 100% outside air and delivers it to each room at any desired temperature. The heat in each room is controlled with an electric thermostat which can be set to any desired temperature. It is impossible to overheat from sun's rays or by occupancy because this type of system provides an absolute individual room control. All air passing into the system is filtered through removable filters; then humidity is automatically introduced to any desired saturation. The heat for the building is supplied from the municipal heating plant. The furnishings are the latest type modern design, arranged in informal groups and not in the conventional fixed straight lines.

FURNITURE IS MODERN, INFORMALLY ARRANGED



Photograph by Gottscho

COBURN COUNTRY DAY SCHOOL

MIAMI BEACH, FLORIDA

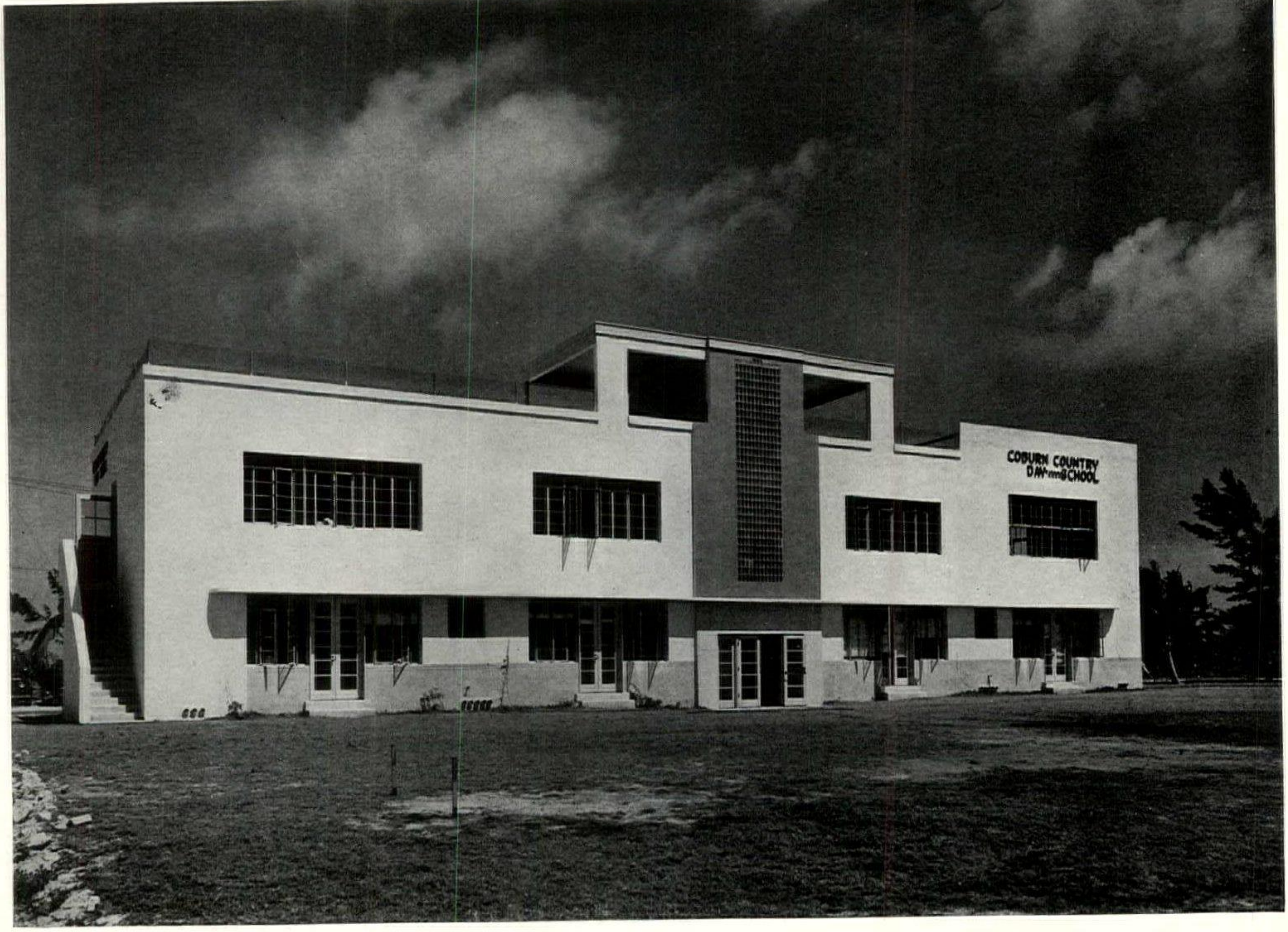
L. MURRAY DIXON

ARCHITECT

LOCATION: Water front lot on Normandy Isle, Biscayne Bay. The whole neighborhood is new, but already, since the school was finished, many houses and apartments surround it.

PURPOSE: This is a private school but as its activities are confined almost entirely to the winter months it was thought best to give it more or less a public school character. The cost budget was also an influence in this decision, for the building had to be erected on piles. A long, low, spread-out building which might seem to be the finest solution for a problem of this kind would be too expensive to erect. At first it was intended to do the building in the usual Mediterranean manner that is so prevalent in this vicinity, but by using a flat roof it was possible to add a great deal of classroom space at no additional cost. Part of this open space was covered over so that shelter could be taken from the quick squalls which occur here often.

MATERIAL: All material used in the building is according to local standards. Concrete block construction with reinforced concrete columns and tie-beams, light section steel sash, cypress millwork, and a 15-year bonded flat roof. Such items as the glass brick were used simply and solely for a structural and practical value. Although the school is not yet landscaped thoroughly it has already excited a great deal of comment as a clean-cut, common sense building.



Photographs by Gottscho

COBURN COUNTRY DAY SCHOOL MIAMI BEACH,

Designed specifically for use as a country day school located in a moderate climate, the building fulfills its purpose. The majority of the pupils are seasonal, accompanying their parents south each winter. Most of these pupils come from schools in the north. They arrive at Miami Beach with outlines of work furnished by the home school, to be followed while they are getting their share of the southern sun. They find at Coburn Country Day School a type of instruction, in the hands of capable instructors working either individually or in extremely small groups, very similar in quality to that to which they are accustomed.

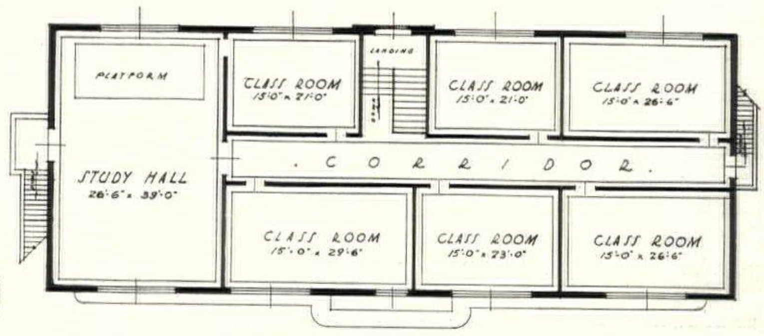
The school offers a conservative and straightforward instruction in all subjects making for a sound academic education and must naturally produce results or lose patronage. Although many northern schools give the school free rein regarding the pace of progress or method of instruction, in frequent instances allowing change of textbook as the most expedient means of reaching the desired goal in each subject, this is not always the case, and a highly diversified schedule for each instructor results. Therefore the need for a large faculty which, were the school's ledgers to be examined and salaries compared, would seem to be disproportion-

FLORIDA

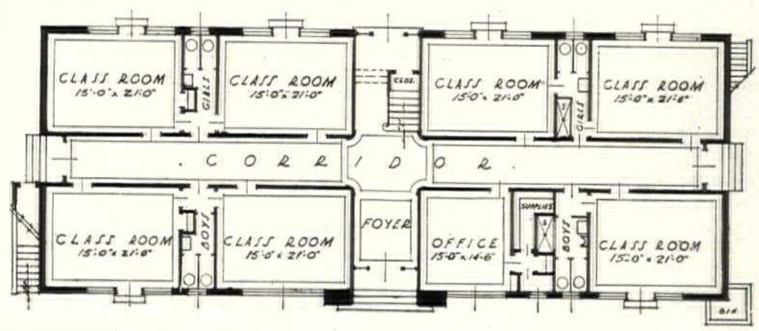
L. MURRAY DIXON, ARCHITECT

ately expensive. But a well-trained, experienced and numerous teaching staff is clearly essential in a school where skillful and thorough instruction is of paramount importance. Naturally, large classrooms are useless under these conditions where piece-work, and not mass production, is the order of the day.

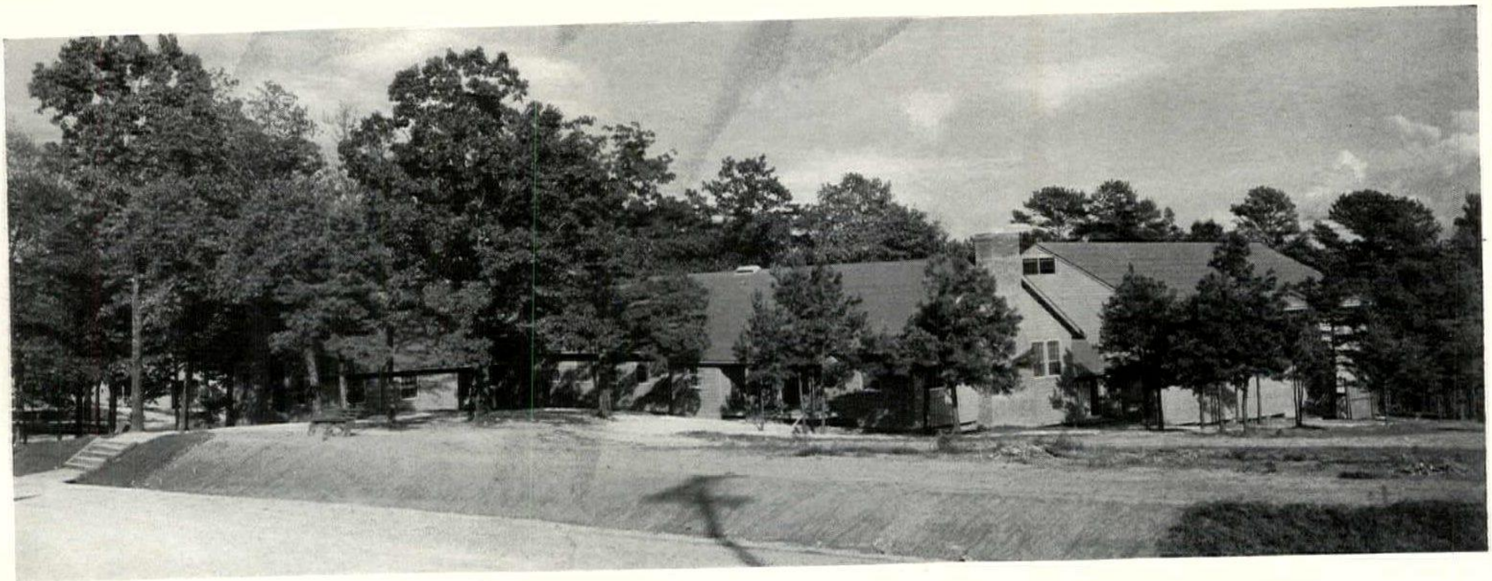
The school offers a wide variety of athletics: horseback riding, sailing, baseball, basketball, touch football, archery, track, and cricket. In cultural pastimes, too, the school offers wide opportunity for expression, its auditorium being designed for all types of presentations. **NELSON COBURN**



SECOND FLOOR PLAN



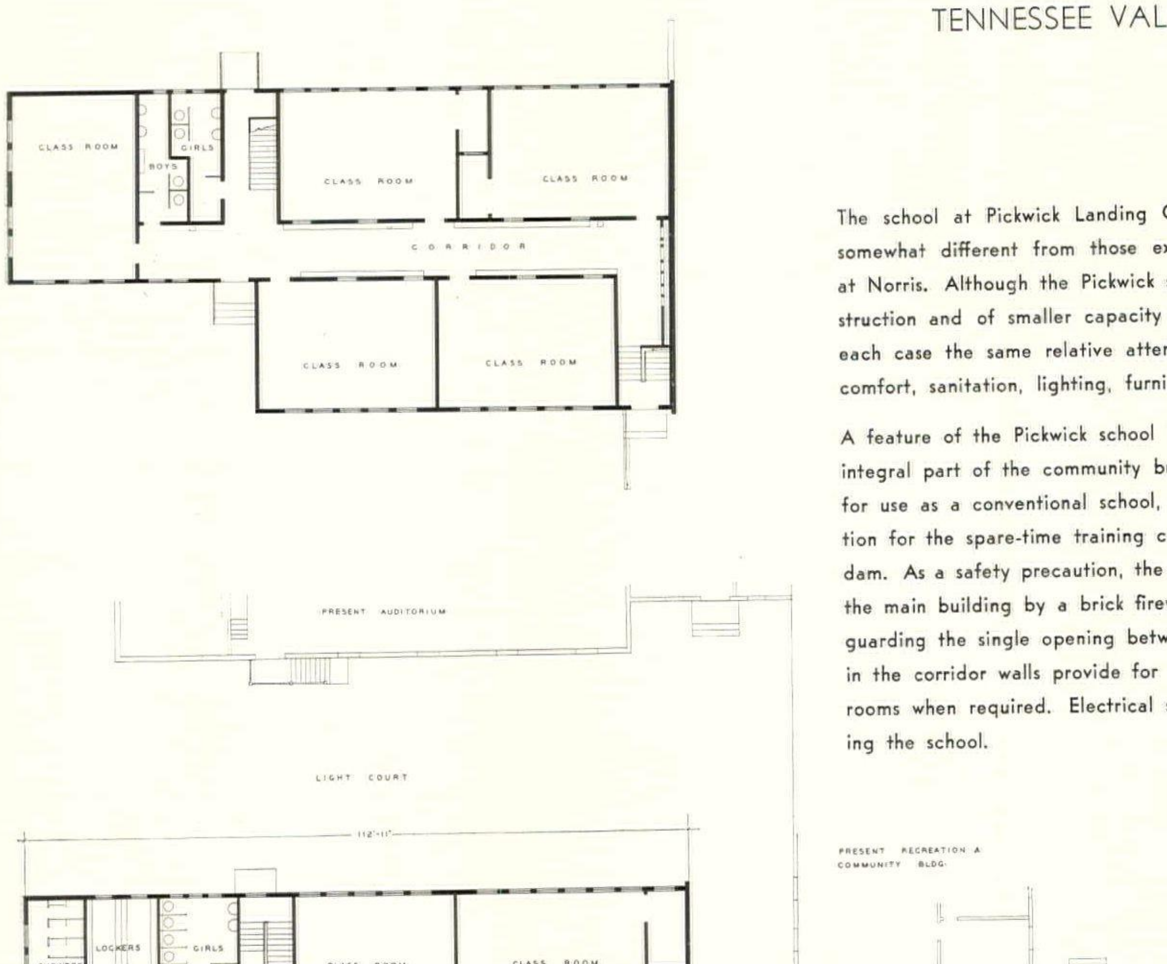
FIRST FLOOR PLAN



COMMUNITY SCHOOL — PICKWICK DAM, TENNESSEE

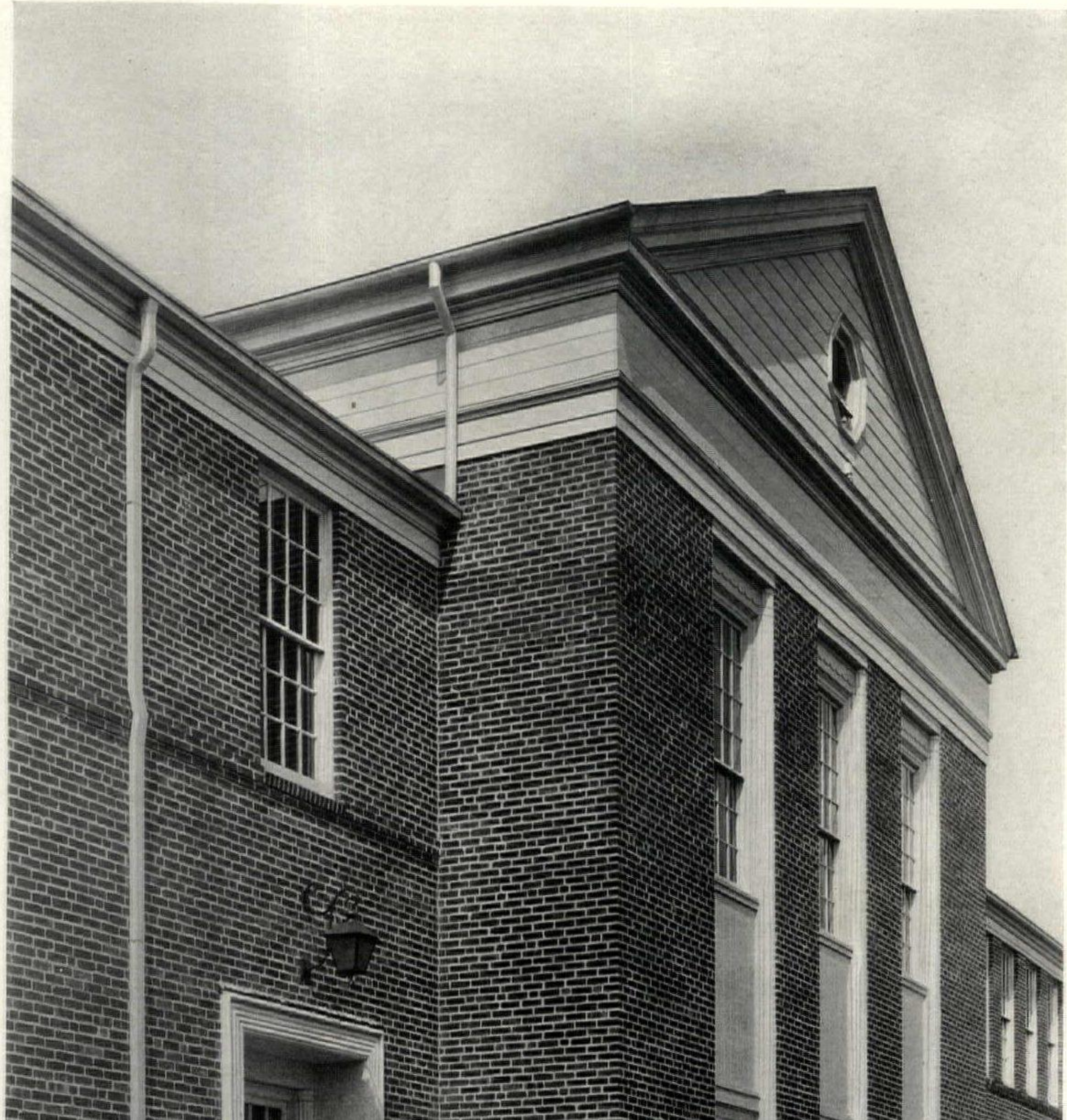
TENNESSEE VALLEY AUTHORITY

ARCHITECTS



The school at Pickwick Landing Camp is adapted to conditions somewhat different from those existing in the larger community at Norris. Although the Pickwick school building is of frame construction and of smaller capacity than the one at Norris, yet in each case the same relative attention was given to standards of comfort, sanitation, lighting, furnishings, and so on.

A feature of the Pickwick school is the fact that it was made an integral part of the community building. This makes it adaptable for use as a conventional school, as well as permitting its utilization for the spare-time training courses offered to workers on the dam. As a safety precaution, the school portion is separated from the main building by a brick firewall, with an automatic fire door guarding the single opening between the two buildings. Transoms in the corridor walls provide for thorough ventilation in the classrooms when required. Electrical space heaters are used for heating the school.



NORRIS SCHOOL NORRIS, TENNESSEE

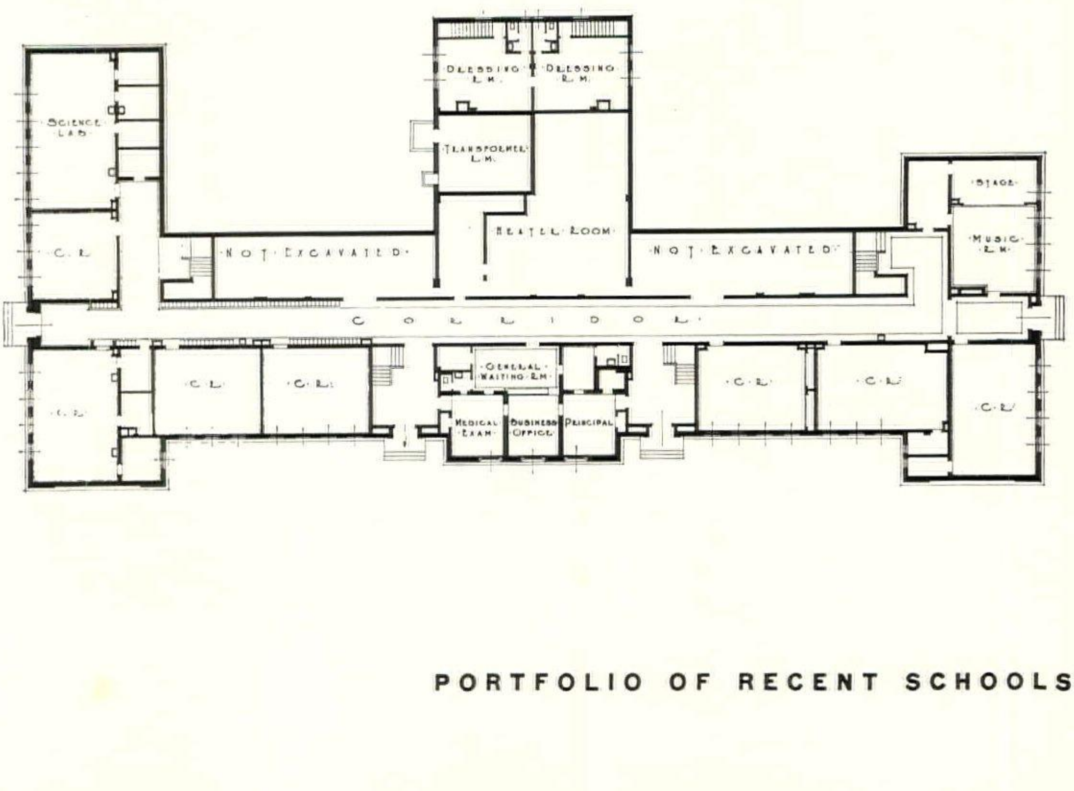
TENNESSEE VALLEY AUTHORITY, ARCHITECTS

THE SCHOOL IS SURROUNDED BY PARKS

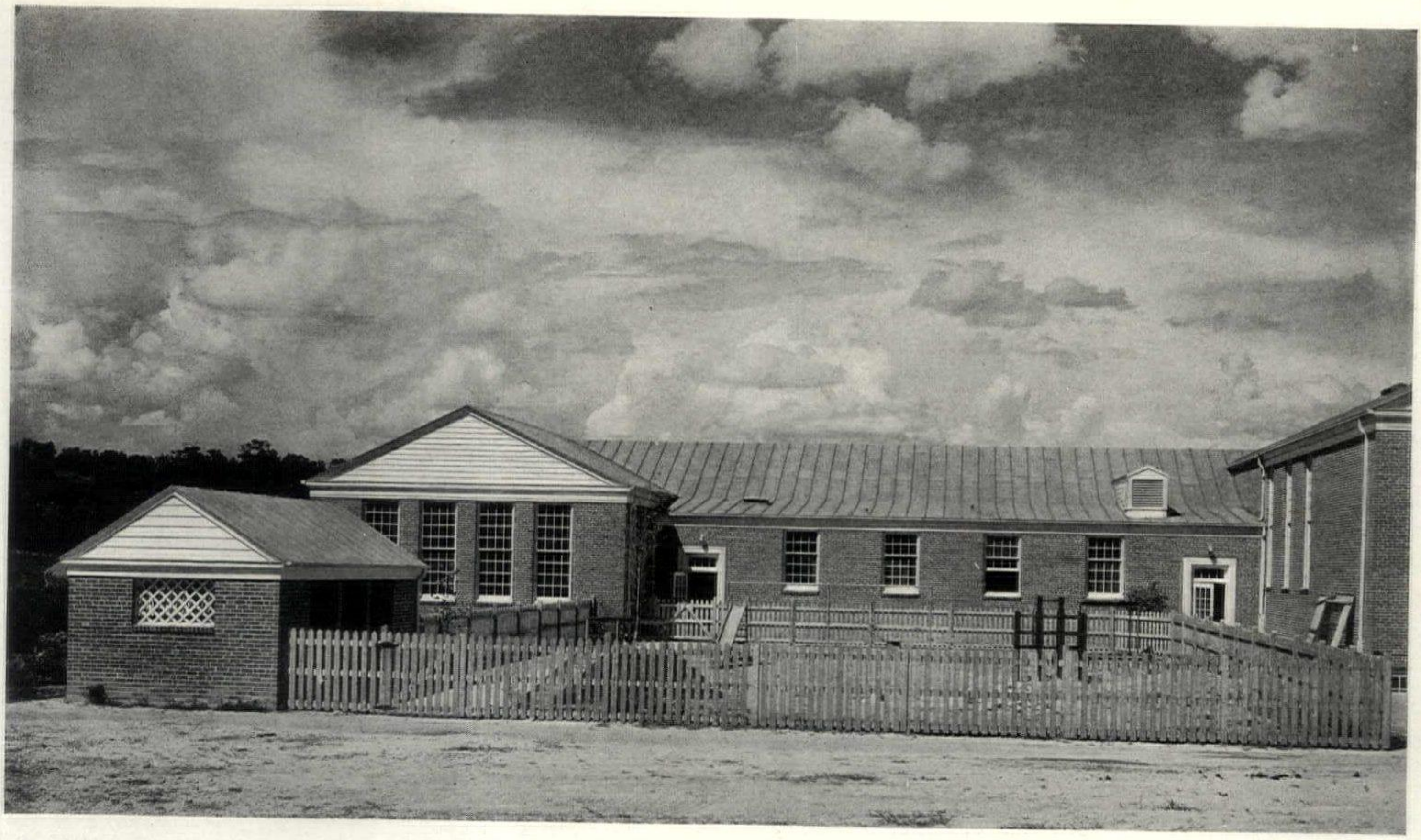
NORRIS SCHOOL

NORRIS,

The school at Norris is a semi-fireproof building—brick walls and metal roof—electric heat—classrooms for kindergarten, elementary, and high school—library, music room, auditorium-gymnasium with stage, science laboratory, and the like.



