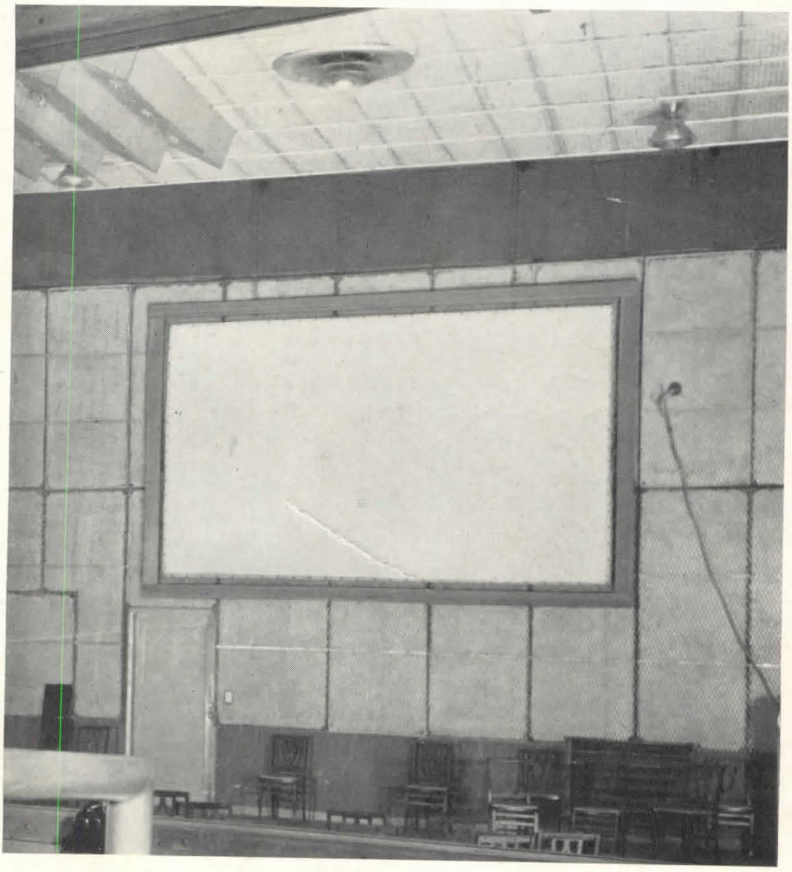
BUILDING NEWS



Control of light, sound, and atmosphere . . . See pp. 33-37

ARCHITECTURAL RECORD
COMBINED WITH
AMERICAN ARCHITECT AND ARCHITECTURE

Washington Post Photo

WASHINGTON, D. C.:

HOMER J. SMITH, Architect
JOHN IHLDER, Executive Officer

THE ALLEY DWELLING Authority of the District of Columbia was created several years ago by Congress to rid Washington of its 200 inhabited "alleys." These alley dwellings are a type of slum housing peculiar to the Capital City. Unlike the simple, gridiron plans which prevail in most American cities, the famous L'Enfant plan of the National Capital created a great number of large and irregularly shaped blocks. Alleys were subsequently developed to give rear access to the houses built on these blocks; and, later, rear shanties were erected facing the alleys. After the Civil War, about 30,000 emancipated slaves arrived in Washington, joining thousands of others who had come there earlier as laborers for the Union army. These negroes, for whom no housing provisions had been made, squatted on public lands, in stables, abandoned structures, etc. With the prospect of quick profits before them, landlords began erecting cheap, crowded structures for them, facing the alleys; instead of building one house facing the street, an owner would build 10 or 20 facing an alley 15 ft. wide.

In 1934, about 10,000 negroes and 500 whites lived in alley dwellings. In general, the alley houses have no heating, electricity, running water, gas, or sewage connections. One privy may serve 20 or more families.

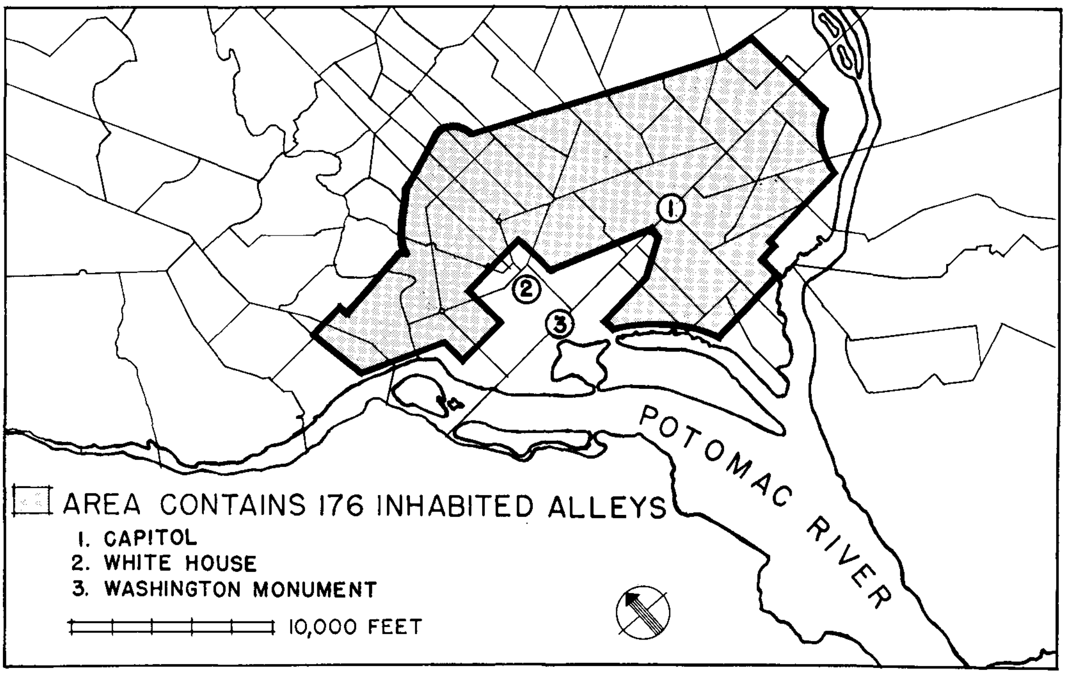
The Alley Dwelling Authority has been handicapped because its operations have so far been confined to inhabited alleys—that is, to built-up sections of the "old" city where land prices are relatively high and where existing revenue-producing buildings, substandard though they are, must be purchased first and then demolished; this adds to site cost. The power of "eminent domain", however, enables the Authority to deal with owners of strategically located plots, who are holding out for exorbitant prices.

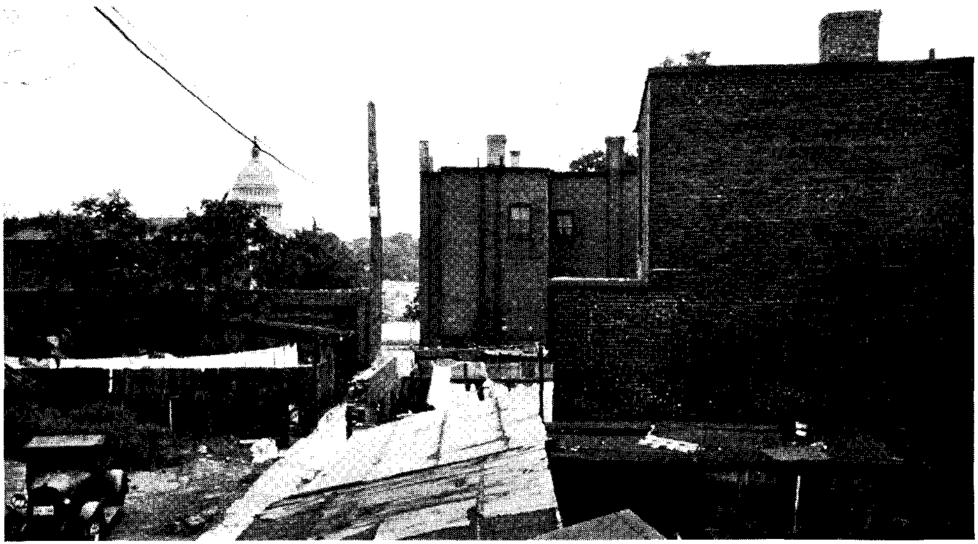
To date, five low-cost housing projects costing $855,000 have been constructed and the number of inhabited alleys has been reduced from 200 to 176. Some of the alleys have been utilized as automobile parking lots.

Recently the United States Housing Authority gave the Alley Dwelling Authority $6,000,000, which, with $733,000 put up by Washington, will provide 1,257 family units in modern buildings for about 5,000 persons. The average cost will be $3,292, and the rents will average less than $4 per room.

JANUARY 1939 issue of ARCHITECTURAL RECORD

CAPITAL CITY'S ALLEY DWELLINGS NOW BEING ELIMINATED





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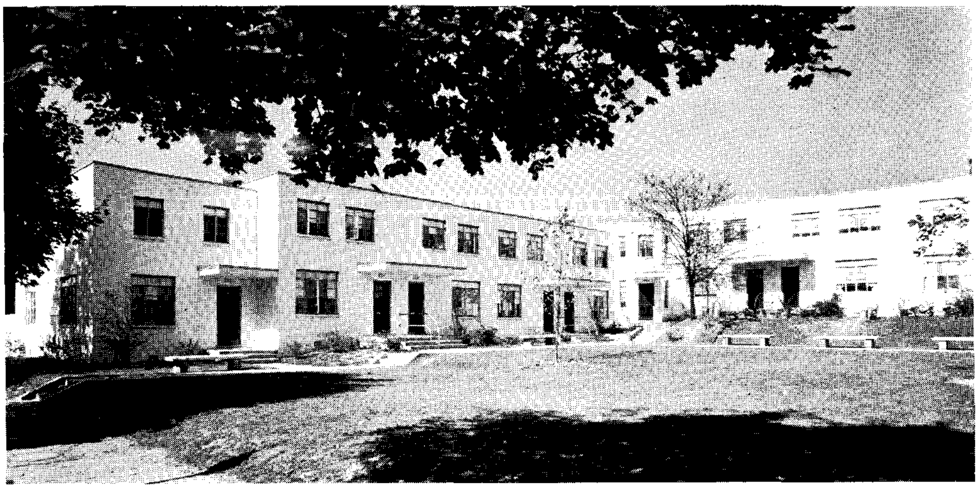
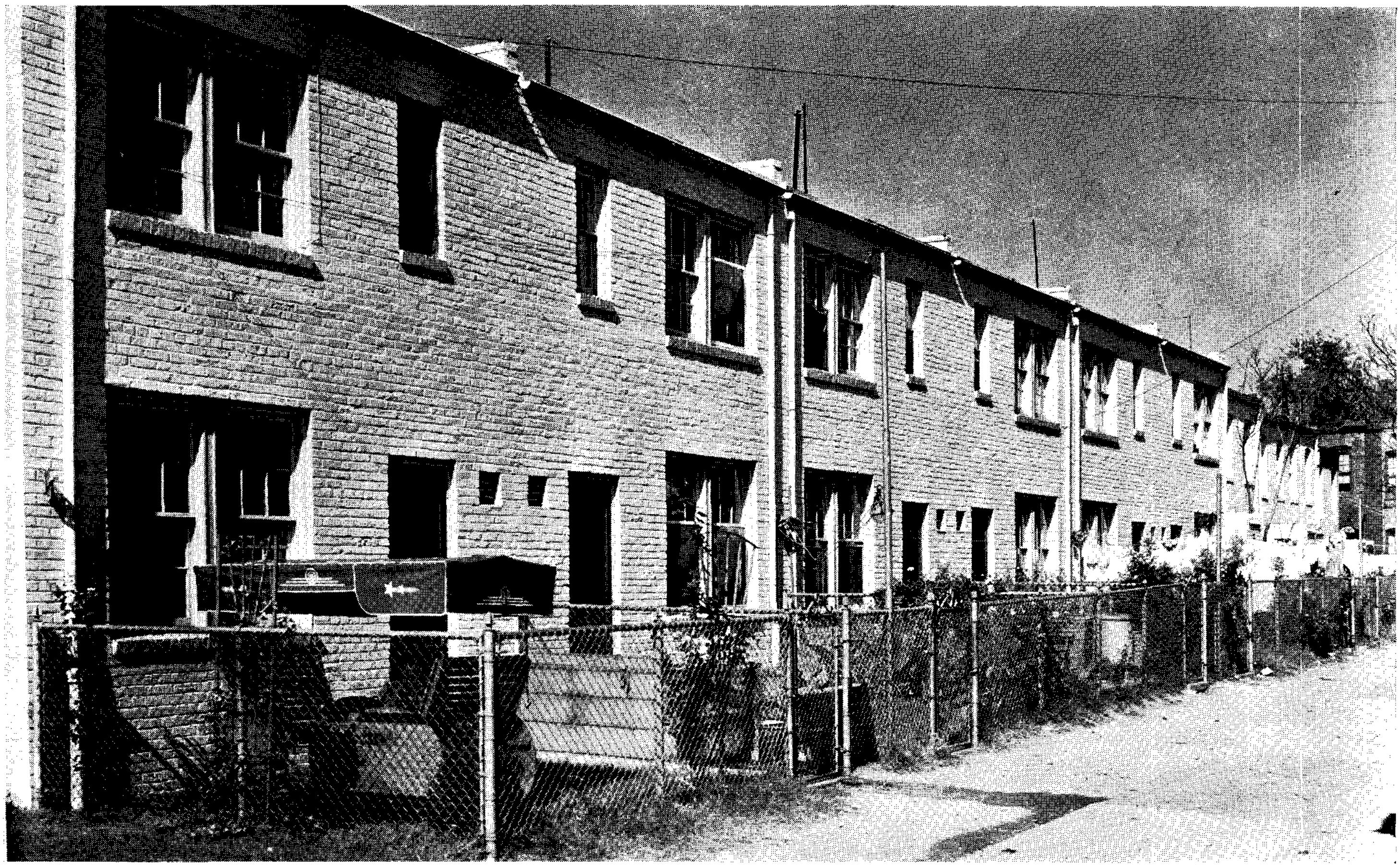
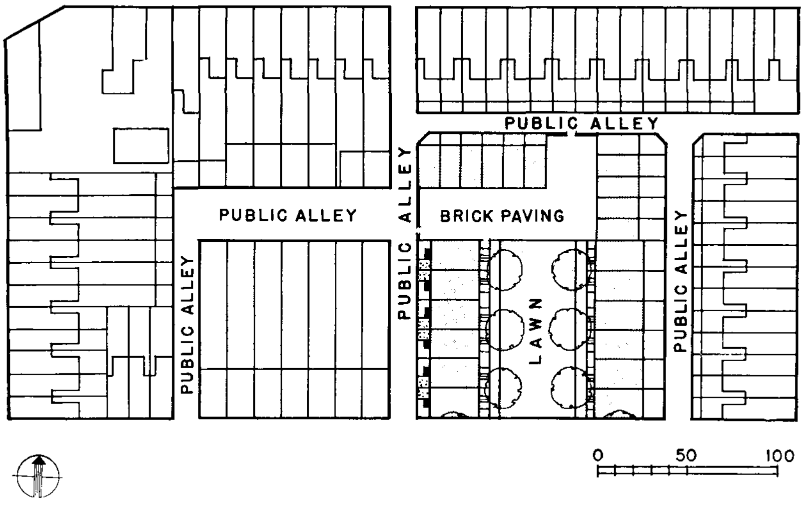


Courtesy Alley Dwelling Authority

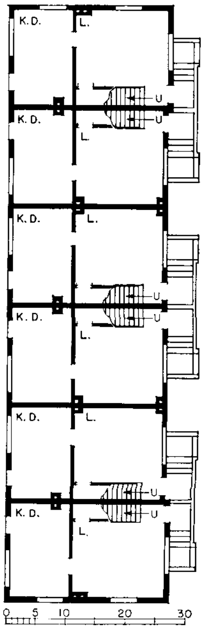
Top: Map of Washington, showing area within which the alley dwellings are concentrated. Center: Alley dwellings with Capitol in distance. Bottom: Typical apartment building which is replacing alley dwellings.



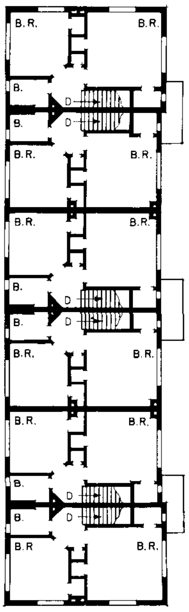
Rear view of new dwellings. One of two wings extending from the street back to a row of remodeled alley dwellings.



THE HOPKINS PLACE Project consists of 23 row, 4-room, 1-family brick dwellings: 12 of them new, 11 remodeled. The new dwellings form two wings extending from the street back to the remodeled houses which are now opened to the street. The remodeled houses are considered temporary. Rents vary according to equipment: in remodeled dwellings, rents are $13.55 and $15.55 per month; in new dwellings, rents are higher—$25, $26.25, $27.50, and $28.75.

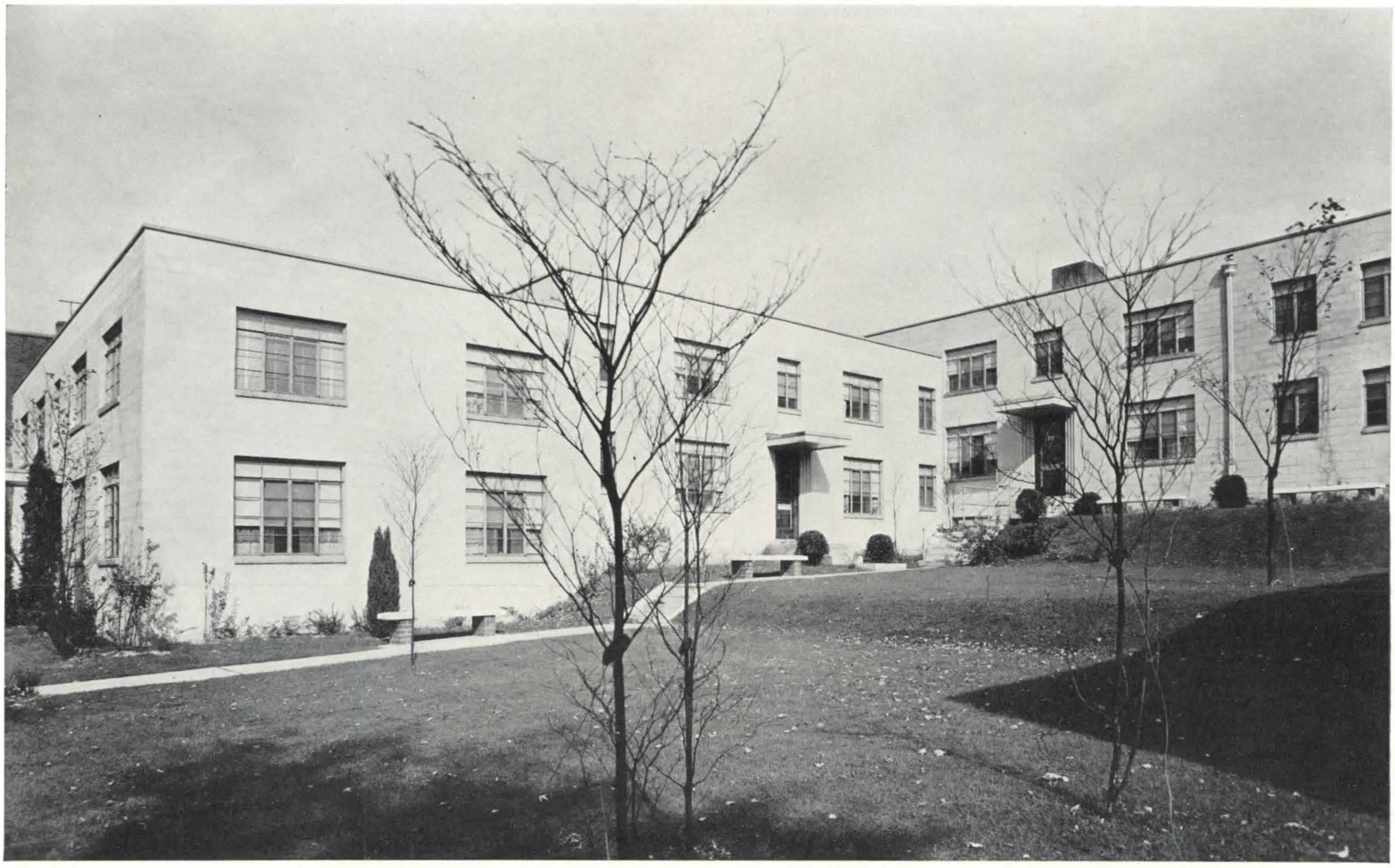


First floor

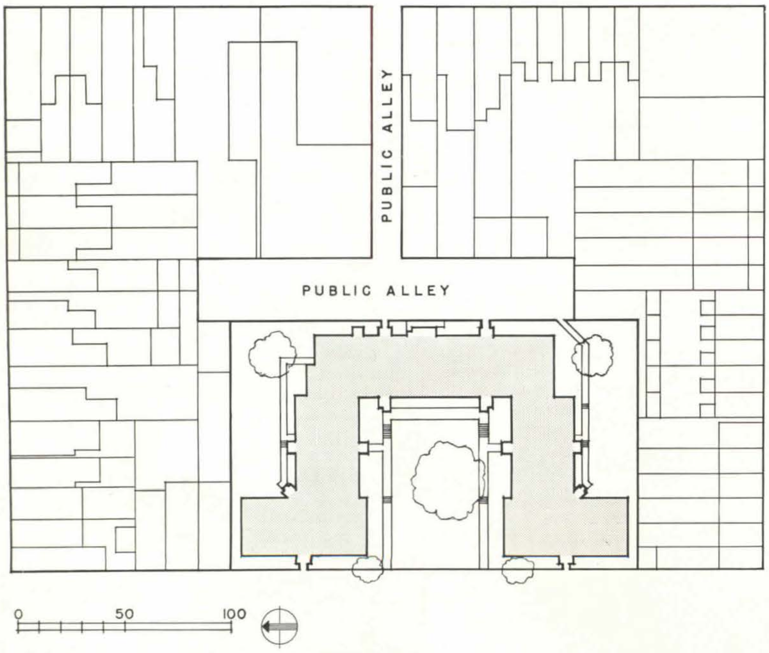


Second floor

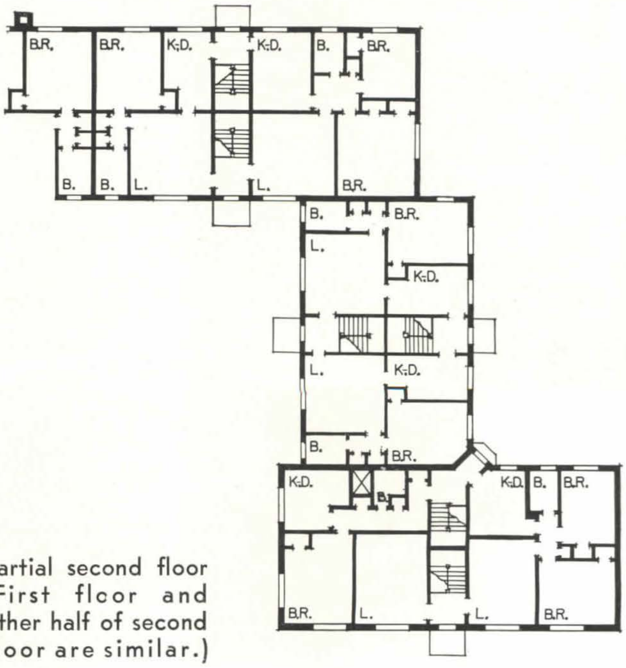
ST. MARY'S COURT: WASHINGTON, D. C.



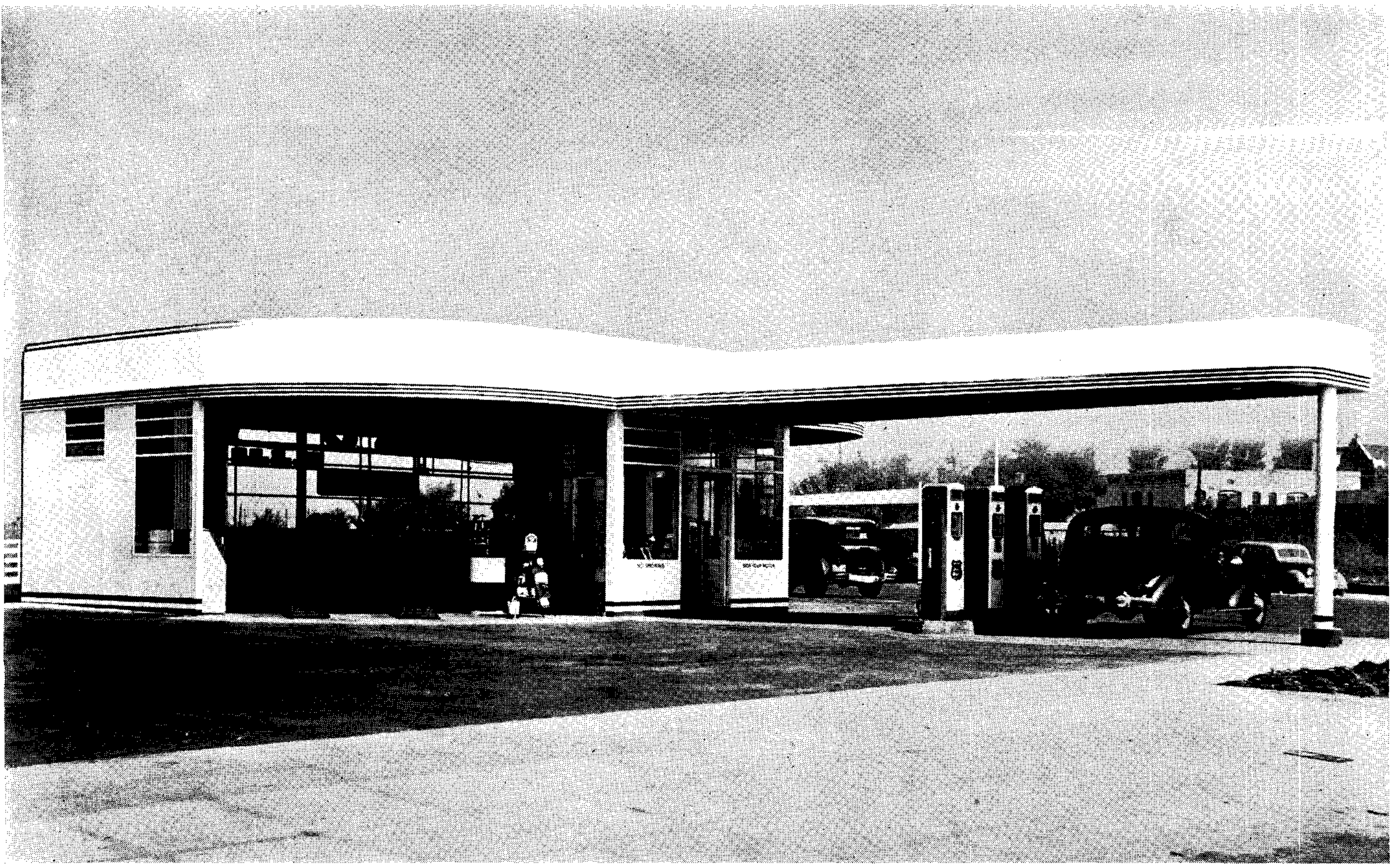
View of new apartments from the street. The open lawn itself replaces several rows of dilapidated alley dwellings.



THE ST. MARY'S COURT Project consists of 24 apartments in a U-shaped, two-story, concrete-block building about a central lawn that opens to the street. The site was formerly occupied by dilapidated alley and street houses. Apartments have central heating (steam), hot water, electric lights, and mechanical refrigeration.



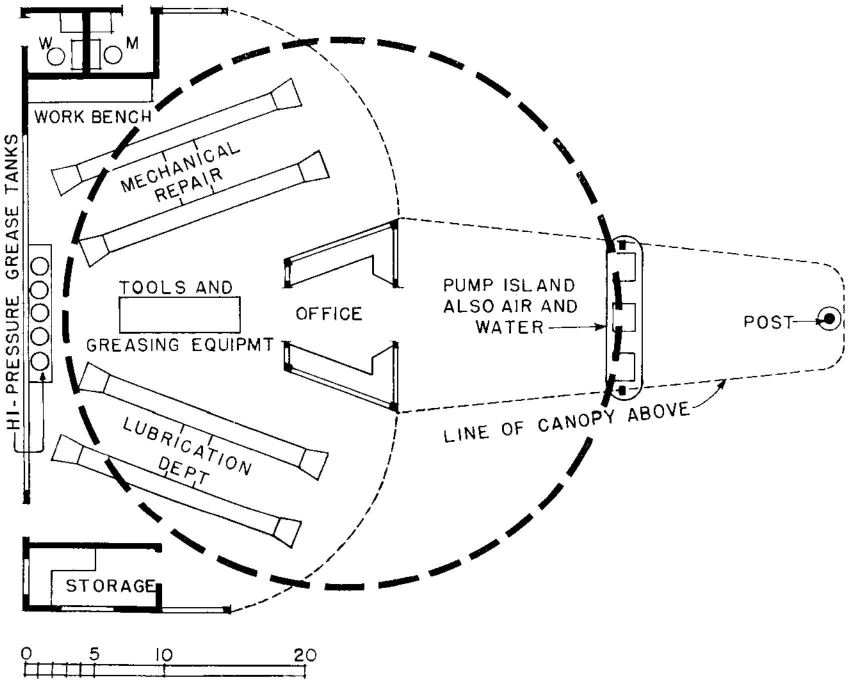
Partial second floor (First floor and other half of second floor are similar.)