FIRST FLOOR PLAN

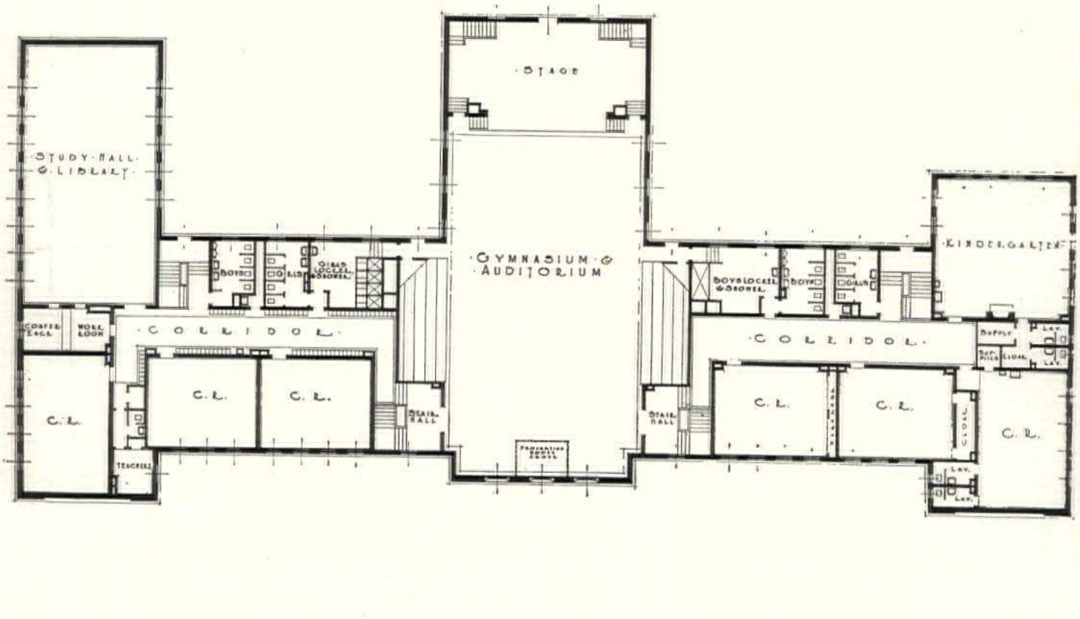


A PLAYGROUND AT THE REAR FOR SMALL CHILDREN

TENNESSEE

TENNESSEE VALLEY AUTHORITY, ARCHITECTS

SECOND FLOOR PLAN



THE LIBRARY IS ILLUMINATED FROM TWO SIDES

NORRIS SCHOOL

NORRIS,

The school at Norris is designed to serve both school and community needs. Provision was made for 150 high school students, including the seventh and eighth grades; 200 elementary school pupils, and 45 children in the kindergarten. The auditorium seats 580 and serves as both a link and a separation between the high school and the elementary grade school; it also serves for adult education. The administrative and medical offices located in the central bay of the first story are conveniently accessible from either within or without the building.

As the site is sloping, the Norris school is designed in two levels—two stories in front and one story in the rear. This results in providing the unique safety factor of direct exits to the ground from each floor level.

The wall construction, including the partitions between classrooms, is of brick. Except for ceilings, no interior plaster is used, the exposed wall surfaces being finished by painting directly on the brickwork. The ground floors are of concrete and the upper floors are of slow-burning construction with wooden joists protected by metal lath and plaster. Critical points, such as the transformer room, have ceiling slabs of reinforced concrete. Roof trusses are of steel, and roofing is of sheet metal painted to harmonize with the surroundings.

Separate toilet facilities are provided for each of the two departments, thus

THE GYMNASIUM IS COMPLETELY EQUIPPED

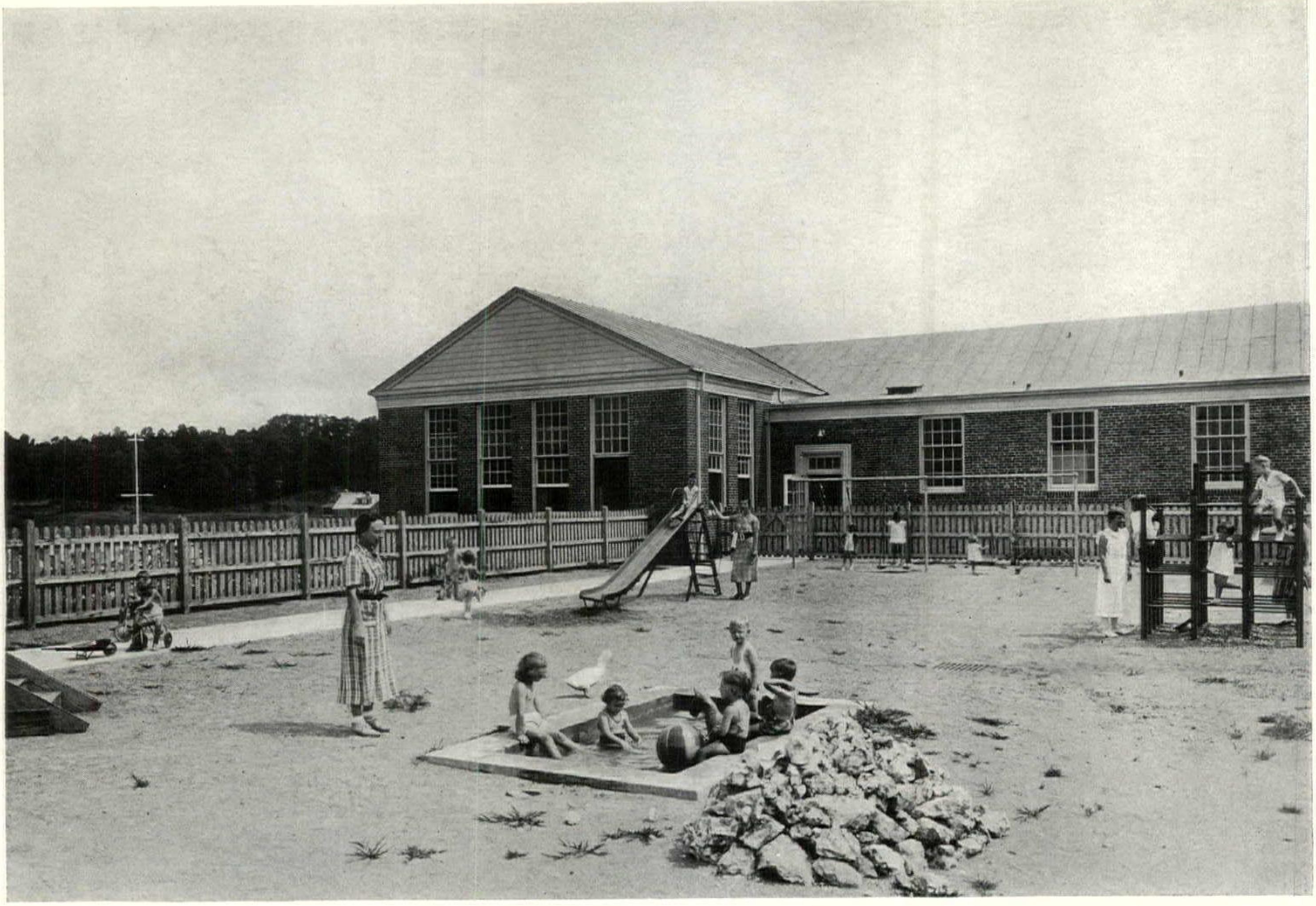
TENNESSEE

TENNESSEE VALLEY AUTHORITY, ARCHITECTS

segregating the age groups. In addition, individual toilet compartments open directly from the kindergarten and the first grade classrooms.

Extending beyond the rear of the school is the athletic field. Play space for the smaller children is reserved adjacent to the kindergarten.

The Norris school serves as a demonstration of the practical application of electrical heating to a building of comparatively large size. The main heating system is of the plenum type. The required amount of fresh air is drawn from a duct extending through the roof, humidified by means of an electrically generated steam-jet, and then, by means of a fan, blown through an electrical heating chamber consisting of a series of resistance coils. After passing through the warm air ducts leading to the various rooms throughout the building, a considerable portion of the partially cooled air is returned to the heating system and recirculated. As a sanitary precaution, however, the warm air for the toilets is dawn from the corridors and exhausted to the outside atmosphere by means of separate fans. To avoid complicating the system, some of the offices and minor rooms are heated by means of unit type electric radiators. The entire heating system is semi-automatic with thermostatic control, thus reducing personal attention to a minimum. The entire hot water supply for the building is also heated electrically by means of immersion type heaters in tanks or boilers.



NORRIS SCHOOL **NORRIS, TENNESSEE**

TENNESSEE VALLEY AUTHORITY
ARCHITECTS

WILLIAM B. ITTNER, INC.
ARCHITECTS

TYPICAL CORRIDOR

GEORGIAN DESIGN TO CONFORM TO EARLIER BUILDINGS

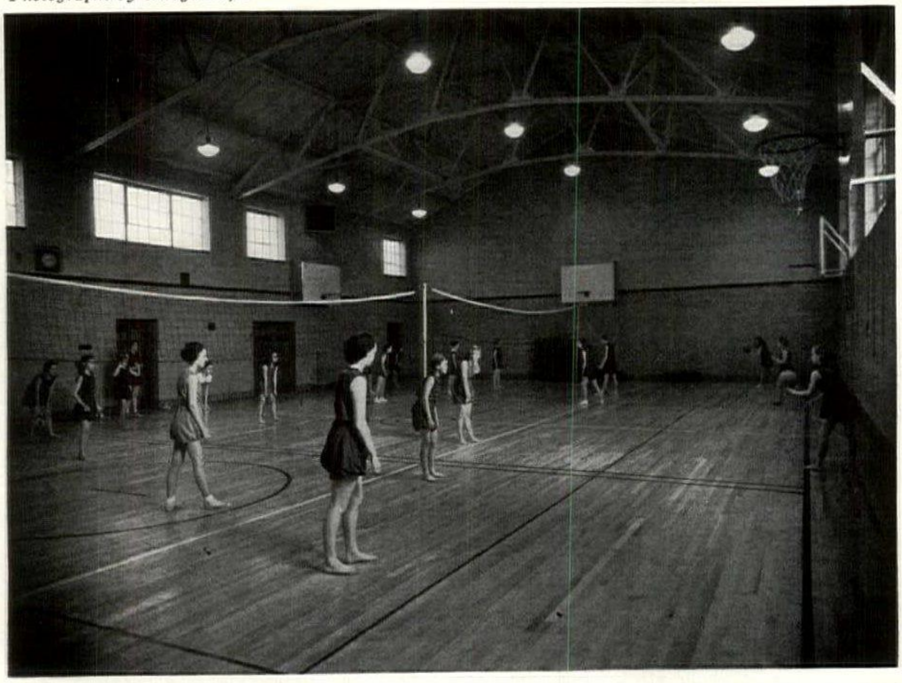
Photographs by Charles Trefts

Photographs by George Tufts

JUNIOR HIGH SCHOOL
WEBSTER GROVES, MISSOURI

WILLIAM B. ITTNER, INC.

ARCHITECTS



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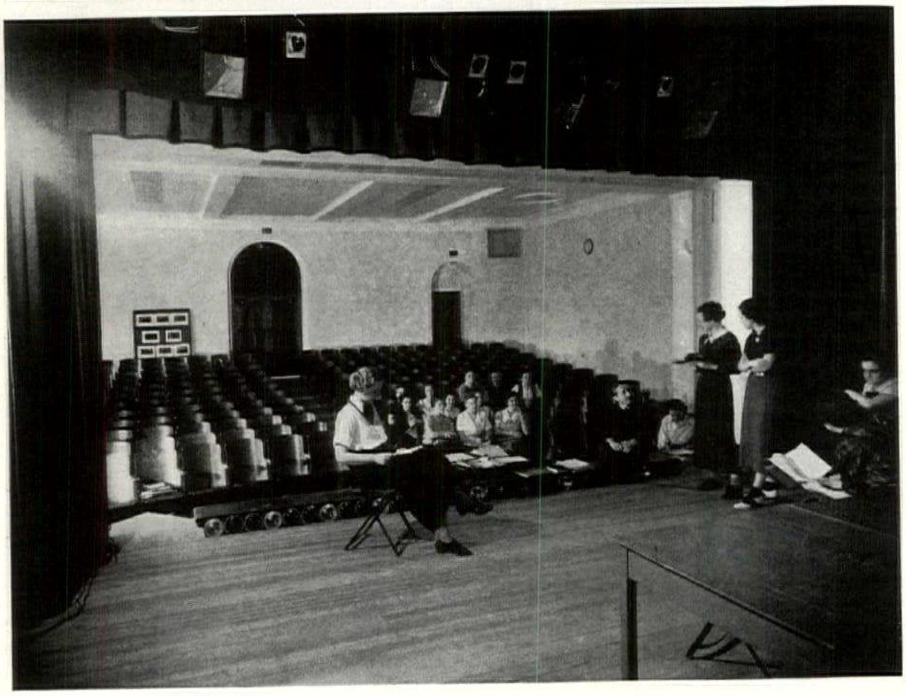


3

1 GYMNASIUM   2 CHORAL ROOM   3 LITTLE THEATER

The new building is united to the Senior High School and properly correlated with its facilities.

The new quarters, which will be used by the seniors as well as the juniors, comprise enlarged facilities for health education, domestic art, choral and instrumental music with practice rooms, and ample facilities for art and academic classrooms.

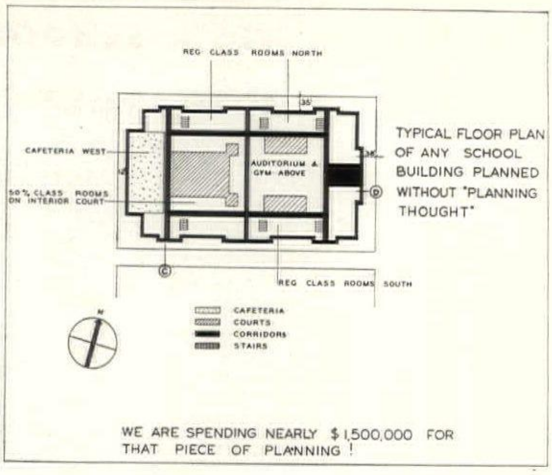
The building contains the following education units:

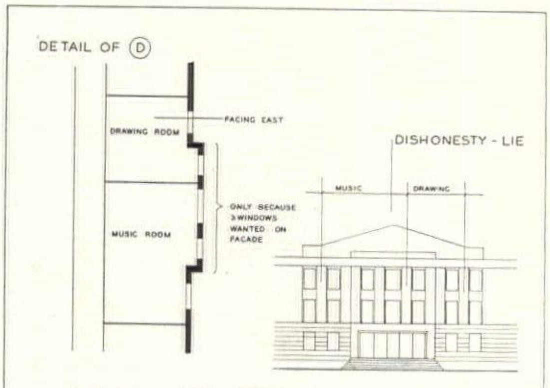
22 Classrooms.
2 Gymnasiums with locker and shower rooms.
4 Home economics with lecture room, reception room, dining room, and office.
1. Dramatic art room or little theater, 220 capacity, with stage and dressing rooms.
3 Music—
 1 Choral,
 1 Orchestra,
 1 Band and practice rooms.
2 Art rooms.
Necessary toilet rooms, storerooms, etc.
Pupils' lockers recessed in corridors.

A fire-resistive structure with a cubical cor. tents of 1,059,000 cubic feet. Capacity: 1,000 students. Cost: \$270,105, or 25½¢ per cubic foot.

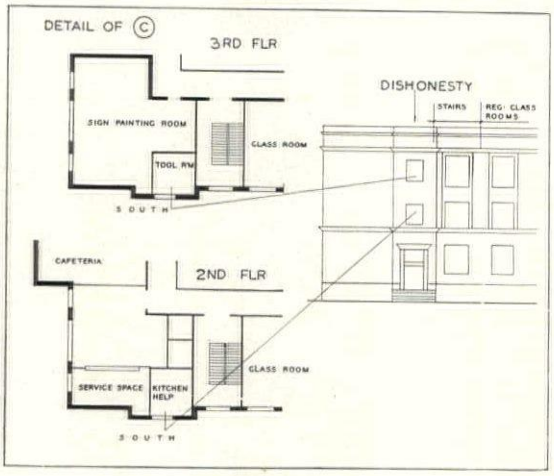
THE FUNCTIONAL APPROACH TO SCHOOL PLANNING

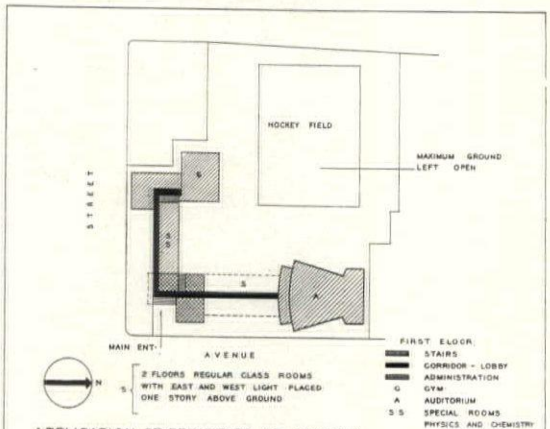
By WILLIAM LESCAZE





EXAMPLE OF BAD ELEVATION ON BAD PLANNING





APPLICATION OF PRINCIPLES OF CHART B

"The functional concept of school architecture is paramount in school building planning." There can be no school planning worthy of the name unless the functions of the building are clearly understood, clearly expressed: and that understanding, expressing clearly the functions of a building, has been achieved by all good architecture in the past, and is what modern architecture is today attempting to achieve.

Buildings have an influence on us, on our outlook, our happiness. Walt Whitman said that there were trees which seemed to drop a blessing when he passed under them. Our buildings have the same effect: that is, they drop sometimes a blessing, and more often a curse. It has been calculated that the high school graduate spends about 13,000 hours within the walls of a public school building. Dr. Carr, Director of the Research Division of the National Education Association, states that "these 13,000 hours are potentially the most impressionable and valuable hours of the child's life." And, he adds, "quite apart from the normal educational processes, the physical school environment during these hours is bound to make a profound impression on the growing child." If buildings have an influence on us, should we not insist that our school buildings work well, and be good looking? Of course we should. But do they work well, and are they good looking? Alas, no! Most of the schools are massive, uninspiring, uninviting buildings. Pediments of limestone, a few columns and, when we can afford them, a tower or a cupola! It is always the same thing, with minor variations. Just as you may order lettuce salad with French dressing or mayonnaise, you may have a school building Gothic or Colonial!

Sacha Guitry, in his biography, wrote: "School ought to be a synonym for Paradise. The very idea of gathering children together in order to educate them and make social beings of them is a beautiful idea. Why, then, should all schools give off the atmosphere of prisons? The architects who put up such horrors should be punished." I think he should, in all fairness, have said the architects *and* the Boards of Education.

Quite recently the following announcement made the headlines of New York papers: " 'No more frills for school buildings,' says new Commissioner." This is good news. But it is only one step in the right direction. There is still much more to do. Much more than mere face lifting. It is a radically different approach to our school buildings which is needed. An honest, rational, up-to-date approach. Now let us ask this question: Can school buildings be designed so that they work and, at the same time, please and inspire? Most certainly, yes!

The only sound way to achieve this is through clear, lucid, honest thinking. That necessitates an effort. We must take the trouble to think. From thinking we get to planning. These processes of thinking, planning, are essentially what constitute good modern architecture. Since the word "modern" has been so often misused, I must hasten to say that by modern architecture I mean something which, with one exception near Los Angeles, we have not yet seen in our public school buildings. There is not at this moment one single, really modern, public school building in the United States!

Now, thinking and planning are a sort of exploration which must be carried out in at least six directions, if one wishes to build a good building (regardless of the kind—church, dwelling or school). (See Chart "B.")

I PROGRAM	Exact nature of the requirements: Kindergarten, Elementary, Junior High.
II SITE	Condition of site, topography level, sloping, orientation of points of compass, direction of prevailing winds, location of streets, adjoining buildings, playing facilities.
III FLOOR PLANS	Arrangement of activities inside the building, per kind of activities; administration unit, regular classrooms, special classrooms, cafeteria, gymnasium, auditorium.
IV FACADES	Outside of building—expression of inside—truth, honesty.
V MATERIALS	Choice, feeling, maintenance.
VI FINANCIAL SET-UP	Within budget—economy.

Why is it, if it is all as simple as this, that we have failed to function—as educators, or architects—during the last 50 to 70 years? It is not that we have been *physically* lazy. On the contrary! During the year 1930 we spent $400,000,000 on school buildings. This is a tidy sum to pay for the kind of buildings we got! The trouble is we have been *mentally* lazy: afraid to think; a bit embarrassed when we realized that our industrial development did not crystallize into the shapes of more Parthenons or Westminster Abbeys. Then we borrowed hastily from left and right to hide our embarrassment, to make believe that we, too, had that kind of civilization—instead of recognizing the true values of our own civilization and of being proud of them.

Most of us realize now that it is useless to deceive ourselves. Modern functions cannot be fitted into old forms, nor can twentieth-century "uses" be combined with twelfth-century "beauties"! The buildings of the past are beautiful not because they are a "style." They are beautiful because the men responsible for them devoted all their skill, their taste, their understanding, to fulfilling the purposes, the *functions,* of these buildings. In other words, these buildings grew out of the life of their time, to meet the requirements of their time. And that is exactly what our buildings must do: Grow out of the life of our time; meet the requirements of our time.

We must decide first what qualities modern education should develop. If they are to be truthfulness, courage, freedom, adaptability, intelligence—then we have automatically decided that what we require is the thinking, planning, functional method of building. We have decided for good modern architecture.

We owe it to ourselves, we owe it to our children, to our country, our civilization, to tackle at once the job of *readjusting* all building forms to the life of today, the needs of human beings living today. This is already being done in education; it must be done in educational architecture. To think and to plan clearly in the field of architecture means to build good, functionally working, aesthetically satisfying, stimulating, modern school buildings.