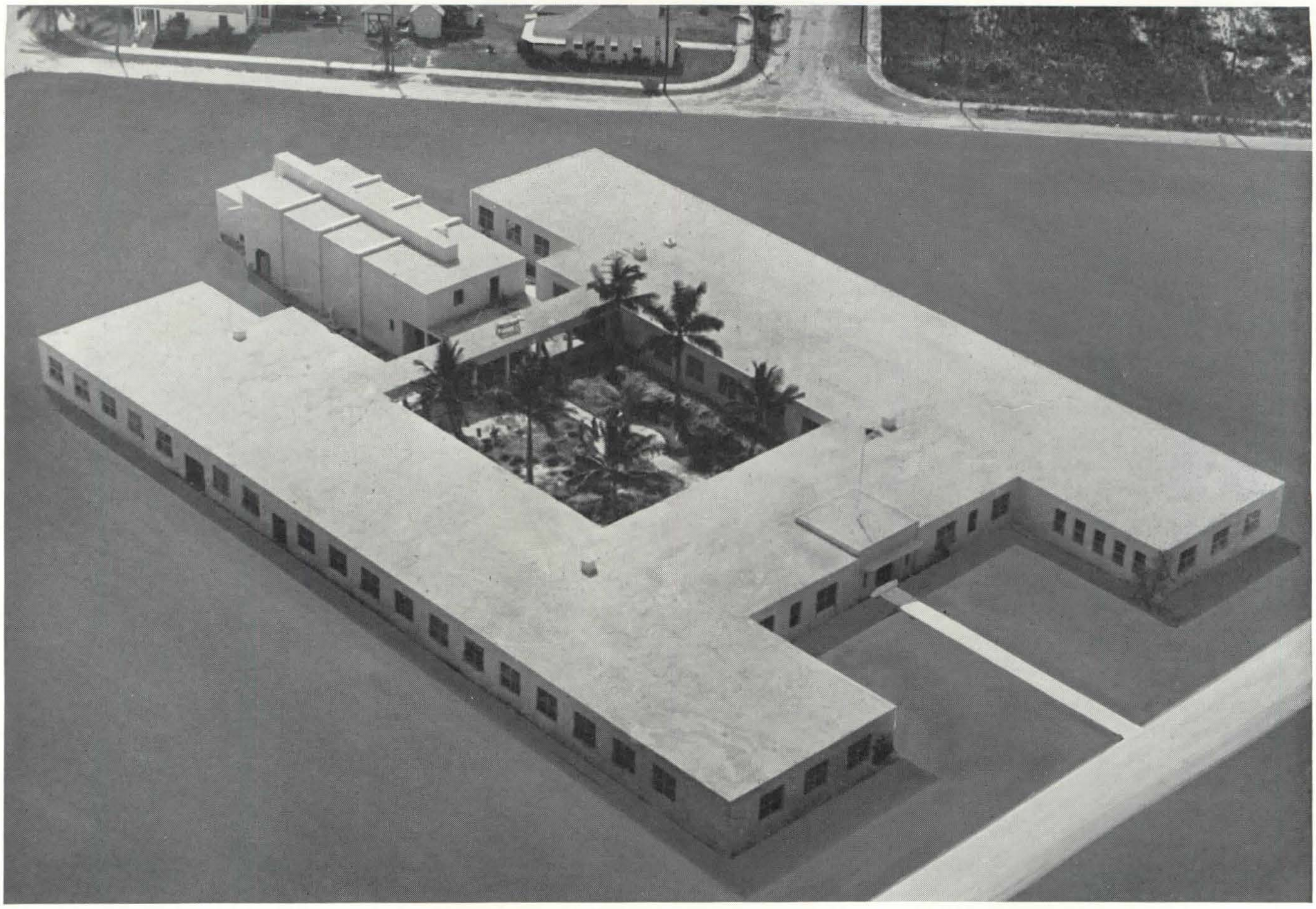
American Photo Art Co.

UNOBSTRUCTED VIEW AND CENTRALIZED WORK SPACE IN GAS STATION

PACIFIC STEEL BUILDING COMPANY, Designers



THIS STRUCTURE permits unobstructed visibility from lubrication and mechanical departments, office, and gas pumps—all within a working area whose radius is only 20 ft. The three departments are placed compactly about a central office; lubrication and repair hoists are set diagonally to eliminate wasted area behind the office. The office itself is entirely glass-enclosed. Lubrication and mechanical departments are usually open, but may be enclosed in bad weather by folding steel doors which, except for a low wainscoting and steel frames, are all glass. The rear wall, above work-bench level, is also glass. For visibility, the canopy over the gas pump area is supported by a single column. Aside from window areas, the structure is all steel, welded into sections, the sections bolted together. It is readily portable. Its cost was approximately $3,500.



LIGHT, SOUND, AND ATMOSPHERE CONTROLLED IN STUDIO DESIGN

C. SHELDON TUCKER, Architect
JOHN M. LYELL, Associate

Charles E. Goodridge

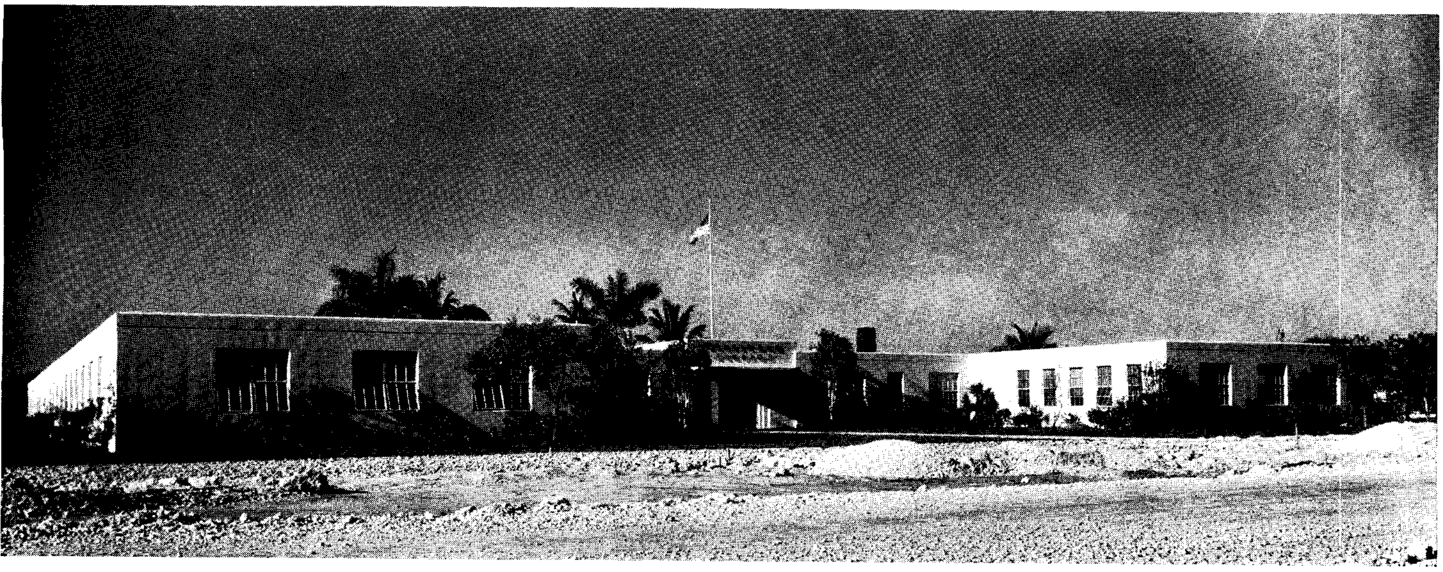
Typical animators' room

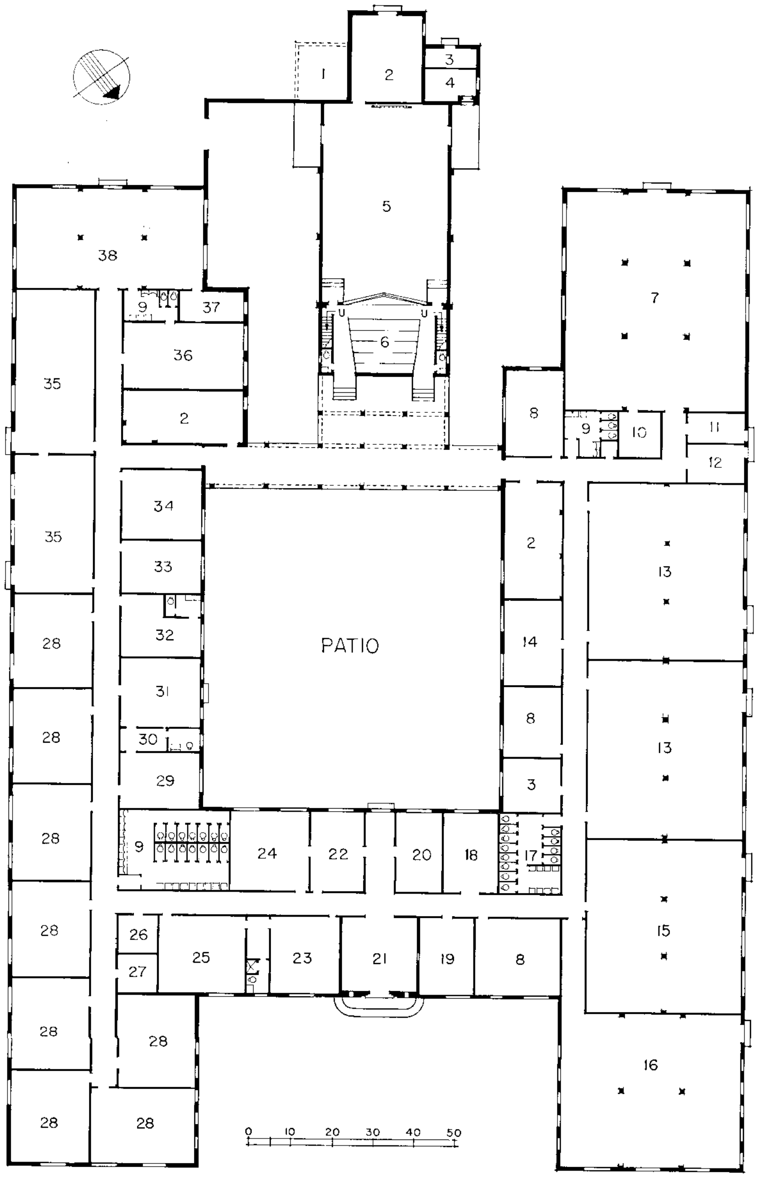
THE NEW Fleischer Studios are located in a part of Miami that had been neglected in the hasty, boom development of the city. The area is now being re-subdivided, and many streets are being closed or relocated. In the area southwest of the building, a rental housing project of 41 houses, similar in construction to the Studios, are being built.

The plant has been designed for the production of "animated cartoons." A "cartoon" consists of a series of photographed drawings, each slightly different from the one preceding it; so that when they are projected rapidly on a screen, an illusion of action is produced. A cartoon that runs for 7 minutes may include 11,000 to 14,000 separate drawings. Production of such a film involves the preparation of stories; of key drawings—usually every fourth "frame"; "inbetween" drawings; inking; coloring; photography; and sound synchronization.

The cost of the plant was approximately $300,000.

Photos by Charles E. Goodridge

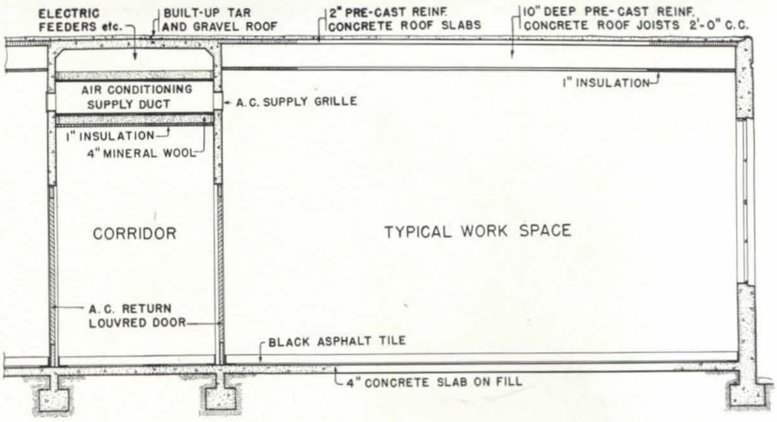




Ground-floor plan

1. Future room
2. Mechanical
3. Storage
4. Film vault
5. Recording studio
6. Theater
7. Camera
8. Story
9. Men
10. Darkroom
11. Cutting
12. Moviola
13. Coloring
14. Conference
15. Inking
16. Background
17. Women
18. Lunchroom
19. Switchboard
20. Mimeograph
21. Reception
22. Manager
23. Secretary to director
24. Accounting
25. Director
26. Supplies
27. Porter
28. Animation
29. Secretary to president
30. Anteroom
31. President
32. Women's rest room
33. Assistant directors
34. Music
35. Inbetweening
36. Experimental research
37. Electrical room
38. Machine shop

FLEISCHER STUDIOS



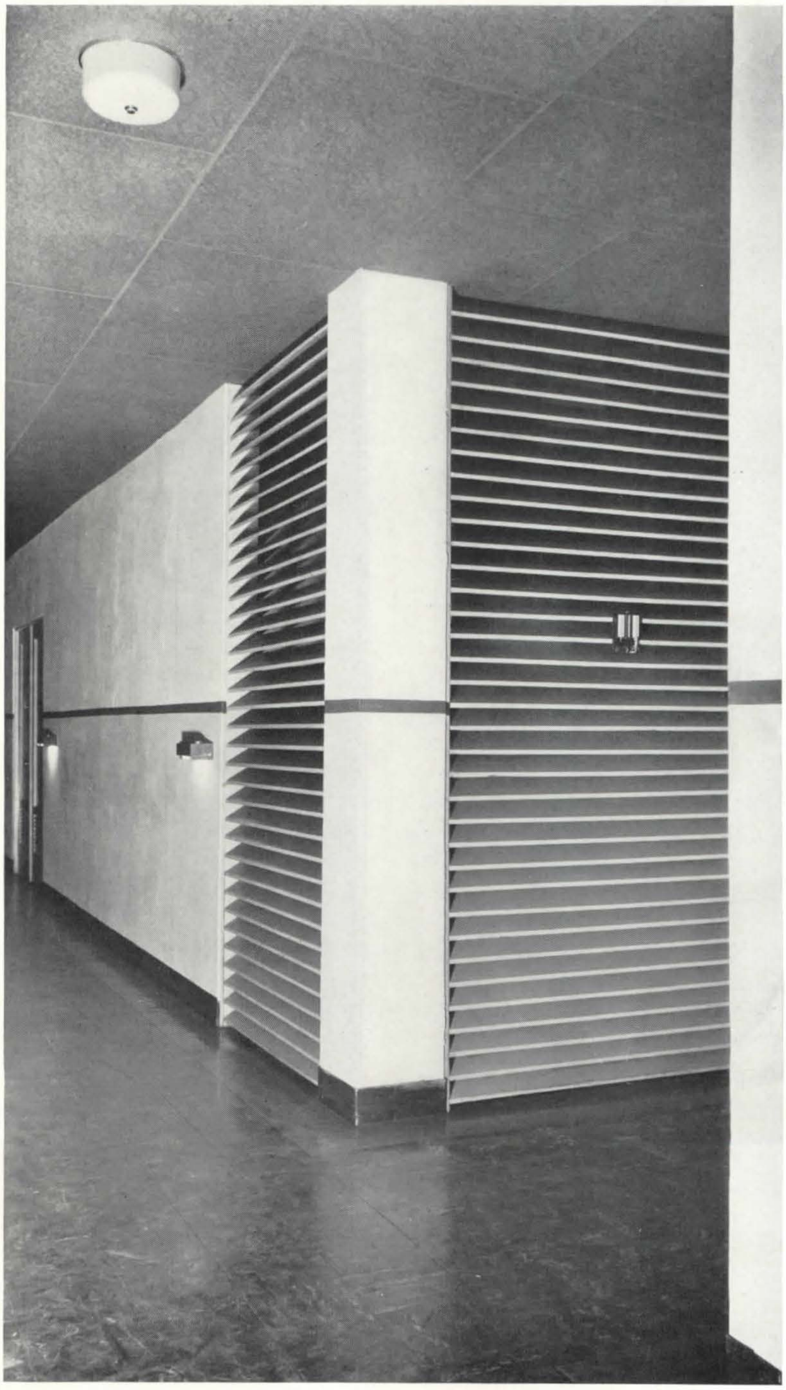
THE STRUCTURE of the Fleischer plant is poured reinforced concrete, except for the roof, which is built of precast concrete slabs over precast joists; the roof slabs over the corridor, however, were poured to obtain greater rigidity as well as to facilitate construction. Prefabricated metal forms, arranged in module units, were used with door jambs and steel windows, which were locked into the formwork before pouring began.

The plant is completely air-conditioned: constant temperature and humidity are essential; for the gelatine coating on motion-picture film is not only temperature-sensitive but also hygroscopic (moisture-absorbing).

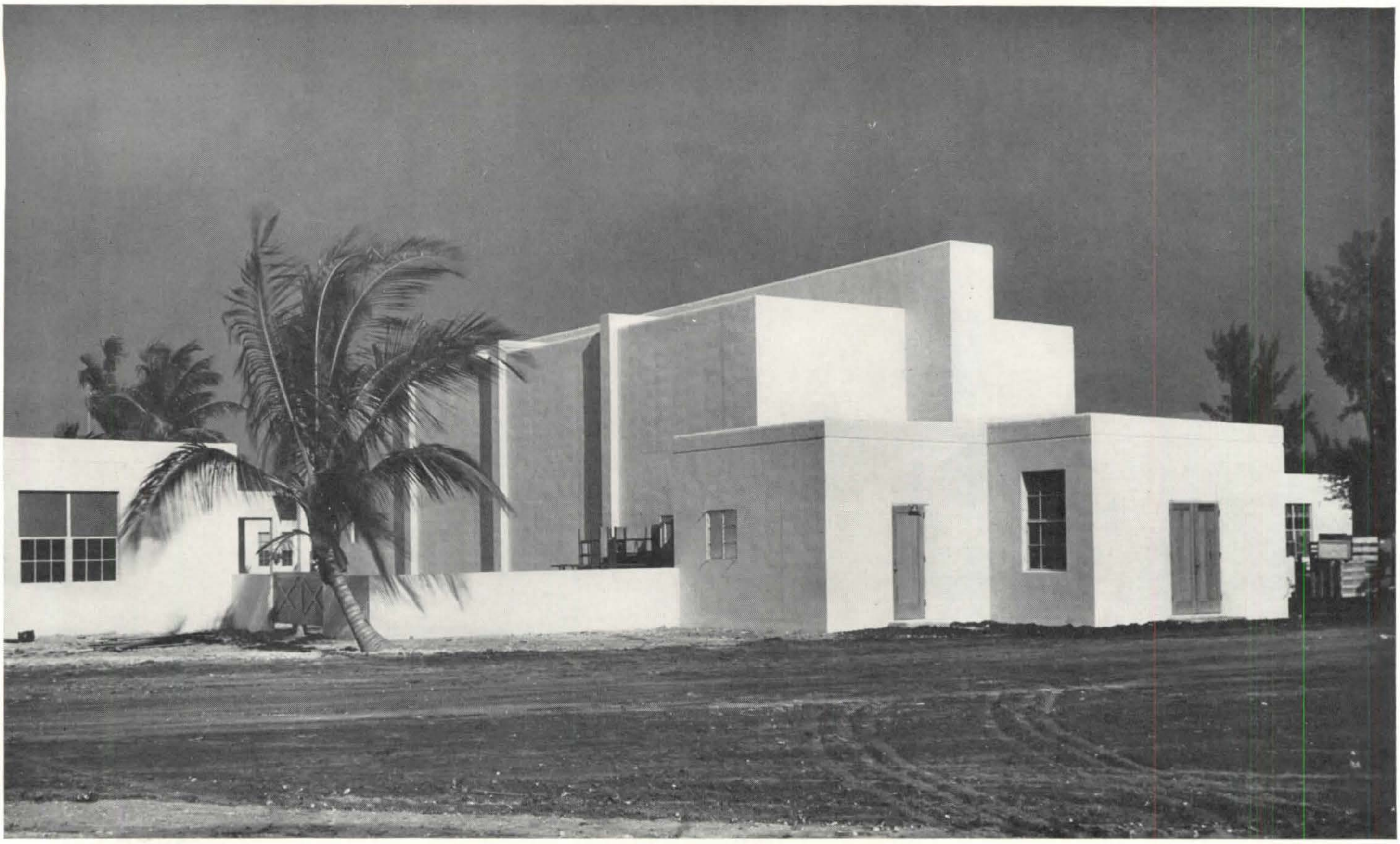
There are three central plants delivering conditioned air to work spaces; air is sent through the adjustable grilles of supply ducts located between roof and corridor ceiling. The air is returned to the conditioning plants through louvered doors on the corridors; corridors are used as plenum chambers. The recirculated air is combined with fresh outside air, passed through filters, then over refrigerating coils or electrical unit heaters, and through blowers into the supply ducts. The duct work is fabricated of composition hardboard.

Air from public toilets is returned through ventilating exhaust fans in the ceilings; this to avoid circulating obnoxious odors in the corridors; a direct exhaust was further needed against the possibility of plant shut-off. (Toilets have no outside fenestration.)

To avoid glare, the Venetian blinds are kept down during working hours. There is local lighting at the drawing desks, which are equipped with circular, rotating glass surfaces, "lighted" either from above or from below. Only under such lighting can a drawing be made to resemble a projected screen image. To avoid glare from corridor lighting, 25-watt deflecting lights are used the length of the corridors, illuminating only the floor edges. General lighting has been provided, however, for the use of porters in cleaning up after working hours.



The corridor is a plenum chamber for the air-conditioning system.



Photos by Charles E. Goodridge

THE SOUND-RECORDING building has been isolated structurally to check vibrations originating in other parts of the building; it is connected to the rest of the plant by an open cloister, with expansion joints for isolation. Monolithic poured-concrete construction has been used largely to satisfy acoustical requirements.

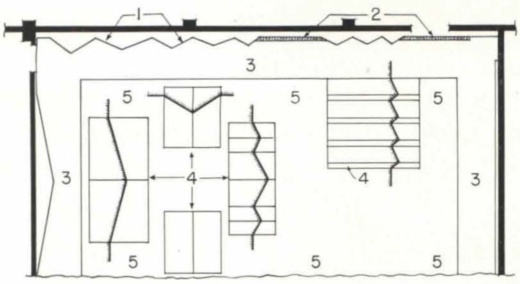
The walls of the sound stage are insulated in "soft" and "hard" areas. The soft areas are insulated mostly with mineral-wool batts, covered with galvanized wire mesh, and the hard areas either with flat surfaces of composition hardboard or with hard plaster baffles. The baffles serve to reflect sound waves to other locations to produce a balanced sound composition at the recording microphone. Walls are insulated above a line three feet from the floor; below this line insulation has little effect on acoustical results.

For sound insulation, all glazed openings to the sound stage are made double, with glass set in sponge rubber. Openings larger than motion-picture projection and observation ports have one thickness of ¼-in. plate glass and one thickness of ⅛-in. plate glass; the two panes are set not parallel, but at a slight angle to each other—about three inches apart at one jamb and six inches apart at the other; this, and the difference in glass thicknesses, breaks up the sound-transmission harmonic and prevents accidental noises from reaching the recording microphone. A system of piping to all glazed observation openings and machine ports was necessary for dehumidification, as well as for equalization of air pressure inside the double-glazing. To facilitate cleaning, panes were made easily removable. (A type of glass like Pittsburgh Crystal-X is needed to minimize the cloudy effect produced by chemical changes at the glass surface.)

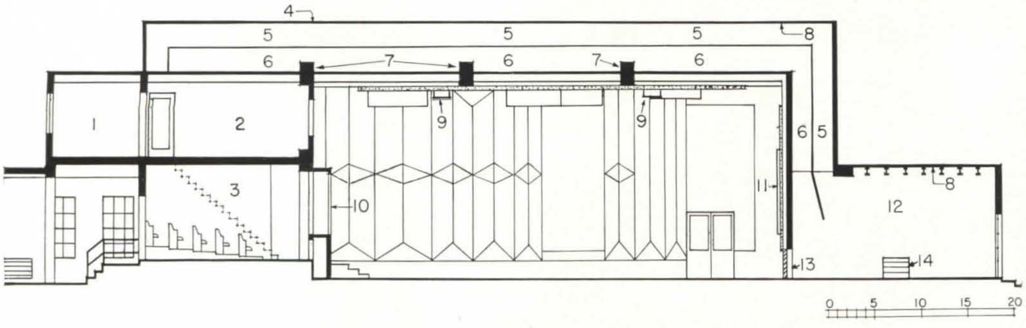
The Monitor room (for the sound-recording engineer) is the "brain center" of the recording operation: it must command a clear view of the screen and of the stage floor; it must be close to the projection room and to the sound-recording machinery room. In the Monitor room are located the sound-control equipment and the control of communications from outside the building (telephone and fire-alarm systems, etc.).

There is a separate air-conditioning plant in the recording building with separate supply ducts over the roof to the sound stage and to the control section of the building. Circular air deflectors deliver air horizontally at the sound-stage ceiling, reducing objectionable air currents. Air velocity in the supply ducts has been decreased by enlarging the ducts.

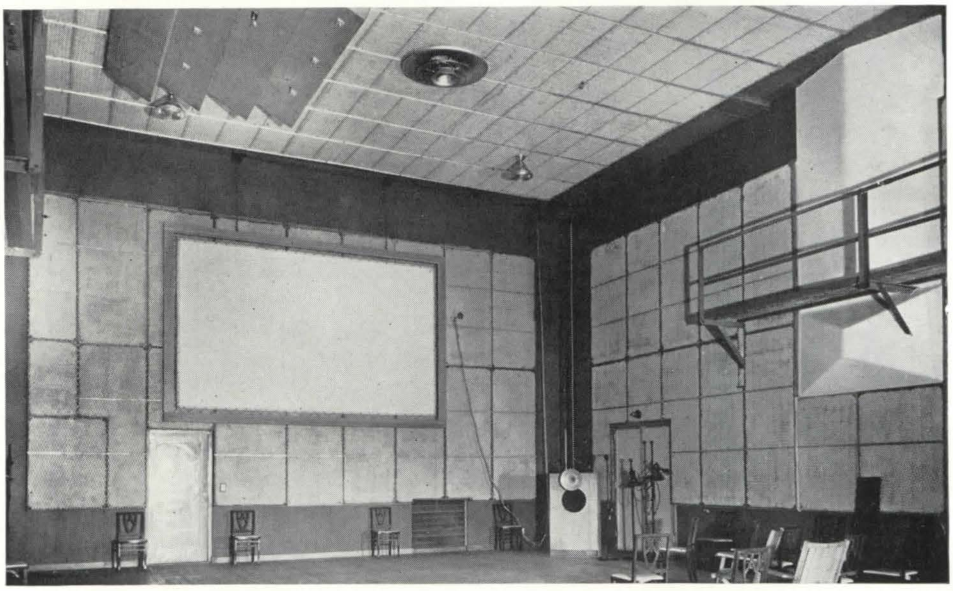
Control of the air-conditioning supply is located at the Monitor's desk. Because of duct or machine vibration and the effect of air currents, the conditioning system is shut down during recordings. These periods are short: a completed film runs only seven to nine minutes, and the recording is done step by step to synchronize the sound track with the animation; hence the heat build-up during recording periods is relatively small. Moreover, the only persons on the sound stage in these intervals are a recordist, voice characters, and musicians; this is a very different situation from that on a sound stage making "live" movies, in which hundreds of persons may be on the stage at once, and in which the lighting and the heat which it generates are usually much more intense.

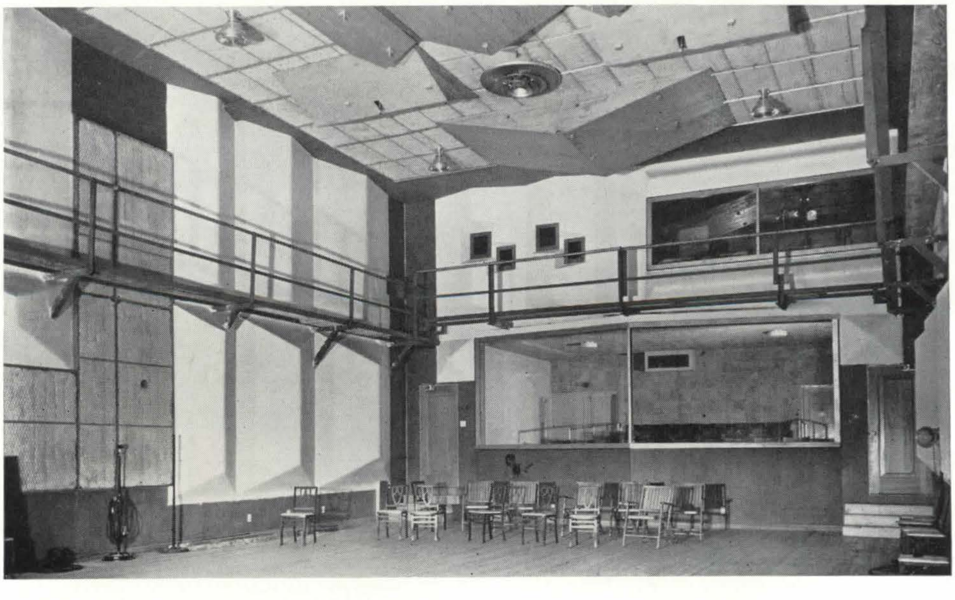


Ceiling plan: **1.** Hard plaster baffles; **2.** Mineral wool; **3.** Hardboard; **4.** Baffles; **5.** Mineral wool.

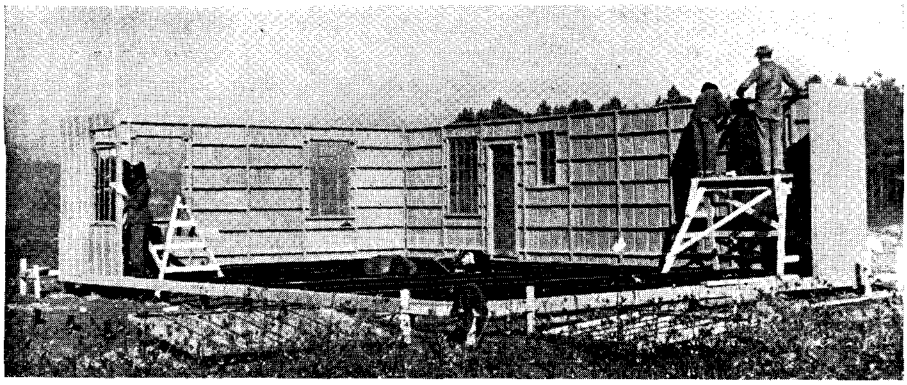


Section: **1.** Recording-machinery room; **2.** Monitor room; **3.** Animators' theater; **4.** Barrett roof; **5.** A.C. supply duct; **6.** A.C. return duct; **7.** Steel girders; **8.** Precast slab; **9.** Air-supply diffusers; **10.** Observation windows; **11.** Screen; **12.** Mechanical room; **13.** A.C. return air louvers; **14.** Exterior supply louvers.

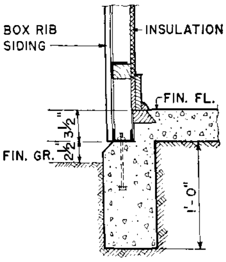




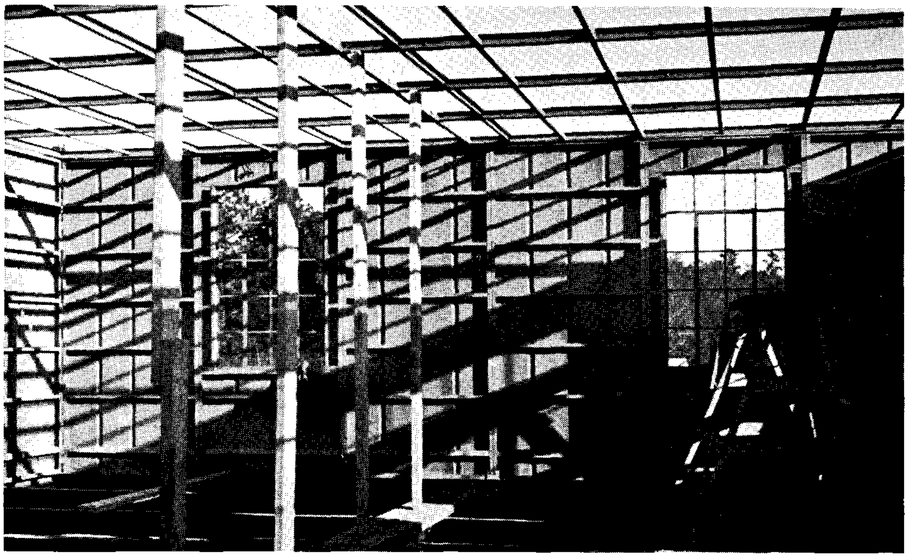
Views of interior of sound-recording building. Above, view looking toward screen. Below, view looking toward projection and observation ports and theater.



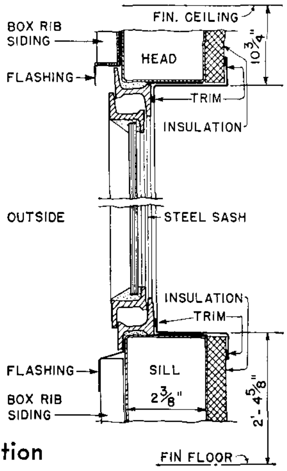
Lollars



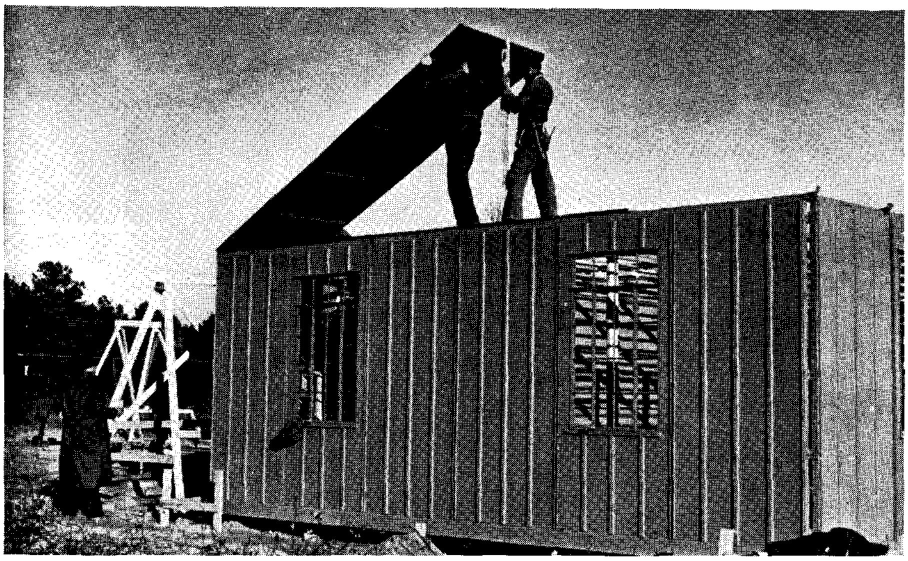
Floor construction



Lollars



Window section



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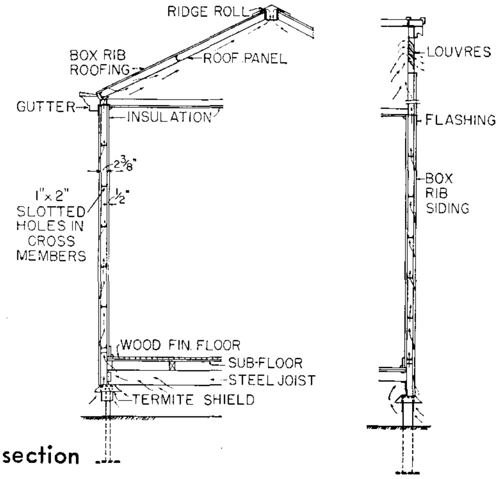
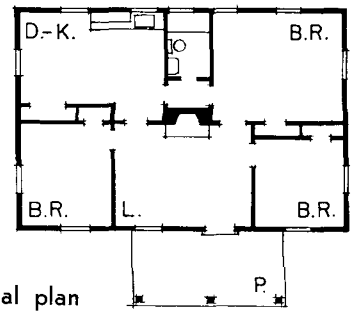


Wall section



Typical plan

STEEL-PANEL PREFABRICATED FARM BUILDINGS ERECTED IN THE SOUTH

TENNESSEE COAL, IRON & RAILROAD COMPANY, Designers

THE TENNESSEE Coal, Iron & Railroad Company recently began erection for the Farm Security Administration of "prefabricated steel farmstead units." Sites were selected by FSA in Alabama, Georgia, and South Carolina. Each unit includes five buildings—house, barn, chicken house, outdoor pantry, and sanitary privy. Approximately 12½ tons of steel are required for each five-building unit.

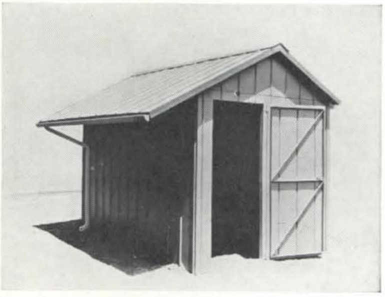
The house has five rooms—living room, three bedrooms, and combination kitchen and dining room. Two large closets and a pantry are included, and space is available for a bathroom. All of the foundation structure, the frame, sides, roof, exterior door, window trim, and fireplace are of steel. Doors are of wood. Floors may be either wood or steel. As finish for walls and ceilings, insulating wallboard is used.

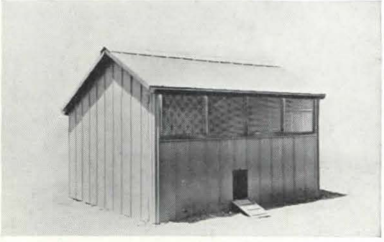
The buildings are erected by the bolting together of prefabricated panels. Foundations are prefabricated, too: piers are formed from two hot-rolled steel channel sections, shop-welded to a steel footing plate, and coated with asphalt by a hot-dipping process. Inside partitions of the house are insulating wallboard surfaces supported on steel frames. Steel joists support the wood floor.

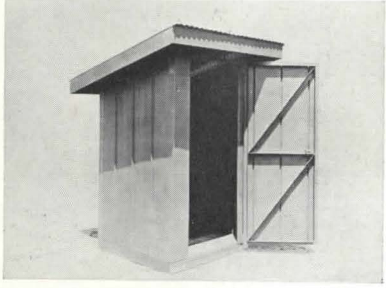
The buildings are lightning-proof, fireproof, and verminproof. The use of overlapping crimps, or grooves, in the metal sheets, makes them weather-tight, too. The walls have a lower conductivity value than a 13-in. brick wall; this is achieved by the insulating wallboard and the air spaces between inner and outer surfaces. The steel lends itself to precise machine-forming. It is nonporous and, therefore, moisture-proof.

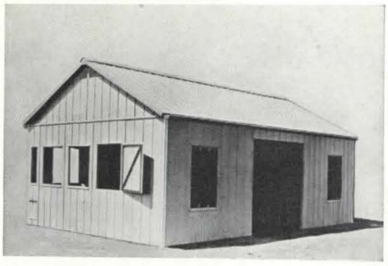
These buildings can be erected in a fraction of the time required for ordinary construction; in a typical instance, 10 laborers working under a skilled foreman erected the 5 structures in 9 days.

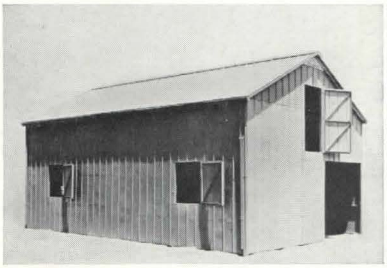
The buildings are not yet sold for general consumption. But, tentatively, costs, including erection, are estimated thus: house, "Calhoun type", $1,695-$1,938; barn, "D type", $851-$900; service building, $133-$142; poultry house, $154-$167; privy, $53-$58.

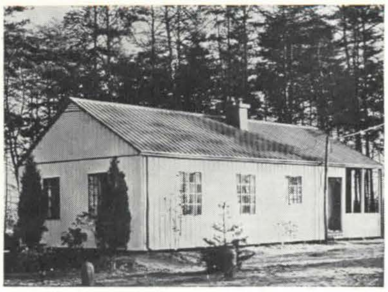


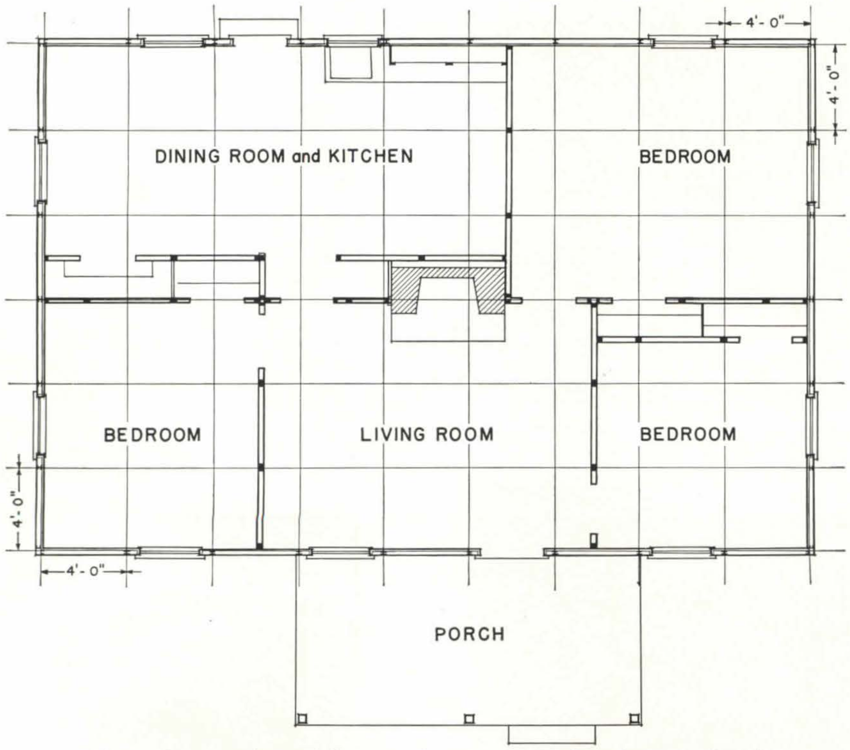






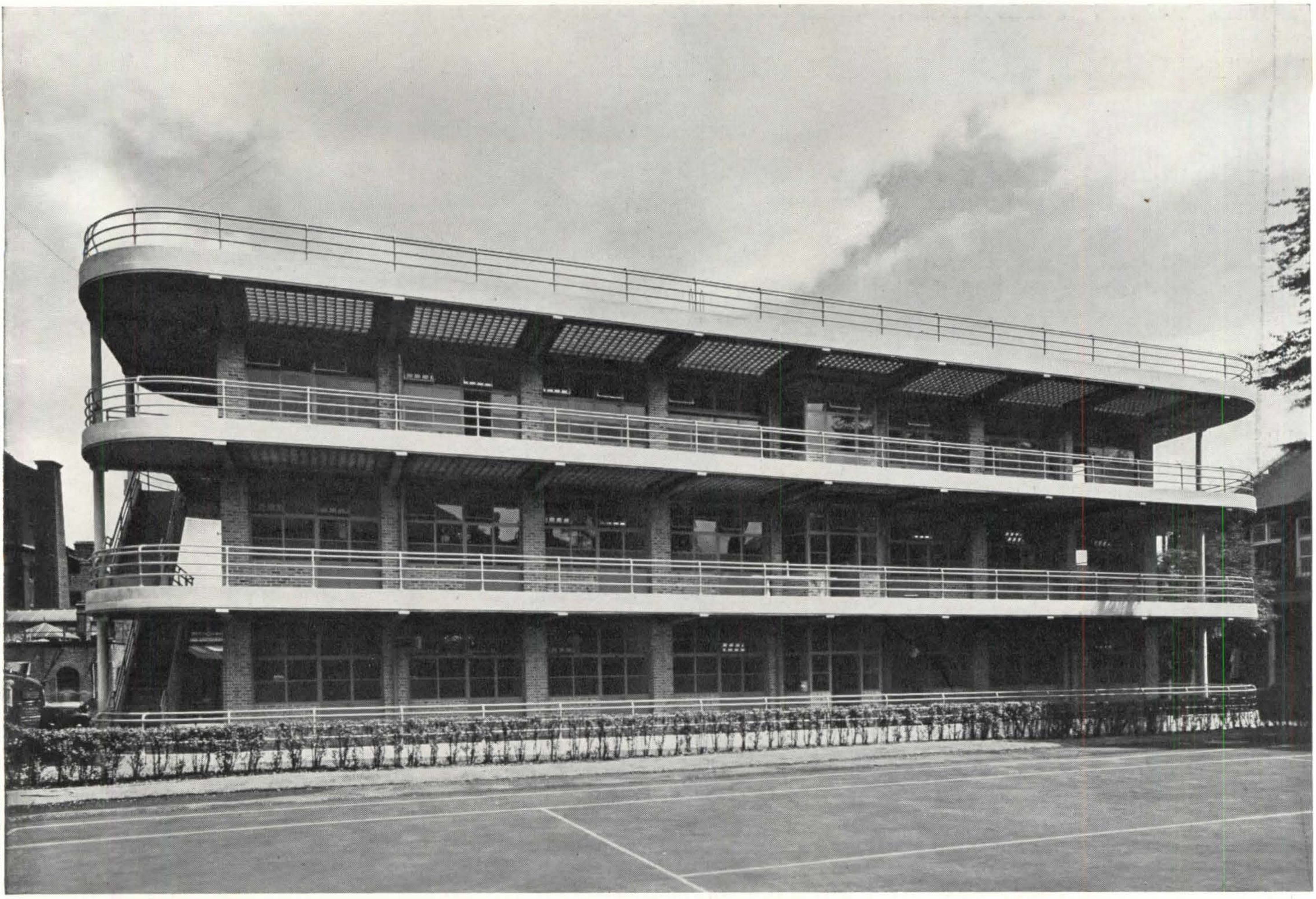






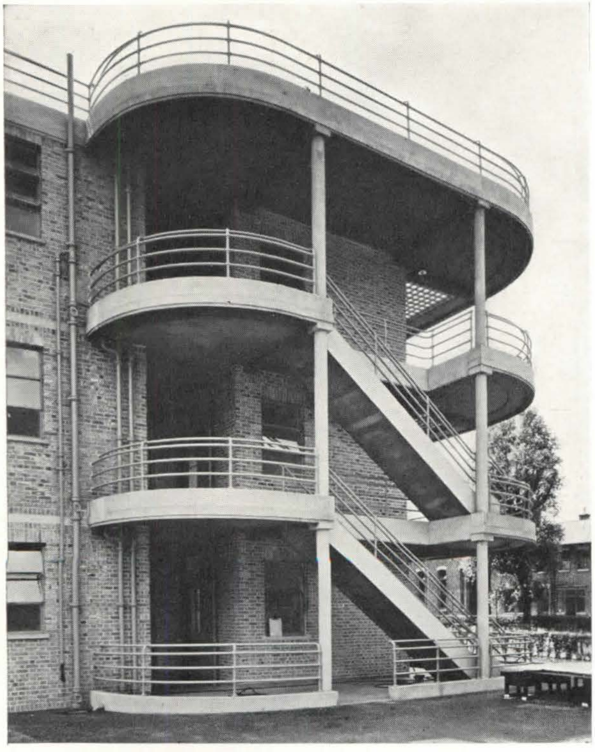
Plan of typical steel house, showing modular design. Steel floor joists are spaced 4 ft. on centers at panel points.

Photos by Herbert Felton, courtesy "Architect and Building News"



HOSPITAL DESIGNED TO PREVENT CROSS-INFECTION

MAURICE E. WEBB, Architect

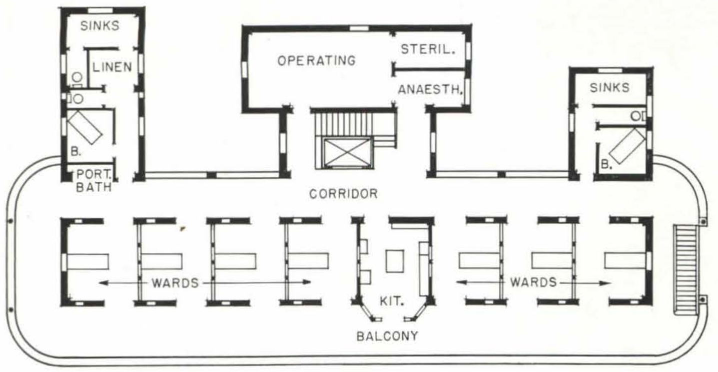


PREVENTION of cross-infection has been the guiding principle in the design of a new isolation block for the London Fever Hospital. For isolation is no longer a problem of separating an entire building: a barrier must be provided around every patient.

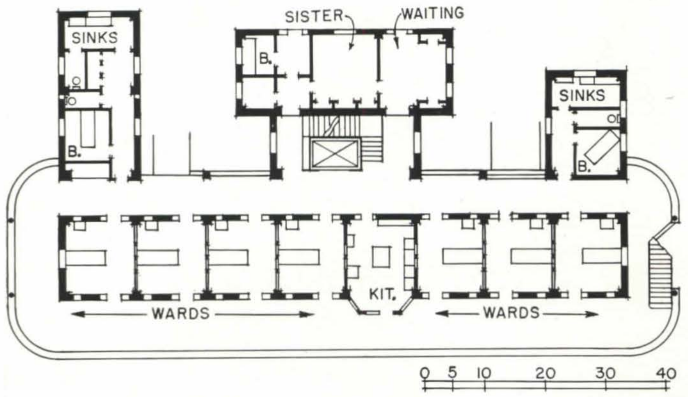
There are no ventilation trunks in the building; all ventilation is natural. Each of the three floors has a 9-ft.-wide balcony which continues around both ends of the building and forms the covered, but open, service corridor behind. There are none of the closed spaces here which in older buildings have allowed some cross-infection from room to room.

Patients with more than one infection need single-room accommodation, and some patients must be placed under observation in single rooms before they can safely be transferred to the appropriate ward. The block will often be used for isolating patients believed to be incubating one of the fevers.

Each room is separated from its neighbor by a glass partition through which a nurse in the central kitchen can view the whole length of the floor; when it is necessary, curtains can be drawn across these partitions.

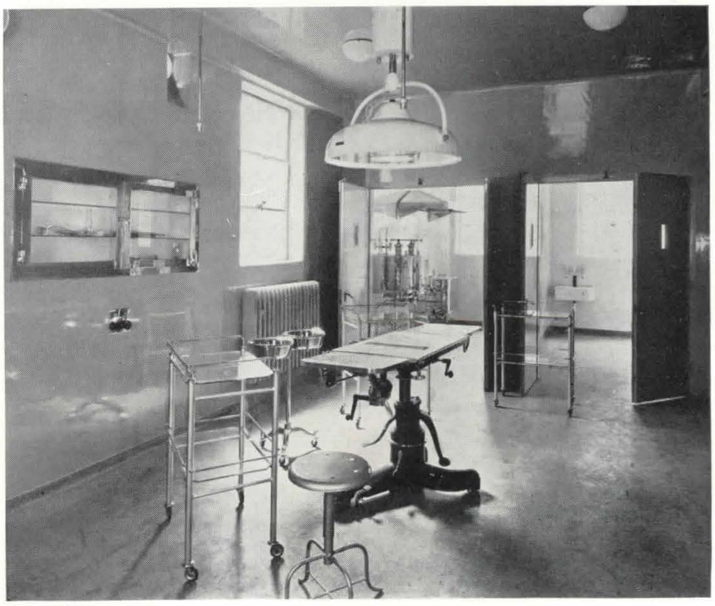


Second floor

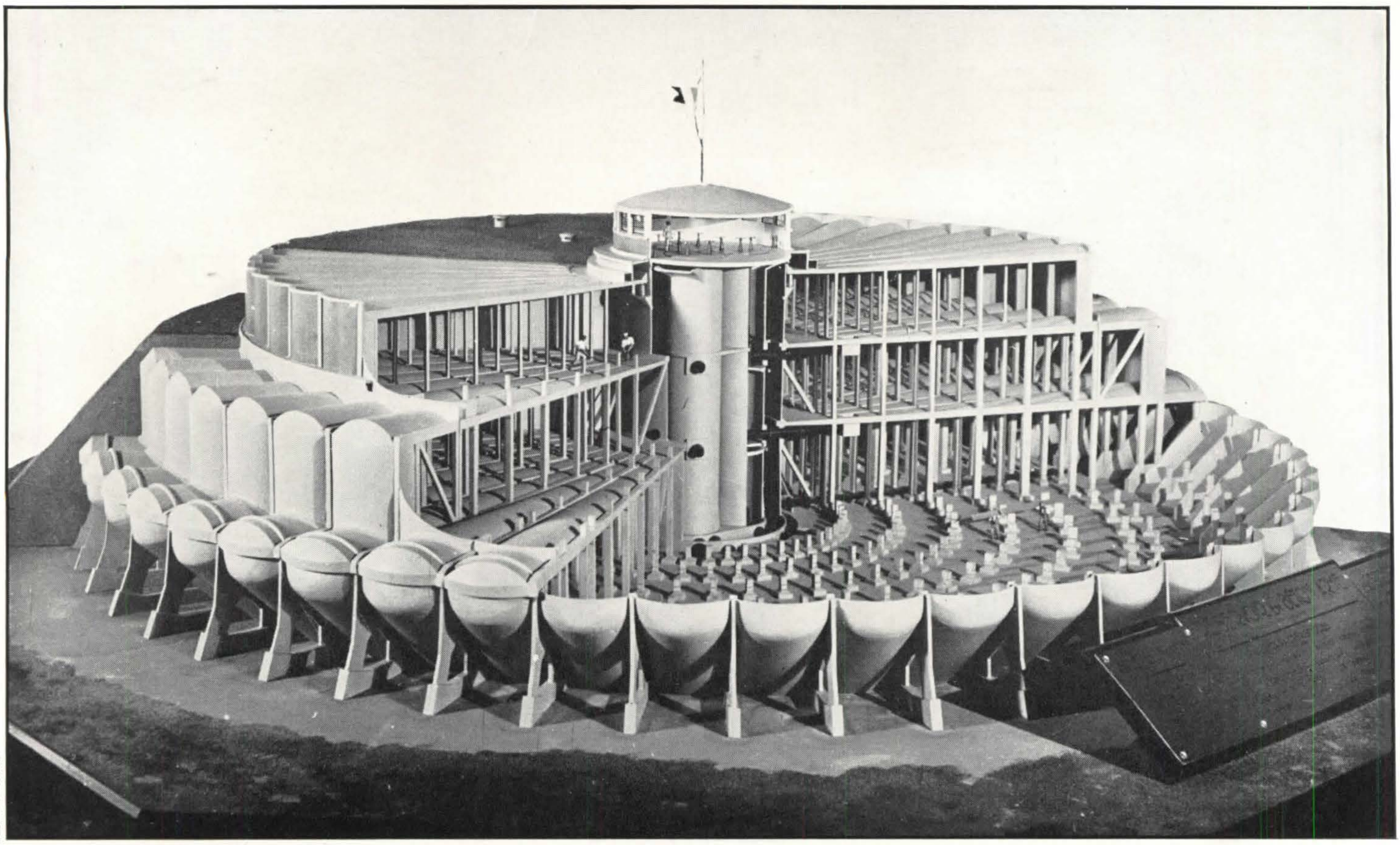


First floor

Photo by H. Keighley Bennet



Right, above: Beds can be moved from the wards to the balcony on the west side of the building; the balcony continues around both ends of the building to the service corridor behind. Right: Operating theater on second floor, with sterilizing and anaesthetic rooms beyond.



René Zuber

CRACKING CAUSED BY DEFORMATION AVERTED IN DESIGN OF RESERVOIR

G. LE MAREC, Engineer

In a water reservoir recently completed at Nantes, France, a difficult problem of deformation of material, caused by extreme variations of loading and of temperature, has been solved. Conditions of the problem were these:

1. The reservoir was to have a minimum capacity of 40,000 cubic meters;
2. It would be built on a foundation of granite rock;
3. It was to have three superimposed levels;
4. The different levels were not to be divided into cells;
5. The overflow of the two lower levels would be discharged in the same proportion as the corresponding overflow of the old reservoir adjoining.

The chief source of difficulty was the fact that the three superimposed compartments could be full or empty independently of each other; each compartment could be subjected to loading combinations that would cause deformations of as much as 8 to 10 centimeters. Because of the capacity required, the dimensions of the reservoir would have to be considerable. Contraction and expansion of materials, directly proportional to the size of the structure, became a problem of critical importance. In the solution adopted, the three levels have been made independent of each other from the standpoint of contraction and expansion, and are moreover expansible in every direction.

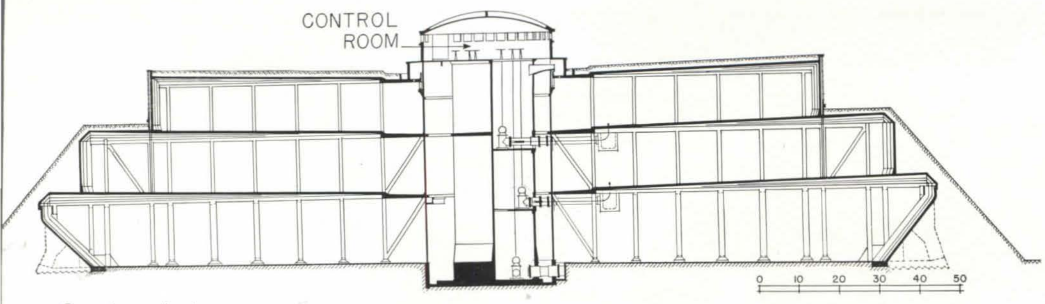
The diameter of the reservoir at ground level is 74 meters, 66 meters at the level above, and 54.5 meters at the top. The two lower compartments are each 5 meters high and the third is 4.5 meters in height.

The floor of the bottom story is of lightly reinforced concrete, 0.1 meter in thickness, applied directly to the foundation rock. This floor supports no great loads; further, since it is inside the reservoir, it is submitted to only minor variations of temperature. It may be considered closely bound to the foundation and relatively rigid.

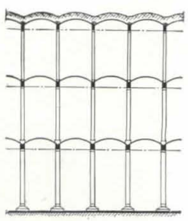
It is not the same, however, for the outer wall; a monolithic wall, enclosing an area 74 meters in diameter, would expand 0.15 to 0.2 meters when drawn to elastic limits; and tied to an unvarying base, it would certainly crack. To avert this, the wall has been curved; it is broken into a series of 50 vaults, stretched to a thinness of 0.08 meters—consequently very flexible, inclined to 45°, and braced by fixed exterior buttresses. From the standpoint of elastic deformation and temperature variation, these cells are completely independent of each other; expansion and contraction, within the limits of each separate cell, become negligible factors. The buttresses carry hydrostatic forces directly to the ground; the first-story columns, which are structurally independent of the outer wall-screen, support the upper compartments.

At the base of the second story, the outside reinforcing band transmits the centrifugal horizontal stresses along the radiating gutter-beams to a circular zone placed around the sluice chamber: this zone consists of a system of 66 bars, each 25 millimeters in diameter, which exert an equalizing tension of 265 tons; as a result, expansion takes place freely. To permit this movement, the posts supporting the gutter-beams have been jointed horizontally at ends.

Independence of the top compartment has been obtained by placing a circular joint between it and the level below.



Section A-A



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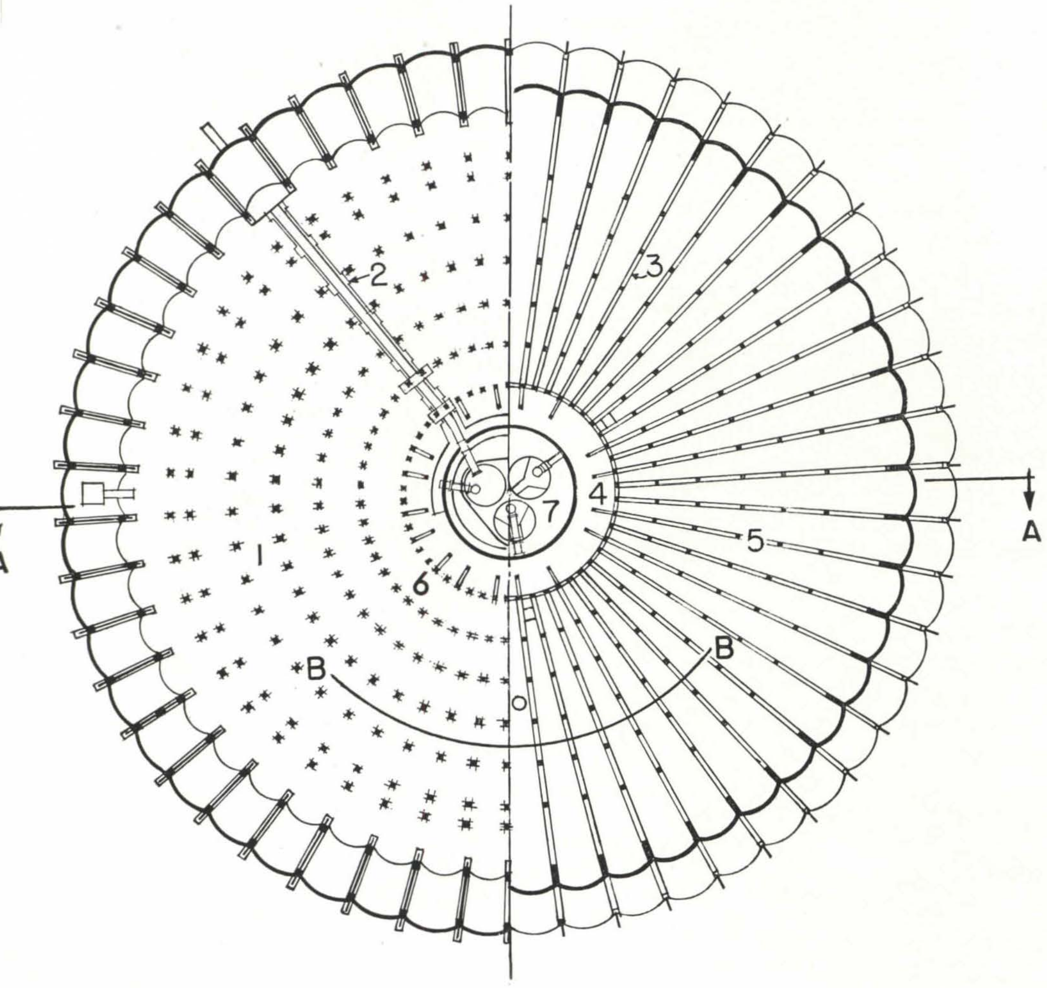
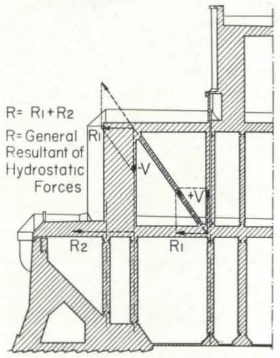
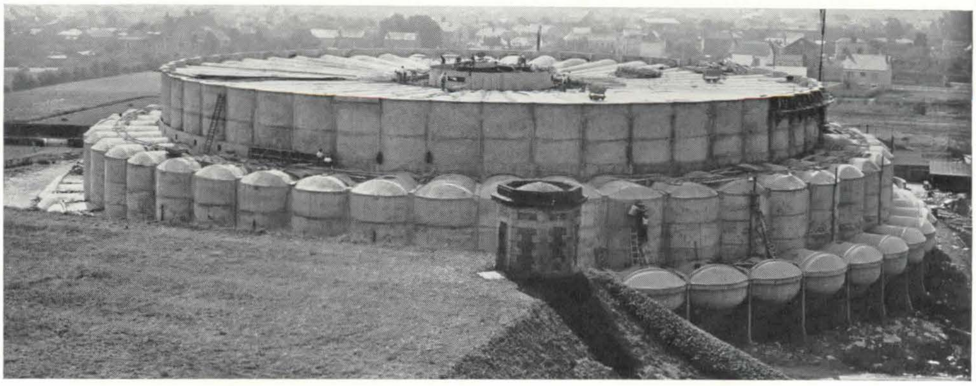




Section through columns and radiating beams

Plan (1st level, left; 2nd level, right): 1. Ground level; 2. Intake and outlet pipe; 3. Gutter-beam; 4. Central tower; 5. Conical vaults; 6. Braces; 7. Circular expansion rings.