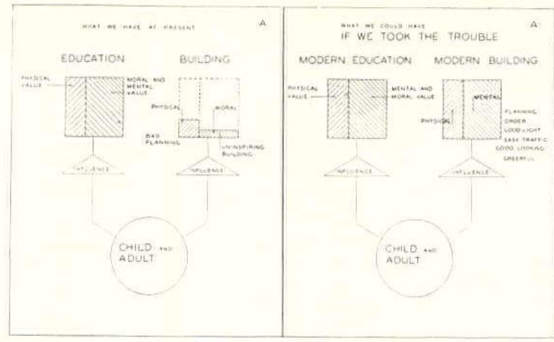


CHART A

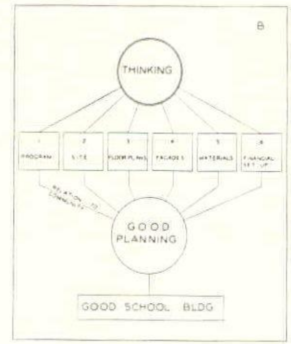
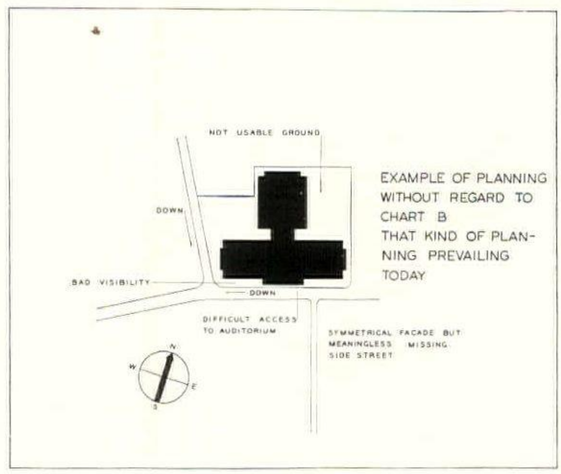
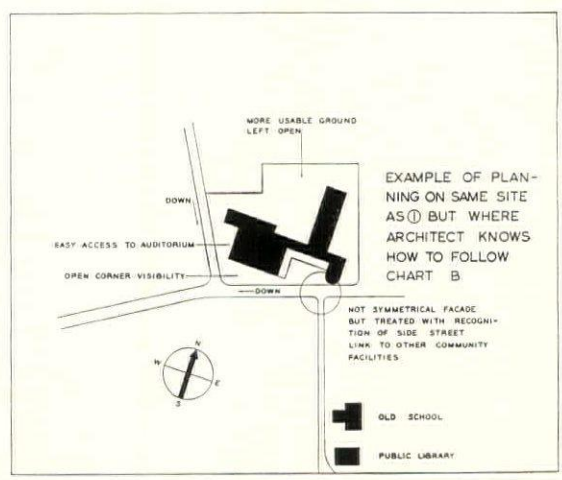


CHART B



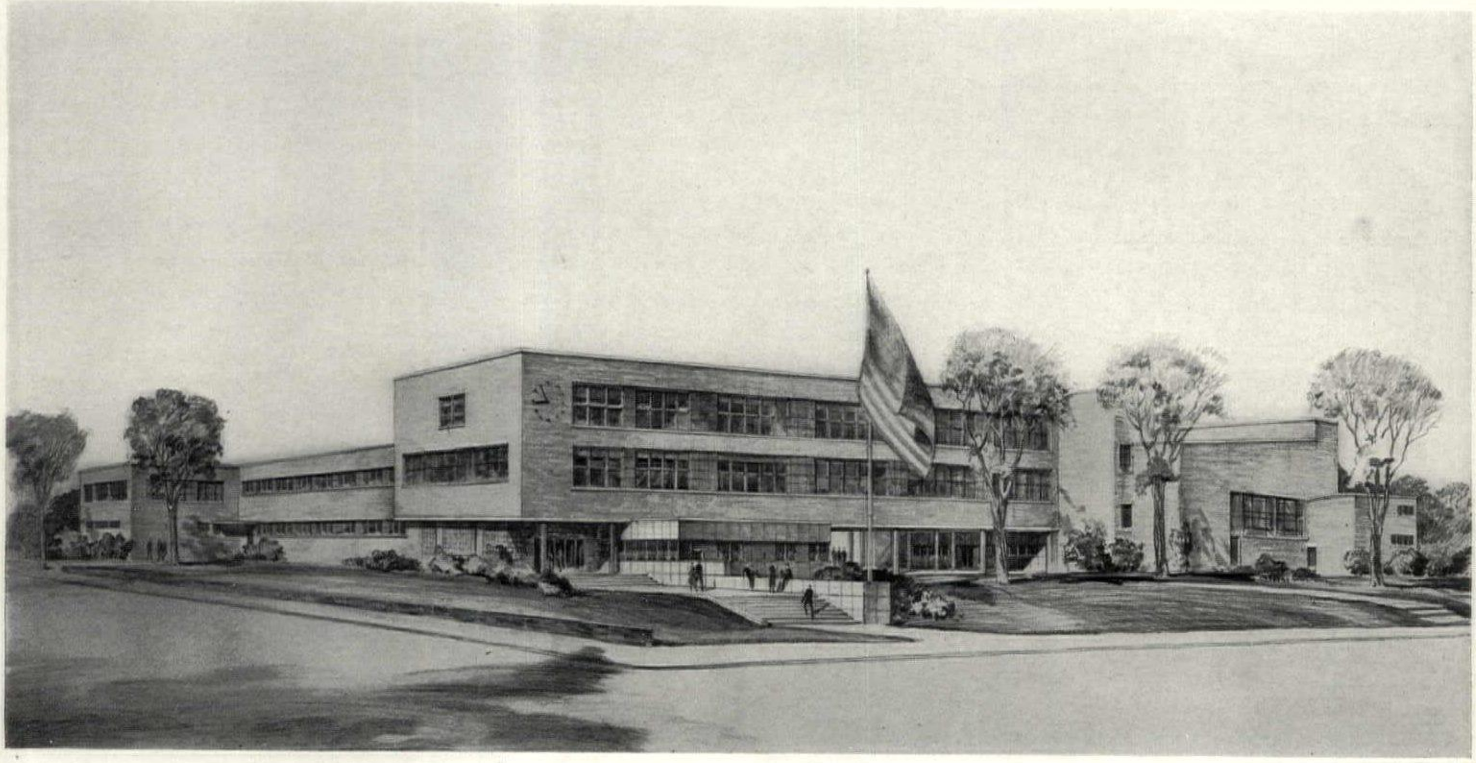


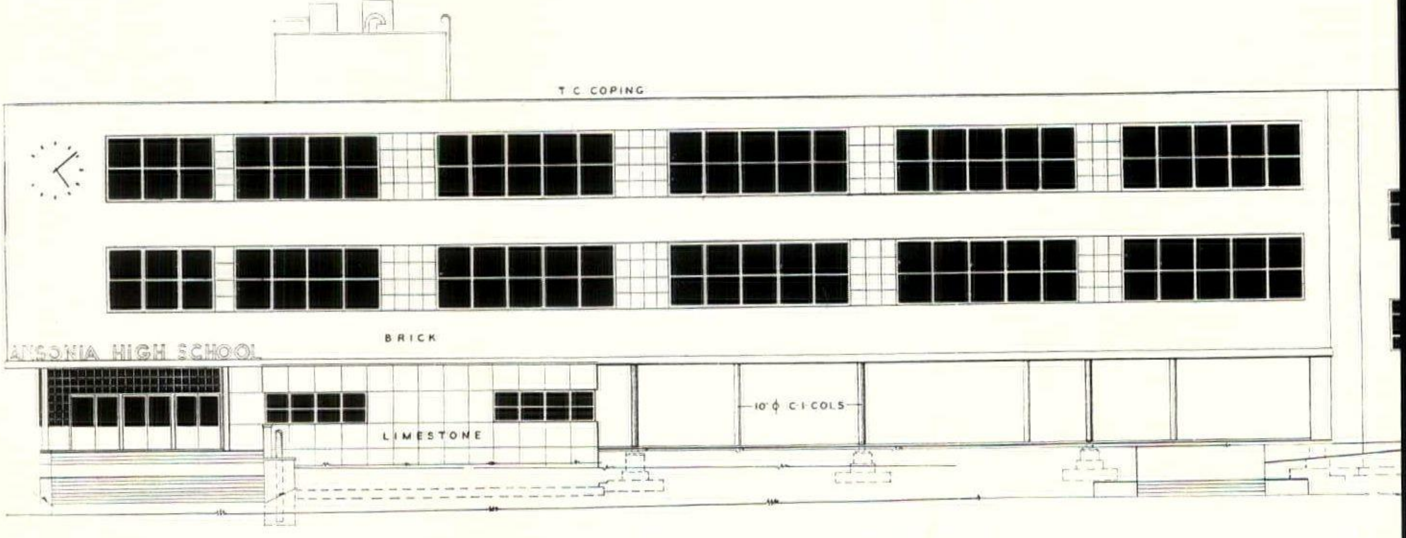
ANSONIA HIGH SCHOOL — ANSONIA, CONNECTICUT

WILLIAM LESCAZE, ARCHITECT
VERNON F. SEARS, ASSOCIATE

The disposition of areas was determined by the orientation and environment. The three major elements of the problem were auditorium, classrooms, and gymnasium. The auditorium was placed on the extreme north side of the property and as near to the main thoroughfare as possible in order to insure easy accessibility of the public, as the auditorium will also be used by other than educational groups. If the auditorium is used in the evening it will not be necessary to open the high school proper, thus insuring easy control. On the other hand, the students may quickly assemble in the auditorium upon call from

FROM THE SOUTHEAST





ENTRANCE ELEVATION

the classrooms. A stadium type of auditorium was designed to allow students to pass from the second floor corridor to the orchestra, via the stadium, if desired.

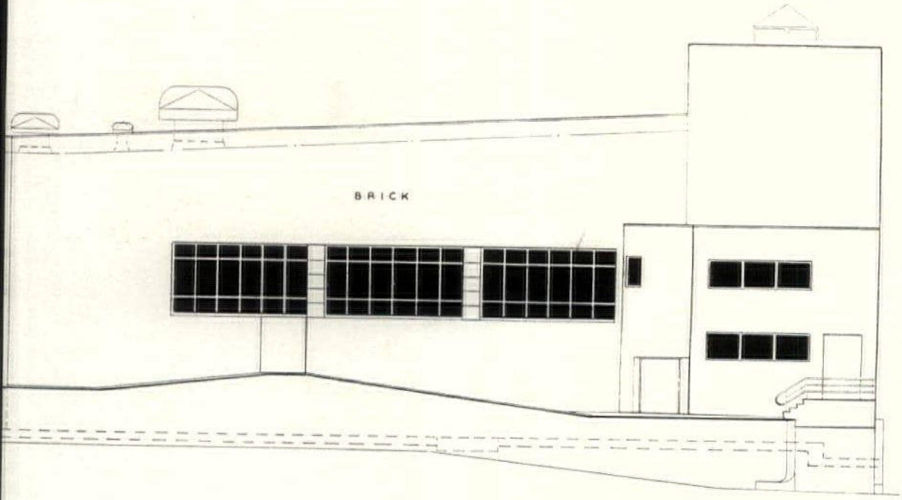
East-west light is the best for each of the ordinary classrooms. These rooms were placed on the second and third floors; on the first floor is the administration at the main high school entrance, it being the central point of all activity. An open porch was created between the administration unit and the auditorium to allow people passing the main thoroughfare an opportunity to see the open court and groups playing on the athletic field. This porch will also be used as the main entrance to all athletic events and to the gymnasium and the athletic field. The central location of the library on the second floor is advantageous for easy control of adult evening education.

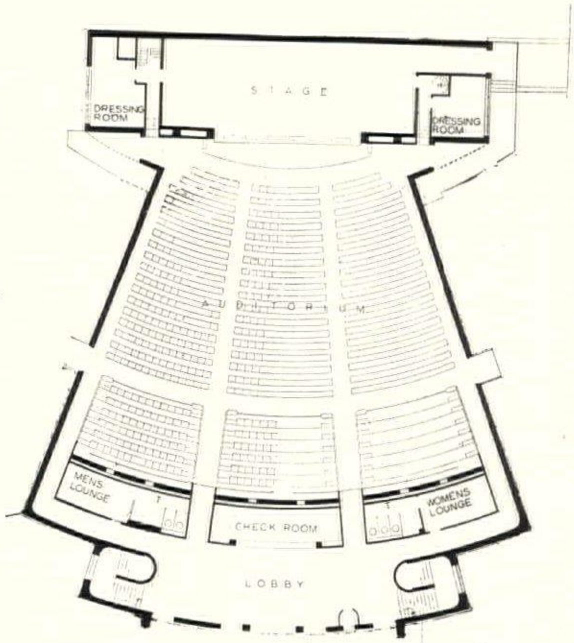
The east-west wing takes care of the special rooms, such as the laboratories and the commercial department, and these rooms are given north light as best for their purpose. The location of this wing on the site was decided upon in order to create as large an open court as possible, but still allowing ample room for future expansion on the south side of the corridor.

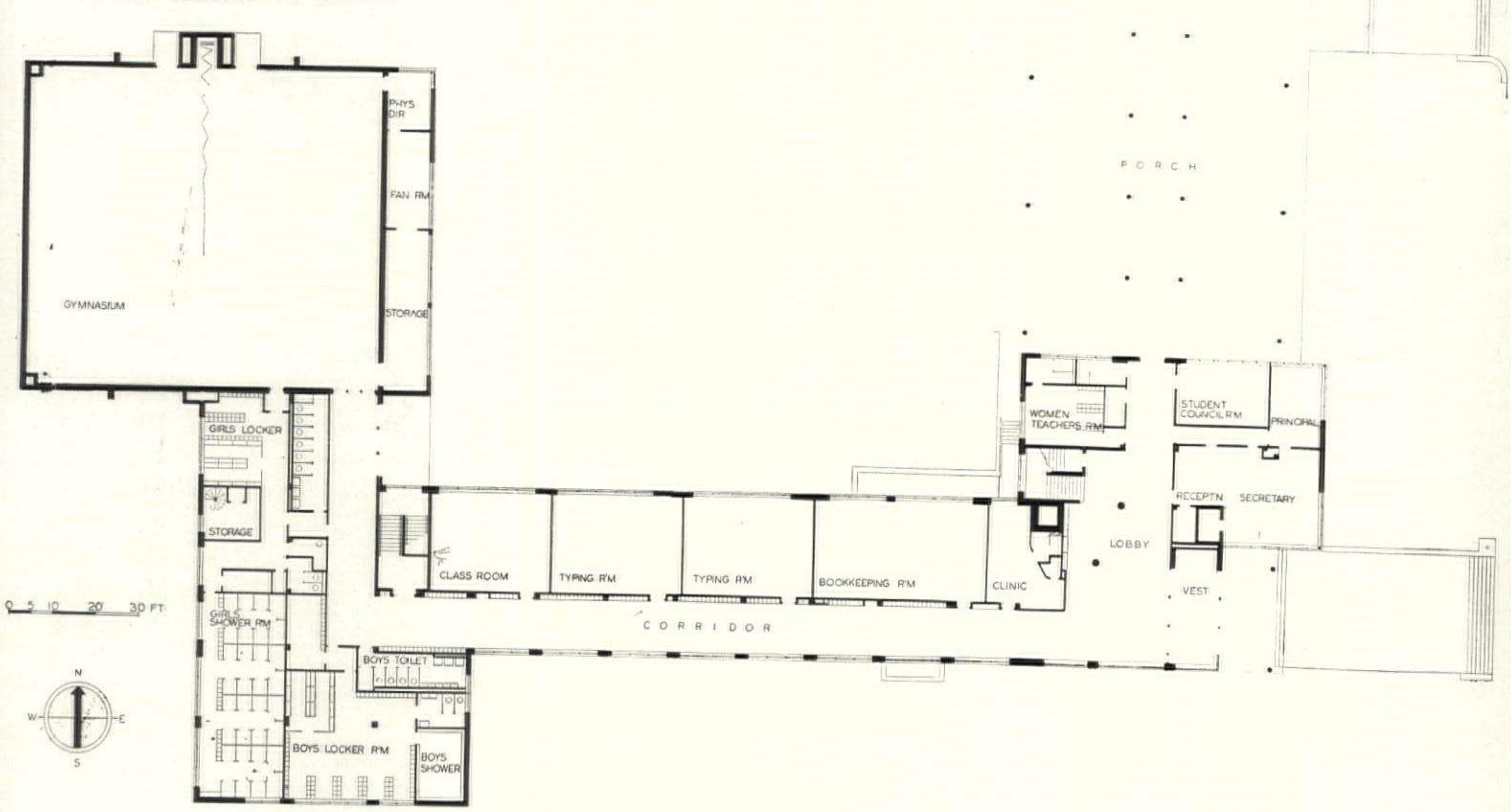
The location of the cafeteria was decided upon because the noise from this room overpowered the need of a central position; therefore it was placed as far away from the classrooms as possible, but still with convenient access.

The gymnasium unit is designed to relate the services as closely as possible to the activities. The physical director's office allows supervision of the activities in the gymnasium as well as on the athletic field. An entrance has been created for this unit to allow easy access from the shower rooms to the athletic field as well as being used as a private entrance for evening affairs held in the gymnasium. This relieves any need for opening of the high school proper.

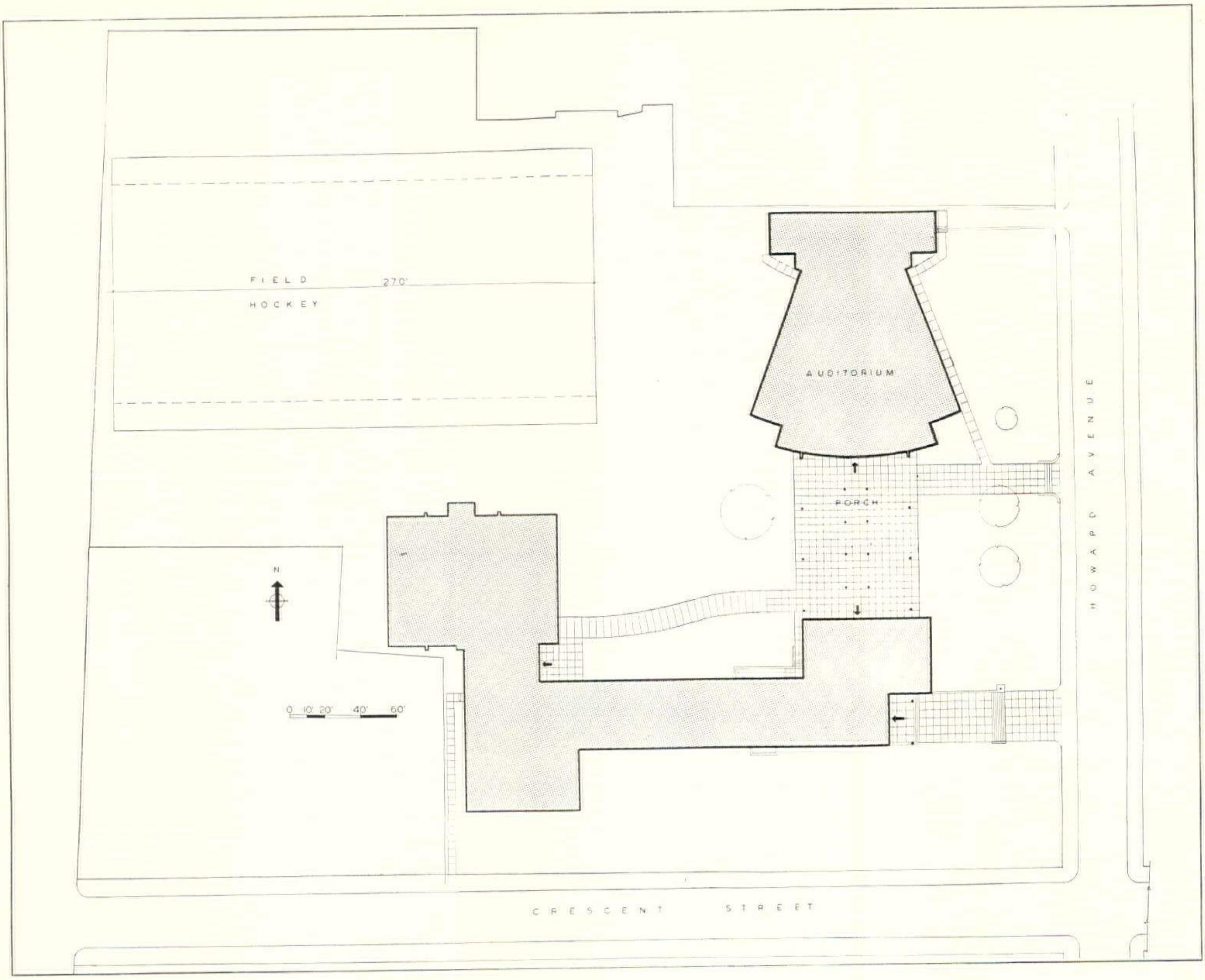
WILLIAM LESCAZE, ARCHITECT
VERNON F. SEARS, ASSOCIATE







FIRST FLOOR PLAN
showing separation of function



ANSONIA HIGH SCHOOL

ANSONIA, CONNECTICUT

WILLIAM LESCAZE, ARCHITECT
VERNON F. SEARS, ASSOCIATE

The finished plan is an interesting illustration of the architects' theories of planning. Notice how the plan reflects the clear definition between auditorium, classroom and gymnasium areas. The building shape likewise shows adaptability to the shape of the plot, without in any way sacrificing desirable orientation, relationships, and the like.

A MODERN BIBLIOGRAPHY OF SCHOOL DESIGN

ESPECIALLY COMPILED, WITH ANNOTATIONS, FOR THE ARCHITECTURAL RECORD

by **EARL F. SYKES, M.A.**

1. GENERAL
2. COMMUNITY AND SCHOOL
3. SITE AND GROUNDS
4a. BUILDINGS: DESIGN AND CONSTRUCTION
4b. BUILDINGS: SPECIAL ROOMS
4c. BUILDINGS: DECORATION
4d. BUILDINGS: COSTS
5. EQUIPMENT
6. SPECIAL SCHOOL TYPES
7. BIBLIOGRAPHIES

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"—AND SUDDEN DEATH": PLANNING TO PROTECT SCHOOL CHILDREN.

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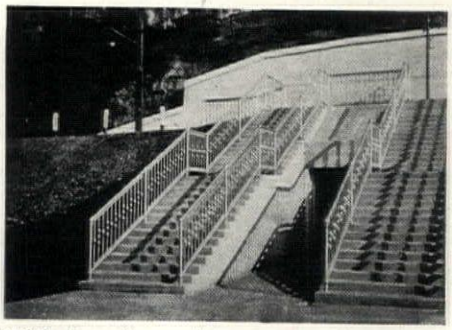

While here the road is raised

N. Y. State Dept. of Public Works.

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Survey Data Book and Standards for Operation and Maintenance of Physical Plant in Colleges and Universities. By N. L. Engelhardt, C. E. Reeves, and Parl West. Bureau of Publications, Teachers College, Columbia University, New York. 1935. In mimeographed form. 148 pp. $1
Provides means of checking efficiency of plant operation and maintenance. Can be utilized in training janitorial and maintenance staff.

Survey Field Book for the Analysis of a High School Building. By N. L. Engelhardt. Bureau of Publications, Teachers College, Columbia University, New York. 1931. 45 pp. 55c
An excellent aid in analyzing plans and in appraising existing high school plants.

The New World Architecture. By Sheldon Cheney. Longmans, Green & Co. New York. 1930. 404 pp. $10
A profusely illustrated volume devoted to modern architecture and building construction. Some school buildings are included. Presents an interpretation of modern design and makes comparisons of older types with the modern.

Sweet's Catalog File. Sweet's Catalog Service. Annual. 119 West 40th Street, New York City.
The most complete and convenient general reference in which to find manufacturers' descriptions of their products, including many manufacturers' specifications.

American School and University. American School Publishing Corporation, 470 Fourth Avenue, New York. Issued yearly since 1929. $2.50
These volumes constitute very comprehensive handbooks on recent school building planning and equipment. Contain articles of a wide variety, also plans and illustrations. Are devoted to the design, construction, equipment, utilization, and maintenance of educational buildings and grounds.

Report of Committee on The Location, Construction, Equipment, Maintenance, and Sanitation of the School Plant. N. L. Engelhardt, Chairman. White House Conference on Child Health and Protection. November 1929. Century Publishing Co.
Covers such topics as: Sites and playgrounds, schoolhousing standards pertinent to the health and welfare of school children, child health and protection through efficient operation of the school plants, the school plant in relation to health and protection of school children as portrayed in school building surveys throughout the United States.

Schoolhouse Planning and Construction. By Chas. A. Lee. Jefferson City, Mo. Botz Printing Company. 1933. 116 pp.
Contains a list of approved practices in school building construction, and detailed plans for various units of the school plant.

The Modern Trend in School Construction. By Reginald E. Marsh. American School and University. pp. 134-137. 1935
Points out some of the remarkable improvements which have taken place recently in schoolbuilding construction both in design and in practicability. Deals chiefly with wall construction, roof and floor construction, floor finish, wainscoting, acoustics, and color.

Getting a Fresh Viewpoint on School Planning. By H. Vandervoort Walsh. American School and University. 1935. pp. 47-52.
Presents several modernistic plans for school buildings, each having a number of unique features but all trying to make adaptations for changing requirements of education.

Planning the Consolidated School for Maximum Utilization. By W. K. Wilson. American School and University. 1936. pp. 31-37
Discusses the various factors affecting school building utilization, the ways of measuring such utilization, and how proper planning makes greater utilization possible. Gives plans of buildings which permit a maximum of utilization.

Approaching Changes in School-Plant Planning. By N. L. Engelhardt. American School and University. 1936. pp. 38, 39
Outlines changes in curriculum and in theory of administration which, together with the utilization of the school building for much broader community service, call for changes in school-plant planning.

Some Fundamentals of School Building Planning. By H. W. Schmidt. American School Board Journal. 92:17-19. January 1936
A good article on the topic named.

Planning the Central Rural School. By Don L. Essex. School Executives Magazine. 55: 6-9. September 1935. Illustrated
Describes the procedures to be followed in planning the housing for a central rural school including elementary and secondary years.

School Board, Architects and Superintendent. By Paul C. Stetson. School Executives Magazine. 55: 307-8. April 1936
Describes the various duties of school board, architects, and superintendent in planning new school buildings.

New England Plans a Modern School. By W. H. Kilham. School Executives Magazine. 55: 285-7. April 1936
Discusses some of the many problems encountered by small New England communities in planning a modern school.

Architect Defines His Service. By N. L. Engelhardt. School Executives Magazine. 53: 195-197, 248. March and April 1934
Analyzes the services which an architect might be expected to furnish when employed by a board of education.

Art in School Buildings and Grounds. By E. Sibley. New York State Education Magazine. 22: 347-351. February 1935. Illustrated
Points out many possible applications of art in planning and equipping school plants.

2. COMMUNITY AND SCHOOL

The School Plant in the Small Community Plan. By Leslie W. Nelson. School Executives Magazine. 54: 310-311. June 1935
Discusses essentials to be considered in locating and designing an educational plant which is also to serve as a community center.

Community and School Plant Planning. By N. L. Engelhardt. School Executives Magazine. 55: 46-48. October 1935
Coordination between planning the educational program and school plant and planning of the community as a whole is stressed as a necessity.

Function of the School Building in the Community. By N. L. Engelhardt. Teachers College Record. 35: 451-459. March 1934
Points out the necessity for coordination of school plant planning with community planning and how the school must be made the community center.

School Buildings as Efficient Laboratories for Coordinating Community Activities. By N. L. Engelhardt. Junior-Senior High School Clearing House. 9: 261-266. January 1935
Insists that school plant planning and community planning should be so coordinated that the schools will be made the "throbbing life centers" of the communities themselves.