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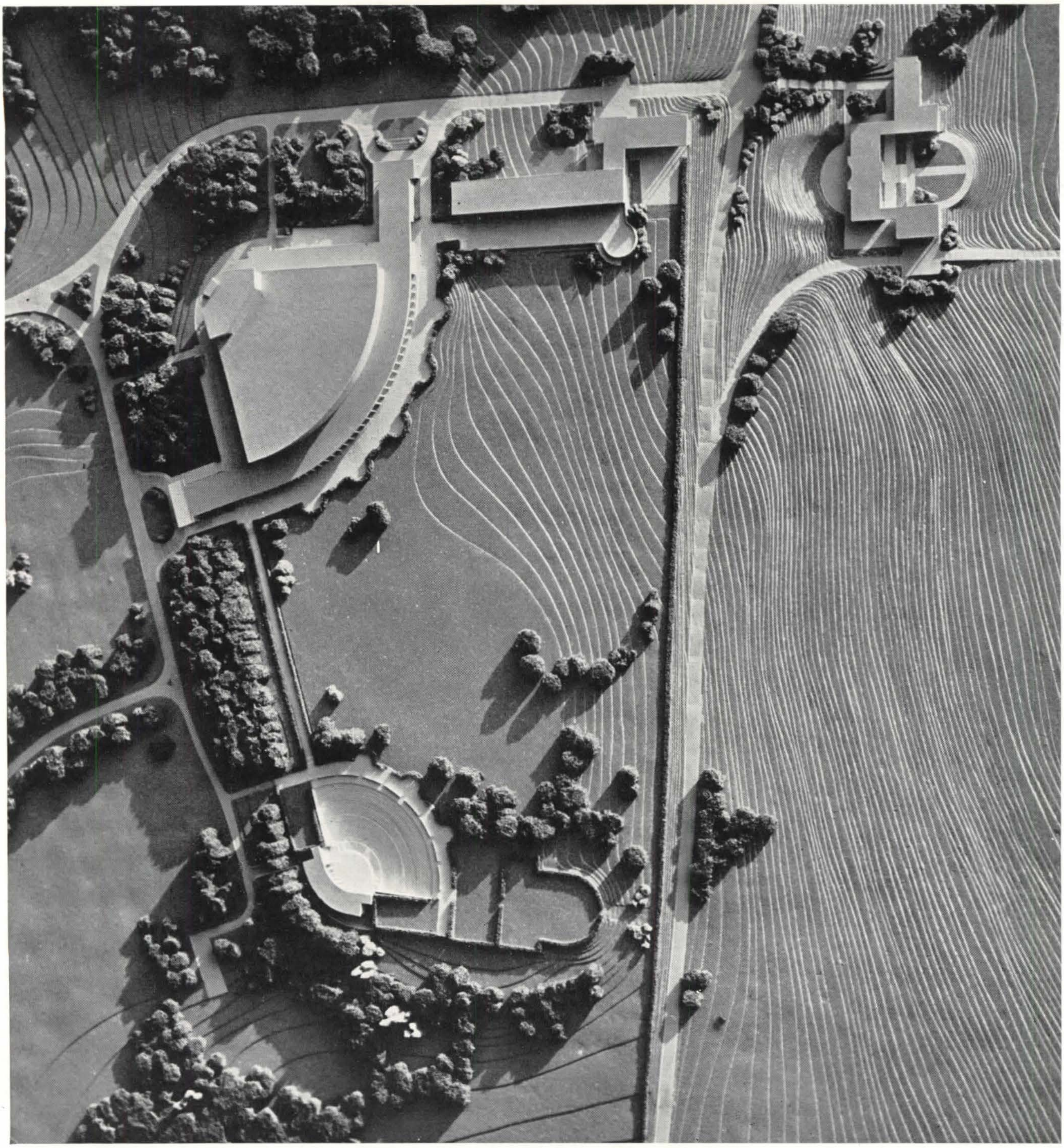
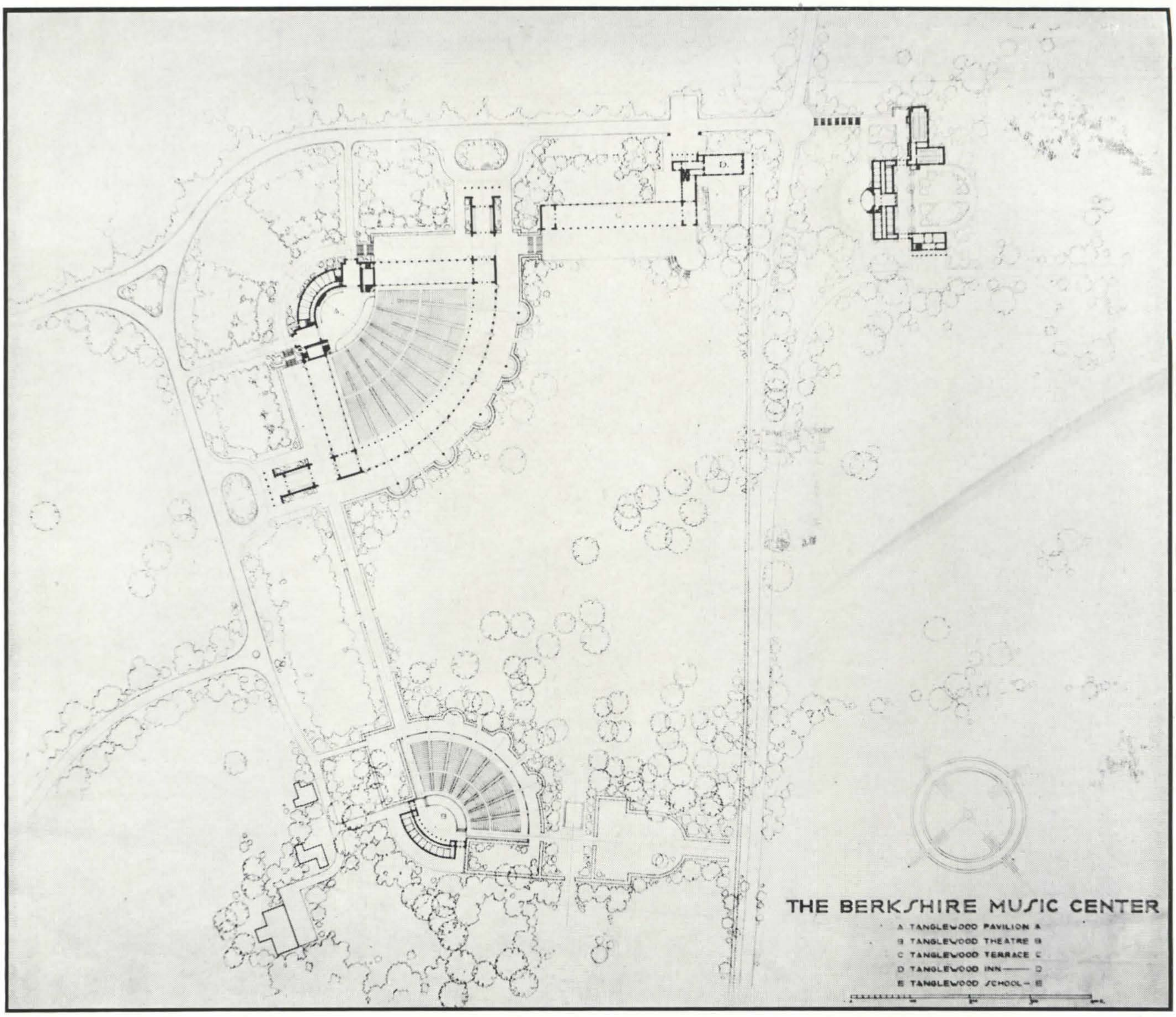
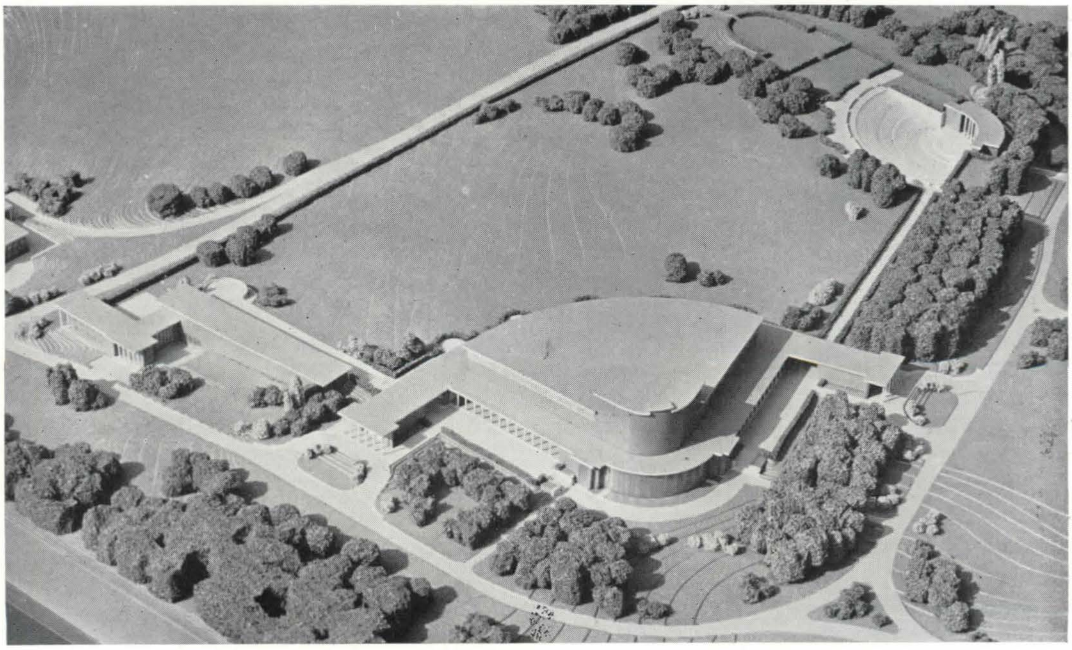


PROPOSED PAVILION DESIGNED FOR SUMMER SYMPHONIC FESTIVALS

ELIEL SAARINEN, Architect

THIS MUSIC PAVILION was originally designed for the Berkshire Symphonic Festival at Tanglewood, Massachusetts. Eliel Saarinen designed the model in collaboration with Serge Koussevitzky, the conductor. But Saarinen resigned when the Board of Directors decided, against his advice, to place columns in the auditorium interior. (The Music Shed, as finally erected, was designed by Joseph Franz, architect.) Covering an acre and a half, the Pavilion was to seat about 5,000 persons. Without exterior walls—only columns—it is open at the sides to the summer air. In Saarinen's design there is also an open-air theater. The materials had not yet been definitely decided upon; the steel skeleton was to have been erected first as a temporary shelter, the finishing materials to be selected and applied later.





The buildings to the left of the roofed pavilion include an inn and a school. Beyond is an open - air amphitheater.

The proposed "Climatorium" has a diameter of about 450 ft. The dome is to be supported on walls on which murals of outdoor scenes are to be painted; this, according to the designers, to give the illusion of an outdoor setting.

CLIMATE MADE TO ORDER IN PROPOSED YEAR-ROUND ARTIFICIAL SPA

DR. I. GOLDMERSTEIN and PROF. K. STOEDIEK, Designers

IN THIS PROJECT, called a "Climatorium", it is proposed not only to condition the air but to install artificial "suns" projecting ultraviolet and other rays of therapeutic value. The scheme proposes to assemble, under one roof, all types of mineral waters; medicinal baths to fill any prescription (vapor, electrical, hot-air, etc.); sporting events, exhibitions, and movies. The building is to be situated in the city—preferably close to a main thoroughfare—and open all year 'round.

Boxes heated to 100° F. and designed for rapid drying of the body will be installed; and there will be special presses for quick drying of bathing suits. (A laundry is to be part of the project.) To avoid the possible consequences of too sudden temperature changes in winter, there are waiting rooms in which the visitor may linger before leaving, thus adapting himself less abruptly to the lower temperatures outside.

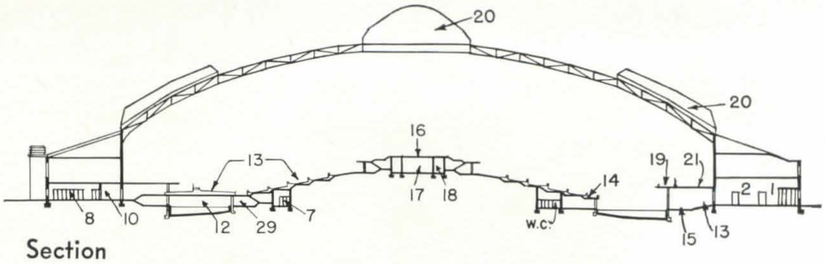
The building is surmounted by a dome with a span of about 450 ft. Interior space would be about 12,200,000 cu. ft., approximately 1,220 cu. ft. of air for each of 10,000 visitors. The supply of conditioned air discharged into the arena would be 9,500,000 cu. ft.; total hourly supply of air for the whole building would be 40,000,000 cu. ft.

In the center of the arena is a hill of fine sand with a restaurant for 400 persons on top. Along the outer edge of the pool stretches another beach which might prove suitable as a race track. The sand is to be maintained at a temperature of 95° F. by means of special heating; it is to be removed constantly for cleaning and for disinfection by steam superheated to 300° F. The water of the pool is also to be changed and purified regularly.

To prevent humidity condensation on walls and dome, inside-air temperature must be kept constant. Warm-air heating is held to be impracticable here: for it is essential to protect bathers and other scantily clothed patrons from draughts; moreover, heating of the ground is essential—the beach sand is to be heated. It is important, too, that the air above water level be renewed constantly, because of the probable presence there of chlorine gas rising from the chemically treated water. Steamheating, then, is the system employed. If adequate supplies of water are available from artesian wells, the water so obtained can be used in the ventilation of the building.

The "Climatorium" was originally designed for the Paris Exposition and there is a possibility that it may be exhibited at the New York World's Fair next summer.

PROPOSED "CLIMATORIUM"



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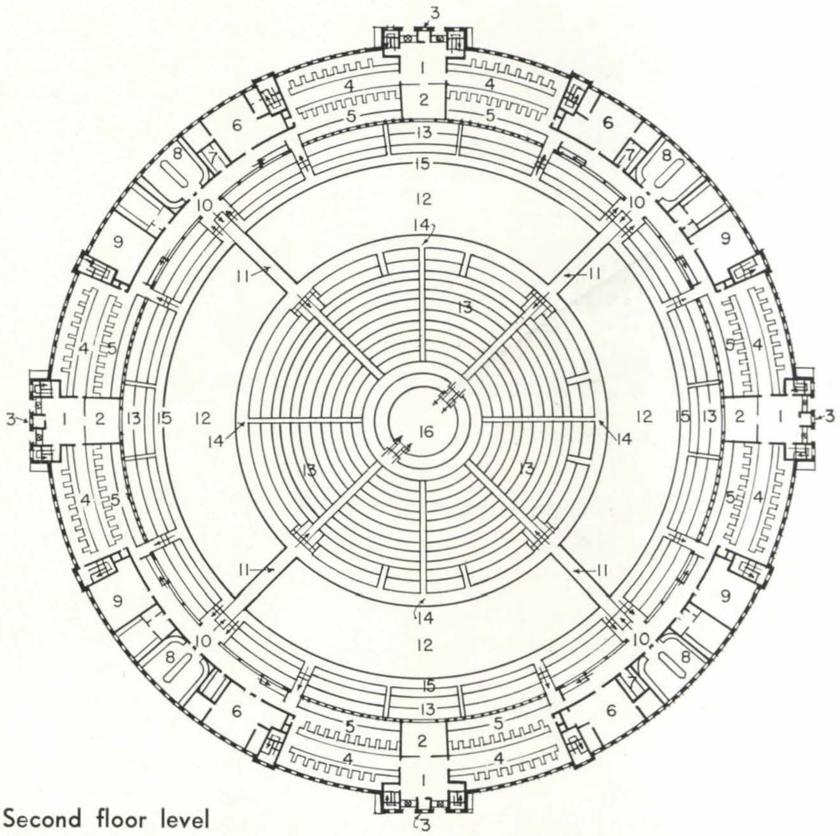
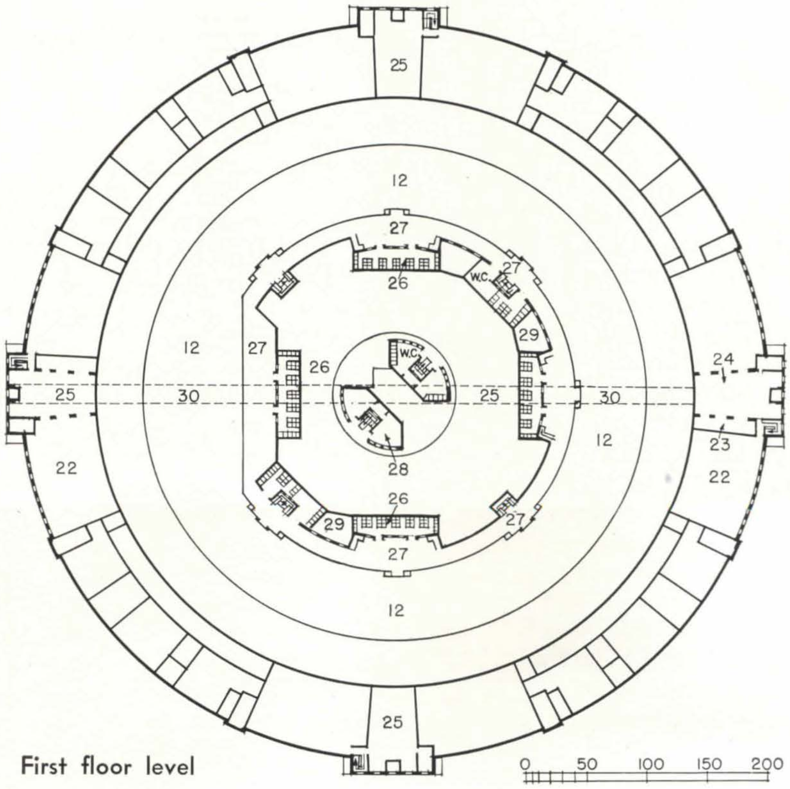


Second floor level



First floor level

1. Main entrance
2. Waiting room
3. Cash office
4. Cloakroom
5. Baths
6. Russian-Roman baths
7. Drying room
8. Showers
9. Medical showers
10. Gallery and supervision
11. Footbridges
12. Circular swimming pool
13. Sand beach
14. Inside promenade
15. Outside promenade
16. Restaurant
17. Thermal springs
18. Cold buffet
19. Promenade gallery
20. Skylight
21. Panorama
22. Workshop
23. Machine room for heating
24. Machine room for distribution, emptying, circulation, and filtration of water
25. Machine room (additional equipment) for ventilation
26. Drying room
27. Inside promenade
28. Restaurant kitchen
29. Hairdresser
30. Passages

Underwood & Underwood

Marvin McIntyre accepts FAECT membership for Architect Franklin D. Roosevelt.

FAECT holds convention; President becomes honorary member

THE FEDERATION of Architects, Engineers, Chemists and Technicians, CIO, held its Fourth National Convention on December 9, 10, and 11 at the Hotel Raleigh, Washington, D. C. The sessions were attended by 111 delegates. They were welcomed by Franklin D. Roosevelt, who sent his greetings to the convention and his wishes for "ever greater service in the cause of good architecture and sound engineering."

At the beginning of the sessions the technicians presented the President (who was architect recently for his own summer cottage at Hyde Park) with drafting board, T-square, and honorary membership in the FAECT. Lewis Alan Berne, president of FAECT, made the presentation to Mr. Marvin McIntyre, who accepted it on behalf of the President. Mr. Berne expressed the appreciation of FAECT members for the Administration's public works program. He said: "We are especially appreciative not only because it has meant increased employment for technicians and others engaged on public works, and because otherwise our talents would be dissipated and frozen, but also because such a program has been designed to provide for the comfort, health, and vital needs of the people."

The International officers of the Federation were all unanimously reelected, an action which disclosed, they said, the unanimity of the entire membership, and complete devotion to the principles of the CIO and the complete unity within that labor body. The officers reelected were Lewis Alan Berne, International President; Marcel Scherer, Vice-President in charge of organization; James A. Gaynor, International Secretary-Treasurer. Other International Vice-Presidents chosen were: Stuart Green, Minnesota; Jules Korchien, Washington, D. C.

Among those who addressed the Convention were: A. C. Shire, Technical Director, U. S. Housing Authority; V. T. Boughton, Managing Editor, Engineering News-Record; Louis K. Downing, Dean of the School of Architecture and Engineering, Howard University. John L. Lewis, President of the CIO, greeted the delegates in a statement in a special issue of Technical America, the Federation's official publication.

Mr. Boughton of the Engineering News-Record discussed the relation of unions to professional groups. He declared that for his part he could see no "strong reason why many licensed professional engineers will find it necessary to join a union . . .but this is not true of the very large number of men who can be most conveniently classed as sub-professionals. So long as the state professional societies treat them as stepchildren, unions such as yours can be of help to them in many instances."

Competition for design of "productive home"

A COMPETITION for the design of a "productive home" is being sponsored by organizations interested in the decentralization of industry and in associated objectives. A "productive home" is regarded as one that is "located on productive land in the country, but within transportation distance of the places where the members of the family have businesses or are employed. The goal of each family is to add to its economic security through production in the home, shop, studio, and garden."

For purposes of the Competition, the country will be divided into five regions: the Northeast, the South, the Middle West, the Southwest, and the Northwest. The Competition will consist of two stages. The first stage is open to every architect in the United States; there is no residence requirement. The second stage will be open to 55 architects, submitting designs intended for each region. These architects will be selected by a jury from those competing in the first stage. There will be five prizes of $1,000 each and fifty additional awards of $100 each to the 55 competitors in the second stage.

The sponsors have retained Walter Sanders, AIA, as Professional Adviser, and Elliott Taylor as manager of the Competition. Copies of the program may be obtained by writing to the Professional Adviser, The Productive Home Architectural Competition, 381 Fourth Ave., N. Y. City.

Competition for sculpture in Plexiglass

THE ROHM & Haas Co., Inc., of Philadelphia, announces a competition sponsored by the Museum of Modern Art for the best example of sculpture in Plexiglass, a plastic "more transparent than glass."

Submissions are to be in sketch form. From these, the Jury, selected by the Museum of Modern Art, will choose five sketches; the sculptors will then be supplied with sufficient Plexiglass to complete their sculpture. First prize is $800; 2nd prize, $300; 3rd prize, $200; 4th prize, $100; 5th prize, $100. Entry blanks and samples of Plexiglass may be had from Gilbert Rohde, 32 East 57 St., N. Y. City.

DESIGN TRENDS

Globe Photo

From military necessity—better buildings?

ARCHITECTURAL
RECORD
COMBINED WITH
AMERICAN ARCHITECT AND ARCHITECTURE

What Does Military Desig

Photos by Triangle

" . . . what a sad commentary upon the history of the world and upon the vanity of human wishes that now for the first time in England, since, I suppose, the end of the fifteenth century, we are beginning to think once again about the fortification of private houses!"

—Sir Samuel Hoare before the R.I.B.A.

Plowshare into sword?

DURING THE COMING YEAR, throughout all of Europe and much of Asia and Africa, every new and existing building will be carefully studied for a new characteristic—safety from aerial attack. While it is quite true, that, historically, war has often exercised decisive influence on architectural progress—at times accelerating higher standards of performance, at others delaying them—never before has military necessity laid so heavy a hand on building design as now, in the day of the air raids. Moreover, if current trends can be projected with any accuracy into the future, this imprint will become even more pronounced. For not only is the design of individual buildings already showing it—town, regional, and national planning also reflect it.*

Air-raid protection plans must be analyzed relative to at least three factors: their efficacy in discouraging aerial attack; their efficiency in meeting it if it comes; finally, their long-range effect on the architecture of

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*One of the central points of discussion at the recent annual meeting of the International Town-planning and Housing Congress in Mexico City was "Underground Planning".

Offer the Architecture of Peace?

WITH no alarmist motives, ARCHITECTURAL RECORD herewith explores a subject which, for several years, has occupied increasing space in Europe's architectural press. Our intention is simple and unambiguous: to examine Europe's No. 1 architectural trend — that of making building design "air-worthy" — not with an eye to building shelters in America but to applying such new design principles as may have been evolved to the architectural problems of peace. This study — documented by material in our own files — was staff-fabricated with the assistance of Douglas Haskell.

peace. For most European architects the first two factors—particularly the second—are of crucial importance; the peril from the air has not permitted much discussion of the third. For "the question of air-raid protection (in England) is quite literally one of life and death for every citizen of this country," writes Prof. J. B. S. Haldane in the *Architect's Journal;* and the rest of Europe's architectural press agrees. Only the building designers of the American continents are in a position to view such problems with any degree of detachment.

What does this new necessity imply for the future of architecture? What new standards does it impose and how do they affect those already operating in civilian architecture? Does it necessarily follow that *all* air-raid protection measures violate *all* accepted standards of building design and town planning? After a careful analysis of various town plan types (existing and proposed), the Nazi architectural press rated the open type proposed by expatriate Walter Gropius, as least vulnerable to and easiest defended from aerial attack. In the same fashion, Le Corbusier's plans for rebuilding Paris with stilted skyscrapers attracts new attention as being hard to bomb and gas; and the slum-clearance and garden city movements in England find new impetus from the peril of the air. Such parallels, however, are perhaps coincidence. At any rate, decentralization is only one aspect of modern industrial society—concentration is likewise essential; and there are other means of slum clearance than by high explosive and incendiary bombs.

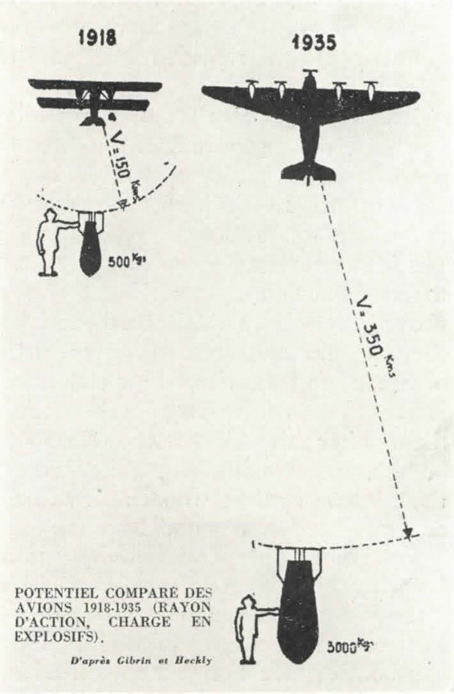
What is implied, then, is a fairly detailed analysis* of current European trends in building design—its materials, its structural and operational systems, its building types, its town and regional plans—to discover if and where the new necessity gives promise of better building standards.

Scope of the problem

The scope of danger of aerial attack is defined by the modern war plane; its intensity by the modern aerial bomb. The modern warplane has so greatly increased its radius of action that today "any European country can be attacked by any other European country"; it has so greatly increased its "payload" that whole cities can be demolished in a single raid—viz., Guernica; and its altitude and speed are so greatly improved that searchlights can't see it, only the fastest pursuit planes can overtake it.

And the effectiveness of planes carrying high-explosive bombs is still rapidly increasing. A single bomber, by the end of the World War, was able to carry a load of 500 k. (1,100 lbs.) for a radius of 150 km. (95 miles); in 1935 it could carry 3,000 k. (6,600 lbs.) a distance of 225 miles. In prospect are bombers carrying 5 tons of payload a distance of 2,000 miles (Fig. 1). Other factors are in the bomber's favor. In the World War it suffered a speed handicap against pursuit planes of about 50%; this handicap has been reduced to an average of only 15% today.

As for explosives, short of the use of some entirely new principle (smashing atoms) there is scant prospect that more powerful kinds will be devised. Although single bombs weighing over a ton are made, it is more economical to use several bombs of lighter weight. Thus the theoretic radius of destruction of 1,000 k. (2,200 lbs.) concentrated in a single bomb and dropped on a mass of concrete is 136 sq. ft.; but if the same weight is distributed among 20 bombs of 50 k. each (110 lbs.) the theoretic radius of destruction increases to 320 sq. ft.



Courtesy "L'Architecture d'Aujourd'Hui"

Fig. 1. In 1918 a plane could carry 1,100 lbs. for 95 miles; by 1935 this had been upped to *6,600 lbs. for 225 miles.*

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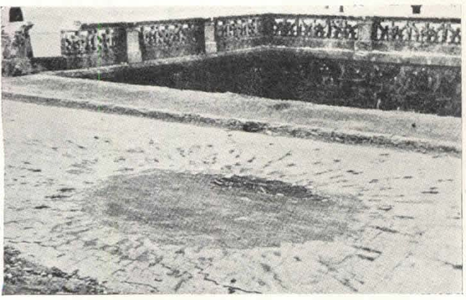
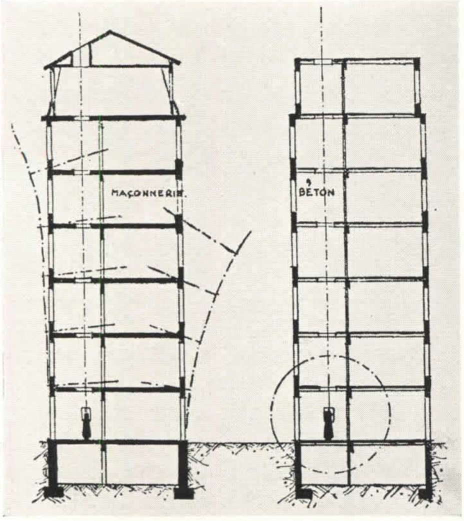
*All statements of fact in this paper are taken from the European architectural press.



Courtesy "The Architect's Journal"

Fig. 2. Spanish street, showing lateral blast effects of percussion bomb.



Courtesy "L'Architecture d'Aujourd'Hui"

Fig. 3. While penetrating bombs destroy masonry structures (left), they only damage steel- or concrete-framed ones (right).

What are aerial bombs?

Bombs fall into three main categories — high-explosive, gas, and incendiary; germ bombs have not yet definitely been reported out of the laboratories.

Incendiary bombs are usually light in weight (approx. 22 to 60 lbs.), are carried by a single plane in numbers up to 1,000, burst immediately upon contact, and are unquenchable (in fact, efforts at quenching may lead to an explosion). Such bombs have proved relatively ineffectual against the masonry and steel-joist structures of Spain, and the Fascist air command is reported to have largely abandoned them after the first two weeks of bombing against Madrid. They would raise havoc against wooden structures or structures with wood framing.

Gas bombs depend heavily upon favoring weather conditions, and cities by nature produce so many air currents as to afford an unfavorable field. That gas bombs have not yet been used in Spain is apparently due to the fact that high-explosive bombs create a great deal more havoc for the same outlay. It is also possible that gas as an instrument of panic, is being saved up.

Following latest European estimates —which rank both gas and incendiary bombs as decidedly secondary dangers compared to the high explosive types— this paper will be largely limited to the latter. "The one big problem is the high-explosive bomb."

High-explosive bombs are of two general types: percussion bomb, which explodes immediately upon striking (Fig. 2); delayed-action fuse bomb, which usually explodes approximately 1/20th of a second after striking, its armor-piercing shell having meanwhile carried it through several floors of the struck building, so that the explosion occurs in a middle story or in the basement (Fig. 3).

An outline picture of what happens to a building when a high-pressure bomb explodes is essential to an understanding of necessary counter-measures. The sequence of that split-second is quite intricate.

1. Impact. If a bomb of the heaviest type now made, weighing a ton, is dropped from the "safe" height of 20,000 ft., the impact has a force of 40,000,000 ft. lbs.

Despite the force of this impact, the percussion type of bomb striking a city pavement makes a very shallow crater. Its vast destruction is chiefly lateral, especially effective against crowds. Carrying only a light shell, the percussion bomb contains explosive making up 55% of its total weight, whereas the charge in the penetrating bomb is only 30% of the total weight. Percussion bombs most commonly used in Spain have been 30 k. to 50 k. in weight (66 to 110 lbs.)

Penetrating, delayed-action bombs, according to an English engineer visiting Barcelona, "invariably explode at about the third floor down. In the case of a house of 5-7 stories (the great majority of houses in Barcelona are of this type) the effect is always to destroy the whole house." The upper part has its support blown away, and the lower floors collapse under the falling debris. "Two bombs each of 300-500 k. fell in a residential quarter in Barcelona and entirely destroyed three 6-story houses with a total frontage of 80 ft., killing between 80 and 90 people, many of whom were buried under the wreckage. This was at 3 a.m. when the house was full of sleeping people."

Impact is almost always at an angle. A bomb, dropped from a plane moving more than 100 m.p.h. (idling speed) at a height of 12,000 ft. or more, may drift nearly a mile, even without appreciable wind before striking. This not only makes air bombardment very inaccurate but also leads to grave error if protection is planned only in terms of floors and roofs, since sidewalls also play a part in absorbing—or more often failing to absorb—impact.

2. Blast. Ignition of the explosive matter, whether by percussion or by delayed-action fuse, causes a *blast,* which is composed of air pressure produced by the enormous expansion of gas, followed by an equally disastrous air suction as the air rushes back into the partial vacuum.

The blast is the chief agency of destruction, although it begins and ends in approximately 8/10,000 sec.

Apart from the immediate problem that blast poses for the defender, of blocking it where human lives are to be protected and yielding to it where the sacrifice of part of the structure will ease the pressure and save the rest, the direction of the blast (from below) and its double action set up reversals of stresses which necessitate wholly revised structural calculations.

3. Shock. Shock is to solids what blast is to gases. It travels in waves like an earthquake, and can shatter a shelter roof far below the actual crater. The deepest crater in Madrid to date has been 30 ft., in Barcelona 23 ft.: a minimum of 50 ft. underground would therefore be necessary for safety.

4. Splinters. These are the shell fragments, hurled at enormous velocity and capable of killing at 400 yards. Within a distance of 50 ft. no 9-in. brick wall can withstand the splinters of a medium-weight bomb. Splinters have a punching, shearing effect, setting up the requirement of special qualities in the building envelope. Concrete, for example, is reinforced in zones rather than planes.

5. Debris, dislodged by the blast, is partly hurled through the air with the splinters, but the chief problem is created by masses of it falling on shelters placed under buildings. These must always carry a factor of roof-thickness for the *live and dead load* of the collapsing super-structure. Moreover, debris seriously limits the *location* of shelters, since experience has shown that it can rarely be cleaned away in less than 3 hours.

What are the standards of protection?

Who is to be protected, and how well? That is the controversy, involving life and death, now raging up and down Europe.

The ideal shelter system would protect the entire population against being:

1. Blown to bits by blast
2. Shattered by shock
3. Pierced by shrapnel
4. Machine-gunned from the air
5. Crushed by falling debris
6. Asphyxiated, seared, blinded by poison gas
7. Burned to death
8. Suffocated by excessive moisture, lack of oxygen in the shelter
9. Deafened
10. Killed by thirst while imprisoned under debris
11. Starved
12. Infected through lack of medical care or faulty sewage disposal
13. Isolated from the rest of the world.

To protect *all* the people against *all* these potential dangers is of course a colossal task. Aside from its staggering cost (Haldane estimates that it would cost $2,000,000,000 for London alone) it also presupposes an *even and constant* distribution of *all* forms of attack such as seldom occurs, if Spain and China are any index. The very fact that the blow may so easily fall somewhere else often becomes an excuse for supplying adequate protection nowhere.

Standards actually adopted vary a great deal, and it is in fact impossible to secure accurate information. The standard is naturally very high in Republican Spain, where air protection enjoys the enthusiastic voluntary support of the threatened population. How effective such protection can be is illustrated by a news dispatch:

"Fifty rebel warplanes raided Castellon recently. They dropped 450 bombs. There were 70,000 people in the city, and only one was killed. A week later the raiders returned in force —19 Junkers escorted by 9 pursuit planes. This time they dropped 180 bombs and destroyed 60 houses as well as the civilian hospital. Two women and three children were killed in the hospital, but in the city itself the death roll was nil."

The answer in this case was simply a clay soil adapted to dugouts 40 ft. below the surface. The population gradually connected these dugout together by tunnels.

Most readily available are published standards for new construction. French regulations recommend that such shelters be proof against direct hits from at least 220-lb. bombs. The law of 1935 and subsequent decrees require that every new industrial plant shall incorporate shelters in its plans. Stellingwerff (Italy) sets his standard for new construction in densely populated areas at protection against 220-lb. bombs as a minimal standard. Elsewhere, in contradiction, he lays down as a cost limit a 2% premium on the total cost, an allowance that would give protection only against debris.

German preparations began promptly with the access of the present regime to power, and their superiority has been the boast of German writers ever since. Schloszberger declares that for civilian purposes, protection against direct hits from 200-k. (660-lb.) bombs is the maximum economically feasible in new industrial layouts; in most circumstances protection against 220-pounders will have to suffice. German law since 1934 has required the provision of shelters in conjunction with every new industrial or multiple-dwelling structure; since 1933 every new housing scheme or Siedlung has been submitted in advance for official approval of its air-raid protective qualities; materials and equipment must be approved after tests officially conducted at one of several universities.

It is confessed by the authorities in all countries that their plans, taking into consideration *existing* structures (which of course form the vast majority), do not contemplate complete protection by far. The best that is being attempted in the great preponderance of shelters is protection against splinters, or the remote effects of blast. In other words, the best that will be done against most shells that fall, by official program, will be to confine their destruction of life to a radius of something like fifty feet.

The German air raid law was passed in 1934, the French early in 1935, with correspondingly thorough technical studies. In England, precautions have not yet been made compulsory by law. The first English Home Office handbook appeared in 1937, and comprehensive technical studies were not offered in the architectural press until the summer of 1938.


Wide World

Fig. 4. Straight trenches such as these were early discarded as being of little value: a zig-zag pattern is much safer.

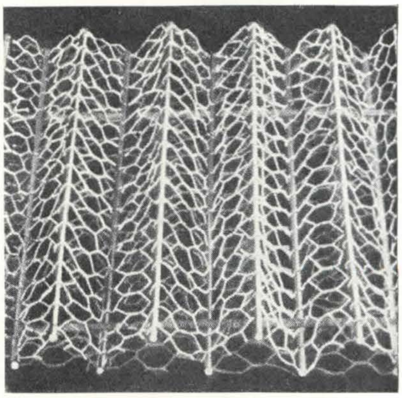

Courtesy "Stahl Uberall"

Fig. 5. One of several types of "zonal" reinforcing developed for protecting concrete against effects of blast.

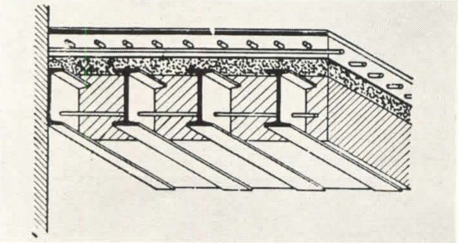
How are they achieved?

Air-raid precautions have not yet brought forth any startling new building materials or structural systems. Indeed, the first effect has been to bring a return to the oldest material known, the common earth (Fig. 4). The reasons were probably psychological as well as technical. "I have lived for very many months in a hole in the ground," declares an English architect, "and I have lived in the ramparts at Ypres, and I know the feeling of security that is given by the knowledge that one is below the surface of the ground. For the ordinary householder there is no better protection than that." In short, dependence was placed upon an unlimited quantity of undifferentiated mass of the most immediately available kind.

Materials now being promoted are steel and reinforced concrete, separately and in combination. In many places (England especially) brick would appear quite as popular. The structural forms are sometimes novel as applied

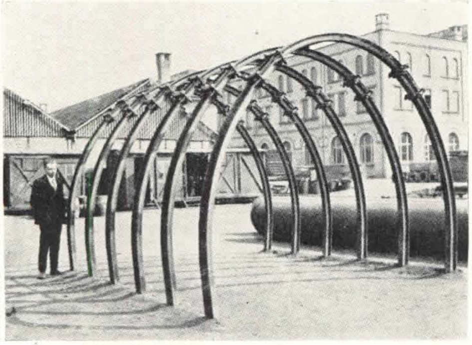
Courtesy "L'Ossature Métallique"

Fig. 6. Many types of corrugated steel piling are used for walls and roofs.



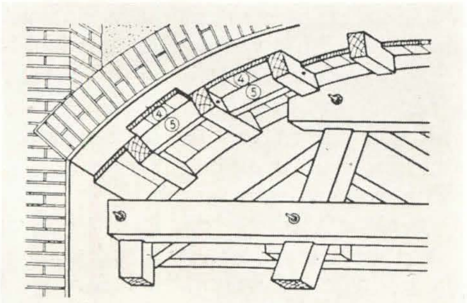
Courtesy "L'Ossature Métallique"

Fig. 7. Typical example of extra heavy reinforced concrete framing.



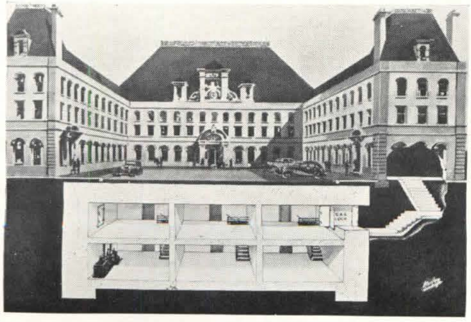
Courtesy "L'Ossature Métallique"

Fig. 8. Many variations of this system are used above and below the surface.



Courtesy "L'Architecture d'Aujourd'Hui"

Fig. 9. Heavy templates left in place.



Fox

Fig. 10. Complete underground shelters like this form a new building type.

to buildings; but closer examination shows that all of them to date have been borrowed from specialized engineering fields, where they have already been in common use. They include:

1. Concrete with special reinforcement. To resist the punching, shearing effect of bomb splinters, the reinforcement, instead of lying on a top and bottom plane, is *zonal:* that is, it is interwoven from top to bottom like a mattress. This is borrowed from bank vaults (Fig. 5).

2. Concrete on copper-bearing sheet-steel of corrugated or dovetail section. Careful sealing of the joints keeps the steel gas-proof even after minor ruptures of the concrete, and easy to decontaminate (Fig. 6).

3. Vacuum-dried concrete. An American, K. P. Billner, demonstrated last August a pill-box of concrete 12 in. thick whose setting was hastened by vacuum-creating machinery in the forms. The claim was made that the material would harden sufficiently to withstand shell-blast in 4 hours; proportionate rapidity being obtainable with increasing thickness. Twelve inches would protect only against effects of remote explosions, and the pill-box form has been severely condemned abroad except for isolated watchmen obliged to remain on duty.

4. Close-set steel I-beams drilled for round cross-rods, with concrete filling between beams. This is the strongest structural combination attempted, and is borrowed from railroad bridges and similar structures supporting extremely heavy live loads (Fig. 7).

5. Steel (copper-bearing) tunnel lining, in various kinds of ribbed or trough section, used either in tunnels or free-standing structures. German and English forms have produced some of them in "lamella" form, that is, leafs that fit together without bolting. The process of erection is derived from mines and tunnels (Fig. 8).

6. Mining has also supplied the technique of shoring; and the German industry is at work on adjustable steel columns, suitable not only for quick shoring of existing cellars but for quick repair to structures already damaged by bombs (Fig. 9).

Equipment

The "services" offered by bomb-proof shelters are conspicuous chiefly by their absence. Water is supplied in pails, because pipes would risk flooding; food is not thought of, because of the brevity of the anticipated stay. Waste elimination is primitive; toilets are chemical, because sewer traps might be blown in from the outside, forcing in gas. Light is electric; if this fails, auxiliary lighting is only by flashlight. Heating instructions are limited to warnings against oxygen-consuming fire. The only special provisions are for what might politely be called "air conditioning" and for decontamination. The atmosphere is kept tolerable either by regeneration or, preferably, by filtration of air from the outside. The filter pumps are of a type easily worked by hand or by foot-pedals. Filters are expensive, and are occasionally relinquished in favor of air intake pipes 60 ft. high. Explosions near enough to demand a shelter at all might easily shear these off.

Decontamination requires a pit with chloride of lime and sand through which entrants shuffle their feet; tight bins for gas-contaminated clothes and others for fresh ones; showers and dressing rooms.

Furniture is bare and non-porous for easy decontamination by washing with plain water; doors and windows are heavily reinforced steel with gaskets, often of inflated rubber hose, as gas-locks (a form easily adaptable to ordinary civilian locking).

In Germany all equipment must be approved in advance by one of the university testing stations.

Space is minimal, layout standardized. The essential parts of a complete shelter are: (1) a guarded entrance, (2) a gas-lock long enough for stretches, (3) decontamination room, (4) first-aid station, (5) sitting space, (6) ventilation pumps so placed that over-pressure will drive against the entrances.

New building types

More interesting than the adaptation of materials from bank vaults, railroad bridges, and mines, has been the effect of air-raid protection upon building design. None of these are radically new: even the sharp-pointed conical tower of reinforced concrete has ancient ancestors of stone. There is a half-hearted attempt to justify the huge cost of many shelters by proposing that they serve as garages, recreation halls, sewers, or subways before and after the air raids. Most authorities agree, however, that a good shelter is good for very little else. European literature classifies shelters mainly according to functional use (i. e. for thickly populated residential sections, for factories, for open lightly populated areas, etc.) or position (in the open, under buildings, or tunnelled underground). But perhaps the most illuminating classification of shelters against explosive bombs might be made according to the *method employed to meet the blow:*

1. Opposition by brute mass. This embraces, as structures employing the earth itself,

a. Trenches, open or covered, useful only against remote blasts and splinters, while localizing the effect of direct hits.

b. Tunnels, either converting existing underground passages (this is often highly dangerous) or creating new ones.

c. In addition, are the thick-walled cellular refuges of steel or reinforced concrete, either above or below ground. This is the most common type of all (Fig. 10).

2. Cushioning the blow. The effect of a blast decreases as the distance cubed. It also decreases greatly in the absence of "tamping," so that a bomb which would completely shatter a given concrete wall if it exploded near the wall underground, will only knock loose a sector of concrete from the reinforcement if the explosion is in midair. These facts have been capitalized for a long time through the use of "bursting layers" acting as cushions for the impact of the shell or for the ensuing blast.*

a. Ordinary "bursting layers" are layers of hard material laid on the ground. The pieces are small so that, if the bomb should penetrate beneath the layer, there would be a minimal "tamping" action, the small pieces flying off with ease.

b. Double-wall systems. In Spain, these have been successfully worked out in combination with the bursting layer. The sequence is: bursting layer, soft earth, concrete shelter roof (Fig. 12). Double walls with air space have also been used in Spain, and are the stock-in-trade of the Italian authority Stellingwerff, who explains that although a single concrete slab 20 cm. thick is stronger than 2 adjacent slabs each 10 cm. thick, nevertheless the first one, acting as a cushion *at a distance* from the second, robs the blow of so much force that the second can stop it entirely.

c. An extension of this principle, now advocated in all countries with framed structures, is the construction of the whole structure as a series of bursting layers. In a tall building, the successive floors act as brakes, stopping the bomb some distance above the shelter in the basement; the floors still remaining help cushion the explosion (Fig. 3).

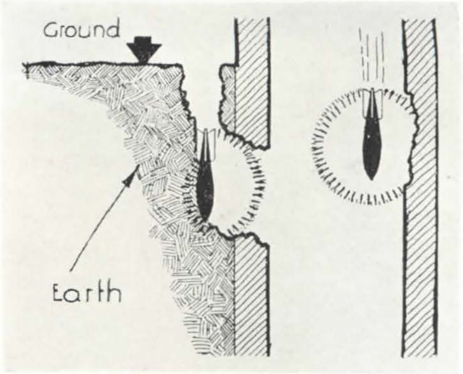
Two serious errors must be guarded against. First, the shelter must not be near exterior walls, whose massed debris might shatter it. Secondly, it must not be forgotten that *almost all bombs strike at an angle,* and therefore are likely to enter through weak walls rather than strong roofs. Hence the very type of building which, through its narrow slab-like form affords the best peace-time ventilation, is a poor cushion; shelters combined with such schemes are better laid underground in open spaces. The best cushioning type of building is the one with large floor areas, like a New York modern loft building.

3. Deflecting the blow. The single type that attempts deflection is the conical tower reported from France, Italy, and Germany. These offer a very limited target from the air and are meant to deflect the bomb to burst against the massive base. Unfortunately, as has just been said, bombs drop at an angle; moreover it would seem simple to adapt bomb fuses to explode no matter at what point the bomb made contact (Fig. 13).

4. Yielding to the blow. The concept of working with natural forces and not against them represents a late stage of technical development and is imperfectly carried out in any field of building. As related to high-explosive bombs, this concept has an ironic sound, to say the least. Nevertheless, there already exist *fragmentary* applications.

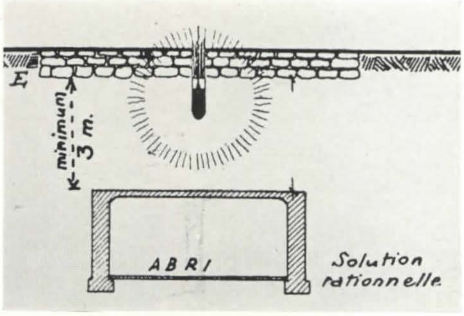
a. Light wall panels in framed structures give way and save the frame itself, localizing the damage. (The population is assumed to have fled into resistive shelters.)

b. Egg-shaped steel structures (Fig. 14) on springs devised by the engineer, A. Friedrich, which automatically streamline themselves to the direction of the blast, are rounded to present a minimal area to the blow. Their efficacy against direct hits has not been tested, and is dubious.



Courtesy "L'Architecture d'Aujourd'Hui"

Fig. 11. Wall with "tamping" (left) is destroyed; without it (right) only damaged.



Courtesy "L'Architecture d'Aujourd'Hui"

Fig. 12. "Bursting layer" at surface protects shelter from radius of shock.

Globe

Fig. 13. Conical towers like these represent new bomb resistant building type.

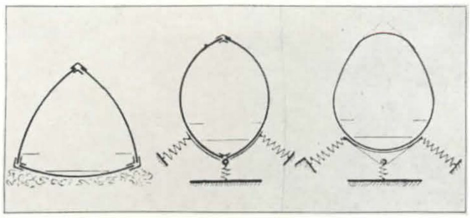


Fig. 14. Advanced building design may spring from such "streamlined" types.

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*Bursting layers, useful against air bombs, would be useless against the higher velocity of the artillery shell.

"News That's Fit to Print."

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Britain Will Expend £20,000,000 To Reinforce Homes for Air Raids

Steel Sheets to Be Placed Between Basement And Ground Floor—Smaller Houses to Get Outside Shelters Easily Put Up

By FERDINAND KUHN Jr.

Wireless to THE NEW YORK TIMES.

LONDON, Dec. 21.—The government announced today that it would spend £20,000,000 in reinforcing private houses, apartment houses and other buildings throughout the country to protect a large part of the populace from enemy bombs.

The plan is to install steel sheets and girders between the basement and ground floor of every house so that at least a part of the building will not fall upon its occupants in case of an air raid.

Moreover, a law will be passed early next year compelling all employers to provide similar protection for their working-people in stores and factories, just as present laws make them safeguard the health and working conditions of their employes.

In addition the government will several million pounds so that public type can be the streets

the House of Commons today. It is simply impossible, he said, to give "100 per cent protection" against a direct hit by a high explosive bomb.

"Apart from the difficulties and delays involved in any scheme for deep bomb-proof shelters," said Sir John, "I do not think we are prepared to adapt our whole civilization so as to compel a large proportion of our population to live and maintain their productive capacity in a troglodyte existence deep under ground.

"What we can and must provide is not bomb-proof shelters but adequate protection against splinters and blasts and against the fall of debris."

In the World War and in Spain these have caused more casualties than direct hits themselves.

Accordingly, Sir John told the House, the government had devised a standardized steel fixture "con-

PRESIDENT T CONGRESS DRAFT NEW

Will Make 'Affirmat tions' and Leave Legislators, Ad

LONG SESSION

Appointments and tions Threaten Dies Asks Sho

By TURNER CAT

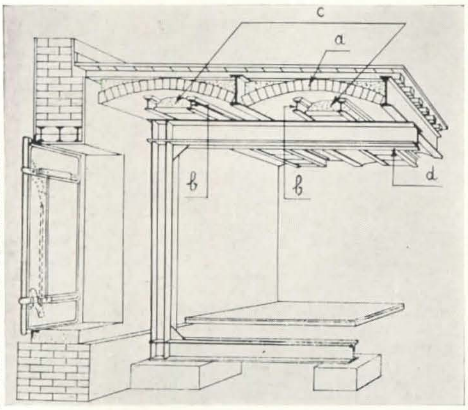
Special to THE NEW YO

WASHINGTON, Dec first session of the n was predicted today Bankhead upon his retu ington to begin prepara opening on Jan. 3.

This forecast was other Congressional le reaching the capital the Speaker, alrea

Courtesy New York "Times"

Fig. 15. In England, plans for strengthening existing residential structures are now proposed.



Courtesy "L'Ossature Métallique"

Fig. 16. A Belgian design calling for heavy construction with steel scaffolding to remain in place.

5. Evasion of the blow, or making it too costly. Bombs cost too much to be wasted on dispersed targets. Therefore the best preventive measure is to spread the population, and any new structures, thinly over the landscape; but this a problem less of architecture than of town and regional planning.

Existing types modified

New buildings types are necessarily only a small element in the whole picture. Two other kinds of precaution are being taken: the strengthening of existing structures, through reinforcement and shoring, and the "improvement" of current building types.

a. Strengthened steel frames: The most widespread among all diagrams appearing in the European architectural press is an illustration, showing, first, a metal, fireproof roof (asphalt and bituminous materials combine with mustard gas to form a poisonous paste impossible to decontaminate); then, floors reinforced by filler joists, and finally the shelter in the basement with a ceiling of concrete on a corrugated sheet section.

b. Even small houses as developed in Germany and used in the country settlements feature special air protection with a disarmingly "peasant-like" appearance. These are designed not for security against direct hits but for protection against medium bombs at a fair distance (c. 50 ft.). For economy they retain masonry wall construction, but the roof is metal-covered; the roof and floor framing are steel well-anchored in the walls; elasticity is maintained in the walls by means not only of good quality cement mortar but frequently by steel reinforcement.

Shelter systems

Nothing in the nature of an integrated shelter system for the civil population yet exists. (Built or building for the protection of government officials and high military officers, are such units as the underground office systems of England's Foreign Office and the air ministry in Berlin.) Apparently, the only complete proposal for such a system is that of Prof. Haldane's for London.

But the nearest approach is the improvised shelter system of Spain. The mass shelters in Barcelona, housing up to 2,500 people each and constituting a new type of public structure, have been planned with an eye to possible peace-time use, but this appears mainly wishful thinking. Besides these mass shelters the Spaniards have improvised private interconnected refugios, dug by the householders and others, available to transients caught on the streets. Only the main outlines of a shelter service begin to emerge in Europe and only history will tell whether or not time remains for its actual production.

Conclusions

Shelter design has so far produced: (1) no civilly useful new materials or construction methods, (2) no civilly useful new equipments of services. While some scattered examples indicate advances in atmospheric control, for example, the average is far below even current standards of civilian work. And *none of the most advanced types has yet been built.* (3) No civilly useful plan or building types. (The conversion of shelters into such peaceful types as garages simply produces an inferior garage.)

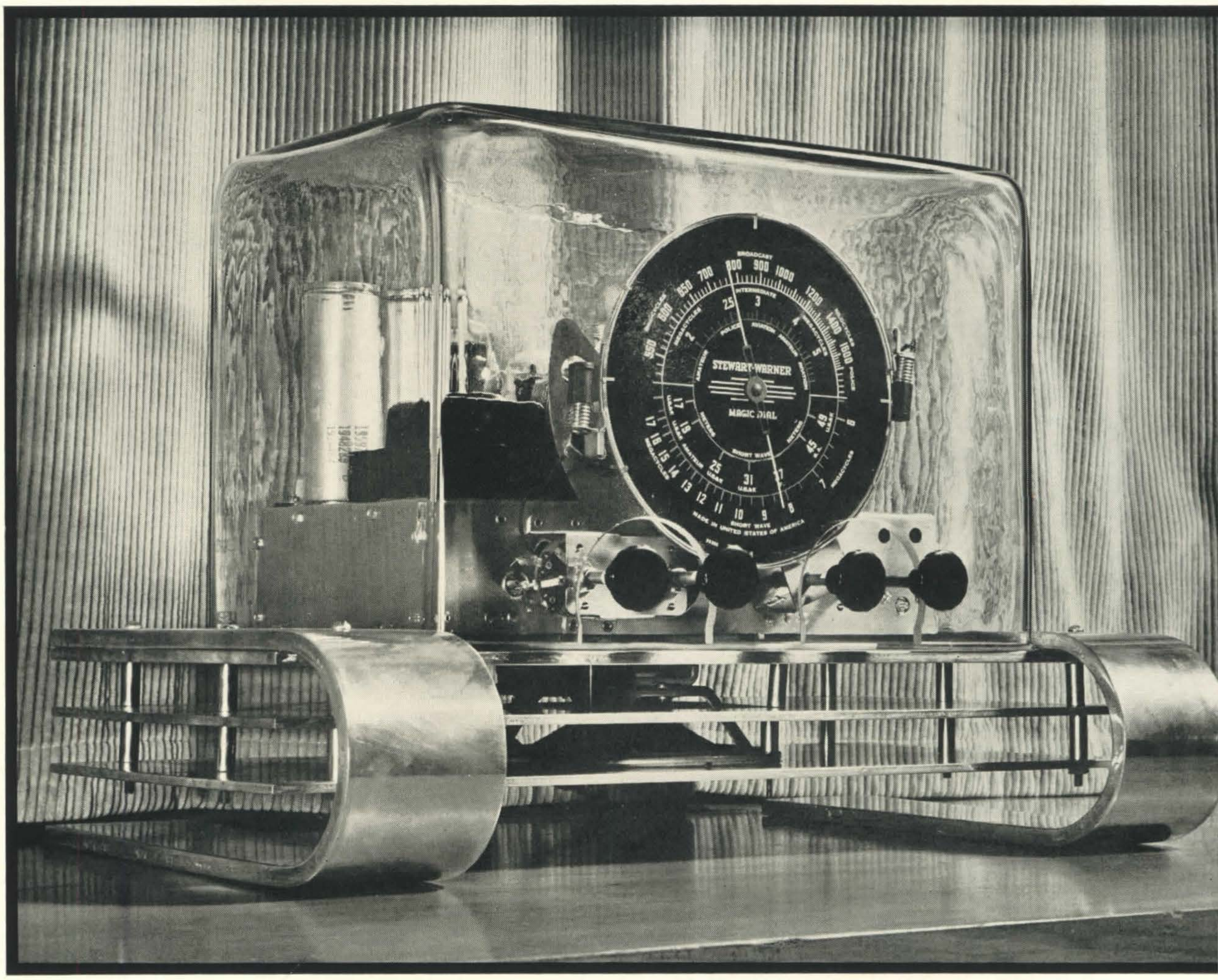
It has, on the other hand, not set up requirements seriously interfering with peacetime efficiency of many current building types.

Any trend which results either in the strengthening of existing structures (Fig. 16), or in the improved framing of new ones, obviously raises the average standards of building performance. The same is true of any trend which points to new or improved methods of fireproofing, etc. There are many design refinements employed in European air raid protection which could be effectively employed against such natural disasters as earthquakes, floods, hurricanes, etc.

However, it is apparent that excessive factors of safety (such as are required to render buildings safe from aerial attack) militate against current trends towards lightness, flexibility, and mechanization in many branches of building design. For example, it is a deterrent to the widespread use of glass or other light and/or flexible materials.

The full effect of air raid protection measures upon town and regional planning is far from clear—even in Europe. But there is some reason for supposing that it is in these fields that military and civilian standards show least conflict. This phase of the subject will be analyzed in a subsequent issue of the RECORD.

GLASS . . .