Coordination of School Planning with City Planning. By Charles D. Anderson. American School Board Journal. 91: 81. November 1935
Stresses the importance of coordinating school planning with city planning. Presents a number of vital reasons for such coordination.

Bethany Community School. By E. B. Floyd. American School Board Journal. 91: 39-40. September 1935. Illustrated
A modern and rather unique treatment of the rural school which is to serve as a community center. Has four classrooms with connected work-rooms and a library. Small auditorium or recreation room in basement with adjoining play room and kitchen. Has small nurses' room with adjoining laboratory and shower.

Our Cities Today and Tomorrow. By T. K. Hubbard & H. V. Hubbard. Harvard University Press, Cambridge, Mass. 1929. 389 pp. $5
Although the book is chiefly concerned with city planning, it considers the schools from the standpoint of location and selection of sites, type and style of architecture, and utilization of the school playgrounds as community recreational centers.

The Location of City School Plants. By L. Leland Dudley. Harvard Bulletins in Education No. 14. Harvard University Press, Cambridge, Mass. 1929. 130 pp.
Provides sound criteria for selecting school sites, and techniques which assist in school plant planning.

The Relationship of City Planning to School Plant Planning. Bureau of Publications, Teachers College, Columbia University, New York. 1935
An excellent reference stressing the importance of proper coordination of city planning and school plant planning.

Educational Buildings: Their Relation to the Town Plant. By Wesley Dougill. The Town Planning Review, Vol. 16, pp. 1-15, July 1934
Develops idea of neighborhood units and cites illustrations in Nottingham and Wythenshawe, England.

A Community-Centered School. By Alice Thompson. Progressive Education. 9: 379-380. May 1932
Describes how, through community cooperation, the buildings were painted and the grounds landscaped at the Hessian Hills Schools.

The Community Activity Room. By H. G. Masters. Platoon School, 6: 3-8, September 1932
Describes the equipment and layout of a community activity room planned for the Pittsburgh schools.

Traffic Problems and Their Relationship to School Plant Development. By Burton W. Marsh. American School and University 1935. pp. 28-34
Analyzes traffic factors important in locating new school sites. Also suggests the facilities needed in schools to enable the teaching of vital safety and traffic knowledge and habits.

The Major Street Plan as It Affects the Location of School Buildings. By Harold M. Lewis. American School and University. 1935. pp. 34-37
Points out the factors involved in locating schools and the importance of neighborhood unit planning, with the schools an important part of the unit.

3. SITE AND GROUNDS

The Development of School Grounds. By R. C. Morrison. School Executives Magazine. 55: 125-127. December 1935
Describes and illustrates how Fort Worth, Texas, has remodeled and developed its school grounds.

A Plan for Planting. By Norman A. Morris. Nations Schools. 17: 50-53. January 1936. Illustrated
Discusses the planning of planting for various parts of the school grounds, also gives some consideration to planning the school grounds.

Landscaping Assumes a Major Rôle. By A. C. Stelling. School Executives Magazine. 13: 53-6. June 1934. Illustrated
Emphasizes the necessity for landscaping school grounds and gives a practical application of how this should be done.

Beautifying the School Grounds. By Carl F. Mack. School Executives Magazine. 54: 307. June 1935
Tells how it is possible to create a harmonious and advantageous effect by landscaping school sites.

Fencing the School Grounds. By S. Herbert Hare. School Executives Magazine. 55: 62-63. October 1935
A discussion of the various types of fencing suitable for use in developing school grounds.

Misfit Purchases of School Land. By John J. Donovan. School Executives Magazine. 55: 93. November 1935
Discusses ways of avoiding excess costs and waste in purchasing and planning school sites.

Selecting the School Site. By Fred Engelhardt. School Executives Magazine. 55: 12-14. September 1935
Discusses the many varied factors which must be considered in selecting school sites, with emphasis upon site selection in rural areas.

Planning the Planting of School Grounds. By L. H. Zach. School Executives Magazine. 55: 254-5. March 1936
An excellent article on the types and arrangements of plantings to use for different purposes and landscaping effects.

The Campus Development Program of Grove City College. By Weir C. Ketler. American School and University: Sixth Edition. 1933-34. pp. 150-152

The Development and Maintenance of Turf on School Grounds. By Howard B. Sprague. American School and University: Sixth Edition. 1933-34; pp. 153-156
An excellent treatment of the many problems involved in developing and maintaining turf on school grounds.

School Grounds—Their Planning and Planting. By R. B. Hull. American School and University: Sixth Edition. 1933-34. pp. 157-160
A comprehensive though brief treatment of the many factors involved in planning and planting school grounds.

Cultural Values of Landscaping Are Important to the Community. By Jens Jensen. Nation's Schools. 12: 16-20. August 1933. Illustrated
Stresses the cultural influence of beautiful natural school sites.

Landscape Assumes a Major Rôle. By A. C. Stelling. Nation's Schools. 13: 53-6. June 1934. Plans and Illustrations
Emphasizes the importance of planting and landscaping school grounds. Gives detailed plans for the landscaping of the Highlands Grade School, White Plains, New York, as an illustration.

The School Environment for the Four-Year Child. By Jane Bernhardt and Margaret Dawson. Childhood Education. 9: 248-52. February 1933
Suggests outdoor play equipment suitable for children of this age.

Selecting Building Sites. American School Board Journal. 85: 49. September 1932
Urges the purchasing of future school sites now.

The Selection of School Sites. By George W. Gerwig. American School Board Journal. 88: 13-15. January 1934. Illustrated
Emphasizes desirability of securing sites now for future school building programs. Shows examples of high cost of sites resulting from a lack of such a policy.

The Landscape Architect's Part in Planning Colleges and Schools. By Henry V. Hubbard and Leon Henry Zach. American School and University. 1935. pp. 155-160
Gives several illustrations of well-planned campuses, and outlines the factors which must be considered in such landscaping.

Surfacing School Play Areas. By William H. Bowles. American School and University. 1933-34. pp. 187-189
Discusses the desirable features of playground surfaces, such as permanence, drainage, texture, resilience, cleanliness, and appearance; and tells how these may be achieved.

Planning Public School Grounds to Meet Changing Needs. By S. Herbert Hare. American School and University. 1935. pp. 160-164
Treats such points as choice and improvement of sites, location of the school building on the tract, landscape construction, and planting.

The Care of Trees on School and College Grounds. By Martin L. Davey. American School and University. 1935. pp. 164-167
Discusses such phases as transplanting of large trees, insuring proper growing conditions, and eliminating the menace of weak and decayed trees.

Recreation and Play-Field Design for the Junior High School. By Willis Thomson. American School and University. 1935. pp. 186-188
Discusses the new recreation and activity program with the types of play-field design necessary to fulfill the needs of such a program.

The Proposed National Grandstand Code. By S. W. Homan. American School and University. 1935. p. 191
Presents the fundamental regulations proposed by the American Standards Association for construction of grandstands.

Space Requirements for the Children's Playground. American School and University. 1935. pp. 192-194
A summary of a comprehensive statement worked out by the National Recreation Association in consultation with the Recreation Division of the Russell Sage Foundation.

Landscape Development of the School Site. By Harold S. Bates and A. Carl Stelling. American School and University. 1936. pp. 170-176
Presents a very comprehensive list of standards and score card to be used in landscaping school sites.

Making Parks of the Fort Worth School Grounds. By R. C. Morrison. American School and University. 1936. pp. 177-181
Describes the school-ground landscaping project in Fort Worth, which is classed as one of the most outstanding in the whole country.

Annotated Bibliography on Landscape Development of the School Site. By Harold S. Bates and A. Carl Stelling. American School and University. p. 181
A brief bibliography on the topic named.

The University of Wisconsin Arboretum and Wild Life Refuge. By Franz A. Aust and G. William Longenecker. American School and University. 1936. pp. 182-184
Describes the purposes and the development of the arboreta at the University of Wisconsin.

Lawn Care. Issued by O. M. Scott & Sons Company, Marysville, Ohio
A small volume issued by the Scott's Seed Company, containing a great deal of information on lawn care. Includes a treatment of weeds and other pest control.

The Development of Outdoor Areas for Physical Education. By George E. Little and Clifton V. Barrett. American School and University. 1936. pp. 205-211
Describes the development of the campus at Rutgers University; sets up an ideal plan developing outdoor areas for physical education and recreation purposes, and then shows how this plan was adapted to the local conditions at Rutgers.

Cork-Surfaced Tennis Courts at Colgate University. By William A. Reid. American School and University. 1936. pp. 215-217
Discusses the cork-surfaced tennis courts at Colgate University and evaluates them as a possible solution of the tennis court surfacing problem.

Play Spaces for Small Children. By Helen L. Jewitt. American School and University. 1936. pp. 217-219
Urges the importance of providing such areas, the proper surfacing for them, and the selection of suitable equipment.

4a. BUILDINGS: DESIGN AND CONSTRUCTION

The Modern School Building. By W. W. Theisen. School Executives Magazine. 54: 172-173. February 1935
Presents problems facing school officials in selecting architects.

Trends in School Planning. By N. L. Engelhardt. School Executives Magazine. 54: 1702-105. December 1934
Sets up the criteria which must be considered in building the school of the future.

The Santa Monica School Reconstruction Program. By Laura Grace Crawford. American School Board Journal. 92: 36-37. March 1936. Illustrated
Describes the new activity-type schools developed in Santa Monica. The classroom units are very well planned for activity type of program.

"A Modern T. V. A. Electrically Heated School Building at Norris, Tennessee. By Ruth Peck McLeod. American School Board Journal. 92: 41-42. January 1936. Illustrated

Adapting the New High School Building to the New School Program. By Homer W. Anderson. American School Board Journal. 92: 23-24. January 1936
Points out trends in high school programs and what these imply in future school building planning.

Modernity in Building and Equipment. By C. A. Bowers. Nebraska Education Journal. 15: 109. March 1935
Cites trends in school program developments which call for changes in plant and equipment.

Adapting Old-World Architecture to New World Schools. By Frank A. Childs. School Executives Magazine. 55: 166-9. January 1936
Points out outstanding examples in United States of various types of old-world architecture being used for school buildings.

Planning the High School Building. By Homer

W. Anderson. School Executives Magazine. 55: 182-183. January 1936
Discusses trends in school programs and the influence these will have upon the number, size and types of classrooms.

The Architectural Forum. Volume 62: January 1935
Entire issue devoted to the design and construction of modern and future schools and to a review of outstanding foreign schools.

Symposium on Schools. Architectural Forum. 62: 17-20. January 1935

Schools of Tomorrow in the United States. By Arthur B. Moehlman. Architectural Forum. 62: 21-23. January 1935

New Elementary Schools for America. By Richard J. Neutra. Architectural Forum. 62: 25-35. January 1935

Suburban Elementary School. By W. Pope Barney and Roy W. Banwell. Architectural Forum. 62: 37-45. January 1935

A High School for the Community. By Wallace K. Harrison. Architectural Forum. 62: 56-63. January 1935

A Progressive Junior School. By Wm. Lescaze. Architectural Forum. 62: 46-55. January 1935

Europe Shelters Education. Architectural Forum. 62: 64-80. January 1935

New Techniques. By Richard J. Neutra. Architectural Forum. 62: 81-96. January 1935

The Architectural Record. Volume 76: August 1934
Includes a number of excellent articles and illustrations showing many modern American school buildings.

New Schools Are Needed. By C. Theodore Larson. Architectural Record. 76: 77-81. August 1934

Vocational Schools. By James O. Betelle. Architectural Record. 76: 82-88. August 1934

Portfolio of School Buildings. Architectural Record. 76: 89-112. August 1934

Modern Architecture for Public Schools. By W. Lescaze. School Executives Magazine. 55: 136-137. December 1935. Illustrated
Presents a strong plea for a modern architecture for schools, a functional and a more economical architecture. Presents illustrations and sketches of several modern schools.

Better Lighting in School Buildings. By Walter Sturrock. School Executives Magazine. 55: 97-99. November 1935
An excellent article on lighting in schoolrooms.

Plumbing Specifications for Schools. By Ernest T. Friton. School Executives Magazine. 55: 60-61. October 1935. Illustrated
Discusses some of the many plumbing essentials which must be considered in planning the new school.

Flexibility and Adaptability in Modern School Buildings. By H. W. Schmidt. American School and University: Sixth Edition. 1933-34. pp. 37-40
Stresses the importance of flexibility and adaptability and outlines the important details to consider in planning school buildings which are flexible and adaptable.

Local Character in College Architecture. By Herbert C. Wise. American School and University: Sixth Edition. 1933-34. pp. 33-36
Discusses and illustrates the use of various types of architecture in designing college buildings.

Desirable Physical Facilities for an Activity Program. By Frank M. Long. Bureau of Publications, Teachers College, Columbia University. 1933
Presents the results of a study of twenty progressive schools made to determine the physical facilities, buildings, equipment and grounds which should be provided for kindergarten and first six grades of elementary school.

Architectural Planning of the American College. By J. Frederick Larson and Archie M. Palmer. McGraw-Hill Book Co., N. Y. 1933. 181 pp. $2
A significant volume, covering college architecture, selection service and compensation of the architect, campus planning, details of spaces devoted to administration, class work, laboratories, dormitories, recreation. Is a product of the Association of American Colleges.

Some Code Controls of School Building Construction in American Cities. By John W. Sahlstrom. Bureau of Publications, Teachers College, Columbia University. 1933
A significant study of the effects of municipal building codes upon the construction of school buildings. Points out needed improvements in such codes.

Standards of School Lighting. The American Institute of Architects. 1932. 39 pp. 20c
A revision of the Code of Lighting School Buildings. Officially approved by the American Standards Association.

The College Library Building: Its Planning and Equipment. By James T. Gerould. Charles Scribner's Sons, New York. 1932. 116 pp. $2
An outline of standards and principles helpful in studying the needs preparatory to planning an effective and flexible college library building.

Types of Windows as Factors in the Ventilation of Classrooms. By John F. Ching. Library of University of California, Berkeley, Calif.
A mimeographed report of an experimental study of window ventilation.

An Architectural Advisory Service for Colleges. By Archie M. Palmer. American School and University: Sixth Edition. 1933-34. pp. 41-43
Describes the services offered to colleges by an architectural advisory bureau maintained by the Association of American Colleges.

Suggestions for the Standardization of School Architects' Working Drawings. By A. M. Proctor. American School and University: Sixth Edition. pp. 44-46
Points out that many obvious items are frequently omitted from drawings and suggests general standards which architects need to formulate.

Some Fire Hazards Frequently Overlooked in Public Schools. By T. Alfred Fleming. American School and University: Sixth Edition. 1933-34. pp. 47-50
Points out some fire hazards which may be prevented by proper school plant planning and others which can be corrected only by proper maintenance.

The Umberto Di Savoia Open-Air School, Milan, Italy. By N. L. Engelhardt. American School and University: Sixth Edition. 1933-34. pp. 50, 51
Outlines the many unique facilities provided and the educational program which utilizes these facilities to the maximum.

A New School for a New Age—the Snowflake Plan. By Herold Bradley. American School and University: Sixth Edition. 1933-34. pp. 55-58
The plan suggested has many unique features, devised to meet the needs of the activities-program and curriculum needs of the modern school.

New School Buildings in the City of Berlin. By Jens Nydahl. American School and University: Sixth Edition. 1933-34. pp. 59-61
Presents unique features of several of the modern German school plants, with illustrations of the plans of the buildings.

Safeguarding the School Board's Purchase of Architects' Working Drawings. By A. M. Proctor, Bureau of Publications, Teachers College, Columbia University. 1931. 138 pp. $2.10
An analysis of the inadequacies of laws and practices dealing with working drawings. A check list is developed which will aid school authorities in analyzing working drawings and in safeguarding their purchase of architectural service.

Check List Materials for Public School Building Specifications. By Lee Byrne. Bureau of Publications, Teachers College, Columbia University, New York. 1931. $2.35
Result of a scientific analysis of a large number of building specifications developed a check list of items which should be included in such documents.

College Architecture in America. By Charles Z. Klauder and Herbert C. Wise. Charles Scribner's Sons, New York. 1929. 301 pp. $5
Makes a study of representative types of architecture found upon college campuses in America. Discusses current theory and practice in college architecture, and the possible development of a distinctly American type of architecture adapted to climatic, environmental, and topographic conditions.

Construction et Aménagement des Ecoles Maternelles. By Mlle. S. Brès. Published by Delagrave, 15, Rue Soufflot, Paris. 44 pp.
Many illustrations and diagrams. Points out the unique features of the infant and nursery schools in France. A typewritten translation by W. M. Wallack can be secured.

Das Berliner Schulwesen. By Jens Nydahl. Wiegandt and Grieben, Berlin, Germany. 1928. 607 pp.
Contains many illustrations of school buildings and school activities of the modern type in Berlin. Shows how the school methods and curriculum have been facilitated by the new type of buildings.

Der Neue Schulbau. By Julius Vischer. Published by Julius Hoffman, Stuttgart, Germany. 1931. 102 pp.
The most outstanding book on modern European school buildings that is available. Covers all the European countries, and is profusely illustrated.

Ecoles. By Poulain Roger. Vincent Freal et Cie, 4 Rue des Beaux Arts, Paris, France
Contains many splendid illustrations, both exterior and interior, of modern French schools.

Edifici Scholastici Italiana, Primari E Secondari. By Luigi L. Secchi, Ulrico Hoepli, Milano. 1927. 228 pp.
A comprehensive treatment of the Italian schools, their architecture and their equipment. Many excellent illustrations.

Efficient Business Administration of Public Schools. By George F. Womrath. Bruce Publishing Co., Milwaukee, Wis. 1932. 461 pp.
Although a general work on school business administration, has excellent section on school building problems, location, construction, operation, maintenance, and equipment.

For Better Schoolhouses. By Fletcher B. Dresslar, S. L. Smith, Haskell Pruett, and others. Interstate School Building Service, George Peabody College, Nashville, Tenn. 1929
Composed chiefly of perspective sketches of school buildings, floor plans, school site arrangements, etc., together with suggestive specifications and contract forms. Treats various sizes and types of schools.

Grade School Buildings. By William Conrad and William George Bruce. 2 Volumes. Bruce Publishing Company, Milwaukee, Wis. 1925. 400 pp.
Is a compilation of selected articles and illustrations originally appearing in the

American School Board Journal. Presents the outstanding articles and illustrations up to date of publication.

High School Buildings and Grounds. Report of the Commission on Reorganization of Secondary Education. United States Bureau of Education. Bulletin, 1922, No. 23. 49 pp.
Gives a brief treatment of ventilation, lighting, safety, economy of construction, architectural beauty, and similar factors which pertain to all schools.

L'Architecture D'Audjourd'hui—Ecoles. Published by L'Architecture D'Aujourd'hui, 5 Rue Bartholdi, Boulogne-Sur-Seine, France. May 1934
An excellent compilation of illustrations of modern European school architecture and equipment, devoted chiefly to a series of varying types of French school buildings.

Measurement and Interpretation of School Building Utilization. By Edgar L. Morphet. Bureau of Publications, Teachers College, Columbia University. 1927. 102 pp. $1.60
Presents the results of a scientific analysis of school building utilization. Sets up criteria for measuring degree of utilization of each type of educational space.

Modern School Buildings, Elementary and Secondary. By Felix Clay. B. T. Batsford, Ltd., 94 High Holborn, London. 3d edition. 1929. 208 pp.
An excellent presentation of the English viewpoint and practice in school-building design and construction. Illustrations of outstanding English school buildings, both exterior and interior.

School Buildings of Today and Tomorrow. By W. K. Harrison, C. E. Dobbin, and R. W. Sexton. Architectural Book Publishing Company, Inc., New York. 1931. 233 pp. $16.50
An outstanding volume on school building design and construction. Traces evolution in school building design and suggests design of future school buildings. Many attractive illustrations.

School Ventilation—Principle and Practices. New York Commission on Ventilation. Bureau of Publications, Teachers College, Columbia University, New York. 1931. 73 pp. $1
This is a summary of the research financed by the Milbank Memorial Fund in the field of schoolhouse heating and ventilation. Points out that there is no justification for the extensive mechanical equipment found in such general practice and so frequently required by law.

Standards for the Administration Building of a School System. By George D. Strayer, N. L. Engelhardt, and W. S. Elsbree. Bureau of Publications, Teachers College, Columbia University. 1927
Includes suggested layouts for different sized school systems, and provides standards which are valuable in evaluating present and planned school administration buildings.

Architectural Concrete, Vol. I, No. 5. Portland Cement Company, Chicago, Ill. pp. 1-35. 1935
Entire issue devoted to articles and illustrations of modern school architecture, especially those of monolithic concrete construction. Splendid illustrations.

Public Elementary School, Los Angeles. By Richard Neutra. Architect and Building News, Vol. 154, November 22, 1935. pp. 226, 27
Presents plans and explanation of a modern elementary school in Los Angeles.

Housing the Modern Elementary School. By Royce S. Pitkin, Kenneth E. Oberholtzer, and George D. Strayer, Jr. School Executives Magazine. 52: 323-5. June 1933
Presents an analysis of twenty-one modern elementary school buildings in the United States.

Design and Construction of the Venice, California, High School. By J. C. Austin. Architectural Concrete, Vol. I, No. 6. pp. 8-11. 1935
Splendid illustrations showing the possibilities of monolithic concrete construction.

A Three-Year High School for 3,000 Pupils. Architecture, Vol. 72. November 1935. pp. 247, 248
Illustrations and plans for the new Wyandotte High School, Kansas City, Kansas.

Methods Used in Determining Room Size in High Schools. By G. E. Irons. Nation's Schools. 11: 43-8. January 1933. Plans, illustrations
Discusses techniques for determining room size.

Building Exits Code. Building Exits Code Committee. National Fire Protection Association, Boston. 1934. 92 pp.
Presents the building exits code, which specifies the number, size, and position of exit facilities.

Modern Practical Stairbuilding and Handrailing. By George Ellis. J. B. Lippincott Co.. Philadelphia. 1932. 242 pp. Illustrated
Describes methods of construction and shows working drawings and diagrams of old and modern types of stairs.

New Day Elementary Schools. By John Hancock Callender. Architectural Forum. 59:479-86. December 1933
Discusses the architectural developments in elementary schools which are necessary to meet the needs of progressive education. Gives floor plans and equipment layouts for kindergarten, primary, and intermediate grade rooms and for various special rooms.

An Achievement in California School Architecture. American School Board Journal. 85:33-34. August 1932
The Williams Union Grammar School, Williams, California, functionally designed and in keeping with climatic and topographic conditions.

School Design and the New Architecture. American School Board Journal. 85:45. October 1932
Discusses the application of modernistic architecture to school buildings.

Three "Modern" Buildings—An Appraisal. By John W. Sahlstrom. American School Board Journal. 86:42-4. January 1933. Plans, illustrations
A critical description of the "Ring Plan" school and the Baulaus School at Dessau, Germany, and the Hessian Hills Private School, at Croton-on-Hudson, New York.

The Sloping vs. Flat Roof. Sheet Metal Worker. 24:319-20. October 1933. Illustrated
Emphasizes the merits of the sloping roof.

Functional Approach to the Design of School Buildings. By John Hancock Callender. American School and University. 1935. pp. 42, 43
Makes an analysis of the functional organization of the school and provides a functional chart showing such organization in graphic form.

Planning Windows for High School Buildings. By N. L. Engelhardt and W. L. Uhl. American School and University. 1935. pp. 44-46
Makes an analysis of sixty-four school buildings planned by thirty-eight different architects, showing the trend in window planning.

The Weequahic High School in Newark. By John H. Logan. American School and University. 1935. pp. 62-65
Picture and plans of the new modernistically designed high school in Newark, and a discussion of the type of program the school provides for.

Eye Protection in Every Classroom. By Olive Grace Henderson and Hugh Grant Rowell. American School and University. 1933-34. pp. 230-33
Explains the new code of Standards of School Lighting and points out the necessity of checking present school lighting facilities with these standards.

Structural Changes Which Modern Educational Ideas May Involve. By Ray L. Hamon. American School and University. 1935. pp. 38-41
Points out a number of the modern educational ideas which seem well established and which have considerable bearing on school plant planning. Suggests some structural changes which are involved.

Trends in Classroom Design and Equipment. By N. L. Engelhardt. American School and University. 1935. pp. 215-17
An excellent presentation of the trends in classroom design and equipment, gives illustrations for elementary and for high schools.

Light—The Connecting Link Between the Eye and Education. By Henry B. Dates. American School and University. 1935. pp. 224-226
A discussion of best artificial lighting practice for schoolrooms.

Beauty and Utility in Food Service: The Public School Cafeteria. By Mary De Garmo Bryan. American School and University. 1935. pp. 289-298
A comprehensive treatment of the many factors which must be considered in planning the public school cafeteria, such as location, size and shape of the room, lighting, ventilation, soundproofing and sounddeadening, walls, floors, furnishings, and equipment.

The New Home of the University of Cologne. By R. De Vau. American School and University. 1936. pp. 47, 48
Presents pictures of several of the new buildings at the University of Cologne and describes the main features of the new plant.

State Construction Codes for School Buildings. By Francis R. Scherer. American School and University. 1936. pp. 53, 54
Discusses the essential factors which should be covered by an adequate state school building code.

The Selection of Woods for School-Building Construction. By Bruce W. Angus. American School and University. 1936. pp. 57-59
Discusses the confusion caused by the present terms as applied to the grading of lumber, and suggests ways of selecting woods so as to insure the grade of lumber desired.