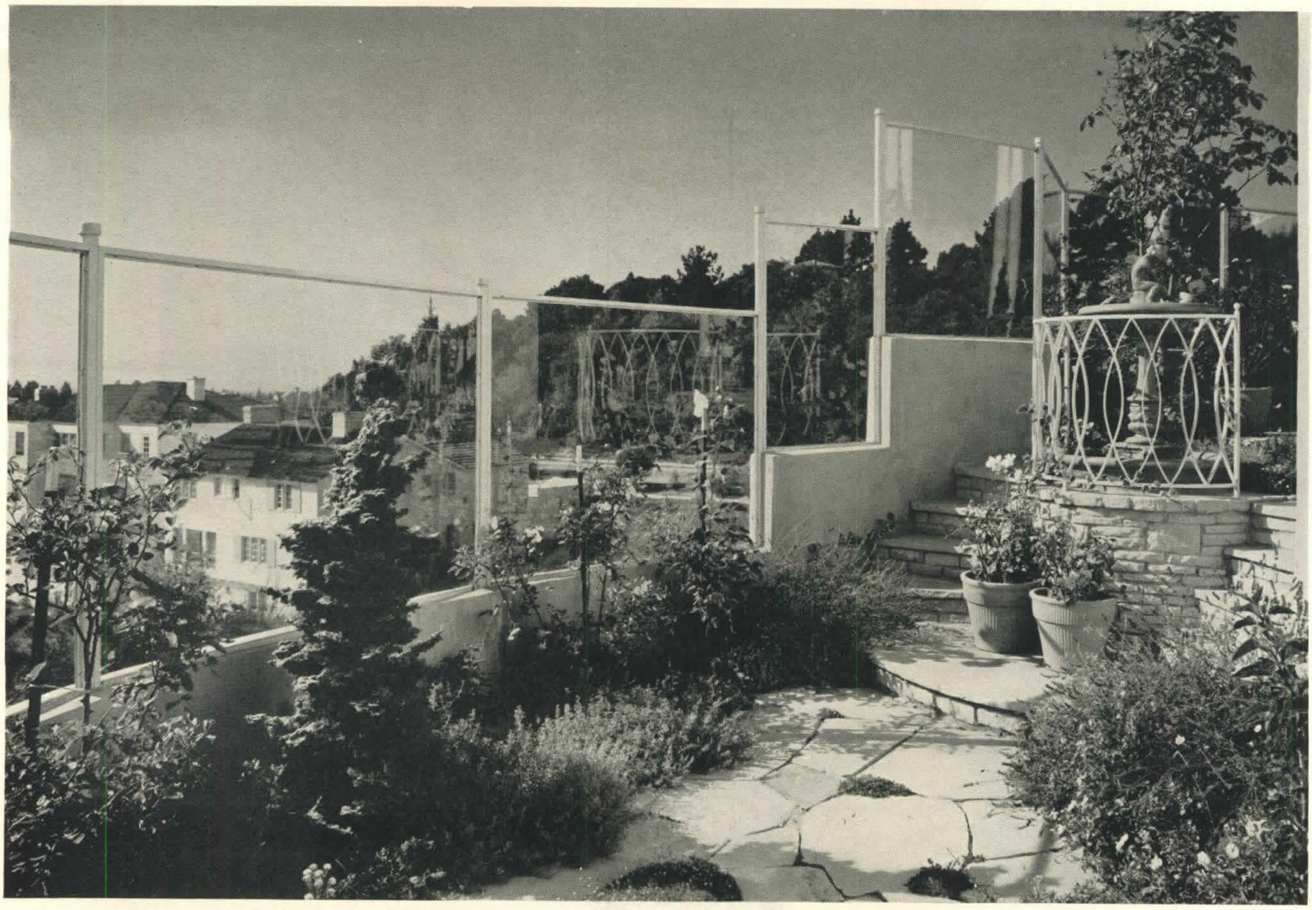


REPEATING its competition for the use of glass in completed buildings, the Pittsburgh Glass Institute this year awarded $3,600 worth of prizes to enterprising, glass-conscious designers. A review of the exhibited entries shows that the current use of glass is predominantly devoted to the solution of problems directly connected with control of light. That glass is not only a potential but an actual structural material will be demonstrated in next month's RECORD by Dr. Jaroslav Polivka, famed Czechoslovak engineer. (See page 7.) Grand prize in this year's competition went to Edward D. Stone and Carl Koch, New York architects, for the residence of Mr. and Mrs. A. C. Koch, in Cambridge, Mass. In addition, prizes and glass plaques were awarded in the following classifications:

HOUSES costing over $12,000: Prize, Edward D. Stone and Carl Koch, New York City; Mention, Kenneth Day, Philadelphia, Pa.; Mention, Richard J. Neutra (P. Pfisterer, collaborator), Los Angeles, Cal. HOUSES costing under $12,000: Prize, Harwell Hamilton Harris and Carl Anderson, Los Angeles, Cal.; Mention, Clarence W. W. Mayhew, Oakland, Cal.; Mention, George Patton Simonds, Hayward, Cal. DOMESTIC INTERIORS: Prize, J. R. Davidson, West Los Angeles, Cal.; Mention, Gregory Ain, Los Angeles, Cal.; Mention, Robert Hiden, designer, Los Angeles, Cal. SHOPS: Prize, George Howe, Philadelphia, Pa.; Mention, Clemence Saymon, New York City. STORES: Prize, Nimmons, Carr & Wright, Chicago, Ill. COMMERCIAL INTERIORS: Prize, Walker and Gillette, New York City; Mention, Amos Parrish and Company, Inc., New York City; Mention, J. R. Davidson, West Los Angeles, Cal. HOTELS: Prize, Harbin F. Hunter, Los Angeles, Cal. MANUFACTURING PLANTS: Prize, Albert J. Daniels, Shrewsbury, Mass. EDUCATIONAL BUILDINGS: Prize, Alfred Kastner, Washington, D. C.; Mention, Richard J. Neutra, Los Angeles, Cal. INSTITUTIONAL BUILDINGS: Prize, Victorine and Samuel Homsey, Wilmington, Del. MISCELLANEOUS: Prize, Reinhard and Hofmeister, New York City; Mention, Gustav Jensen, designer, New York City.

Although prizes were awarded on the basis of building type, glass usage falls logically into four main categories—protection, transparency, translucency, and reflection; organized on such a basis, the RECORD presents in the following pages typical examples from competition entries.

GLASS . . . for protection



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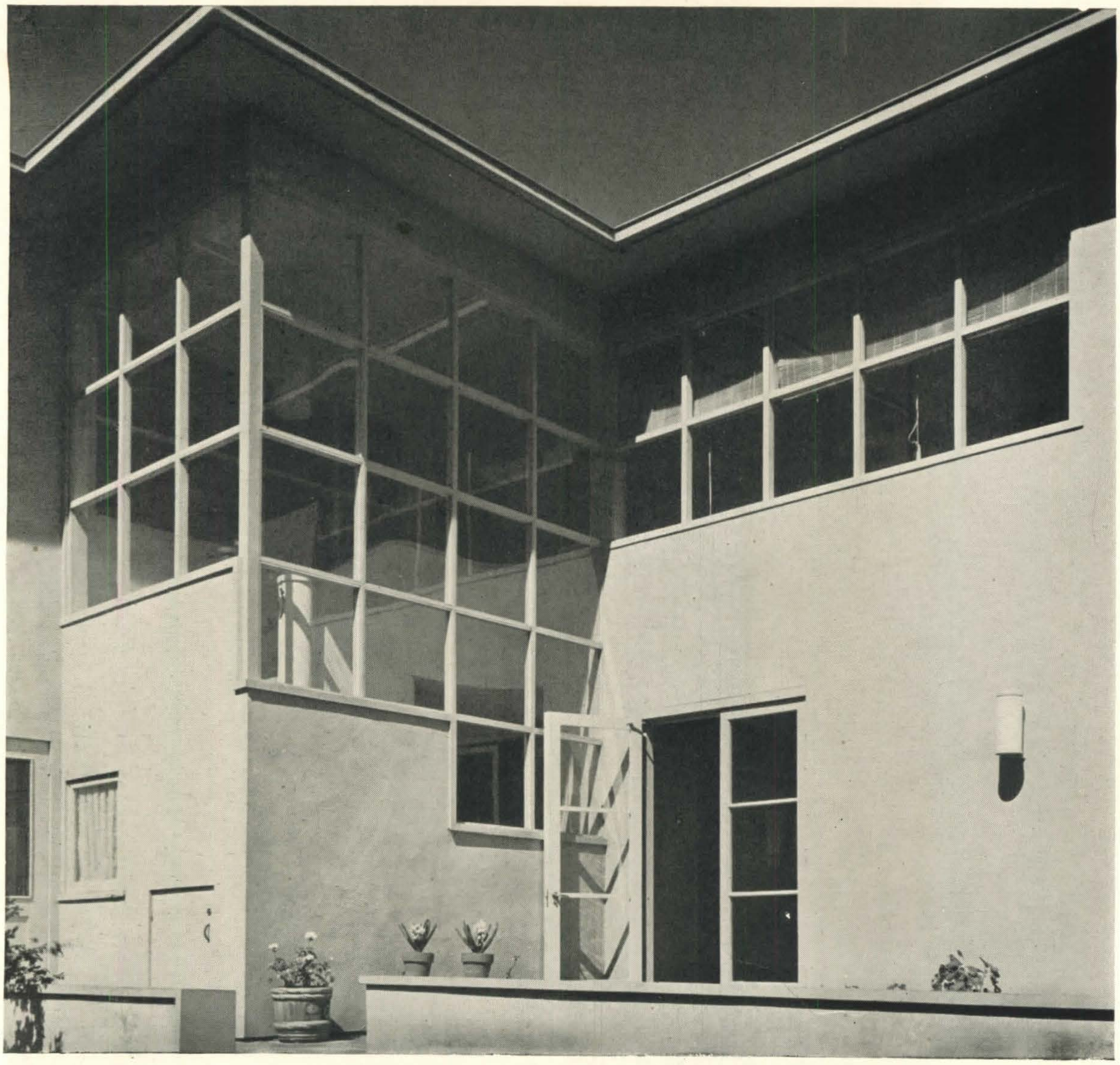
Ezra Stoller

COVER: Molded glass radio cabinet, Newcomb T. Montgomery, designer.

ON FACING PAGE: 1 is a plate glass windbreak for a garden wall, designed by Miller and Warnecke, architects. 2 is the porch of a beach house for Mr. and Mrs. Dearborn Clark at Seacliff, *Cal.*; *William* Wilson Wurster was the architect.

ON THIS PAGE: 3 is in the Glendale, Cal., residence of George C. Bauer; Harwell Hamilton Harris, designer, and Carl Anderson, associate. 4 shows the terrace of the grand prize-winning A. C. Koch residence at Cambridge, Mass.; Edward D. Stone and Carl Koch, Jr., architects.



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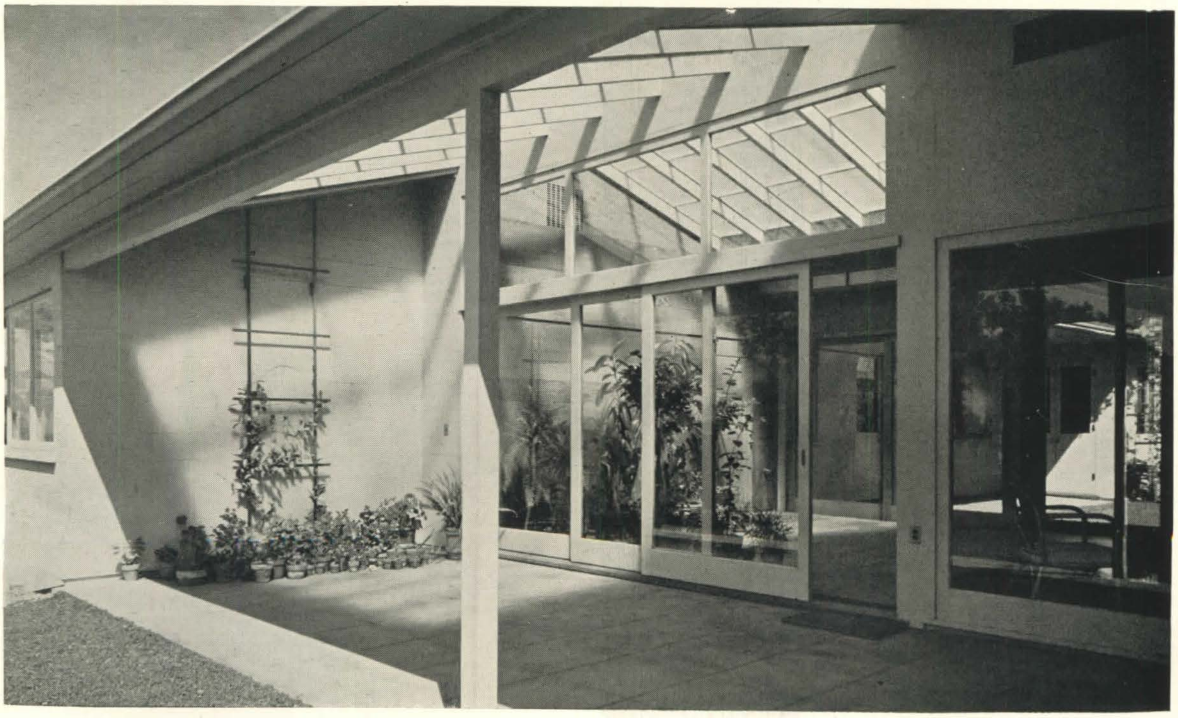

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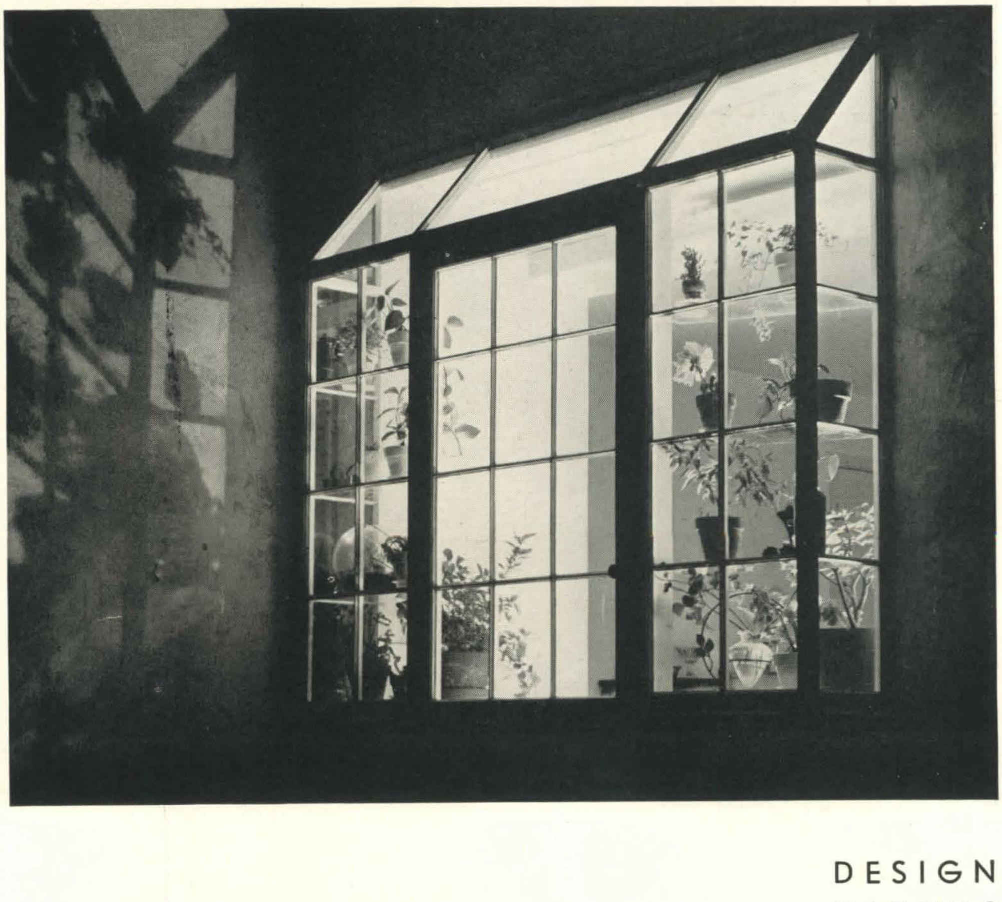
Robert M. Damora.

11


12

ON FACING PAGE: 9 shows stair well and hall in J. M. Hamill residence, San Francisco, Cal., for which William Wilson Wurster was architect. 10 is the porch and solarium of the residence for Harold V. Manor, Orinda, Cal.; Clarence W. W. Mayhew was the architect.

ON THIS PAGE: 11 is the bathroom of Kenneth Day's own residence at Miquon, Pa., which features a corner-window conservatory. 12 is the greenhouse in the residence of L Wilfrid Coleman, Jr., at Bryn Mawr Pa.; Earle W. Bolton, architect.

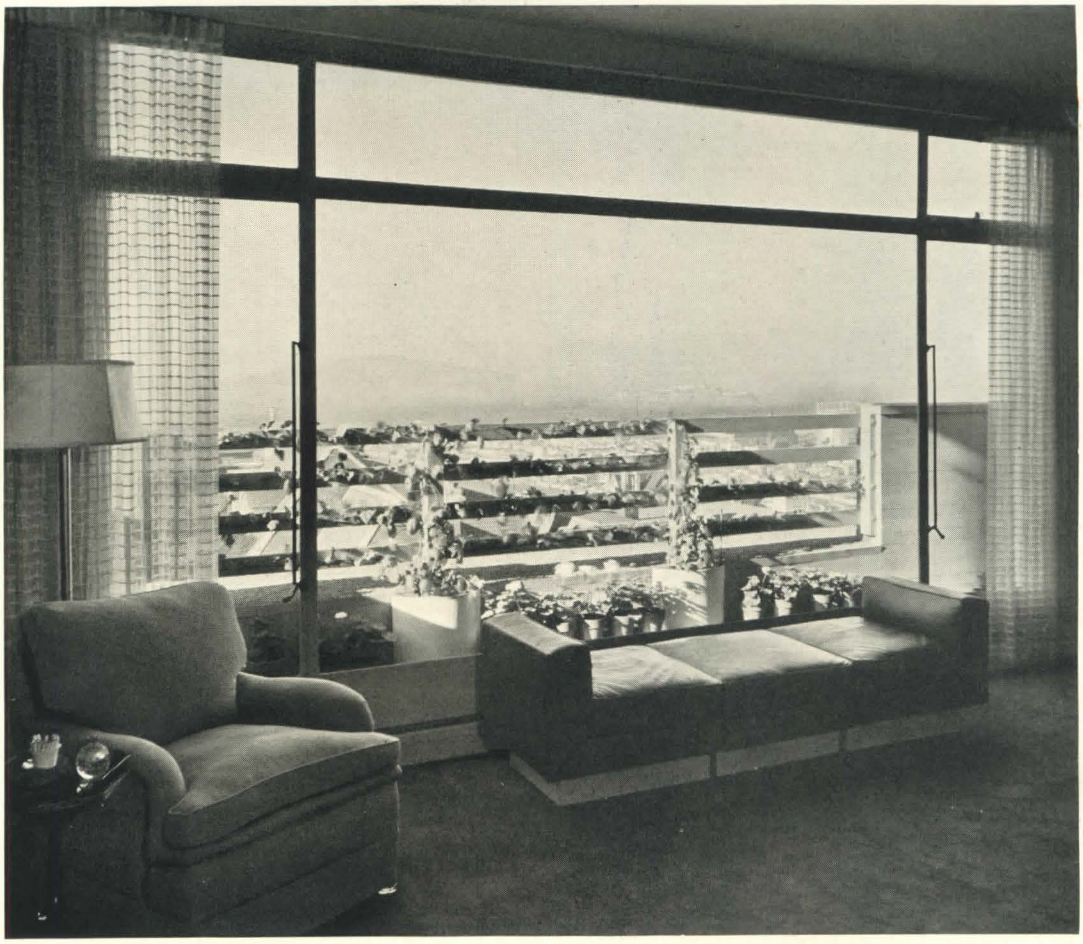
GLASS . . . for transparency

Hedrich

5

Ludwig

6



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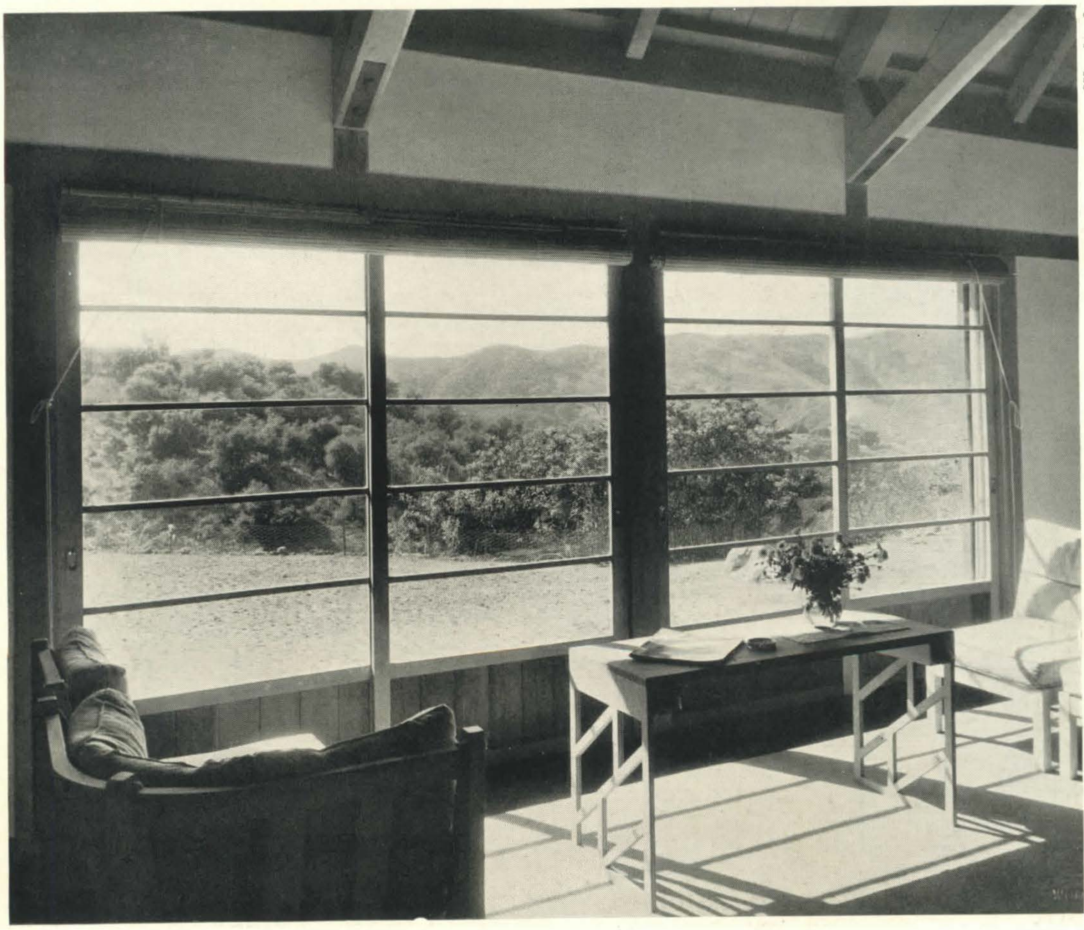
Woodcock



8

ON FACING PAGE: 5 is the bedroom of the B. J. Cahn residence at Lake Forest, Ill., for which George Fred Keck was the architect. 6 shows living room and terrace of the Stothart residence, Santa Monica, Cal. J. R. Davidson designed the residence.

ON THIS PAGE: 7 is the penthouse living room of Mr. and Mrs. Covington Janin, San Francisco, Cal.; Hervey Parke Clark, architect. 8 is the living room of the Douglas McFarland residence, Beverly Hills, Cal., designed by Mr. McFarland.

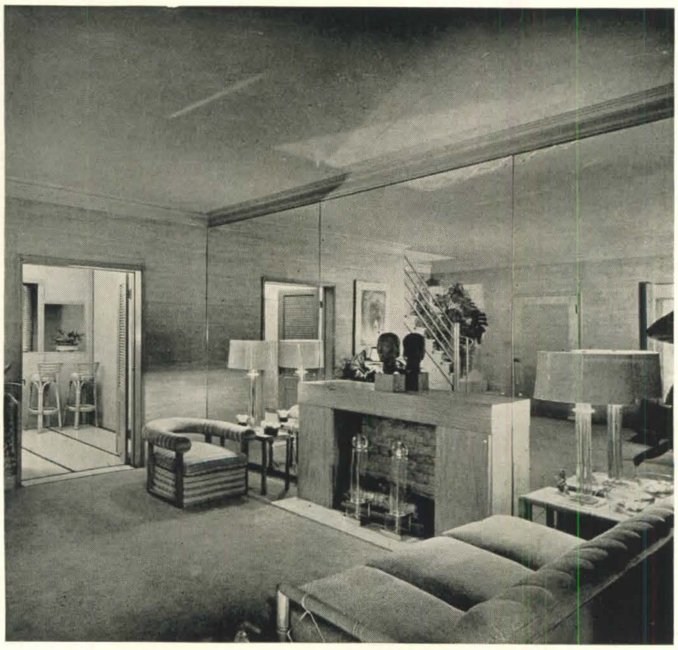
GLASS . . . for reflection

13

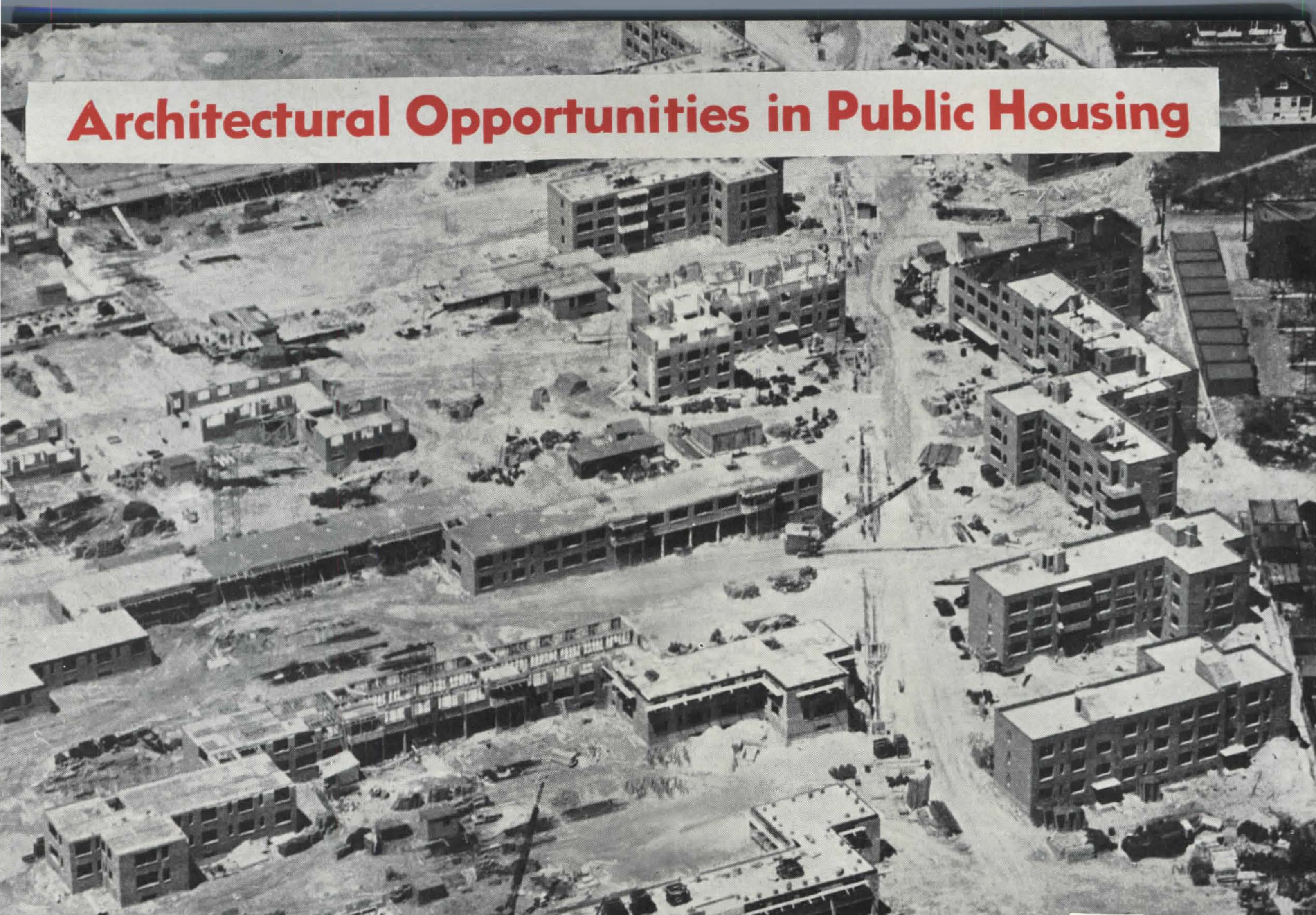
13 is the dining room in a New York apartment which uses a mirror panel on the wall and on the low ceiling beam; Robert Hiden, designer. 14 is the bedroom of the John F. Neylan residence at Woodside, Cal., which uses mirror panels on one entire wall; William Wilson Wurster, architect. 15 is the living room of a bachelor's apartment in Los Angeles, Cal.; Robert Hiden also designed this apartment.

14

15



Architectural Opportunities in Public Housing



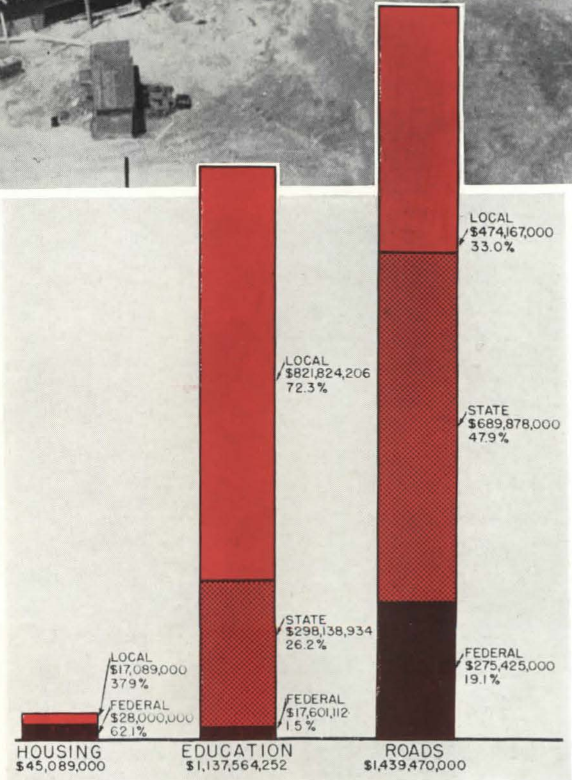
By CATHERINE BAUER

Director, Research and Information, USHA

FROM THE point of view of the architect, the low-rent housing program of the United States Housing Authority constitutes an unprecedented opportunity.

Until the creation of the United States Housing Authority, only a little more than a year ago, an almost inseparable barrier stood between American architects and the millions of American people who have always been in great need of well-built and well-designed homes. For the most part the private construction industry found it unprofitable to build homes for low-income families and therefore confined itself to the more profitable task of catering to the higher income groups. On the few occasions when private enterprise did build homes for low-income groups, the architect's services were frequently dispensed with or—what is even worse—the architect was asked to turn out plans for jerrybuilt chickencoops.

Public enterprise, on the other hand, never made more than a few scattered efforts in the low-rent housing field. During the World War the United States constructed and operated low-



As a public service, housing still has a long way to go before it even approaches America's annual subsidies to education and transportation.

Photos courtesy U.S.H.A.

That local conditions have already led to a wide variety in the "centralized" design of public housing projects is apparent in the finished projects of USHA's predecessor, PWA Housing Division. From top to bottom: "Westfield Acres" at Camden, N. J.; "Parklawn", Milwaukee, Wis.; "Mirapalmeras", San Juan, P. R.

rent homes for munitions workers and shipbuilders. But when the war was over, instead of following the example of England and most European countries by launching a large-scale public housing program, the Federal Government retreated from the housing field and sold its holdings to private interests. More than a decade later, with the creation of the Resettlement Administration (now the Farm Security Administration) and the PWA Housing Division, the Federal Government returned to public housing. Yet, once again housing was regarded as a war-time measure—as a weapon in the war against the depression.

Today, however, the situation has undergone a marked change. By virtue of the United States Housing Act low-rent housing is recognized as a permanent public responsibility. Although still valued as an important means of relieving unemployment and assisting in the stabilization of economic conditions, it now stands upon its own feet. It is here to stay, come boom or depression. The low-rent housing horns are being blown from one end of the country to the other and, like the walls of Jericho, the barrier which has hitherto separated the architect from the low-income worker is fast tumbling into dust.

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The architectural opportunities offered by the USHA program, even at this early stage, are fairly sizeable. With the $800,000,000 which the USHA is authorized to lend to local housing authorities plus the 10 per cent share in the initial costs which the local housing authorities must raise for themselves, it is estimated that about 150,000 dwelling units will be constructed. It has also been calculated that approximately $23,000,000 of the total amount of money will be expended for architectural services. In this connection, it should be emphasized that although the USHA program is a *public* housing program, both the designing and the construction of USHA projects are undertaken by private enterprise. The public character of the program derives from the fact that public funds, loaned by the USHA, finance construction, and that public housing authorities, set up by the local communities, determine policies. The actual designing of the housing projects is in the hands of local architects employed by local housing authorities. The fees which these architects receive are based on the general scale of fees submitted to the USHA by the American Institute of Architects. The wages paid by the architects to their draftsmen and technical workers, in accordance with the provisions of the United States Housing Act, are the prevailing wages for similar work in the community.

Geographically speaking, the opportunities afforded American architects by the USHA program are even more impressive. There are now 33 states with legislation allowing their cities, towns, and counties to set up housing authorities and borrow money from the USHA. These 33 states comprise more than 80 per cent of the population of the entire country. Local housing authorities have already been established in more than 215 communities, embracing a total population of more than 33,000,000. A total of $576,104,000 has already been set aside for use by 142 local authorities. Loan contracts amounting to $265,054,000 have been signed with 59 housing authorities and have been approved by President Roosevelt. Moreover, $311,050,000 has been earmarked.

So far, 53 architectural contracts have been awarded by the local authorities, and in a rapidly growing number of other towns architectural contracts are now under immediate consideration. Local architects are competing for the jobs. Associations are being formed whereby the designing of the projects may be accomplished on a collective basis. In a few towns the plans have already been completed, construction is under way, and the local architects are already thinking about new housing projects.

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But the low-rent housing program means more than a mere opportunity for profitable employment and the collection of fees. It constitutes a challenge to the resourcefulness, the adaptability, and the social viewpoint of the American architect.

There are innumerable difficulties facing the architect engaged in designing a low-rent housing project. If he is the average local architect, he has had no experience at low-rent housing whatsoever. The experiences he *has* had, moreover, might even prove harmful. If he has spent much time catering to the whims of individuals who demand homes in the manner of this-or-that period of such-and-such a country, he will naturally have formed certain habits of thought which will have to be completely broken or else temporarily discarded. Ostentation, luxuriousness, and fancy gadgets have no place in homes that are designed, not for well-to-do families living separately, but for low-income families living in a low-rental community. This does not mean that the architect will have to lower his standards; in many cases he will have to observe certain standards of liveability which he would never think of living up to in his ordinary practice.

There are certain rules by which the low-rent housing architect must abide —some of them set forth in the United States Housing Act and some of them laid down by the USHA as administrative policies. First, all homes built with funds borrowed from the USHA must be genuinely low-cost homes. In cities under 500,000 population, the maximum average construction cost per family dwelling unit is $4,000 and the maximum cost per room is $1,000. In cities over 500,000 population, the maxima are $5,000 and $1,250 respectively. Under no circumstances, moreover, can the construction costs exceed the cost of similar construction undertaken by private industry in the same community. Yet at the same time the architect must plan homes which in many ways are substantially better than those erected by private enterprise. He must observe certain minimum space standards. He must arrange to have through or cross ventilation in every room.

And, most important of all, he must plan homes that will last for at least 60 years. This is one of the most vital aspects of the low-rent housing program. In order to achieve low rentals, amortization of USHA loans has been set upon a 60 year basis and the architect must necessarily build homes which will endure so as to give the USHA reason to feel that its investment is secure over such a long period

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Although the annual rent contributions made by the USHA and annual local contributions in the form of tax exemption will help to bridge the gap between the economic rent and the rent which the slum dweller can afford, rent contributions themselves will not guarantee low rents. Even low cost of construction in itself is no guarantee that rents will be low. The architect is called upon to attack the problem of maintenance costs. He must realize that he has a responsibility not only for delivering a product in good condition but for planning it in such a way that it can be used and kept in good condition at a minimum of expense over a larger period of time.

Will the architect meet this challenge? Will he succeed in building durable, low-cost and low-rent homes?

The experiences of the housing program's first year indicate that he will. Working hand in hand with the technical staffs of the local authorities and of the USHA, the local architects have made important steps toward solving the problem of low costs and low rents. Studies have been made of the costs of building materials. In some cases architects have made use of new and more economical materials, such as glazed tile.

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In view of the fact that prevailing wages must be paid to construction labor, they have kept an eye on local wage scales. Considerable alertness has been shown to the problem of designing parts of the projects that must be publicly maintained in such a way that the cost of such maintenance is slight. The corners of stairways, for instance, are generally being rounded. In addition, the amount of publicly maintained facilities is being reduced as much as possible. In many localities, one and two-story row houses are being built instead of apartment houses, in order to avoid the expense of maintaining corridors, elevator systems, public cellars, etc. A high percentage of the unused land in projects of this kind is being spaced off for individual gardens to be maintained by the individual tenants.

The construction contracts which have already been awarded for the first USHA projects speak for themselves. In New York City the net construction cost for two projects will be about $2,900 and $3,400 per dwelling. The cost per dwelling for the Buffalo project will be about $3,600. In Jacksonville, Florida, it will be less than $2,900 per dwelling. In Austin, Texas, it will be about $2,300.

Although no rentals have been definitely arrived at as yet, fairly accurate estimates can be made in advance. The general range of rentals per room per month will extend as low as $2.50 and rarely any higher than $5. The rent per dwelling unit will average about $20 per month in the larger cities in states like New York, New

Jersey, and Ohio. In some of the Southern and Southwestern states the base rent for 3 rooms will be as low as $7 per month.

But the challenge of the USHA program is more than a challenge to achieve low costs and low rents. It is an esthetic challenge as well.

Will the local architects develop new architectural forms in this new field of low-rent housing? Will the housing projects suffer from the same monotonous lack of imagination which characterizes the average development built by private industry? Will the architects plan homes truly designed for intelligent living? These questions remain to be answered.

In England, where for many years a low-rent housing program has been conducted on a basis similar to our own, the architecture of low-rent housing projects has been uniformly mediocre. In Germany and Vienna on the other hand, before the advent of fascism, low-rent housing architecture was genuinely original and inspired. The English example will be avoided, and the German-Viennese achievements will be equalled or surpassed only if American architects make a thorough analysis of the problem to be solved and study the sociological implications of the housing program. Uncritical acceptance of standard designs—whether they be the standards of other countries, the standards ordinarily followed in the local community, or the standard designs drawn up by the USHA—must be avoided. Architects must study local tastes, customs, and habits—and above all, the needs of the families who will live in the projects. Only in this way will a worthwhile public housing architecture come into being in America.

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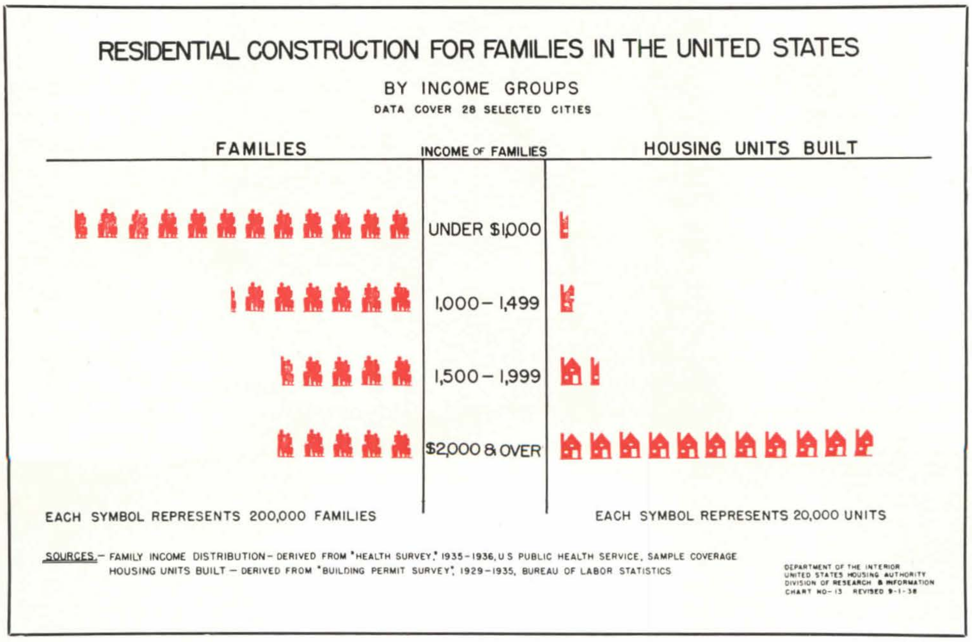
The challenge which confronts American architects, then, is threefold: a challenge to achieve low costs, low rents, and great architecture.

And it is a gauntlet thrown down to the architectural schools as well. Teachers must be secured and teaching methods must be emphasized that will develop a generation of architects whose ability and talent will be commensurate with the tasks involved in so vast a program.

But there is no reason to despair about the present generation of architects, the men who never studied housing at college and never had an opportunity to learn about housing while continuing in private practice. The school of practical experience has just started an intensive course in low-rent housing.

In hundreds of cities architects are enrolling in this course. In others, classes have been going on for quite some time. Architects are campaigning for the passage of state housing laws in the 15 states still without enabling housing legislation. They are taking part in the movement to have housing authorities set up in the cities and towns where such action is possible. They are being appointed to membership on the local housing authorities and are helping to form local housing policies. They are being awarded contracts by the housing authorities. They are studying local economic and social conditions, as well as local building practices. They are giving more attention to costs and materials than they ever did when engaged in architecture for private use. They are learning the principles of site planning and town planning. They are making mistakes and are learning by them.

The word "architect" means The Master Contriver. *Throughout all* ages he has fashioned the enduring physical aspects of his civilization, in ancient Egypt, in Rome and Greece, and during the Middle Ages in Europe. The Greek temples and Chartres are the typical expressions of their periods. But what shall be America's contribution to the history of architecture? Not the uninspired, routine skyscraper; and certainly not the stereotyped rookery into which we now crowd hundreds of families amid unlovely surroundings. It is not at all impossible that public housing—low-rental community housing, if you will—is to be one of the forms for great architectonic expression in the future. This is a consummation devoutly to be desired.



Current Trends of Building Costs

Compiled by Clyde Shute, Manager, Statistical and Research Division, F. W. Dodge Corporation, from data collected by E. H. Boeckh & Associates, Inc.

Curves indicate control trends in the combined material and labor costs in the field of residential frame construction, the monthly curves being an extension of the local cost averages during the years 1935, 1936, and 1937. The base line, 100, represents the U. S. average for 1926-1929.

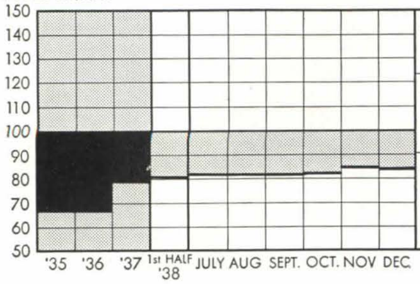
Tabular information gives cost index numbers relative to the 100 base for nine common classes of construction, thus showing relative differences as to construction types for this year and last.

Cost comparisons or percentages involving two localities can easily be found by dividing one of the index numbers into the difference between the two. For example: if index A is 110 and index B, 95, (110-95) ÷ 95 = .16. Thus costs in A are 16% higher than in B. Also costs in B are approximately 14% lower than in A: (110-95) ÷ 110 = .14.

CONSTRUCTION COST INDEX

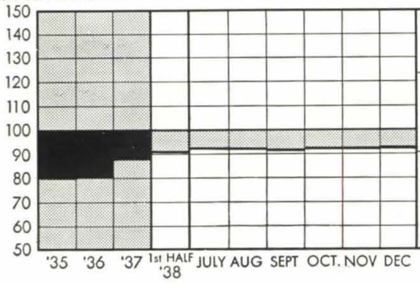
U. S. average, including materials and labor, for 1926 - 1929 equals 100.

ATLANTA



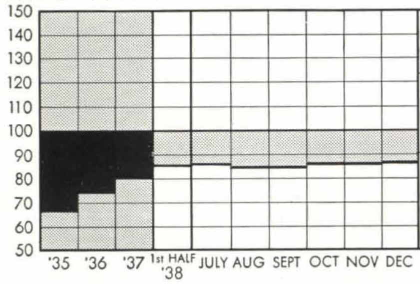
	Dec.'37	Dec.'38
Residences		
Frame	76.4	83.1
Brick	82.9	86.3
Apartments		
Br. & Wood	80.7	86.5
Br. & Conc.	93.7	96.1
Br. & Steel	92.9	96.5
Comm. & Fact.		
Frame	73.9	81.1
Br. & Wood	83.5	88.7
Br. & Conc.	96.4	98.0
Br. & Steel	94.0	96.2

BALTIMORE



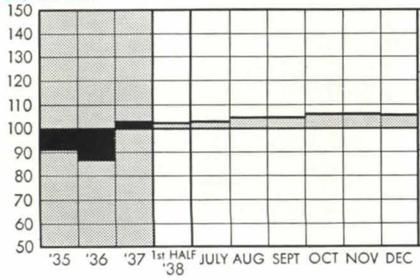
	Dec.'37	Dec.'38
Residences		
Frame	91.5	92.6
Brick	96.4	95.2
Apartments		
Br. & Wood	93.6	94.4
Br. & Conc.	97.4	97.6
Br. & Steel	97.2	97.7
Comm. & Fact.		
Frame	91.3	92.8
Br. & Wood	95.3	95.6
Br. & Conc.	97.9	97.9
Br. & Steel	99.7	98.3

BIRMINGHAM



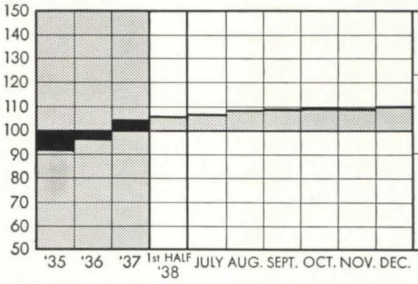
	Dec.'37	Dec.'38
Residences		
Frame	81.7	86.8
Brick	88.5	90.0
Apartments		
Br. & Wood	86.1	90.4
Br. & Conc.	92.4	95.4
Br. & Steel	91.6	92.4
Comm. & Fact.		
Frame	79.1	84.1
Br. & Wood	92.1	94.9
Br. & Conc.	94.5	96.4
Br. & Steel	92.8	94.9

BOSTON



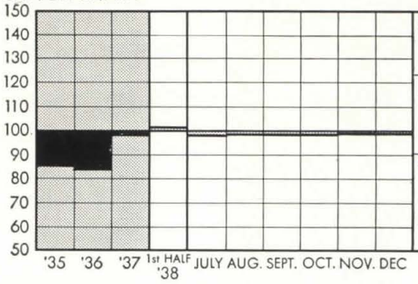
	Dec.'37	Dec.'38
Residences		
Frame	106.1	105.2
Brick	109.8	109.6
Apartments		
Br. & Wood	113.2	109 1
Br. & Conc.	113.2	115.8
Br. & Steel	110.7	112.9
Comm. & Fact.		
Frame	107.7	104.5
Br. & Wood	114.9	110.9
Br. & Conc.	114.9	117.8
Br. & Steel	116.7	117.3

CHICAGO



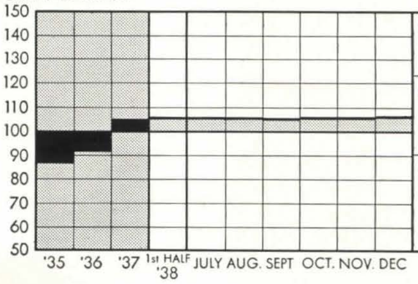
	Dec.'37	Dec.'38
Residences		
Frame	105.4	110.4
Brick	111.9	112.4
Apartments		
Br. & Wood	107.9	110.9
Br. & Conc.	121.3	122.9
Br. & Steel	116.3	118.0
Comm. & Fact.		
Frame	108.4	113.9
Br. & Wood	106.3	109.3
Br. & Conc.	125.1	126.9
Br. & Steel	121.9	121.6

CINCINNATI



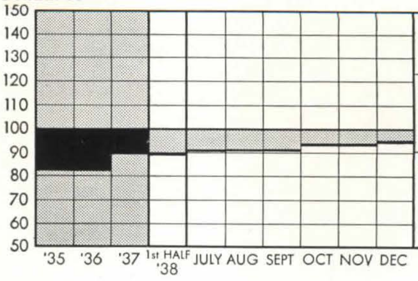
	Dec.'37	Dec.'38
Residences		
Frame	101.0	99.7
Brick	109.7	103.1
Apartments		
Br. & Wood	105.5	103.1
Br. & Conc.	112.2	111.9
Br. & Steel	109.8	108.6
Comm. & Fact.		
Frame	100.8	99.6
Br. & Wood	107.8	104.7
Br. & Conc.	116.0	113.7
Br. & Steel	114.1	112.7

CLEVELAND



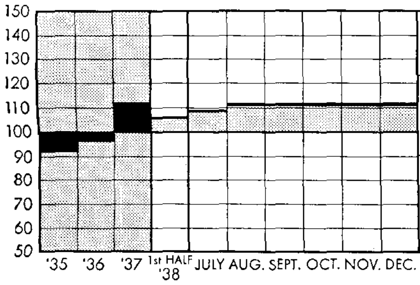
	Dec.'37	Dec.'38
Residences		
Frame	105.6	100.6
Brick	113.4	103.8
Apartments		
Br. & Wood	109.2	103.8
Br. & Conc.	115.1	112.2
Br. & Steel	111.5	108.8
Comm. & Fact.		
Frame	107.1	100.6
Br. & Wood	110.2	105.2
Br. & Conc.	118.8	113.7
Br. & Steel	118.0	112.9

DALLAS



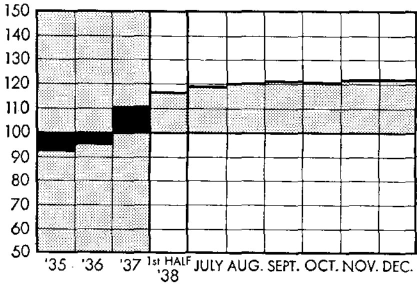
	Dec.'37	Dec.'38
Residences		
Frame	88.8	95.9
Brick	92.9	96.1
Apartments		
Br. & Wood	90.3	96.7
Br. & Conc.	90.9	99.2
Br. & Steel	92.8	99.9
Comm. & Fact.		
Frame	86.0	96.0
Br & Wood	92.2	96.1
Br. & Conc.	90.4	98.6
Br. & Steel	93.6	102.0

DENVER



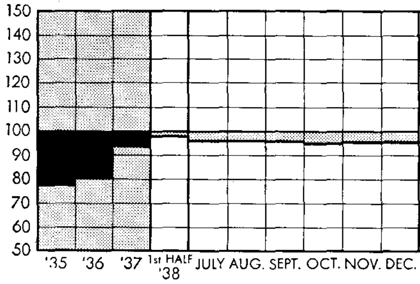
	Dec.'37	Dec.'38
Residences		
Frame	115.5	111.1
Brick	118.7	110.6
Apartments		
Br. & Wood	113.5	109.7
Br. & Conc.	115.6	114.9
Br. & Steel	114.7	113.2
Comm. & Fact.		
Frame	118.7	113.5
Br. & Wood	110.6	108.1
Br. & Conc.	117.2	116.2
Br. & Steel	118.3	116.0

NEW YORK



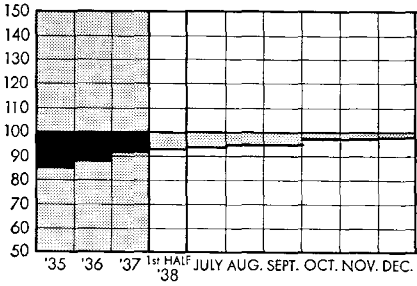
	Dec.'37	Dec.'38
Residences		
Frame	113.2	121.2
Brick	118.9	122.4
Apartments		
Br. & Wood	114.3	121.7
Br. & Conc.	126.2	130.1
Br. & Steel	121.9	125.3
Comm. & Fact.		
Frame	115.3	124.4
Br. & Wood	112.4	118.9
Br. & Conc.	127.7	132.8
Br. & Steel	126.1	129.3

DETROIT



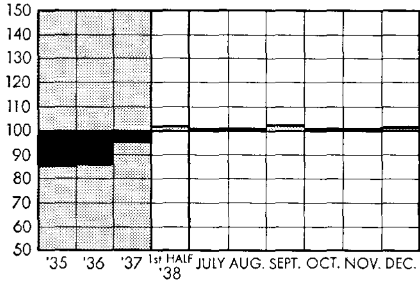
	Dec.'37	Dec.'38
Residences		
Frame	93.3	95.8
Brick	101.7	100.5
Apartments		
Br. & Wood	98.9	100.9
Br. & Conc.	108.1	108.5
Br. & Steel	106.1	107.1
Comm. & Fact.		
Frame	92.7	95.3
Br. & Wood	101.3	102.8
Br. & Conc.	110.4	110.3
Br. & Steel	111.9	111.7

PHILADELPHIA



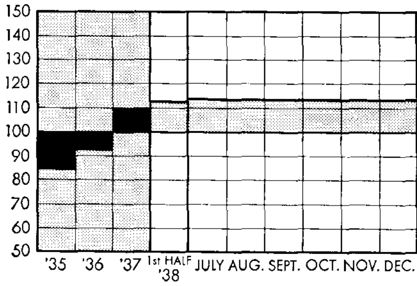
	Dec.'37	Dec.'38
Residences		
Frame	88.5	97.9
Brick	95.4	101.8
Apartments		
Br. & Wood	93.2	101.8
Br. & Conc.	98.6	105.4
Br. & Steel	98.5	103.0
Comm. & Fact.		
Frame	85.1	97.6
Br. & Wood	97.0	103.9
Br. & Conc.	101.1	106.3
Br. & Steel	101.2	104.2

KANSAS CITY



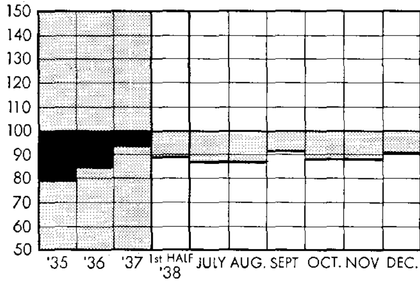
	Dec.'37	Dec.'38
Residences		
Frame	97.3	102.5
Brick	106.5	108.2
Apartments		
Br. & Wood	103.3	108.0
Br. & Conc.	114.7	118.0
Br. & Steel	111.4	115.0
Comm. & Fact.		
Frame	95.7	102.0
Br. & Wood	107.3	111.1
Br. & Conc.	117.6	121.3
Br. & Steel	118.0	119.2

PITTSBURGH



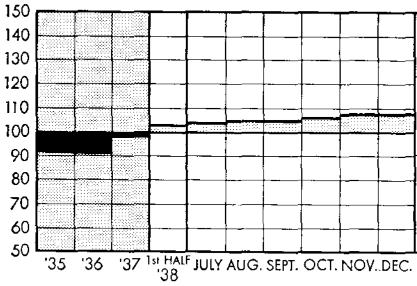
	Dec.'37	Dec.'38
Residences		
Frame	113.7	113.2
Brick	121.8	116.8
Apartments		
Br. & Wood	117.3	115.0
Br. & Conc.	118.6	117.0
Br. & Steel	115.2	113.5
Comm. & Fact.		
Frame	113.0	113.4
Br. & Wood	119.8	116.0
Br. & Conc.	120.3	118.8
Br. & Steel	118.2	116.4

LOS ANGELES



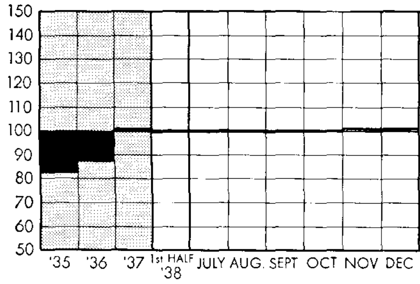
	Dec.'37	Dec.'38
Residences		
Frame	94.5	91.1
Brick	98.6	96.9
Apartments		
Br. & Wood	95.3	96.8
Br. & Conc.	98.8	103.1
Br. & Steel	101.1	104.0
Comm. & Fact.		
Frame	95.7	95.6
Br. & Wood	93.4	95.5
Br. & Conc.	94.6	104.1
Br. & Steel	104.2	103.2

ST. LOUIS



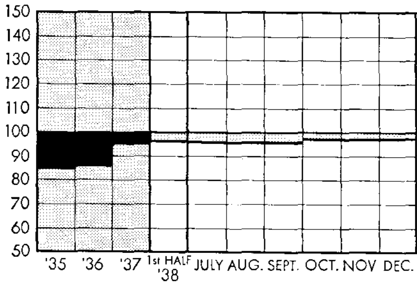
	Dec.'37	Dec.'38
Residences		
Frame	97.6	108.1
Brick	106.6	111.0
Apartments		
Br. & Wood	102.4	110.9
Br. & Conc.	114.7	119.1
Br. & Steel	112.7	117.1
Comm. & Fact.		
Frame	95.7	108.6
Br. & Wood	114.9	110.9
Br. & Conc.	118.9	120.1
Br & Steel	118.5	120.5

MINNEAPOLIS



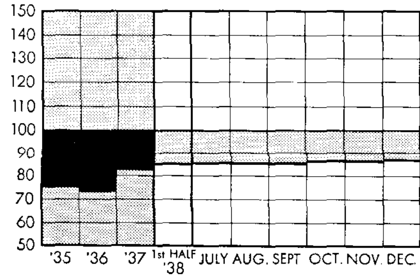
	Dec.'37	Dec.'38
Residences		
Frame	103.8	100.8
Brick	110.2	104.2
Apartments		
Br. & Wood	105.9	103.5
Br & Conc.	113.1	113.5
Br & Steel	111.2	111.0
Comm. & Fact.		
Frame	105.3	101.4
Br & Wood	104.3	103.2
Br. & Conc.	116.5	117.6
Br. & Steel	115.8	114.6

SAN FRANCISCO



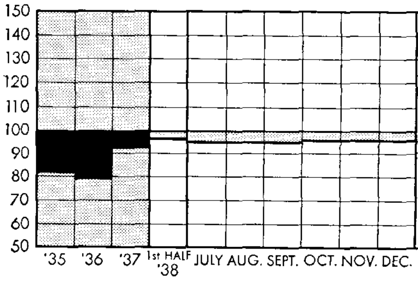
	Dec.'37	Dec.'38
Residences		
Frame	93.9	97.5
Brick	103.4	105.4
Apartments		
Br. & Wood	100.6	102.3
Br & Conc.	114.2	116.0
Br. & Steel	111.9	112.5
Comm. & Fact.		
Frame	91.4	95.9
Br. & Wood	103.9	105.9
Br. & Conc.	119.0	121.0
Br & Steel	114.8	116.2

NEW ORLEANS



	Dec.'37	Dec.'38
Residences		
Frame	85.6	86.8
Brick	88.8	87.9
Apartments		
Br & Wood	86.6	89.0
Br & Conc.	88.2	92.8
Br & Steel	92.1	96.0
Comm. & Fact.		
Frame	85.3	85.5
Br. & Wood	86.4	89.6
Br. & Conc.	86.5	91.9
Br. & Steel	94.0	96.0

SEATTLE



	Dec.'37	Dec.'38
Residences		
Frame	98.0	96.3
Brick	108.6	104.1
Apartments		
Br & Wood	105.3	103.7
Br. & Conc.	120.5	120.0
Br & Steel	116.4	115.8
Comm. & Fact.		
Frame	95.8	93.9
Br. & Wood	109.6	108.3
Br. & Conc.	126.7	126.3
Br. & Steel	122.1	120.6

BAUHAUS and DESIGN—1919-1939

Two new books* and an exhibition by New York's Museum of Modern Art have recently served to give a somewhat limited history of the Bauhaus movement, but it still remains for someone to make an adequate and objective survey of this epic movement. The reader should make it a point to read both volumes consecutively, for in so doing, he will find in the Museum's publication, *Bauhaus* 1919-28, a confused chronicle of Bauhaus ideas and accomplishments during that period; in *The New Vision* he will find an effervescent accounting of the ideas of essentially the same group ten years later, in new surroundings.

We must concern ourselves more seriously with the Bauhaus ideas and principles than with the work of the Bauhaus itself, because these principles seem to have preceded the actual founding of the school, and seem to be much more sound than the school's pedagogy was. In other words, there appears, in the Bauhaus, (if we may judge from the two books) to have been a definite discrepancy between theory and practice. One is deeply concerned because, in the main, the theories seem to be so attractive that we hope and believe the errors of the Bauhaus were due to people rather than to the principles for which they stood.