Raising the Standards of School Sanitation. By George L. W. Schulz. American School and University. 1936. pp. 144-147
Treats the relationship of sanitation and school building construction showing how proper construction automatically raises sanitation standards. Deals with such facts as flooring, wainscots, walls, ceilings, plumbing fixtures, ventilation, etc.

The Summer Renovation Program. By J. L. Gleason. American School and University. 1936. pp. 148-151
Outlines the many things which should be included in the summer renovation program.

The Housing of Schools for Young Children in European Countries. By Mary Dabney Davis. American School and University. 1936. pp. 237-244
Describes the major features of the school housing and equipment facilities for small children in the various European countries. A number of well-selected illustrations to point out unique features of the newer schools in the various countries.

Designing the Classroom in Terms of the Activity Program. By Edwin W. Broome. American School and University. 1936. pp. 252-55
Presents sketches and pictures of a classroom designed to better meet the needs of the activity program. Has a number of unique features.

Modern Architectural Approach is Logical in School Construction. By W. P. Barney. Nation's Schools. 15:41-5. March 1935
Tells how such an approach permits the use of new materials, economy in construction, a new architectural beauty, and adaptation to educational needs.

Implications of Progressive Education for School Plant and Equipment. By H. H. Davis. American School Board Journal. 89:25-6. July 1934
Outlines the type of educational program the progressive school offers and explains the implications for future school plants and equipment.

Designed to Meet the Children's Needs. By H. L. Smith. Nation's Schools. 16:44-7. November 1935. Illustrated
Describes how the new elementary building at Teaneck, New Jersey, was designed and built to meet the children's needs.

Building Schools for the Nation. By C. Theodore Larson, Technical News Editor, The Architectural Record. (In National Association of Public School Business Officials. Proceedings, 1934.) pp. 149-58
Points out that school architecture is not so much a matter of externals but rather a matter of internals, making a distinction between monumental architecture and instrumental architecture. Also points out many of the recent and probable future developments in school plan design and construction.

Planning and Building Schools in the Smaller Districts. By N. L. Englehardt. School Executives Magazine. 52:355-7. July 1933. (Same condensed in School Management. 2:8-9. September 1933.) Plans
An excellent article on the various phases of the problems involved in planning and building schools for the smaller districts.

Professional Advice Expected by the School Architect from the School Administrator. By C. O. Thompson. Elementary School Journal. 33:690-7. May 1933
Points out that planning and construction of a school building is a cooperative enterprise in which the services of several types of highly trained specialists are needed.

Functionally Designed Building Aids Progressive School. By L. Hamilton and N. Moseley. American School Board Journal. 91:33-5. August 1935. Illustrated
A seven-classroom unit, with connected workrooms, office, nurses' room, kitchen and combined auditorium and gymnasium. Has several unique features, the major one being the functionally designed architecture.

Modern Design for School Buildings. By A. C. Guth. American School Board Journal. 88:44. January 1934
Forcefully presents the necessity for modern design for school buildings. Emphasizes that architects must cease to rehash the models of the past, and should develop a modern style of architecture, more economical and suited to the needs of the institution.

Our School Architecture of Tomorrow. By W. B. Ittner. American School Board Journal. 87:40. August 1933
Presents the need for a new school architecture in a forceful manner, showing that the change will call for a revolutionized building plan evolved to meet the needs of an enlarged and reorganized educational program; and that new building forms, use of new materials and new design must come.

Trends in School Building Construction. By Elwyn E. Seelye. American School Board Journal. 88:35-36. January 1934
Presents several types of economies in school building construction, such as the use of ceilings of rubbed concrete rather than plaster.

School Architecture That Will Live. By E. Sibley. American School Board Journal. 90:15-16. January 1935. Illustrated
Brings out the fallacy that beauty and economy are incompatible. More attention must be given to the architecture of the interiors; new uses of materials, soundproofing, etc., must be developed.

Ramps Versus Stairs for School Buildings. By Wm. H. Weeks. American School Board Journal. 90:38-39. May 1935
Points out the merits of the ramps and compares costs.

Novel Trends in School Building. By R. A. Getter and R. B. Warren. School Executives Magazine. 54:123. December 1934
Proposes that the modern idea in school building design is to combine educational necessity with architectural accomplishment. Critically reviews the major features of the modern European school architecture.

Built for Tomorrow's Needs. By E. P. Tooker. Nation's Schools. 16:44-7. October 1935. Illustrated
Depicts how a rather small school was planned and built to fill the needs of both a modern school and a community center.

Schools of Tomorrow. By F. L. Devereux. (In National Association of Public School Business Officials. Proceedings, 1934. pp. 36-41); Same in Journal of Business Education. 10:17-19. October 1934. Excerpts. Ed. Screen. 13:182. September 1934; Pennsylvania School Journal. 83:75-6. October 1934
Outlines the many developments which will take place in school plant planning, construction, and equipment.

One Hundred Years of School Building in Chicago. By D. C. Rogers. Chicago School Journal. 15:74-83. January 1933. Plans, illustrations
Presents plans of World's Fair Elementary School which has some unique features.

Rehabilitation of School Buildings. By John A. Sexton. School Executives Magazine. 55:128-130. December 1935. Illustrated
Tells how Pasadena has rebuilt her schools to conform to new standards of safety.

Brockport Central High School. By H. B. Dryer. American School Board Journal. 90:33-7. June 1935
Presents some of the interesting features of the Brockport, New York, High School.

Wood Has Service to Perform in the School Building. By W. H. Scales. Nation's Schools. 16:47-9. August 1935. Illustrated
An excellent article on the place of wood and synthetic wood in school buildings. Tells of the modern and inexpensive one-story earthquake-proof buildings which have been built of wood in California.

Types of Construction and Materials as Related to the Original Cost, Maintenance, and Operation of School Buildings. By F. R. Scherer. Review of Educational Research. 5:383-7. October 1935. Bibliography
A very good summary of the literature on this topic.

School Building Specifications. By W. E. Shelfer and H. Bradley. School Executives Magazine. 53:173. February 1934
Sets up a check list to be applied to school building specifications. Valuable in setting up such specifications and in evaluating those which have been set up.

Supervising School Building Construction. By Ray L. Hamon. School Executives Magazine. 54:326-28. July 1935
Discusses some of the salient factors to be considered when school buildings are being constructed. Makes recommendations regarding the qualifications of the supervisor, his duties, and the cost of supervision.

Building Supervision Pays High Dividends. By R. L. Hamon. Nation's Schools. 13:53-4. April 1934
Explains how adequate supervision can be secured and the advantages of such supervision.

Heating, Ventilation, and Sanitation in School Buildings. By H. W. Schmidt. Review of Educational Research. 5:344-61. October 1935. Bibliography
A brief but excellent review of the literature on heating, ventilation, and sanitation in school buildings.

National Board of Fire Underwriters. Building Code. 5th edition, revised. National Board of Fire Underwriters, New York, 1931.
Provides basis references on safety in school buildings.

4b. BUILDINGS: SPECIAL ROOMS

The Biological Science Building of the State College of Washington. By Stanley A. Smith. American School and University. 1936. pp. 384-87
Gives floor plans and describes the new biological science building at Washington State College.

The Physical Plant for a Modern Program of Vocational Education. By F. J. Jeffrey. American School and University. 1936. pp. 413-18
In addition to giving illustrations, explains how the building was planned so as to permit efficient expansion, how movable metal partitions are used, how outside light is controlled, the placing of lockers and washbasins on the shop balconies, and means of securing flexibility.

A New Printing Shop in the Frank V. Thompson School, Dorchester District, Boston. By Edward C. Emerson. American School and University. 1936. pp. 419, 420
Describes layout and equipment of the printing shop in the Thompson school.

Technical Education in Chadsey High School, Detroit. By Earl L. Bedell. American School and University. 1936. pp. 421-24
Illustrations and explanations of the curriculum at the Chadsey High School, which endeavors to train for life interests.

The New Cousens Gymnasium at Tufts College. By John T. Whitmore. American School and University: Sixth Edition. 1933-34. pp. 178-181
A description of the major features of the new gymnasium at Tufts college.

Planning Residence Halls. By Harriet Hayes. Bureau of Publications, Teachers College, Columbia University. 1932. 247 pp. $2.25
Outlines the essential details which need to be given preliminary consideration, the desirable physical facilities, and provisions for safety and general welfare.

Some Administrative Problems of the High School Cafeteria. By Willard S. Ford. Bureau of Publications, Teachers College, Columbia University, New York. 1926. 191 pp.
Discusses suggested layouts for school cafeterias and proposes standards which may be used in determining room sizes and space relations.

The High School Classroom. By R. E. Green. American School Board Journal. 88: 37-38. January 1934
Summarizes the trends in school building construction, and the desirable physical characteristics of the high school classroom.

Science Buildings. Architectural Review. 4: 225-227. December 1933
Plans and illustrations of the new "Science Block" at the Beeford School.

A Mathematics Room That Speaks for Itself. By Edith L. Mossman. School Science and Mathematics. 33: 423-430. April 1933

Discusses essentials in planning a mathematics classroom, its equipment and decoration.

The Science Laboratory in the Small High School. By W. W. Carpenter and Ralph Watkins. American School and University 1933-34. pp. 306-309
Presents illustrations and standards helpful in planning science laboratories for small schools.

Summary of the Report of the Committee on Laboratory Standards in Secondary Schools. Science Education. 18: 60-61. February 1934
In addition to giving an abstract of the committee report, presents standards for laboratory equipment.

Summary of Research and Opinion of Library Planning. By E. C. Bolmeier. Bulletin of Department of Elementary School Principals of the National Education Association, Washington, D. C. Twelfth Yearbook. 12: 220-226. June 1933
Covers location, floor plans, decorations, equipment, furniture, and standards which are essential in library planning.

Library Planning and Design. By Edward L. Tilton. Architectural Forum. 56: 567-572. June 1932
Gives plans and illustrations of different types of library floor plans.

An Elementary Printing Course. By Earle L. Hadley. Industrial Arts and Vocational Education. 23: 58-59. February 1934
Presents plans for a junior high school print-shop layout and gives a list of necessary equipment.

Shop for Sheet-Metal Work. By Gaird Hood. Industrial Education Magazine. 36: 82-83. March 1934
Provides a suggested sheet-metal shop layout and list of necessary equipment.

Vocational Agriculture in Rural High Schools. By Louis M. Roehl. Industrial Arts and Vocational Education. 21: 158-162. May 1932
Describes and suggests layout for separate vocational agricultural building in rural community.

Planning and Equipping the Unit Kitchen. By Doris W. McCray. Practical Home Economics. 11: 349-350. December 1933
Treats the planning and equipment of high school kitchen and foods laboratory.

Principles Underlying the Physical Layout of a Commercial Department in a High School. By Allan Davis. Eastern Commercial Teachers Association Yearbook. 6: 5-13. 1933
Suggests lists of equipment for the various commercial classrooms.

Building Efficient Work Units for the School Cafeteria. By Fred I. Byerly. Practical Home Economics. 11: 361-362. December 1933
Discusses the plans and equipment of the cafeteria unit in the Rufus King High School, Milwaukee.

Modern Swimming Pool Construction. By E. H. Darling. Canadian Public Health Journal. 24: 420-428. September 1933
A comprehensive treatment of swimming pool construction, lighting acoustics, heating, and auxiliary features.

The School Swimming Pool. By Andrew P. Hill and Charles W. Bursch. California State Department of Education, Division of Schoolhouse Planning, Sacramento, Calif. 17 pp.
Provides a check list and an excellent set of standards for swimming pool construction.

The Essentials of Swimming Pool Sanitation. By C. A. Scott. Follett Publishing Co., Chicago. 1933. Illustrated. 142 pp.
Discusses the various types of sanitation apparatus for swimming pools.

Planning the Recreation Building. By Raymond E. Hoyt. Recreation. 28: 221-223, 258. August 1934
Presents many suggestions relative to the planning of community recreation rooms in the school.

San Francisco's New School-Business Administration. American School Board Journal. 88: 19-20. April 1934
Presents illustration and floor plans of the new administration building in San Francisco.

On Progressive Art Rooms. By R. E. Cote. American School Board Journal. 88: 40-1. March, April, May 1934.
Consists of a series of articles on the ideal equipment and layout for art rooms.

Putting the White House Conference Ideals Into Effect. American School Board Journal. Vol. 85: 35-37. August 1932
Describes and illustrates special therapy rooms and equipment of the Ann J. Kellogg School, Battle Creek, Michigan.

Planning Men's Dormitories for Ttoday and Tomorrow. By William M. Ingemann. American School and University. 1933-34. pp. 275-278
Suggests means of securing both beauty and economy through careful designing. Provides illustrations and suggestive layouts.

Servicing a Modern Laboratory from a Central Delivery Room. By W. B. Foulk. American School and University. 1933-34. pp. 298-305
Discusses the equipment and layouts suitable for servicing a modern laboratory from a central delivery room.

Rooms, Service and Furnishings for Biology Departments in Teachers' Colleges. By Harry A. Cunningham. American School and University. 1933-34. pp. 310-314
Discusses the layout and equipment vital for such departments. Illustrated.

Indoor Play Facilities for College Women. By Gavin Hadden. American School and University. 1935. pp. 189, 190.
Gives the results of a study of indoor play facilities provided for women by a number of the leading colleges and universities. Develops a list of desirable facilities.

The Winter Exercise Building at the Choate School, Wallingford, Connecticut. By Rev. George C. St. John. American School and University. 1935. pp. 195, 196
Describes the planning of the winter exercise building, giving floor plans.

School Library Planning and Equipment. By Lucile F. Fargo. American School and University. 1935. pp. 227-232
Suggests the need for planning the library and its equipment upon a functional basis. An excellent article with well-chosen plans and illustrations.

Office Practice—An Integrated Laboratory Project. By Edward J. McNamara. American School and University. 1935. pp. 233-235
Outlines the equipment and layout needed for the office practice unit of the commercial department.

Dormitory Design and Equipment. By Inez V. Bozorth. American School and University. 1935. pp. 302-306
Discusses such factors as size of residence units, location and orientation, main floor arrangements, dining room and kitchen layout, student rooms, essential equipment, etc.

Dick's House—The Dartmouth College Infirmary. By Jens Frederick Larson. American School and University. 1935. pp. 307-310
Discusses the plan and equipment of the new Dartmouth College infirmary. Illustrated.

Recent Trends in Laboratory Construction, with Special Reference to Chemical Laboratories. By C. R. Hoover. American School and University. 1935. pp. 339-343
A comprehensive treatment of recent developments in science laboratory construction. Well illustrated.

Physics Classrooms and Laboratories in the Wichita High Schools. By J. W. E. Stogdill. American School and University. 1935. pp. 344, 345
Gives an illustration of the layout for the physics classrooms and describes the major features.

The Science Building of Marlborough College, Wiltshire, England. American School and University. 1935. pp. 346-348
Presents plans and illustrations of the new science building at Marlborough College. It has a number of unique features both with regards to plan and construction.

Room Design and Equipment Requirements for Sight-Saving Classes. By Winifred Hathaway. American School and University. 1936. pp. 245-51
An outstanding article on both artificial and natural lighting, which is applicable not only for sight-saving classes, but for all classes. Includes a number of unique illustrations, showing the varying light intensities in different parts of the rooms.

The Physical Administration of the Book Collection. By William M. Randall. American School and University. 1936. pp. 261-264
Presents two of the major functions of the library, that of preserving the books collected, and that of making them accessible to the readers, and develops a number of the problems involved in carrying out these functions. Provides an excellent treatment of the major problems involved.

A Plan for a One-Room Home-Making Department. By Ata Lee. American School and University. 1936. pp. 334-336
Presents plans for a rather complete one-room home-making department layout, and lists the needed equipment.

The New Chemistry Laboratories of the College of Arts and Sciences, Georgetown University. By Lawrence C. Gorman. 1936. pp. 375-378
Gives illustrations and explanations of outstanding features of the new chemistry laboratories building at Georgetown University.

The New Engineering Building at the University of Virginia. By W. S. Rodman. American School and University. 1936. pp. 379-383
Presents illustrations and explanations of the outstanding features of the new engineering building at the University of Virginia.

The School Executive's Office. By Arvid J. Burke. School Executives Magazine. 54:181-182. February 1935
Provides a check list of the equipment which should be provided in the school executive's office.

A Plan for a Social Science Suite. By H. Z. Wooden and Others. School Executives Magazine. 54:262-4. May 1935. Illustrated
Describes plan of and equipment for a social science suite. Excellent.

A Game Room for Elementary Schools. By Bertha Smith. School Executives Magazine. 54:265-7. May 1935. Illustrated
Describes the planning of a game-room unit which is suitable for both school and community purposes.

Planning the Social Studies Classroom. By Albert A. Orth. American School Board Journal. 92:30-33. January 1936. Illustrated
Gives details to be considered in planning a classroom to be used for social studies.

Equipping the School Art Studio. By Belle Boas. School Executives Magazine. 55:191-2. January 1936
Outlines the essentials which must be considered in planning and equipping a modern high school art room.

The Junior High School Stage. By Erik A.

Anderson. School Executives Magazine. 55:-300-1. April 1936
Discusses the necessary equipment and the planning which can make the modern school stage a true educational laboratory.

Planning the Mathematics Classroom. By Fred L. Bedford. School Executives Magazine. 55:290-2. April 1936
Outstanding article on planning a modern mathematics classroom.

Special Rooms for New Chicago Elementary School Buildings. By Don C. Rogers. American School Board Journal. 88:34. January 1934
Presents plans for principal's office unit, library unit, and kindergarten unit, all of which are effectively planned.

4c. BUILDINGS: DECORATION

Modern Decorative Methods Beautify Concrete Interiors. By S. P. Moore. Nation's Schools. 11:29-32. February 1933. Illustrated
A very interesting article on ways of decorating concrete interiors.

Case for Color in School Buildings. By J. Jay. American School Board Journal. 52:26-8. August 1932
Stresses the importance of using color, when well chosen, to relieve the monotony of the ordinary sameness in school color schemes.

School Library Decoration. By Alice Hogge Baer. Bulletin of Department of Elementary Principles of the National Education Association, Washington, D. C. Twelfth Yearbook. 12:217-219. June 1933
Offers many suggestions on library decoration.

4d. BUILDINGS: COSTS

Building an Elementary School in the Depression. By Clem O. Thompson. American School and University: Sixth Edition. 1933-34. pp. 52-54
Points out possible economies in school plant construction.

Extra Costs and Incidental Costs in the Erection of School Buildings. By Frank M. Misner. Bureau of Publications, Teachers College, Columbia University, New York. 1934. 79 pp. $1.60
A scientific analysis of causes and types of "extra" costs encountered in erecting a school building. Presents a check list which will enable school authorities to reduce and largely eliminate "extra costs."

Eliminating Extra Costs in Construction. By F. M. Misner. Nation's Schools. 16:45-6. August 1935
Explains the causes of extra costs and the means of eliminating them.

Distribution of School-Building Costs. By G. D. Coons and D. L. Esses. American School Board Journal. 90:38-9. June 1935
Discusses the factors influencing distribution of school building costs for general, heating, ventilating, plumbing, and electrical contracts.

5. EQUIPMENT

Furnishings and Equipment for Residence Halls. By Mary De Garma Brya and Etta M. Hanby. Bureau of Publications, Teachers College, Columbia University, 1933. 95 pp.
Outlines the many factors affecting the selection of furnishings and equipment for residence halls.

Public School Plumbing Equipment. By Minor W. Thomas. Bureau of Publications, Teachers College, Columbia University, New York, 1928. 128 pp. $1.60
A comprehensive treatment of the field of public school plumbing equipment. Presents criteria to serve as a guide in judging plumbing equipment and in the arrangement of such equipment.

Buildings and Equipment for Home Economics. By Melvin Brodshaug. Bureau of Publications, Teachers College, Columbia University. 1931
An excellent treatment of the planning of home economics suites. Evaluates present practice and sets up objectives to guide in the planning of such suites. Covers building problems, space allotments, and equipment.

The University of Southern California Basket Locker System. By William R. Laporte. American School and University. 1933-34. 182-184. Illustrated
Describes the basket locker system in use at the University of Southern California. The system presented is practical for the large school.

Equipment of the Elementary Classroom. By Guy L. Hilleboe. School Executives Magazine. 52: 116-117. November 1932.
Compares the physical characteristics of the traditional and the modern classroom, giving special emphasis to types of seating essential in an efficient classroom.

The Kewaunee Book of Laboratory, Vocational and Home Economics Furniture. Kewaunee Manufacturing Company, Kewaunee, Wis. 1932. 455 pp.
Plans and illustrations of suggestive layouts for the science laboratory, home economics unit, art room, commercial room, kindergarten, cafeteria, and shops.

Library Equipment and Appliances. American Library Association Bulletin. 28:337-345, June 1934
Gives illustrations and descriptions of various items of library furniture and equipment.

Equipment for Industrial Education. By O. D. Adams. American School and University. 1933-34. pp. 314, 315
Deals with the selection and purchase of equipment best suited to the needs of industrial education.

Suggested Equipment for Teaching Business Subjects. By Charles E. Cook. Eastern Commercial Teachers Association Yearbook. 6:261-267. 1933
A committee report upon the equipment needed in a junior high school commercial department.

Commercial Education Equipment for Small High School. By William R. Odell. School Executives Magazine. 52:32. September 1932
Outlines the classroom provisions and equipment needed for commercial education in a small high school.

Expending the School Stage Lighting Budget. By A. L. Powell. American School and University. 1933-34. pp. 210-215
Points out the important factors in selecting stage lighting equipment. Tells how to get the most for the money, and provides suggested budgets for such equipment for amounts varying from $500 to $20,000.

Office Machine Equipment for the School With Moderate Funds. By Grace M. Kennedy. American School and University. 1933-34. pp. 218-220
Analyzes the equipment needed for the office practice unit in a vocational high school. Provides a suggested list of equipment.

How to Make School Radio Effective. By Cline M. Koon. American School and University. 1933-34. pp. 221-224
In addition to outlining the functions of radio in the school, discusses present trends in the selection and use of school radio equipment.

Looking Ahead in Radio. By Armstrong Perry. American School and University. 1935. pp. 221-223
Points out the probable implications of coming radio developments for the schools.

Utilizing Educational Talking Pictures in the Schools. By Frederick L. Devereux. American School and University. 1935. pp. 235-237
Not only discusses the utilization of educational talking films in the schools, but offers a layout and describes equipment required for classroom projection.

Forms and Equipment for the Keeping of Student Records. By Ira M. Smith. American School and University. 1935. pp. 238-241
Outlines the type of data which should be preserved and suggests the equipment necessary for keeping such student records.

School-Building Structure and Equipment for Efficient Use of Visual Aids and Radio. By Walter C. Martin. American School and University. pp. 256-260
A treatment of the problems involved in making efficient use of visual aids and radio in the schools. Covers such problems as extraneous noise, correct acoustical conditions, auditorium and special room design, and the selection of equipment to obtain the proper volume of sound.

Equipment of the General Business Training Classroom. By Foster W. Loso. American School and University. 1936. pp. 265, 266
Outlines the objectives of the general business training course and from them develops the room layout and equipment needed for effective functioning of the course.

Equipment for School Dramatics. By Theodore Fuchs. American School and University. 1936. pp. 267-276
A very comprehensive treatment of the layout and equipment necessary for the most effective school dramatics. Presents layout plans for the Shorewood High School Auditorium and accompanying dramatics units, which have many excellent features.

Purchase of Classroom Equipment. By Ray E. Cheney. School Executives Magazine. 54:20-21. September 1934
Analyzes many of the perplexing problems encountered by school officials in purchasing equipment.

Steel Wardrobes for Grade School Classrooms. By George M. Rohdes. School Executives Magazine. 54:186. February 1935
Discusses the economy and efficiency of steel wardrobes in grade school rooms.

Problems of Equipment Specifications. By H. W. Schmidt. School Executives Magazine. 55:52-54. October 1935
Outlines a number of principles which should be kept in mind when writing equipment specifications.

The Selection of School Lockers. By W. E. Long. American School Board Journal. 92:20-21. March 1936
Suggests important factors to be considered in the selection of lockers.

Fundamentals of Visual Education. By J. Raymond Hutchinson. School Executives Magazine. 55:186-8. January 1936
Discusses the planning and utilization of audio-visual aids in elementary and secondary schools.

Types of School House Doors. By Ray L. Hamon. School Executives Magazine. 55:172-4. January 1936. Illustrated
Discusses the planning of various types of desirable exterior and interior doors for the modern school.

Plan Your Seating Program. By E. J. Hummel. School Executives Magazine. 55:248-51. March 1936. Illustrated
Points out the necessity for planning a seating program, and explains how the maximum utilization may be secured.
A Plan for Selecting School Building Equipment. By J. P. Arp. American School Board Journal. 91:41. July 1935
Sets up criteria for selecting school equipment.
Facilities for an Activity Program. By F. M. Long. School Executives Magazine. 54:170-1. February 1935. Illustrated
Discusses the planning and equipping of a classroom suitable for use in connection with an activity program.
Accessory Equipment in Toilet Rooms. By Preston M. Geren. School Executives Magazine. 55:19. September 1935
An excellent article on the necessary equipment for toilet rooms.
Finished Hardware in Schools. By Bruce W. Angus. School Executives Magazine. 55:26-28. September 1935
Sets up standards for selecting serviceable as well as attractive hardware.

6. SPECIAL SCHOOL TYPES

A Modern Version of a Rural School. By Ernest Sibley. American School Board Journal. 92:43-44. January 1936. Illustrated
Has many unique features including its landscaping, site play areas, building arrangements, its school and community education program, and its social and recreational program.
The George P. Phenix Training School, Hampton Institute, Hampton, Va. By Warren S. Holmes. American School and University: Sixth Edition. pp. 62-65
Points out the fundamental needs of Negro education today and explains how the school was planned to make possible the fulfillment of these needs.
The New Rindge Technical School, Cambridge, Massachusetts. By Ralph Harrington Doane. American School and University. Sixth Edition. pp. 66-69
Describes and illustrates some of the major features of this school.
Rural Schoolhouses, School Grounds, and Their Equipment. By F. B. Dresslar and Haskell Pruett. Bureau of Education, U. S. Department of the Interior, Washington, D.C. Bulletin No. 21. 1930. 14 pp.
Although brief, this bulletin is an excellent source of information on design, function, location, and planning of rural schools. Well illustrated.
Campus Standards for Country Day and Boarding Schools. By G. D. Strayer, N. L. Engelhardt, and T. C. Burton. Bureau of Publications, Teachers College, Columbia University. 1930. 51 pp. $1
Provides a set of standards and a score card to be used in appraising present country day and boarding school plants and in planning future plants.
Trade Schools, School Projects, Field Buildings. Architectural Record, August 1934. Vol. 76. pp. 77-112
A series of articles with illustrations and plans on school plants, covers such topics as the need for new schools, recent trends in school plant construction, special school units.
The Open-Air School, Newark, N. J. American Architect. Vol. 147. November 1935. pp. 38, 39
Plans and illustrations of the new school are given.
The New Fresh Air School at Suresnes, France. American Architect. Vol. 147. November 1935. pp. 34-37
Plans and illustrations of the new school at Suresnes, France, which has many unique features.
The Rural School and Its Solution. By J. J. Donovan. Architect and Engineer. Vol. 97. pp. 35-56
Gives plans and illustrations of a number of smaller school buildings, high school, elementary and rural
New Science Building at Phillips Exeter Academy. By Wilhelm Segerblom. Journal Chemical Education. 9:766-769. April 1932. American School and University. 1932-33. pp. 336-339
Illustrations and description of the special features in the Exeter Academy.
Problems and Practices in Housing the Junior College Program in California. By Cecil Donald Hardesty. University of Southern California Press, Los Angeles. 1934. 153 pp.
An analysis of the factors affecting the housing of the junior college program in California.
The Planning and Equipping of Nursery Schools. By George D. Stoddard. American School and University. 1935. pp. 218-21
Outlines the opportunities offered by the nursery school and the essentials of a good nursery school plant. Well illustrated.
Parochial School Requirements. By Rev. William R. Kelly. American School and University. 1936. pp. 40-46
Gives plans and illustrations of parochial schools which are planned to meet the needs of different sized parishes. Outlines the various uses which such buildings must be planned to serve.
The Students' Health Service of the University of Minnesota. By Robert B. Radl. American School and University. 1936. pp. 341-346
Describes and presents floor plans and illustrations of the new health service building at the University of Minnesota.
Dormitory Design. By J. Binford Walford. American School and University. 1936. pp. 347-51
Presents plans and illustrations of two interesting examples of dormitory design, Taliaferro Hall, College of William and Mary, and a new dormitory group at State Teachers College, Fredericksburg, Virginia.
Schools for Physically Handicapped. By David E. Weglein. School Executives Magazine. 54:274-5. May 1935
Discusses the planning and equipping of schools and classrooms for the physically handicapped.

7. BIBLIOGRAPHIES

Recent Publications in the School-Building Field. By Leslie L. Chism. American School and University: Sixth Edition. 1933-34. p. 40
A selected list of recent publications in the field.
School Buildings, Grounds, Equipment, Apparatus and Supplies. By T. C. Holy. Review of Educational Research. December 1932. pp. 343-441. American Educational Research Association, Washington, D. C.
A comprehensive though brief review of the literature on school buildings and equipment.
A Bibliography of School Buildings, Grounds, and Equipment. By H. L. Smith and L. M. Chamberlain. Bureau of Cooperative Research, Indiana University, Bloomington, Ind. 1928-35. Parts I-IV
A very comprehensive series of annotated bibliographies on all phases of school buildings. Part IV covers materials up to October 1934.
Bibliography of College and University Buildings, Grounds and Equipment. By H. L. Smith and T. R. Noffsinger. 1934. Bulletin of the School of Education, Indiana University, Bloomington, Indiana. 75c
A very comprehensive, briefly annotated bibliography covering all phases of college and university buildings, grounds and equipment.
A Bibliography of Fifty Outstanding Books on School and College Buildings and Allied Topics. By William J. Lowry. American School and University. 1936. pp. 60-62
The list includes books of relatively recent publication and covers the planning and maintenance of school buildings.

KITCHEN, LANE TECHNICAL HIGH SCHOOL — CHICAGO, ILLINOIS

RAMPS VERSUS STAIRS FOR SCHOOL BUILDINGS

Photographs by J. Walter Collinge

By WILLIAM H. WEEKS, ARCHITECT

After close observation and checking, over a period of years, I have become convinced that the incline (or ramp) is much to be preferred over the stairway as a means of travel between floors of the school building. The reasons are the following:

(1) It has been demonstrated that the incline can be built with the extra space included for practically the same cost as a first-class stairs.

(2) The ramps are practically 100 per cent safe in case of fire or panic. In checking on the use of the best constructed stairs, I have found records of many accidents, whereas I have yet to find a record of one accident on inclines.

(3) The inclines are more easily kept clean, because the many angles and corners found in the average stairs are eliminated and the cost of janitor's service is thus reduced.

(4) The ramps give children a sense of security not found in stairs.

(5) The ramps are more adapted to the varying strength of children and adults.

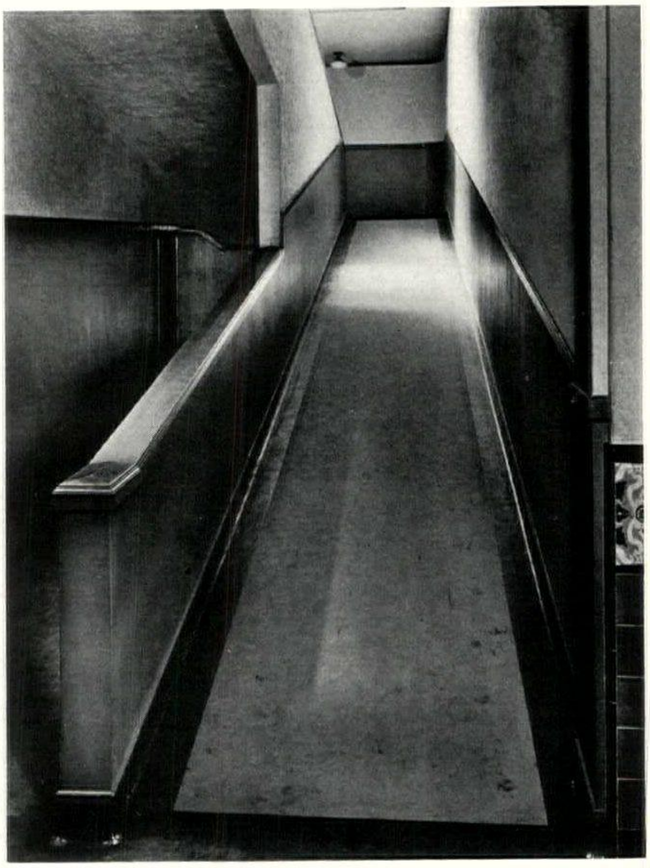
(6) It is possible for cripples in wheelchairs to go from floor to floor.

(7) The ramps are less noisy.

(8) The ramps cost practically the same as stairs.

(9) Service elevators can be eliminated. All supplies and furniture can be taken from floor to floor.

Construction: I have built ramps as much as 2¼-inch rise to the foot, and they have proved satisfactory, but careful personal observation suggests 2 inches as a safe and satisfactory slope for schools. The material used should be fireproof. I have used reinforced concrete in practically all my installations and have found this material very flexible and satisfactory. The floor of the incline should be covered with cork carpet or rubber matting.



School ramps designed by Weeks and Weeks, architects

BETTER ACOUSTICS FOR THE SCHOOL

BY FREDERICK L. DEVEREUX
vice-president, Erpi Picture Consultants, Inc.

In the preparation of this article, Colonel Devereux had the assistance of J. P. Maxfield and G. T. Stanton of Electrical Research Products, Incorporated. Mr. Maxfield is at present in charge of technical consulting and new developments of his company. Mr. Stanton has conducted the noise study of rapid transit lines in New York City, the noise study ventilation in buildings for the Port of New York Authority, and large parts of the survey for the New York Noise Abatement Commission.

The success of the oral portion of the educational program depends on the extent to which the students hear and concentrate upon the educational material so presented. While the demand for good hearing conditions has always been present, the advent of the talking motion picture as an instrument of education has focused attention anew on the problem of school acoustics.

High cost of noise: It is perhaps reasonable to assume that all concerned with modern schools—the officials directing their activities and the architects who plan them—are aware of the harmful effects of noise and that in all new designs precautions will be taken to avoid excessive noise. On the other hand, it is doubtful if the enormous economic loss to the educational community occasioned by an apparent disregard of this factor is appreciated.

A recent survey of 846 public school buildings showed that some 30% of the classrooms were almost useless by virtue of disturbing and interfering noise. If we accept these figures it would indicate approximately $150,000,000 worth of school property which is unfit for educational purposes. A consideration of this vast sum predicates the reasonableness of adopting what might otherwise be called extreme measures to insure reasonable quiet in the classroom.

It may be argued that this much property is not valueless since most of the classrooms included in the category of "useless" are actually continued in use today. If we admit that, then the education of the children compelled to use these rooms is defective because of the extremely noisy conditions, and we must face the fact that of the total enrollment in the schools surveyed upwards of 400,000 children are receiving less education than is being provided by the taxpayers and, in addition, are living during the school day in an environment unfavorable to healthful development.

Teaching loss in noise: That noise is directly harmful is borne out by an increasing amount of scientific data, the bibliography of which is too lengthy to mention here. Two brief examples may serve to indicate the seriousness of uncontrolled noise. Dr. Donald Laird of Colgate University in a series of carefully controlled tests showed that routine work, comparable to the effort of school children, required the expenditure of 19% more energy to accomplish a given quantity of work in a noisy room than was required in the same room after acoustic absorbing material was placed on the ceiling. The difference in noise level in the room under these two conditions was small compared with the excess noise level over reasonable amounts which may be found in many classrooms.

Aside from unnecessary expenditure of energy which, especially in the young, may lead to depleted health and nervous disorders, the ability to master new subjects in an educational curriculum is reduced, even though more energy be expended. Elaborate experiments were conducted by the Noise Abatement Commission in collaboration with Frank S. Hackett, principal of the Riverdale School, New York. These experiments continued for a week and involved the entire student body of the school. Without dwelling on the nature of the tests, which are recognized tests of reading comprehension, it was significant that under the loud noise conditions, a loss of over 7% in ability to comprehend was noted. In considering this loss it should be appreciated that this was a measure solely of loss of ability to comprehend visual instruction and that no allowance was included for the probably larger loss had the instruction been of an audible nature.

In general these tests were made with an electrically produced, continuous harmonic noise. The disturbing value, sometimes called "annoyance," of noise, while proportional to the loudness, is also largely affected by the quality of the sound.

CONTROL OF SOUND

noise measurement tests for the New York Noise Abatement Commission

Courtesy Electrical Research Products, Inc.

Irregularly produced, non-rhythmic sound creates a high degree of disturbance. Sounds of inharmonic nature are naturally more disturbing than harmonic sounds and there is some evidence of increased disturbance from sounds of high basic pitch. In our modern life, the majority of urban noises are traffic-created and thus unfortunately comply with the requirements of high annoyance. It is evident, therefore, that the quantitative data, briefly referred to above, in both cases represents only a fractional part of the deleterious effect of noise as generally experienced in our urban schools.

Sound-insulating the school: The architect faced with the responsibility of designing a school in one of our congested urban districts is admittedly in a difficult position. The school site is of necessity located at or near the population center of the area which it serves and therefore is generally assailed by high external noise levels originating from traffic and, in some cases, industrial sources. The disparity between a reasonably tolerable noise level within the classroom and that existing externally is so great as to require frequently drastic treatment.

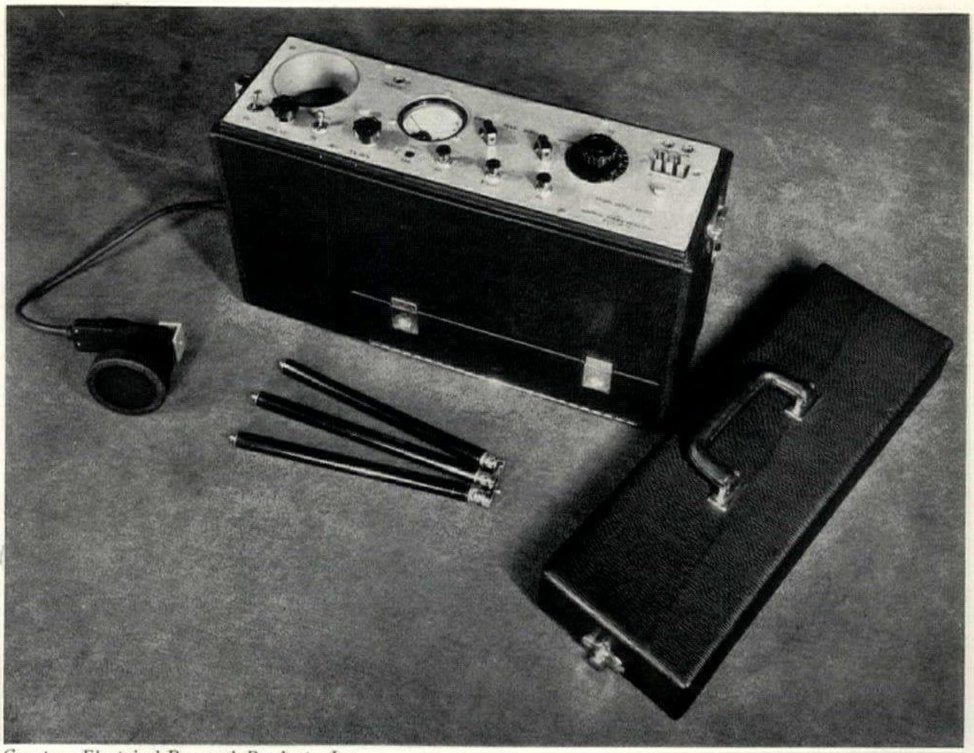
The obvious remedy is construction of a building with noise reduction properties equaling or approximating the difference between the external and the desired internal noise level. Such a building must, of course, be windowless or have fixed windows with sound isolating properties equal to those of the building structure. This in turn involves artificial ventilation, again introducing additional complexities to the design proper.

Means of sound control: Noise is a quantitative entity which may be measured and classified in defined units. In specific cases the noise level prevailing on the selected school site may be determined for definite comparison with the desired internal noise level. The amount of improvement which may be obtained by all of the available means of noise reduction may similarly be expressed in quantitative terms, thus permitting a study of the potential internal noise level which may be reached by various plans. The desirability of these plans in comparison with their respective costs should indicate the proper procedure to be followed.

The various planning steps which may be considered are (1) selection of least noisy site; (2) detour of traffic; (3) cooperative reduction of local industrial noises; (4) extraordinary maintenance of street surfaces; (5) shielding; (6) internal arrangement of rooms; (7) acoustic treatment of rooms; (8) insulation of building structure.

Prevailing noise levels: The need for a completely inclosed air-conditioned building to exclude noise, depends on the aggregate reduction that may be accomplished by shielding, arrangement and acoustic treatment. In a modern classroom noise levels should not exceed 40-45 db above the threshold of hearing. Along our average city streets in daytime hours the prevailing noise level will average around 70 db and in some of the extreme cases will continue at levels as high as 90. In New York City some progress has been made by cooperative efforts of the Noise Abatement Commission, Board of Education and the Police Department,

CONTROL OF SOUND



sound level meter used in measuring conditions of noise

Courtesy Electrical Research Products, Inc.

in arranging for the detouring during school hours of a large part of the very heavy traffic from those schools most seriously affected, although in some locations it is impracticable to reduce this excessive level in the immediate vicinity of the school building. In suburban districts a street noise level of 60 db may be expected.

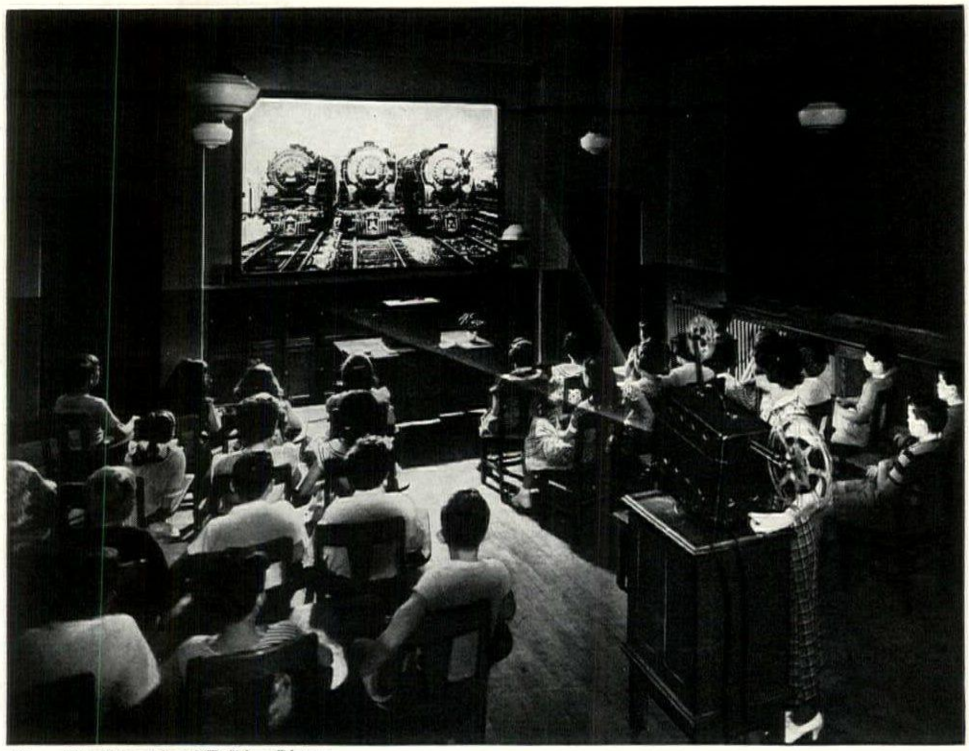
Shielding against noise: Sound tends to some degree to travel in more or less straight lines expanding along its own front as it progresses. Areas therefore cannot be shadowed completely as in the case of light, but nevertheless relatively large reductions in noise may be obtained by shielding or partial acoustic shadowing. Where the principal noise disturbance on a proposed school site is reasonably localized along one side or at one point near the area, advantage may in some cases be taken of the shielding effect of existing buildings. In multi-structure schools the arrangement of the individual buildings may be such as to shield the classroom sections from the external noise. Reasonably quantitative information as to the reduction which may be obtained under any given set of circumstances is available.

Another method is the arrangement of the internal spaces of the building so that classrooms having the most severe minimum noise requirements are located on the side away from the principal noise source or even at the interior of the building, whereas vocational rooms, gymnasiums and similar spaces can be placed at the points of severest disturbance. Extraordinary improvement can frequently be accomplished through somewhat unconventional arrangements. Equal consideration should be given to adequate protection or isolation of classroom from those vocational rooms which, because of machinery or other sources, may create high noise levels.

Acoustic treatment: A material reduction of noise level may be obtained by the application of acoustic material within the classroom itself. Care should be taken, however, that the requirements for proper room acoustics are not violated by the addition of too great a quantity, by the improper distribution or the improper type of sound-absorbing material. In a classroom, more particularly in the larger classroom or auditorium, the objective is an efficient transmission of sound from point to point. It is generally recognized that an excessive amount of reverberation, which is manifested by an extreme prolongation of each of the individual syllables or speech sounds, is destructive to intelligibility, but it is somewhat less well known that a room can be made too dead for good intelligibility. A treatment which will give best acoustic conditions will generally yield so nearly the maximum noise reduction as to indicate the desirability of determining the quantity of material on an acoustic rather than on a noise reduction basis.

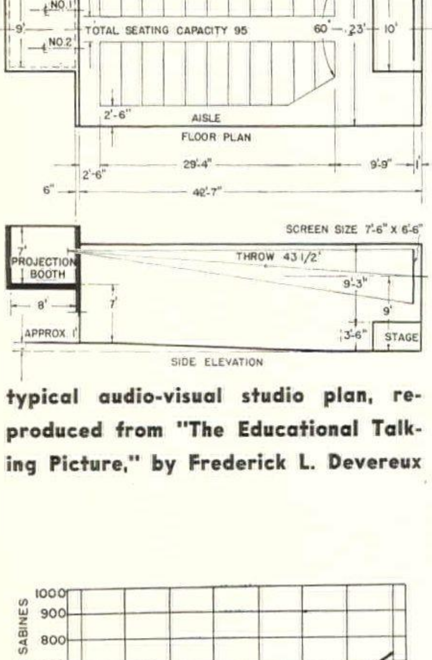
Quality and distribution of material is important in the small classroom but becomes an imperative consideration in the large rooms, such as an auditorium. Here, careful thought must be given to the amount of absorption at various audible frequencies to insure a proper balance of the reverberant sound energy.

CONTROL OF SOUND

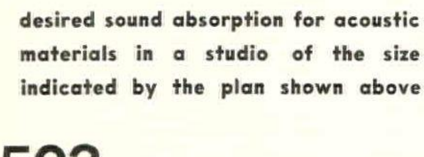


a classroom in the Roosevelt School, New Rochelle, New York, specially adapted for audio-visual instruction

From The Educational Talking Picture



typical audio-visual studio plan, reproduced from "The Educational Talking Picture," by Frederick L. Devereux



desired sound absorption for acoustic materials in a studio of the size indicated by the plan shown above

The distribution of material about the auditorium must be such as to permit the maximum enhancement of sound from the stage or platform with the minimum of discrete disturbing reflections. The principles which govern acoustics of theaters should be fully applied in considering the school auditorium, allowance also being made for the probable use of sound reinforcement and educational talking pictures.

Extent of noise reduction: It is, of course, impracticable to indicate, except in a specific case, the amount of reduction which may be accomplished by any of the measures suggested here. However, reductions of 8 to 12 db from localized sources have in some instances been realized by the shielding of buildings. Differences in noise level on opposite faces of a building, one exposed to noise and the other open, may run from 10 to 20 db, depending upon the nature and location of the noise source with respect to the building. Obviously for those rooms which may be located within the interior of the building, little consideration need be given to the external noise level as the reduction so obtained is large as compared with the reduction required. By the use of acoustic absorbing materials within the room in an amount consistent with good acoustic properties, reductions of the order of 5 to 8 db may be anticipated.

Audio-visual studios: The growing use of talking motion pictures in the modern educational program increases the need for proper acoustic conditions in individual classrooms as well as in large auditoriums. In addition the school should include, in proper ratio, special purpose rooms providing maximum facilities for talking picture programs. The accompanying illustration shows a typical plan for such a room, called an "audio-visual studio." The best acoustic condition for such a studio will be obtained by concentrating the sound-absorbing material on the wall opposite the screen with a limited amount distributed along the side walls. The absorption offered by the acoustic treatment should, for a room this size, equal the amount shown in the chart. In this curve the absorption is measured in sabines or units equaling one square foot of 100% absorption. It will be noted that different quantities are indicated for various frequencies. This is important in order to secure the correct balance in the amount of reverberation for each portion of the sound frequency spectrum.

Control of internal noise: Precaution must be taken to avoid the creation of disturbing noises within the building itself or to permit their transmission into the classroom or other quiet sections. In the inclosed air-conditioned building this requirement becomes of greater significance, owing in part to the lower prevailing noise level and in part to the air-conditioning machinery and to the avenues of sound transmission afforded by the ducts. The means for preventing disturbance from these sources—such as elastic support for the machinery, flexible connections between machinery and ducts, sound-absorptive linings between ducts, and the like—are well known.

CONTROL OF SOUND

AMERICAN STANDARD FOR MEASURING NOISE LEVELS

A basic standard for the measurement of sound has just been set up for the first time through the work of an American Standards Association committee, directed by the Acoustical Society of America. Measurement of sound is the first step in the control of noise. The new standards for noise measurement and for sound level meters establish a uniform reference system. The specification of loudness is described in a report by Harvey Fletcher, chairman, Subcommittee on Noise Measurement, from which the accompanying paragraphs are quoted.

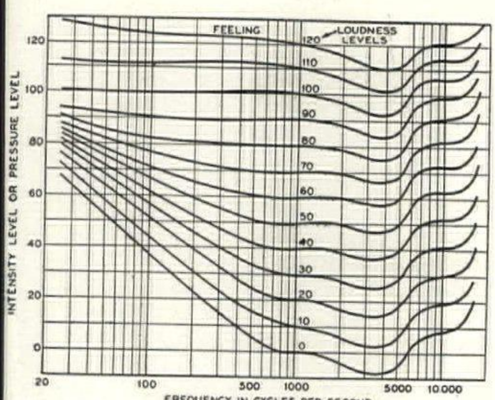


figure 1—intensity level of pure tones of different frequencies must be changed to maintain a given loudness level

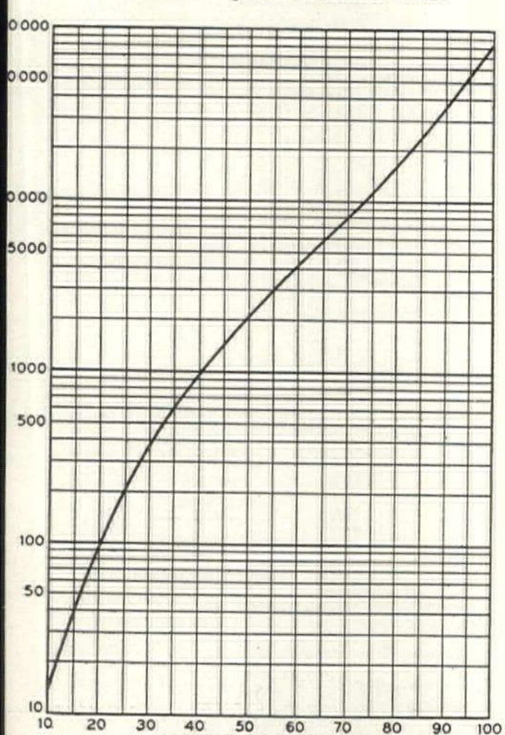


figure 2—curve shows relation between loudness as measured in loudness units and the loudness level measured in decibels

Some physical quantities, such as weight or length, are stated as so many pounds or feet added to nothing at all. However, such a quantity as altitude is measured as so many feet above a reference level, usually sea level. Intensity level is like altitude and is most conveniently stated as so many units above a value arbitrarily chosen as "reference level." The unit chosen for indicating the difference between a given intensity level and reference level is the "decibel."

While intensity level is a physical quantity, the loudness of a sound depends on the ear and on the observer's judgment. To guide this judgment a reference tone has been selected and loudness has been defined. By definition, the loudness level of any sound is the intensity level of an equally loud 1,000-cycle reference tone. By making such comparisons with the 1,000-cycle reference tone, the loudness levels of pure tones having frequencies and intensities throughout the audible range were measured. The results are shown in the curves of Figure 1. The curve marked "0" represents the faintest sounds that can be heard and the one marked "120" the loudest that the ear will tolerate. Referring to the "0" loudness curve it is seen that as the frequency decreases from 1,000 cycles, more and more intensity is necessary to make the sound audible. On the other hand at higher levels, for example 90 decibels, sounds are almost equally loud as the frequency is decreased.

Among several practical uses for these curves may be noted the case where a particular noise is compared to a tone of, say, 100 cycles. If the intensity level of this tone were found to be 58 to sound equally loud to the noise, then following the curve to the right shows the loudness level to be 30 decibels. Thus we see that by using this set of curves any pure tone can be used for finding the loudness level of a noise.

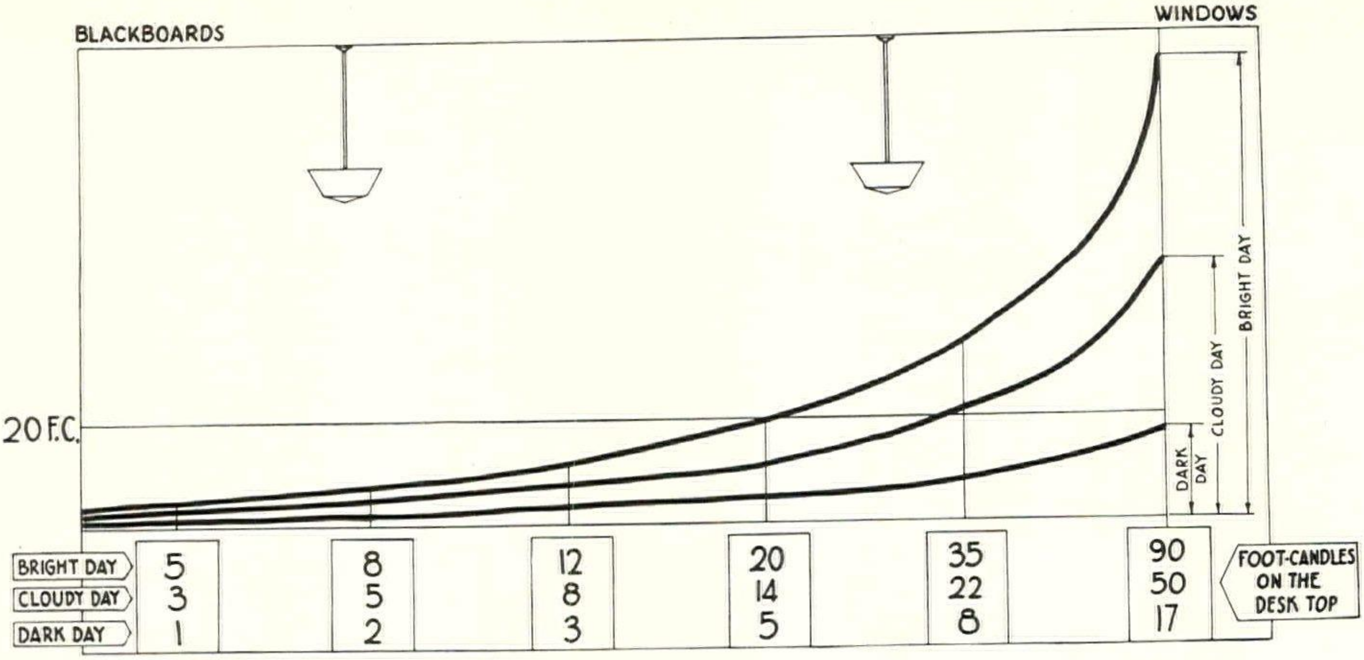
Relative loudness: Although loudness level values define precisely the loudness of any sound, the numbers on such a scale do not correspond to the relative loudness that is experienced by most people. If you give a person the reference standard and ask him to turn the dial until the loudness of the sound has been doubled, how many db will he change it? To get an answer to this question large numbers of observations on such judgments were taken, both in this country and in England. In the intensity range where most noises were heard, it was found that the intensity level of the reference tone was increased about 10 db to produce double the loudness. Judgments were taken to find the changes in intensity level corresponding to ½, ¼, 1/10, and other changes of loudness. In this way the relationship between loudness and loudness level has been found. It is shown by the curve of Figure 2. This relationship has also been accepted as a tentative standard.

To illustrate further the meaning of loudness and loundness level when applied to practical problems, Table 1 shows the loudness of noises which are familiar to most every one. It will be seen that the loudness values range from one to one million corresponding to a loudness level range of about 126 db.

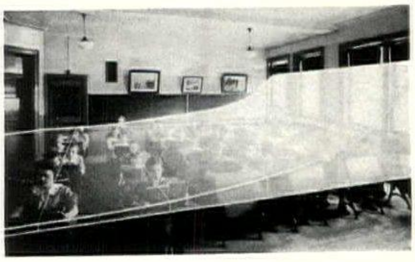
It is expected that the adoption of these standards will make it possible to write more definite specifications regarding noise conditions, which in the end must also bring about desirable noise reduction.

TABLE 1: LOUDNESS OF TYPICAL NOISES

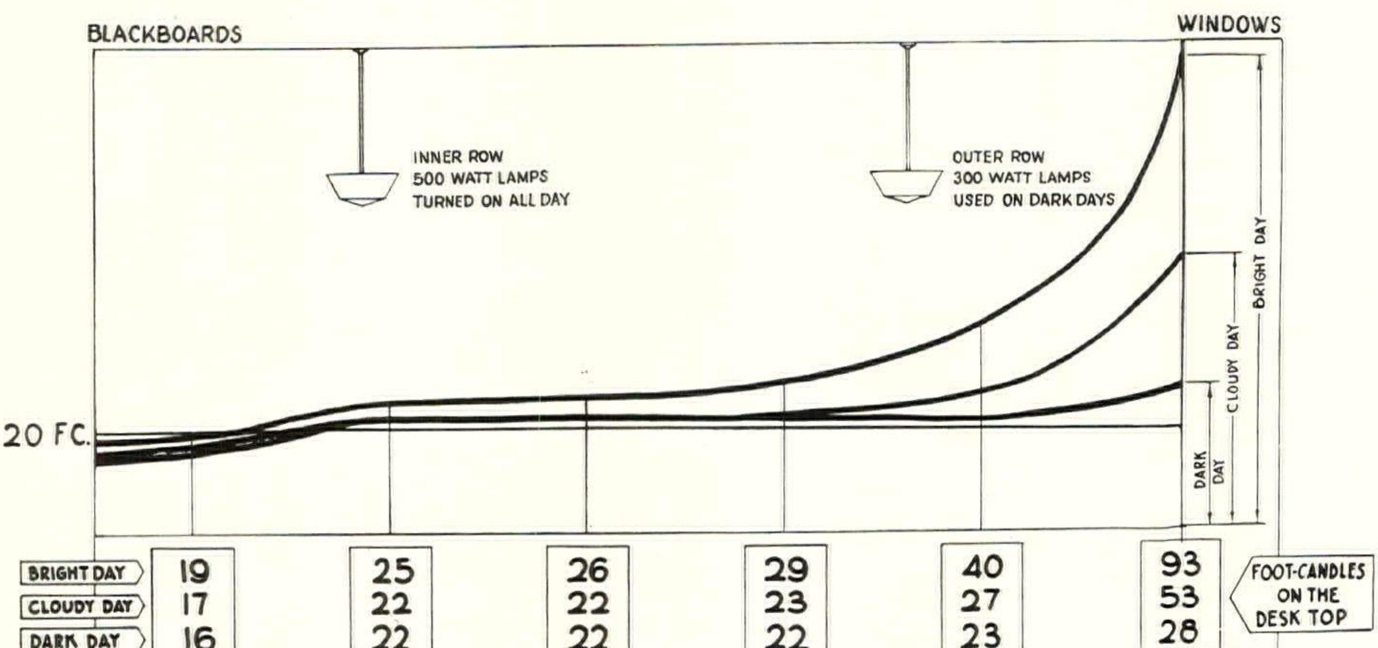
NOISE SOURCE	DISTANCE OF LISTENER	LOUDNESS LEVEL	LOUDNESS
Threshold of pain	—	126 db	1,000,000
Airplane	18 feet	123 "	700,000
Hammer on steel plate	2 "	120 "	550,000
Riveter	35 "	105 "	140,000
Elevated train	20 "	95 "	60,000
Heavy street traffic	50 "	85 "	25,000
Average motor truck	30 "	80 "	17,000
Average automobile	30 "	70 "	8,000
Conversation	3 "	65 "	6,000
Quiet automobile	30 "	56 "	3,000
Loud whisper or soft voice	2 "	45 "	1,500
Suburban street (no traffic)	—	36 "	700
Average whisper	2 "	28 "	300
Rustle of leaves by gentle breeze	—	16 "	50
Noise of ordinary breathing	1 "	10 "	14
Threshold of hearing (in soundproof booth)	—	0 "	1



NATURAL LIGHTING



Since most classrooms are used largely for daytime work, arrangements should be made for controlling and distributing artificial light to supplement daylight when necessary. Natural daylight alone is insufficient, as shown by the illustration. Illumination is strong near the windows, but falls off rapidly across the room.



BALANCED LIGHTING

A minimum illumination level of 20 foot-candles can be maintained almost evenly across the room by adding artificial lighting in quantities indicated on the diagram. A full-sized demonstration and experimental classroom utilizing this principle has been installed in the General Electric Institute at Nela Park, Cleveland.

CONTROL OF LIGHT

BETTER LIGHT FOR THE CLASSROOM

By ALSTON RODGERS, engineer

General Electric Company

Most of our thoughts and actions are controlled and dictated by our sense of sight. A human being is, to a large extent, a seeing machine. By far the greatest part of our learning is gained through the eyes.

In view of this fact, particular attention is paid to the eyes of school children today. Eye examinations are now conducted regularly in practically every school, and eyeglasses or treatments by competent eyesight specialists are recommended for students with defective vision. There are still many whose visual defects remain uncorrected, but a large number of children with poor eyesight have been given normal vision by these precautions.

The only aid to overburdened *normal* eyes, however, is in making the job of seeing easier. To this end, difficult seeing tasks are eliminated, as far as possible, from the lower grades. For children with very subnormal vision "sight-saving" classes have been instituted in many schools: textbooks are printed in very large type, oversized pencils and blackboard crayons are employed to make classwork more visible, and the children are required to rest their eyes for prescribed periods.

Not until recently has better lighting been recognized as one of the most important aids to vision. New knowledge of light and seeing, gained from years of scientific research, has shown that better lighting improves visibility as effectively as increasing the size of type in textbooks or seating the pupils closer to the blackboard, and it is generally a more economical expedient. Furthermore, it has been proved that seeing is not done by the eyes alone. It is work done by the whole body; it affects the nerves, the muscles, the heart, and the brain. Difficult seeing is a drain on physical energy, and often results in nervous disorders and undue fatigue.

Conditions of seeing: Since light affects us so materially, the question arises, How much light should we have for easy seeing? The photronic cell light-meter makes it possible for us to measure illumination as simply and accurately as a thermometer enables us to measure temperature.

Outdoors in the direct sunlight of a bright summer day, the illumination may be in the order of 8,000 to 10,000 foot-candles. Probably this would be too brilliant and annoying for reading a book printed on white paper. However, the shade of a tree or porch would be quite comfortable for such work. Here we might expect to find several hundred or a thousand foot-candles. Even on a dark rainy day we have several hundred foot-candles outdoors. Under these conditions of abundant natural light the human eye has developed for ages. Now, with even more difficult visual tasks imposed by our civilized world, we expect our eyes to function equally well with only a very small fraction of this illumination. At present, in our schoolrooms, we find 3-5 foot-candles, or less, of artificial lighting.

The eye can adapt itself, of course, to see with only a little light. It is possible to read under bright moonlight (about 1/50 of a foot-candle). Such a condition might be termed one of "barely seeing" as opposed to "easy seeing." Present provisions for artificial lighting are certainly far down toward this "barely seeing" range.

Ease of seeing does not increase in direct ratio with the addition of foot-candles. If we wish to advance toward nature's seeing conditions in equal steps of "better seeing," we must increase the illumination in about the following series of foot-candle values: 5-10-20-50-100-200-500-1,000. Each step-up represents an equal improvement in ease of seeing.

Although daylight outdoors actually varies through a range of hundreds and thousands of foot-candles, it constitutes a change of only a few steps in "seeing effectiveness." Our lighting indoors is many steps lower. For this reason, by the addition of a comparatively few foot-candles, increasing the artificial illumination to values of 10, 20 or 50, we can actually effect improvements in "seeing" comparable to the change between a gloomy day and a clear day outdoors.

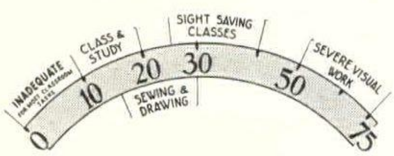
Standards of lighting: Artificial lighting was invented originally to compete against darkness—to give "just a little light, something better than the dark." Today, science has advanced to the point where artificial lighting can be a competitor of daylight—it can provide seeing conditions comparable to nature's provisions.

Fifty years ago it would have been impractical to supply even 10 foot-candles of artificial illumination throughout a classroom because of high cost and technical limitations. In 1932 a recommended range for minimum classroom illumination of 8 to 12 foot-candles was adopted as an "American Standard," as set forth in the bulletin, *Standards of School Lighting*, prepared under the joint sponsorship of the Illuminating Engineering Society and the American Institute of Architects. Today, it is possible to obtain as much as 50 foot-candles in the classroom practically and economically.

Because of this rapid advancement, the old school lighting standards have be-

CONTROL OF LIGHT

photronic cell light-meter



recommended foot-candles for schools

come obsolete and the "American Standard" bulletin is now in process of revision. Undoubtedly, the minimum foot-candle recommendations will be revised upward. The values for classroom lighting in all probability will be in the order of 10 to 20 foot-candles. For the more exacting eye work in sewing and drawing classes, 15 to 30 foot-candles may be recommended. For children with defective vision in "sight-saving" classes, higher values are desirable. For prolonged research, study, drafting, fine sewing or other close detailed work, supplementary lighting should be added to raise the illumination still higher. Such recommendations are indicated on the accompanying scale.

Quality of lighting: If foot-candles were the sole consideration, illumination could be obtained cheaply and easily with bare lamps or lamps in simple shades or reflectors. But this type of lighting is raw, harsh and glaring, for the light sources are concentrated in small brilliant spots. Small diffusing-glass enclosing globes increase the size of the light source and thereby decrease its brightness and glare. Still larger globes further decrease the annoying brightness without decreasing the illumination on the desk tops.

Most enclosing globes used in classrooms today are too small and consequently appear too brilliant. Where such globes are used in the schoolroom, it is recommended that the following sizes of glassware be employed:

Recommended Minimum Diameters of Enclosing Globes for Classrooms

150-watt lamp	14-inch globe
200-watt lamp	16-inch globe
300-watt lamp	18-inch globe

A still better quality of lighting can be obtained with totally-indirect or semi-indirect lighting fixtures. All or most of the light is reflected from the ceiling which becomes an extensive light source of relatively low brightness. As some of the light is absorbed by the ceiling, roughly 30% more wattage must be supplied than necessary with the enclosing globe system for the same illumination. However, the lighting is more comfortable, both direct and reflected glare are minimized and sharp shadows are eliminated.

Lighting layout: All too frequently the mistake is made of spacing the lighting fixtures too far apart. With a given mounting height, any fixture can light only a certain area effectively. With wide spacing of indirect lighting fixtures, the ceiling directly over the lighting units appears bright and the spaces between appear dim. This usually creates an uncomfortable glaring contrast which largely defeats the purpose of the lighting scheme.

A classroom with about a 12-foot ceiling height and of typical size, as shown in the plan on page 507, should be equipped with six lighting units. This layout is proper for rooms having the range of dimensions noted.

The table shows the average foot-candle values that can be expected from various sizes of lamps in direct lighting enclosing globes, or the average indirect fixtures, assuming a good white ceiling and medium light side walls. The values vary of course with the actual size of the room. These figures take into account reasonable depreciation and represent average lighting "in service." The initial illumination with new fixtures and lamps and freshly painted ceiling and walls will be somewhat higher. With any lighting system, careful maintenance is necessary to keep dust and dirt from wasting the light.

Wiring: One of the greatest obstacles to improved lighting in present school buildings is the inadequacy of the wiring provisions for carrying even slightly increased loads. In practically every branch of structural engineering and building planning, large safety factors are commonly used, yet in the matter of wiring it seems general practice to make little or no allowance for the greater loads which are almost inevitable.

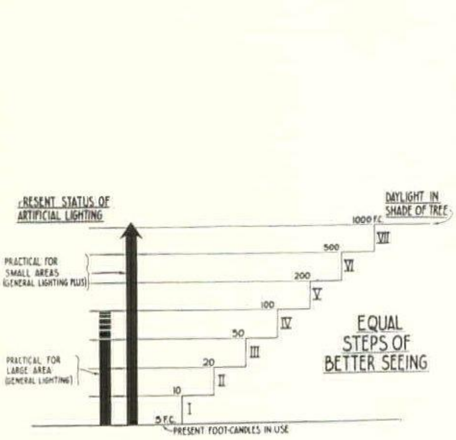
A great many old and new wiring installations are even inadequate for efficient operation of the lighting load for which they are planned because the voltage drop in the wires causes the lamps to operate at less than their rated voltage. Lamps burned undervoltage produce light less efficiently. One cause of this lack of provision for proper voltage is that most architects and contractors use only the Underwriters' Codes as a guide in specifying wire sizes for given loads. Primarily these are safety codes and they do not take into account the length of the wire run and the voltage drop.

As a minimum consideration, the wire size and length of runs should be so planned that the voltage drop from panelboard to outlet will be no more than about 2% with the designed load. To provide for the future, this designed load should include a reasonable "safety factor."

Room surfaces: In the classroom the ceiling and upper side walls are as much a part of the lighting system as are the lighting fixtures. This is particularly true with indirect lighting.

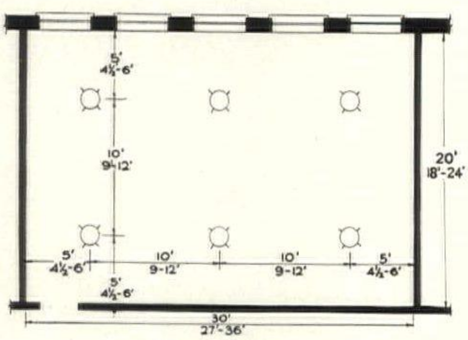
In specifying the wall and ceiling finishes there are three considerations which are important from the standpoint of lighting:

(1) *The ceiling should reflect at least 70% of the light which strikes it.*



seven steps to daylight

CONTROL OF LIGHT



layout for a well-lighted classroom

PROPER FIXTURES AND LAMPS AVERAGE FOOT-CANDLES OF ILLUMINATION

TYPE OF LIGHTING	SIZE OF LAMPS (WATTS)	ROOM DIMENSIONS 18' x 27'	20' x 30	24' x 36'
Direct Lighting Enclosing Globes	200	11	9	6
	300	17	14	10
Indirect Lighting Fixtures	300	14	11	8
	500	24	19	15
	750	36	29	21
	1000	50	40	31

(2) *The walls should reflect about 50% of the light.*

(3) *Walls and ceilings always should be given a flat or matte finish.*

A good flat white paint on the ceiling will reflect at least 80% of the light initially. The higher the reflection factor, the more efficient will be the lighting. Sometimes ivory or cream is preferred from the standpoint of appearance. If this does not decrease the reflection below 70%, the illumination will not be seriously affected. There is no reason why a tinge of blue or green might not be added to the white if a cool effect is desired.

Acoustic ceilings usually absorb a considerable amount of light because of their porous nature. Where such sound-absorbing ceiling materials are used with an indirect lighting system, the illumination is generally decreased by as much as 25%. This can be compensated by using proportionately larger lamps in the lighting fixtures.

If the walls reflect more than 50% of the light, the brightness in the field of vision often becomes annoying. If they reflect much less than 50% some possible illumination and efficiency are sacrificed. The dado may be finished in a dark color, if desired, for this contributes little toward reflecting light on the desk tops.

Glossy or shiny finishes on walls, ceiling or trim are extremely bad from the standpoint of lighting and seeing. Contrary to general opinion, good flat or matte finishes generally do not depreciate much more rapidly nor are they much harder to keep clean than most glossy finishes. Shiny walls reflect uncomfortable glare from the window areas in the daytime. Glossy ceilings never appear evenly illuminated. Such a surface acts partly as a mirror reflecting images of the bright light sources and of the dark spaces between. The statement that a light-colored flat or matte finished ceiling should *always* be used with an indirect lighting installation has been made time and again by lighting authorities, and yet many architects, decorators, painters, and contractors apparently do not take it seriously. Probably more good indirect lighting installations have been spoiled because of shiny ceilings than for any other reason.

Wall colors: The question of what color to paint the walls is largely one of preference, involving decorative and psychological effects more than illumination. Tints of any color can be evolved to reflect 50% of the light. Warm tans and buffs seem to have become somewhat standard for schoolroom walls, but there are some excellent arguments in favor of using cool colors in preference to these. The cool greens, blue-greens and blues have a restful, quieting influence. They need not be depressing if the colors are carefully chosen. Schoolrooms generally are well heated in the wintertime, and they are certainly warm enough in the spring and fall, so there appears to be little need for supplying an additional warm effect for comfort. Warm colors make walls appear to press inward, while cool tones give an airy, spacious effect. Our eyes appear to prefer the predominant cool colors of natural daylight. Warm-colored walls tend to accentuate the excess of yellow and red rays from the incandescent lamp, whereas tints of blue or blue-green offset this to a great extent.

Daylight in the classroom: Daylight indoors on a bright day at the row of desks near the window is usually less than 1% of the light outdoors in the open. The reason for this is that, on a clear day, about 80% of the light in the open comes directly from the sun and about 20% from the sky; about one-twentieth of the sky dome is visible through the classroom windows, leaving only 1%, or about 100 foot-candles, available close to the windows. From this point, the illumination falls off rapidly across the classroom until only 5 foot-candles are available on the farthest row of desks. Where the school is situated on high ground with few trees or obstructions, the natural lighting may be somewhat better in classrooms with large windows, but daylight at the last row of desks rarely exceeds even 10 foot-candles. This unequal distribution handicaps the students in the rows away from the windows.

In most northern localities, about half of the schooldays are cloudy or dark. Then the indoor daylight falls much lower and seeing conditions become relatively poor throughout the whole room. When direct sunlight streams in, much higher illumination values are obtained, but the glare through the windows becomes unbearable; desks and books also reflect glare and the room is filled with sharply contrasting lights and shadows. Good translucent shades or some form of Venetian blinds, which again reduce the illumination, offer the only present means of controlling this condition.

Supplementing indoor daylight: As most classrooms are used largely for daytime work, arrangements should be made for controlling and distributing artificial light to supplement daylight when necessary. The diagrams on page 504 show how this can be accomplished by a simple control arrangement of a standard lighting system. The first diagram shows the distribution of natural daylight across a typical classroom on average bright, cloudy, and dark days. Let us assume that 20 foot-candles is the minimum illumination to be provided at any time. The

CONTROL OF LIGHT

most economical way to maintain this minimum level would be to distribute only enough artificial light at each point to raise the foot-candles to 20 and to supply as little light as possible where the daylight is above this value. As the second diagram shows, a simple control arrangement comes surprisingly close to balancing the daylight and meeting ideal requirements.

Balanced lighting: The wiring and switches should be arranged so that the row of lighting fixtures on the window side and the row on the inner side can be controlled independently. Since the daylight at the inner row of desks seldom if ever exceeds about 5 foot-candles, this inner row should be turned on continually when the room is in use. Assuming the use of indirect lighting fixtures for comfortable lighting and proper spacing of units as shown in the diagram on page 507, 500-watt lamps in this row of fixtures will balance the daylight quite evenly to slightly above 20 foot-candles on both bright days and average cloudy days.

On dark days the illumination near the windows would fall off. At such times the outer row of indirect fixtures should be turned on. The graph shows that 300-watt lamps in these units are sufficient to take care of usual dark day conditions and this lower wattage can be recommended here with good justification. However, as these lamps are used only a small part of the time, some schools may find it more convenient to use 500-watt lamps here as well, to take care of any night work or for the sake of simplification in lamp stocks and renewals.

Photo-cell control: It is impossible for a teacher or any other person to judge accurately when the light near the windows has decreased to below 20 foot-candles. The electric-eye can be used to control the outer row of fixtures and to turn on more artificial light when necessary, thus assuring good light for the students at all times and relieving the teacher of the responsibility. The photo-cell relay can be mounted on the wall above the blackboards and aimed to view the sky through the windows. This instrument connected to a contactor at the panel board can be adjusted to turn the lights on or off at specified foot-candle levels.

It is not necessary to use one of these photo-cells in every classroom, as one cell can control the lights in a whole group of rooms having the same daylight exposure. Unless there are trees or obstructions which shadow some of the rooms, four photo-cells usually can control the classroom lighting for an entire school building with reasonable accuracy. Within the past year, photo-call equipment has been somewhat improved and simplified with the result that more compact units are available at about half the price of comparable equipment on the market a year ago.

Control of daylight: Before the daytime lighting in a room can be called really comfortable, some measures generally must be taken to decrease the window brightness. Even on a cloudy day the sky brightness at the top of the window appears uncomfortable when viewed from across the room and the shades must be drawn part way down. Only on dark days can the shades be left up with comfort.

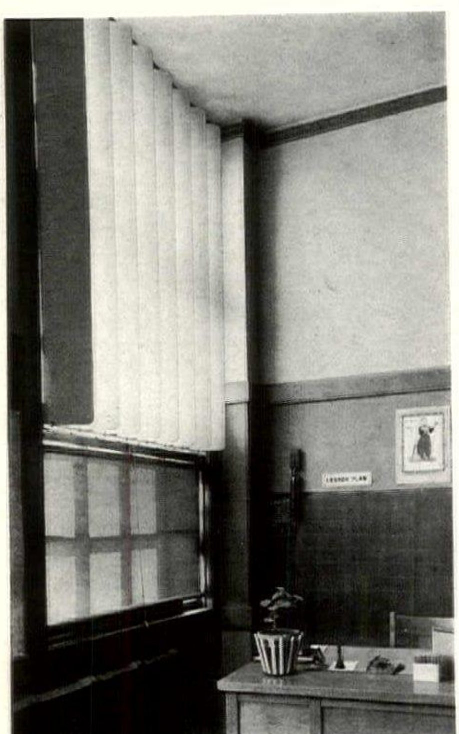
Windowless buildings greatly simplify the lighting problem. Additional reflecting areas are provided on the walls to help light the rooms. Switching control possibly may be simplified. Plenty of easily accessible space for wiring is made available by the ventilating ducts, and air conditioning outlets may be combined as part of the lighting fixture supports.

Glass buildings present some problems in lighting. Large areas of glass walls transmit some of the interior light rather than reflect it back into the room. This construction creates even more of a problem in direct sunlight control because of the large areas of Venetian blinds or shades necessary.

Window louvers: There is one other interesting possibility to which, apparently, little thought has been given. This is the development of some nonadjustable shielding arrangement to conceal the sky completely from normal view, while reflecting the outdoor light into the room in a direction away from the eyes of the occupants. Such an arrangement conceivably might be incorporated in glass walls or large window construction, or it might be attached to present high windows.

One way of accomplishing this might be through the use of horizontal fins resembling a Venetian blind, with the louvers set rigidly at varying angles to conceal the sky, but admitting as much light as possible. The upper surfaces of the fins might be of polished metal to direct light efficiently toward the ceiling. In classrooms where the pupils all face in one direction, vertical louvers set at an angle might be used to intercept light coming toward their eyes. A similar arrangement has been placed on the market and is being given a trial in some schools, as shown in the illustration.

It is not necessary for the louvers to extend the full length of the window since the bright sky generally is visible only above a point slightly higher than eye level. This leaves the lower part of the window unobstructed.

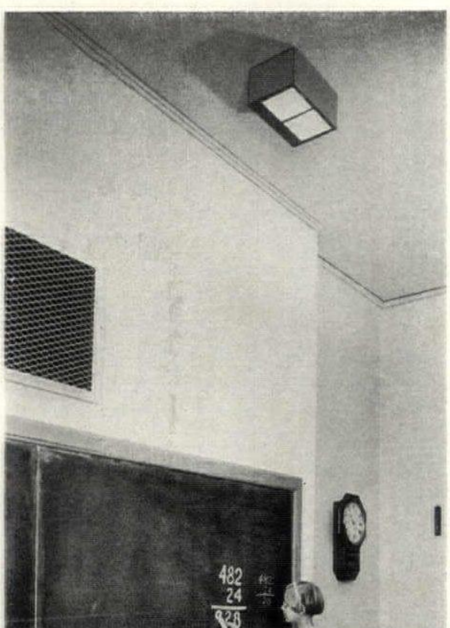


Delmo Sales Corp., San Francisco

window louvers — "Dalmo Litecontrol"

CONTROL OF LIGHT

This new instrument, the Luckiesh-Moss Visibility Meter, enables the experienced seeing specialist to rate accurately the relative difficulty of any seeing task and to prescribe illumination on this basis. While looking at the task through this device, graded light-obscuring filters are moved across the eye openings until the threshold of seeing is reached; at this point the relative visibility and recommended foot-candles of illumination are indicated on the dials.



blackboard lighting—Holophane fixture

Desks: Many educators very sensibly are advocating the use of desks with tilted easel tops which may be adjusted to a comfortable working position by the student, allowing him to sit up straight instead of bending over the task. By making a movable unit of this type desk with a seat attached, the pupil can turn the desk keeping his back to the bright light as the sun's position changes and the tilted easel top will pick up added illumination from the vertical window area. In supplying artificial lighting on these tilted desk tops it appears that some combination of diffused and directional light from above and behind the desk might be effective. When desks are movable, it is difficult to supply such lighting. If fixed daylight control devices, as suggested above, could be provided, the desks might be fastened in a permanent position and the artificial lighting problem would be simplified.

Blackboards: Some preliminary studies on the visibility of blackboard work show that, for students in the back of the room, this seeing task is considerably more difficult than reading a textbook. This indicates that several more times illumination is required on the blackboard than on the desk tops. The large wall area occupied by blackboards in the average classroom also affords somewhat of a handicap to good lighting and seeing conditions. The black areas absorb some of the light which might be reflected to the desks and the sharp contrast with the light walls directly in the field of vision is rather annoying to the eyes when viewed for a long time. To overcome this condition, the suggestion has been made to develop white or amber surfaces which could be written on with black chalk. This would aid in the room lighting, but the main idea seems to be to improve the visibility of the writing. Contrary to general opinion, laboratory researches indicate that writing in white on black is just as visible as black on white. It is doubtful, then, that this suggestion would aid much toward easy seeing.

In some schools, experiments have been made with light-colored window shades mounted above the boards to cover the dark surfaces when they are not in use. One thought which might be given consideration is to hinge the blackboards in sections so that they may be turned around exposing light-colored back surfaces. These may be used as bulletin or exhibit boards and reversed when the writing surface is required.

Lighting research: In the laboratories, scientists are making rapid strides toward the development of new light sources. Several forms of these new illuminants are on the market today, but it seems likely that their application in the school field may be somewhat restricted for a while, because they involve more complexities than does the incandescent lamp at the present time. However, new developments in incandescent lamps themselves and the use of new reflecting and diffusing materials now available may make possible the design of radically different forms of lighting equipment especially suited to meet the particular requirements of the school classroom. Thought is being given to this possibility.

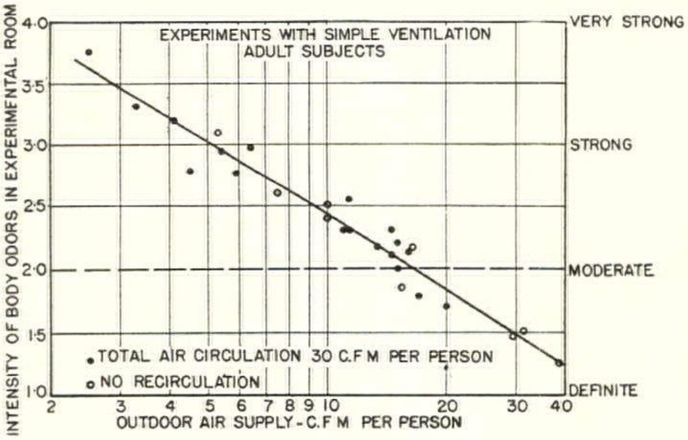
Prescribing light: Up to the present time, appraising the relative difficulty of various eye-tasks has been largely a matter of estimation, for there was no easy means of measurement. The recent development of the Luckiesh-Moss Visibility Meter makes it possible for the seeing specialists to measure accurately the relative visibility of any task and to prescribe the illumination necessary to meet a predetermined standard of seeing ease. With this instrument studies are being made of schoolroom tasks with a view to developing particular lighting to suit special requirements.

Specializing the classroom: At present the same classroom is generally used for lecture, study, demonstration, writing and recitation. These involve a variety of different seeing problems and it is difficult to plan one lighting system which will meet each of the different requirements equally well. Therefore the lighting must be a compromise attempting to meet the more difficult situations as well as possible.

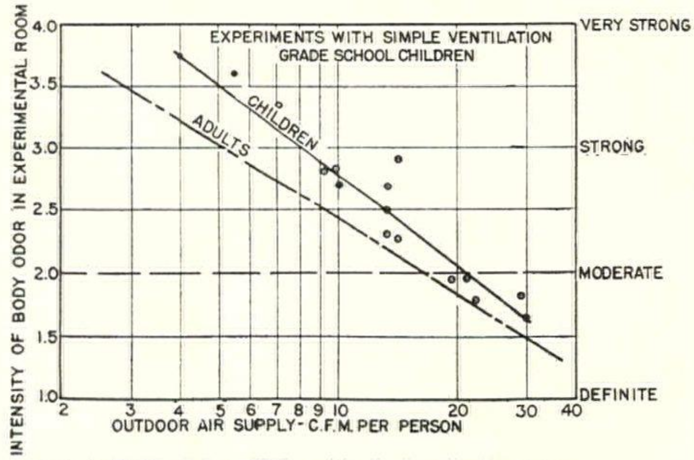
Some school authorities are beginning to advocate a revision of the educational system to permit each room to be used for a particular purpose. Certainly such a plan would make possible far more effective lighting. For example, in lecture and demonstration rooms a medium level of illumination at the seats would be sufficient for the easy task of taking notes, while plenty of light could be provided at the front of the room for easy seeing and concentration on the teacher and demonstration. Separately controlled lighting could be provided on blackboards and charts. Writing, study and workrooms might be so arranged that students could be placed in groups around desks or tables. This would permit supplementary lighting on the work in addition to medium general illumination. By this means much higher levels of illumination could be afforded on the task with little increase in operating cost.

A plan of this kind offers interesting possibilities from the standpoint of lighting. Very probably it would afford unusual architectural and design opportunities as well.

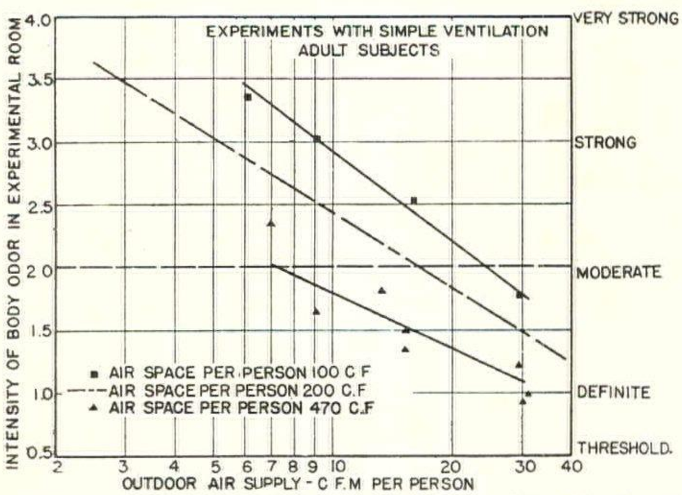
ADULTS

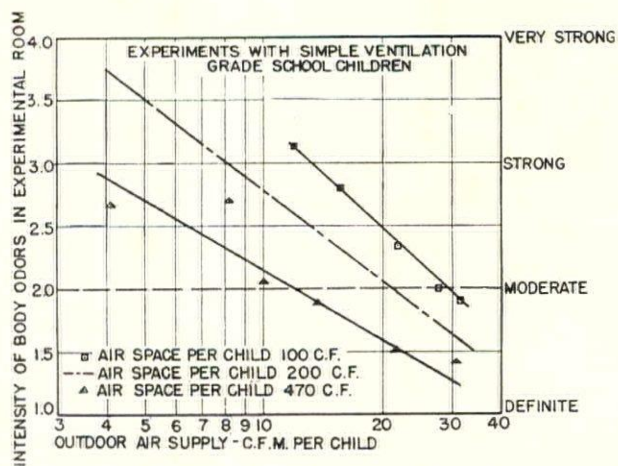


CHILDREN

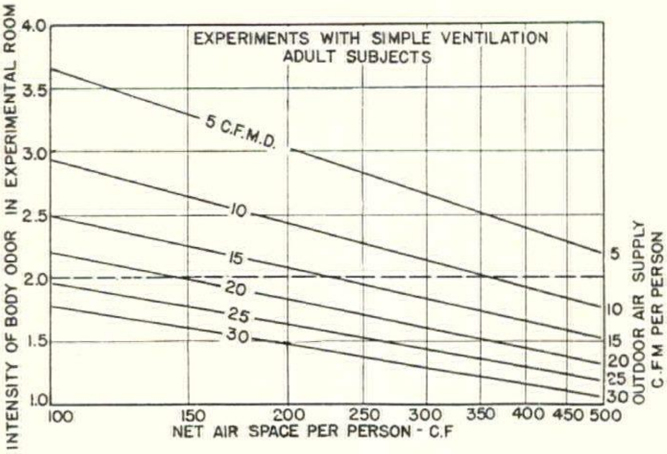


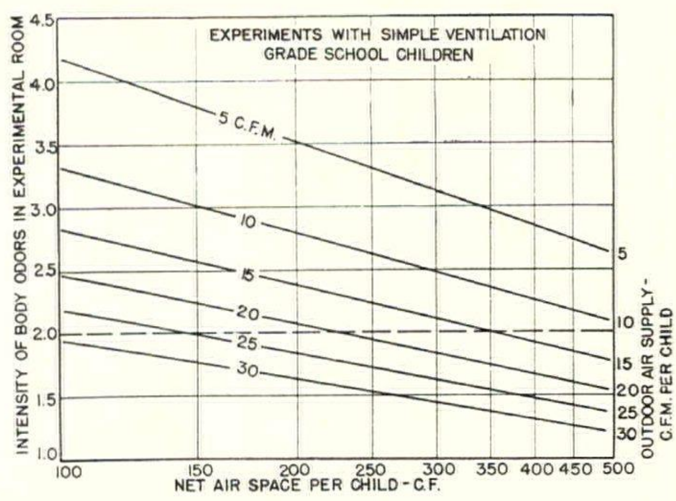
charts show relationship of outdoor air supply to odor intensity when each individual has 200 cubic feet net air space.





charts show influence of air space on odor intensity for adults and children.





charts for computing ventilation requirements from standpoint of body odor: for example, given an air space of 300 cubic feet for each person, follow vertical line indicating this condition until it intersects the broken horizontal line representing the allowable odor intensity of 2; by interpolation the required outdoor air supply is found to be 12 cfm for each adult, 17 cfm for each child.

ATMOSPHERIC CONTROL

The American Society of Heating and Ventilating Engineers has undertaken an investigation of odors and their relationship to minimum ventilation standards for health and comfort. A study of odor conditions resulting from reduced ventilation in classrooms was made by the A. S. H. V. E. Research Laboratory in Pittsburgh in connection with a study on classroom drafts and reported in a paper ("Classroom Odors With Reduced Outside Air Supply") by F. C. Houghten, H. H. Trimble, Carl Gutberlet and Merle F. Lichtenfels at the Society's semi-annual meeting in Toronto, June 1935. Further research is currently being conducted in cooperation with the Harvard School of Public Health; provisional findings were described in a progress report ("Ventilation Requirements") presented by C. P. Yaglou, E. C. Riley and P. I. Coggins at the Society's 42nd annual meeting in Chicago, January 1936. The accompanying paragraphs are based on facts and conclusions set forth in these two papers.

BETTER VENTILATION IN THE CLASSROOM

Air volume requirements for school ventilation probably have been the subject of more discussion than any other phase of heating and ventilation. The diversity of opinion can be seen in legal requirements: thirty States require 30 cubic feet of outside air per minute per pupil, and others require less or have no ventilation laws.

The engineer has advocated the circulation of a relatively large volume of air, whereas the medical man, knowing the harmlessness of carbon dioxide and the small oxygen content necessary to sustain life, has been unable to recognize a need for more than a very nominal amount of outside air.

Present researches have shown that recirculation of air within the classroom is as effective in providing the required motion and cooling power of the air as the supplying of outside air, provided the proper effective temperature of the recirculated air is maintained. This development has reopened the discussion concerning the required amount of outside air. Why should an outside air supply greater than that necessary to supply the minimum requirements for oxygen supply and carbon dioxide elimination be required?

Need for outside air: It is generally agreed that the requirement for oxygen supply and carbon dioxide elimination is no greater than 2 to 4 cfm per person. In conventional classrooms this will usually be supplied by infiltration and the initial volume of air in the room before occupancy. Based upon this reasoning, it seems logical to believe that no outside air need be supplied through the ventilating system, except when required to maintain the desired cooling power of the air. Recent research indicates, however, that when outside air is not required to maintain the cooling power, odors represent a limiting factor.

Sense of smell: The human nose when properly utilized affords a better criterion of the quality of air in occupied rooms than any of the known physical or chemical tests. In ordinary respiration, the course of air passing through the nasal cavity does not extend up high enough to strike the olfactory membrane, but the odoriferous particles reach the membrane by diffusion which gradually changes the air in the olfactory cleft. Sniffing appears to be the most effective and quickest way for the full perception of odors, as it directs the air stream upwards toward the olfactory areas. The sense of smell is normally aroused by inconceivably small concentrations of odoriferous substances. The sensitivity varies in different individuals. However, the olfactory organs are quickly and easily fatigued if the exciting stimulus continues, although they can perceive the sudden appearance of new odors. The occupants of a crowded and poorly ventilated room are not capable of recognizing body odors which are very apparent or even intolerable to a newcomer. Breathing fresh air restores the sensitivity.

Sources of odors: Odors in rooms come mostly from the occupants themselves. Odors from furniture and the like are not, as a rule, conspicuous in the presence of body odors, although they may be accentuated in a warm or moist atmosphere. The sources of body odors are numerous—foul breath, decaying teeth, sweat and sebaceous secretions (especially when personal hygiene is deficient), gases from the stomach and bowels, and decomposition of matter from the skin and clothes. Even healthy and clean persons freshly after a bath gave off in the experiments an appreciable amount of odor, which is apparently a normal waste product arising from metabolic processes and decomposition of matter in the skin and clothing. Such odors are not, as a rule, known to be harmful, but they certainly indicate a feeling of stuffiness and discomfort to any one coming from outside. The occupants themselves may not be conscious of the odor but they seem to be capable of detecting stuffiness or lack of freshness in the air.

TABLE 1: SENSORY INTENSITY SCALE OF BODY ODOR

ODOR INTENSITY INDEX	CHARACTERISTIC TERM	QUALIFICATION
0	None	No perceptible odor.
½	Threshold	Very faint, barely detectable by trained judges; usually imperceptible to untrained persons.
1	Definite	Readily detectable by all normal persons but not objectionable.
2	Moderate	Neither pleasant nor disagreeable. Little or no objection. Allowable limit in rooms.
3	Strong	Objectionable. Air regarded with disfavor.
4	Very strong	Forcible, disagreeable.
5	Overpowering	Nauseating.

ATMOSPHERIC CONTROL

In general, little attempt is made rigidly to enforce ventilation laws which require 30 cubic feet of outside air. Where recirculation is permissible a considerable percentage of return air is mixed with outside air after treatment. The Ventilation Standards of the American Society of Heating and Ventilating Engineers, adopted in 1932, require a minimum of 10 cubic feet of outside air per person provided that the relative humidity is between 30 and 60 per cent and that an effective temperature range between 64 and 69 degrees is maintained when heating and humidification is required and between 69 and 73 degrees when cooling or dehumidification is required. As architects and engineers will see from the accompanying report, it is necessary to specify school ventilation systems that will meet a wide range of conditions. Installations should be designed and operated so that as little as 10 cubic feet of outside air and as much as 30 cubic feet or more will be supplied to fit varying needs. It is also clearly demonstrated that the average requirement of 30 cubic feet or more of air per person in schools represents a fair average to meet normal conditions.

Measurement of odors: In order to get a good impression of ventilation conditions in a room, one should pass quickly from clean outdoor air to the room to be tested. One or two sniffs produce the strongest sensations of body odor, after which the sensation diminishes and soon ceases altogether. . . . The olfactory threshold—a barely detectable odor—is the baseline for measuring odor intensity; it is analogous to the threshold of hearing—a barely audible sound. On this unit of odor intensity is established the sensory intensity scale (see accompanying table). Standards for noise and sound have been determined by similar subjective tests, using the normal human air for criterion.

Air supply ratios: The strength of body odor perceived by the sense of smell on entering an occupied room from relatively clean air varies inversely as the logarithm of the outdoor air supply. In the Harvard experiments, it was observed, the body odor was very strong and disagreeable when the outdoor air supply per person was under 3 cfm, the strength decreasing arithmetically as the air supply increased logarithmically. The minimum air supply required to dilute the odor to the allowable intensity of 2 under the given conditions (200 cubic feet air space per person, no air conditioning) is about 16 cfm per person. With 30 cfm per person, the odor is still readily detectable but not objectionable. Recirculation does not seem to affect the odor strength appreciably. In other words, from the standpoint of body odor, a room can be ventilated just as well with an outdoor air supply of 16 cfm per person as with a total supply of 30 cfm, about half of which is recirculated.

The impossibility of fixing any single standard that would apply under all conditions is clearly evident. Each case must be considered separately.

Observations with children: Grade school children between 7 and 14 years old have apparently an equation of their own. In spite of smaller body surface and lower total metabolism, they give off more odor than the adults and the air requirement is therefore considerably greater. In tests on a group of children of average socio-economic status, the air supply had to be increased to 21 cfm per child. Adolescent boys and girls between the ages of 16 and 20 years yielded results closer to those of adults than those of grade school children.

Air space variations: The number of persons occupying a room appears to be a very important factor affecting odor intensity and air requirement. With 470 cubic feet of air space per person, which is more or less representative of conditions in homes, uncrowded offices, and the like, the air requirement from the standpoint of body odor was 7 cfm per person; with 200 cubic feet of air space, it was about 16 cfm per person, and with 100 cubic feet of air space, it was almost 25 cfm. Theoretically, doubling the air space is equivalent to doubling the air supply, as in both instances the concentration of odor should be reduced to half. Actually this is not quite the case, owing presumably to imperfect diffusion of odors and of the air supplied to the room. . . . For average children the requirements corresponding to the allowable odor intensity of 2 are 12, 21 and 29 cfm per child with, respectively, 470, 200 and 100 cubic feet air space.

Means of odor control: The usual methods of washing, humidifying or cooling recirculated air were found to remove a considerable amount of odor, thus making it possible to reduce the outdoor air supply. The surface cooler absorbed the least amount of odor and the dehumidifier the most. The absorption by the centrifugal humidifier was but only slightly greater than that of the surface cooler. The outdoor air requirement was correspondingly reduced from 16 cfm per person with simple ventilation to about 13 cfm per person when the mixture of outdoor and recirculated air was passed through the centrifugal humidifier or over the surface cooler, and to less than 4 cfm per person when the mixture was passed through the spray dehumidifier. In the last instance the odor intensity appears to be almost independent of the outdoor air supply.

Socio-economic factors: In a special series of experiments an attempt was made to study maximum variations from the average by using a limited number of subjects of the poorest and wealthiest classes. The requirements of school children were found to vary from 18 to 38 cfm per child, according to their class status. This reflected objectively on bathing habits. Once the minimum ventilation requirements are fixed for any given conditions, the problem of body-odor control resolves itself into personal factors of hygiene and sanitation. The ventilation engineer has no control upon these factors. Two baths a week would help a great deal in solving the schoolroom odor problem. Unfortunately, there are homes of poor families with no bathing facilities at all. A worthwhile experiment from the standpoint of both economy and education would be to have grade schools in the poorer districts provided with baths and in this way treat the real cause with, perhaps, less expenditure of money than would be the case with costly ventilation, which after all is temporarily corrective, not preventive.

THE

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