The premise of the Bauhaus principles is very simple: we live in an age of great technological development and necessarily our artistic expressions must be derived in part out of the relationship of man to the technology he is evolving. The men who formulated the Bauhaus principles were by no means the only ones, nor the first, who held ideas based upon this premise; many other advanced thinking-artists throughout Europe and America—architects, painters, and sculptors were actively experimenting with new forms, new materials, and new techniques in an effort to achieve works of art that would be expressive of the civilization of which they were a part. The historic artistic contribution of Walter Gropius and his associates is not the fact that they thought along these lines as independent artists, but rather that they consolidated themselves into a working unit, the better to translate their ideas into actual achievements. This consolidated working unit was the Bauhaus. It served two purposes simultaneously: (1) the developing of basic, and at that time revolutionary, ideas concerning the relation of architecture, painting, and sculpture to technology, and the interdependence of all three arts, and (2) the training of other people in these beliefs.

Because its theories were sound, and because the group worked as a unit, the Bauhaus became the most articulate and one of the most authoritative voices in the rising revolt against academicism. Hence its great historic importance. The Bauhaus, a school with a completely new pedagogy in art education, sired the Bauhaus Movement. We must agree with a part of Mr. Barr's introductory remarks to the Museum publication—although the Bauhaus itself no longer exists, the Bauhaus movement is still a potentially vital force.

Examining the book to appraise the illustrated work of the Bauhaus from 1919 to 1928, one finds disappointingly few examples of students' work other than that done in the preliminary course. The majority of the work shown in both books is that of the Bauhaus instructors. This is merely a criticism of the book, and not a very important one; what is bound to startle the reader will be his gradual awareness of some discrepancy between theory and accomplishment. It's a little difficult to put one's finger on these discrepancies, for we must be careful to consider these accomplishments in their historical context. One should not be considered ungrateful to pioneers in trying to evaluate their accomplishments; this is particularly true of the Bauhaus work, because the basic theories are sound and the full development denied them in Germany is still possible in America.

In this limited space and with only these two volumes as source material, nothing more than a cursory evaluation is possible. The stated curriculum appears to have been unworkable because mastery of all the subjects theoretically required of each student would be impossible in most men's life-time. It is also strange that no studies in the sciences as such were included in the curriculum, since a knowledge of physics and chemistry is essential for anyone who desires to exploit modern technology. Recognizing these faults, the Bauhaus authorities seem to have set-up numerous specialized courses and separated the study of architecture from that of "industrial design". This is possibly one reason for the inadequacy of most of the students' product designs. From the examples shown, it appears that the best work was done in the architecture and advertising design departments. This is curious because the majority of the students and teachers were not architects, nor destined to become architects.

It is curious for another reason—one of the avowed intentions of the Bauhaus was to train people to be designers of products that would be functionally and psychologically good and acceptable for mass production. In view of the untold possibilities for new product development inherent in our modern technology, we are disappointed by the range of products with which the students concerned themselves over a period of ten years. This range seems to have been limited in the main to semi-decorative household objects such as portable lamps, tea and coffee services, minor kitchen equipment, decorative fabrics, and the like. There is no evidence in these products of a true exploitation of new materials, nor of the design possibilities inherent in mass production methods.

Certainly experiments with these familiar type-forms was desirable and perhaps even necessary in training students to design for mass production, but that type of product is all we see as the result of ten years work. The change from handicraft production to automatic and semi-automatic mass production means much more to a designer of products than the mere use of simplified forms and novel materials.

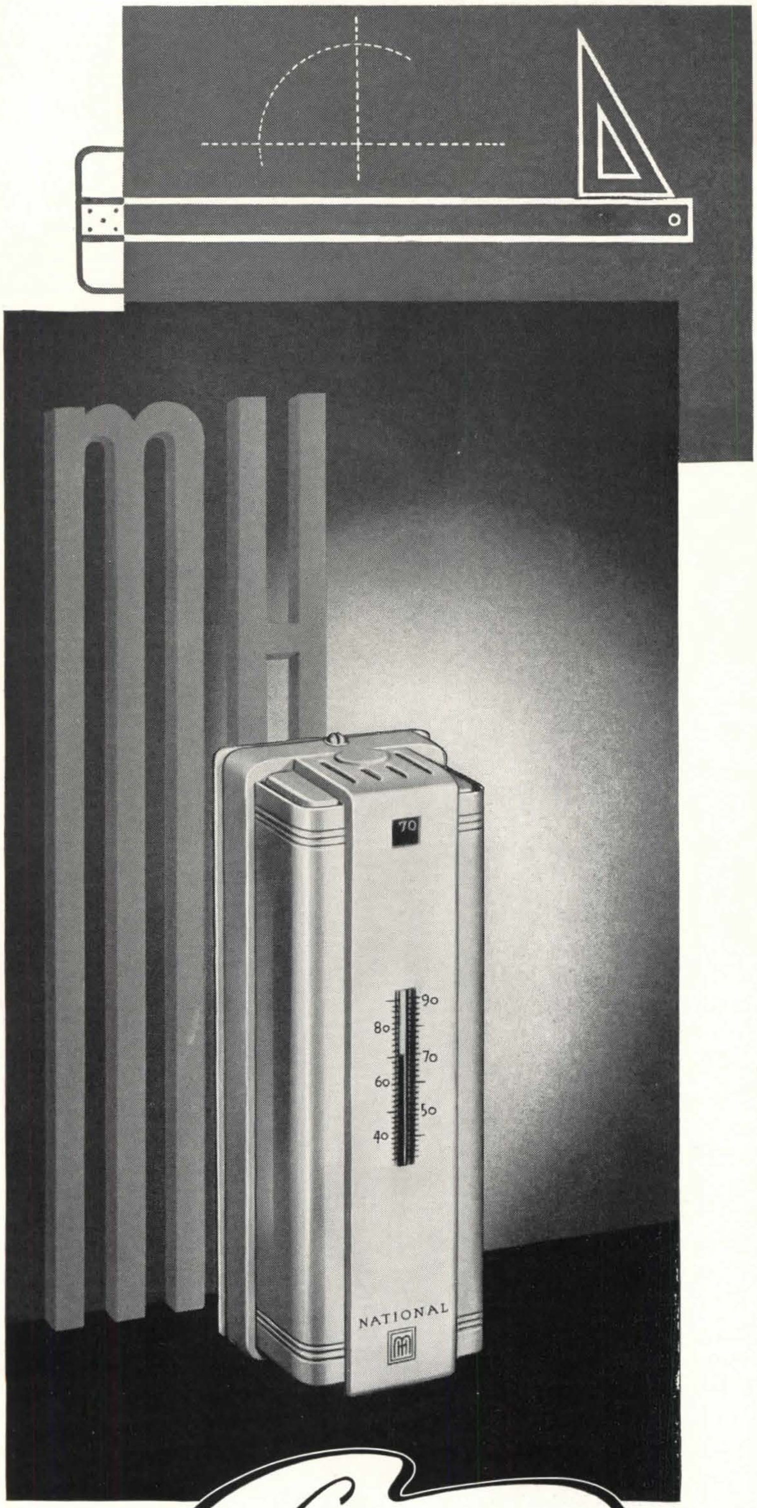
Unless we completely misunderstand the Bauhaus principles, we may assume that designing for twentieth century mass production means much more than making familiar (sometimes outmoded) objects so that visually and tactically they reflect the current technology. As a matter of fact, architecture and products, even more than painting and sculpture, could and should be direct expressions rather than formal reflections of man's mastery of modern technics. This is true because the architect and designer must be the corre-

(Continued on page 118)

***BAUHAUS 1919-28, edited by Herbert Bayer, Walter Gropius, and Ise Gropius. Museum of Modern Art, New York. 224 pages. $3.75.**

THE NEW VISION, by L. Moholy-Nagy. W. W. Norton & Co., Inc., New York. 207 pages. $3.75.

A NEW CONCEPTION OF *Pneumatic Control*



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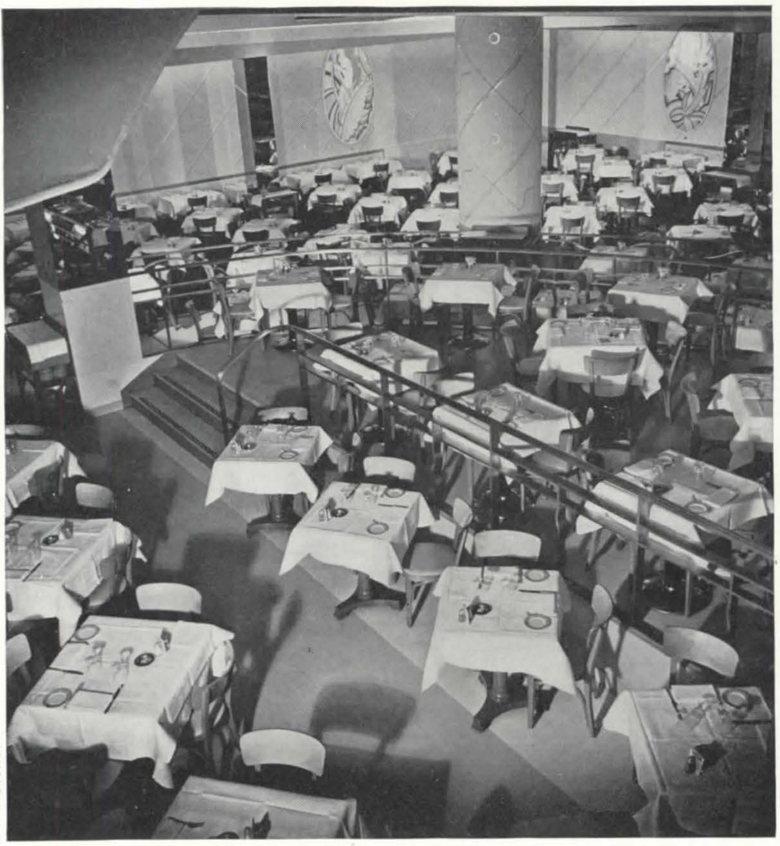
BUILDING TYPES



Ezra Stoller

RESTAURANTS

FORTHCOMING STUDIES: 1939 — February, Elementary Schools; March, Housing Developments; April, Retail Stores; May, Houses; June, Factories; July, Houses. PRECEDING STUDIES: 1938 — December, Office Buildings; November, Houses ($25,000 and Up); October, Houses ($15,000–$25,000); September, Apartments; August, Hospitals; July, Theaters

ARCHITECTURAL
RECORD
COMBINED WITH
AMERICAN ARCHITECT AND ARCHITECTURE

C. G. Rosenberg Photo. The Norma Restaurant, Stockholm, Sweden. Kjell Westin, Architect

RESTAURANT DESIGN

CONTENTS INCLUDE:

THE PROBLEM is not subject to any standardized solution. Differing local conditions may produce widely varying results in economic set-up, layout, provision of mechanical and service equipment, and decoration. Specialized knowledge—particularly relative to economic set-up and the design of service areas and equipment—is required for developing successful solutions of a problem to which rules-of-thumb have only a small degree of practical application. . . . Material in this reference study deals largely with those factors of layout and conditioning equipment (as opposed to service equipment) which furnish a basis for the designer's collaboration with the restaurant operator and equipment specialist.

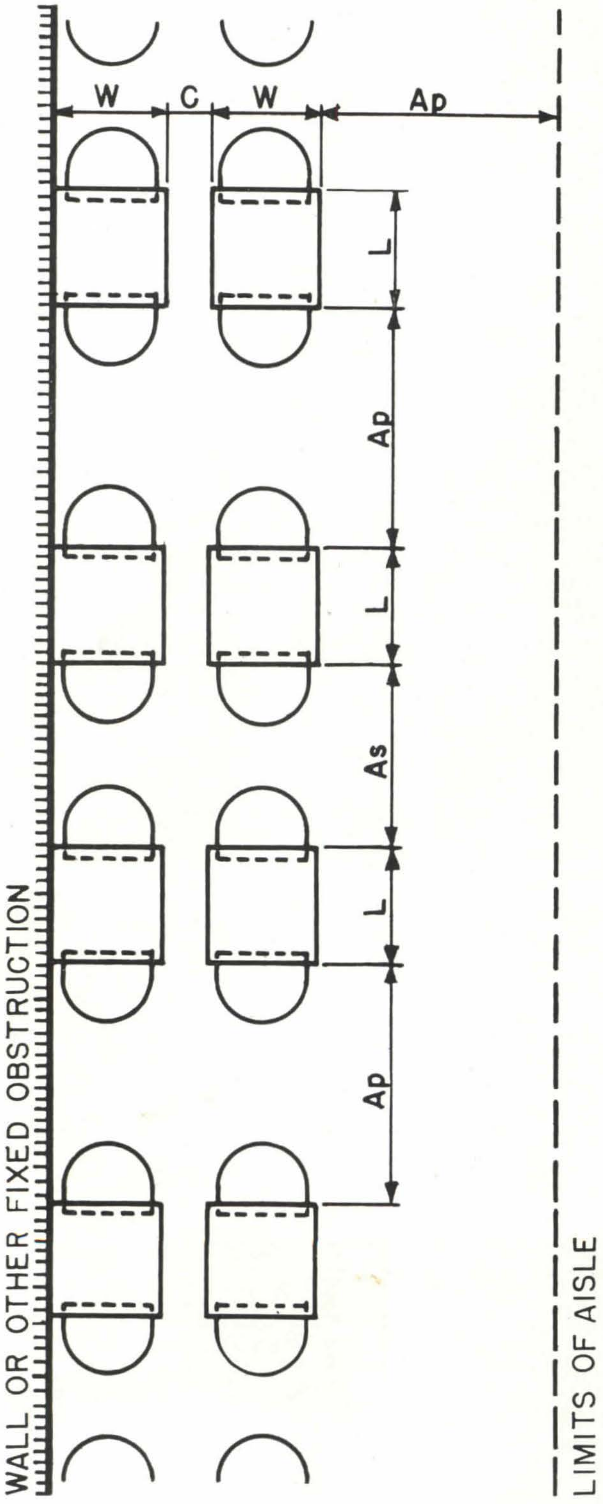
TABLE-and-CHAIR UNITS

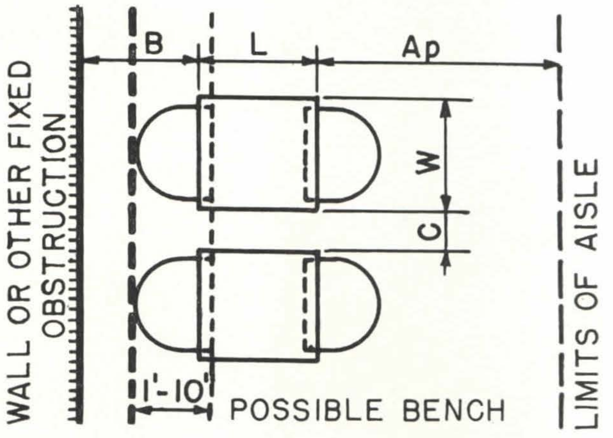
For 2 Persons

TIME-SAVER STANDARDS

Data on space allocations and clearance contained in this and the following seven pages is presented as an aid in determining capacities, desirable seating layouts, and necessary clearances. Information was furnished by the John Van Range Co. and Albert Pick Co., restaurant equipment specialists; Louis A. Brown, architect; and the Brunswick-Balke-Collender Co.

Tabulations are divided into three groups. The most luxurious establishments ordinarily use as minima the largest figures given, and vice-versa.





	Abs. Min.	Des. Min.	Comfortable
Ap Public circ'n	3–0 to 4–6	3–6 to 5–0	3–9 to 5–0
As Service aisle	3–6 to 4–6	4–0 to 5–0	4–0 to 5–6
B To wall	1–8 to 2–0	2–0 to 2–6	2–0 to 3–0
C Between units	0 to 8	6 to 1–0	1–0
Length	1–8 to 2–0	2–3 to 2–4	2–4 to 2–6
Width	1–8 to 2–0	2–2 to 2–3	2–4 to 2–6

Scale: 1/4" = 1'-0";

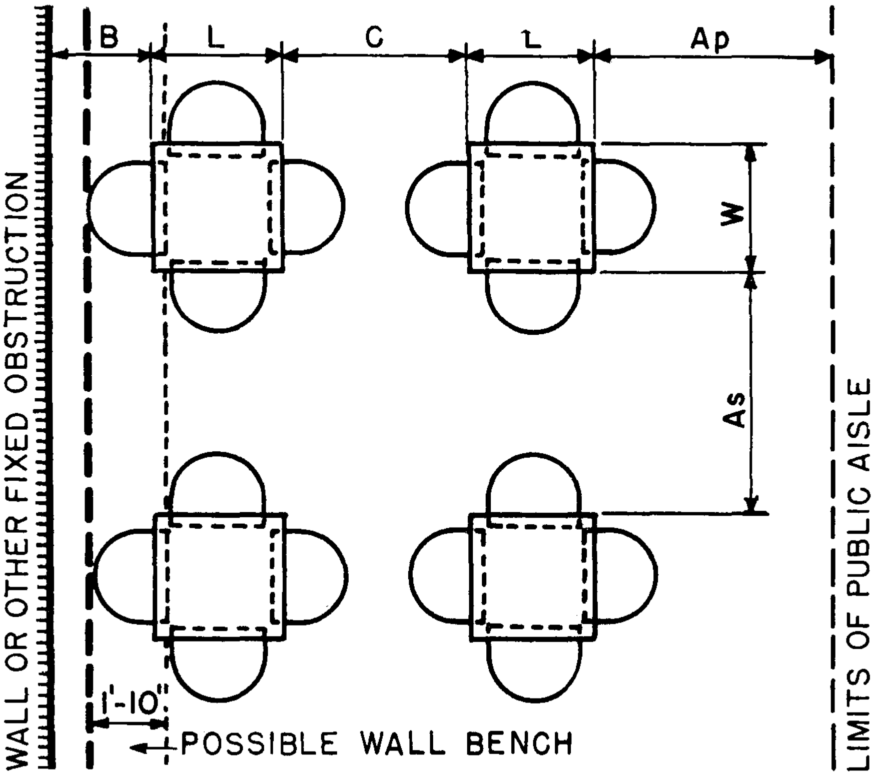
all dimensions in feet and inches

	Abs. Min.	Des. Min.	Comfortable
Ap Public circ'n	*1–10 to 4–6	2–3 to 5–0	3–0 to 5–0
As Service aisle	3–0 to 3–6	3–6 to 4–0	3–9 to 4–0
C Between units	0 to 3	4 to 6	6
Length	1–8 to 2–0	2–3 to 2–4	2–4 to 2–6
Width	1–8 to 2–0	2–2 to 2–3	2–4 to 2–6

* Lower range only if chairs, etc., do not project into aisle

TABLE-and-CHAIR UNITS

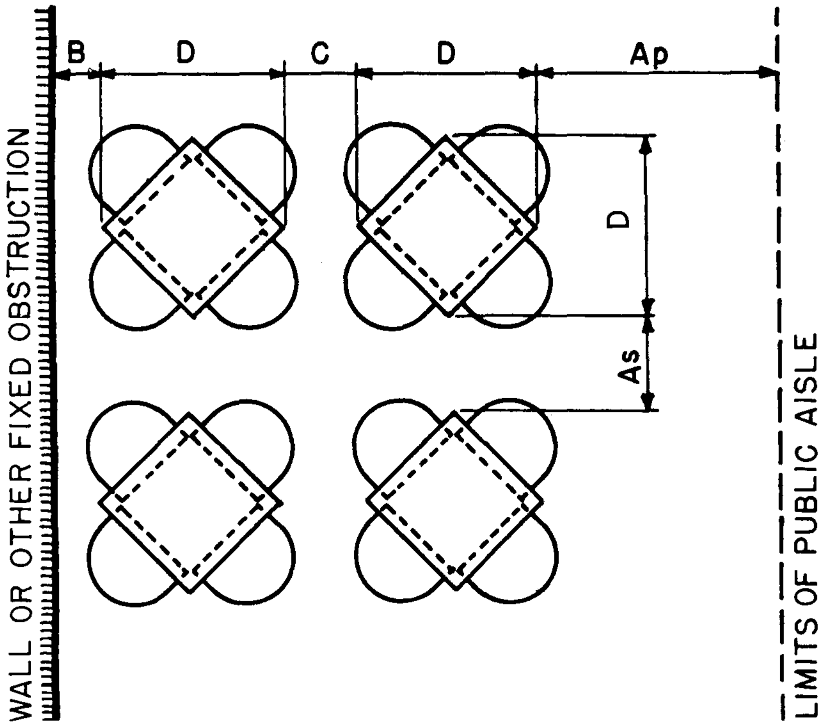
For 4 Persons



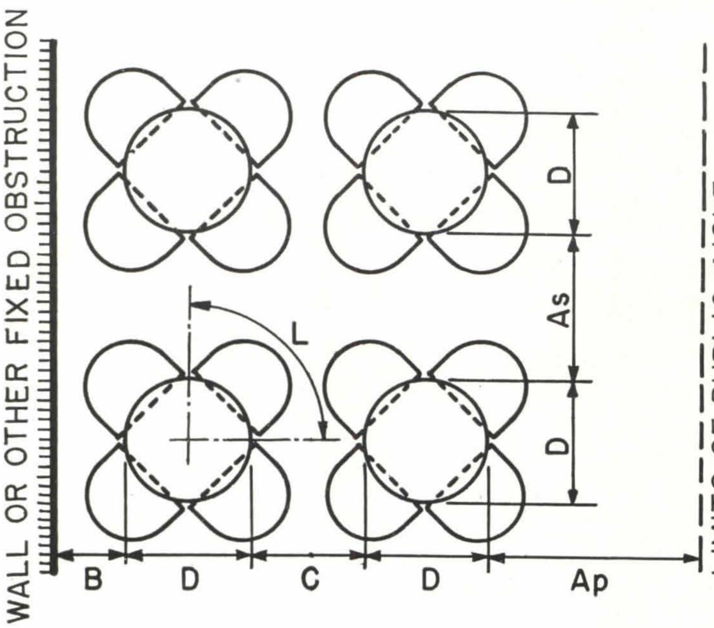
		Abs. Min.	Des. Min.	Comfort-able
As	Service only	4–6	5–0	5–6
Ap	Public circ'n	3–0	3–6	3–9
B	To wall	2–0	2–6	3–0
C	Between units	3–0	3–6	3–9
Length		2–4	2–9	3–0
Width		2–4	2–9	3–0

Note: This type of seating recommended only when no other can be used, as others are more economical

Scale: ¼" = 1'-0";
all dimensions in feet and inches



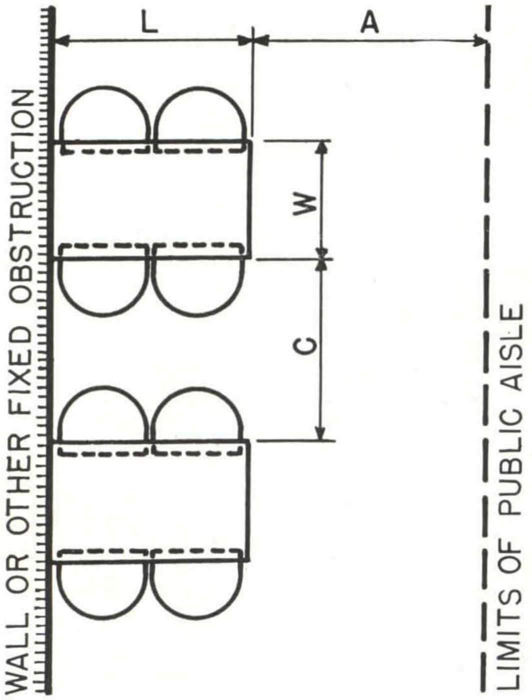
		Abs. Min.	Des. Min.	Comfort-able
As	Service only	1–9 to 2–6	2–0 to 3–0	3–0
Ap	Public circ'n	2–0 to 3–6	2–6 to 4–6	3–0 to 4–6
B	To wall	6 to 1–0	10 to 1–0	1–0 to 1–3
C	Between units	6 to 1–0	10 to 1–6	1–3 to 1–6
D	Diagonal	3–6	4–0	4–3
L or **W**		2–6	2–8	2–10

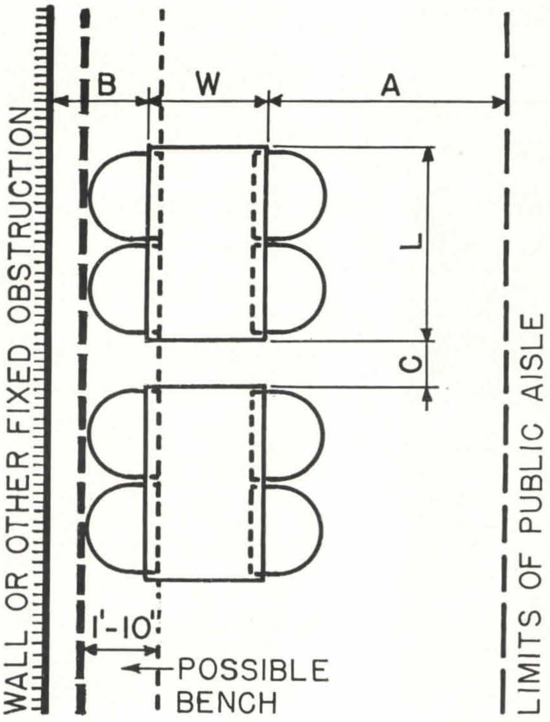


		Abs. Min.	Des. Min.	Comfort-able
Ap	Public circ'n	3-0 to 3-6	3-6 to 4-6	3-6 to 4-6
As	Service only	2-0	2-6	3-0
B	To wall	6 to 1-0	10 to 1-0	1-0 to 1-3
C	Between units	1-6	1-10	2-0
Diameter		2-8	2-10	2-10
***L**	Perimeter per seat	1-10	2-0	2-2

*For seating units for more than 4 persons, round tables are usually recommended; diameter depending on perimeter necessary to seat required number.

Scale: 1/4" = 1'-0";
all dimensions in feet and inches





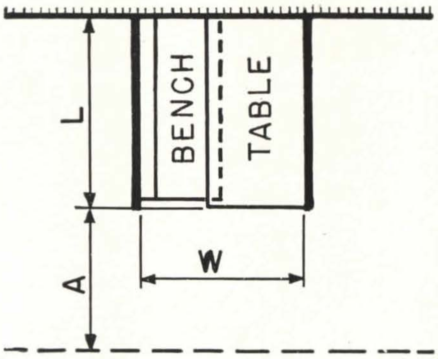
		Abs. Min.	Des. Min.	Comfort-able
A	Service or pub. circ'n	2-0 to 3-6	2-6 to 4-6	3-0 to 5-0
C	Between units	3-0 to 3-6	3-6 to 4-0	3-9 to 4-0
Length		3-6	3-10 to 4-0	4-0
Width		1-8 to 2-0	2-0 to 2-3	2-4 to 2-6

		Abs. Min.	Des. Min.	Comfort-able
A	Service or pub. circ'n	3-6 to 4-6	4-6 to 5-0	5-0 to 5-6
B	To Wall	2-0	2-0 to 2-6	2-0 to 3-0
C	Between units	0 to 1-0	1-0	1-6
Length		3-6	3-10 to 4-0	4-0
Width		1-8 to 2-0	2-0 to 2-3	2-4 to 2-6

BOOTHS

For 2 to 4 Persons

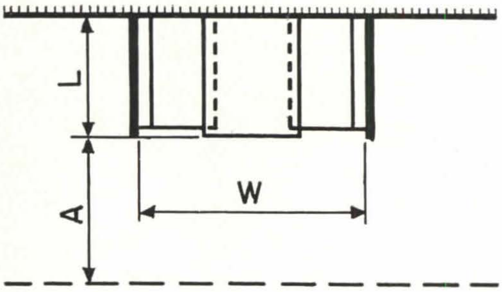
There are, in some localities, code and other restrictions on booth furniture dimensions. Authorities having local jurisdiction should be consulted. One designer consulted regarded the 2-person booth (side-by side) as a waste of space; others recognize that conditions may arise when no other type of furniture will suffice. Booths for more than four persons are not commonly encountered.



2 PERSONS SIDE BY SIDE

	Abs. Min.	Des. Min.	Comfortable
A Service and pub. circ'n	2–6	3–0	3–6
Length	3–6	3–9	4–0
Width	3–0	3–3	3–6

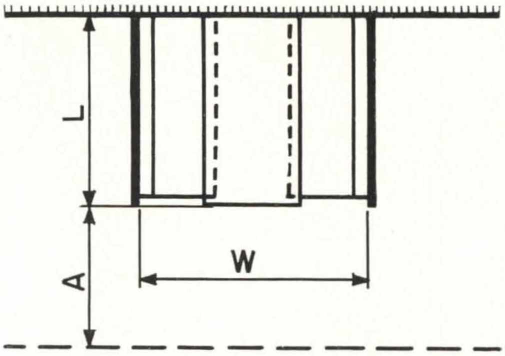
Note: This type not ordinarily recommended.



2 PERSONS FACE TO FACE

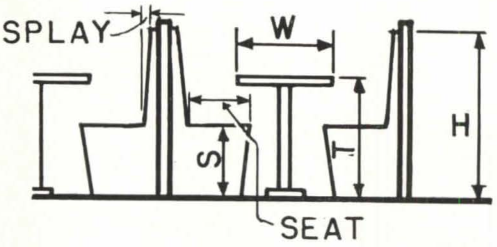
	Abs. Min.	Des. Min.	Comfortable
A Service and pub. circ'n	2–6 to 3–0	3–0 to 4–0	3–6 to 5–0
Length	2–0	2–2 to 2–6	2–6
Width	4–10 to 5–6	5–2 to 5–6	5–8 to 5–10

Scale: 1/4" = 1'0"; dimensions in feet and inches



4 PERSONS

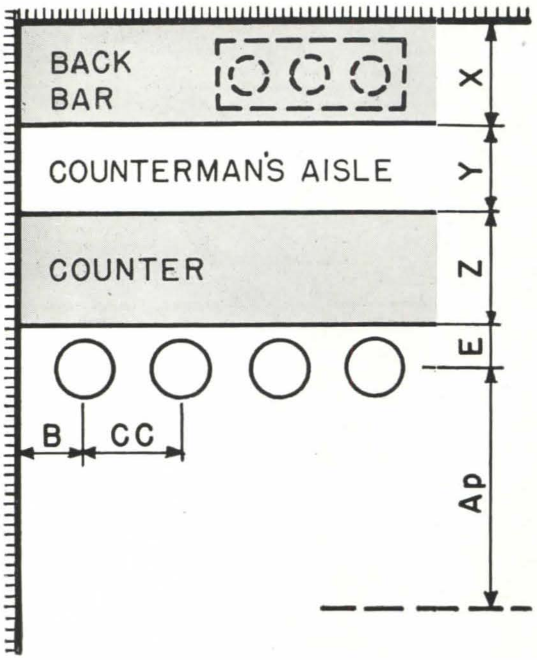
	Abs. Min.	Des. Min.	Comfortable
A Service and pub. circ'n	2–6 to 3–0	3–0 to 4–0	3–6 to 5–0
Length	3–6	3–9 to 4–0	4–0 to 4–2
Width	4–10 to 5–6	5–2 to 5–6	5–8 to 5–10



BOOTH FURNITURE HEIGHTS

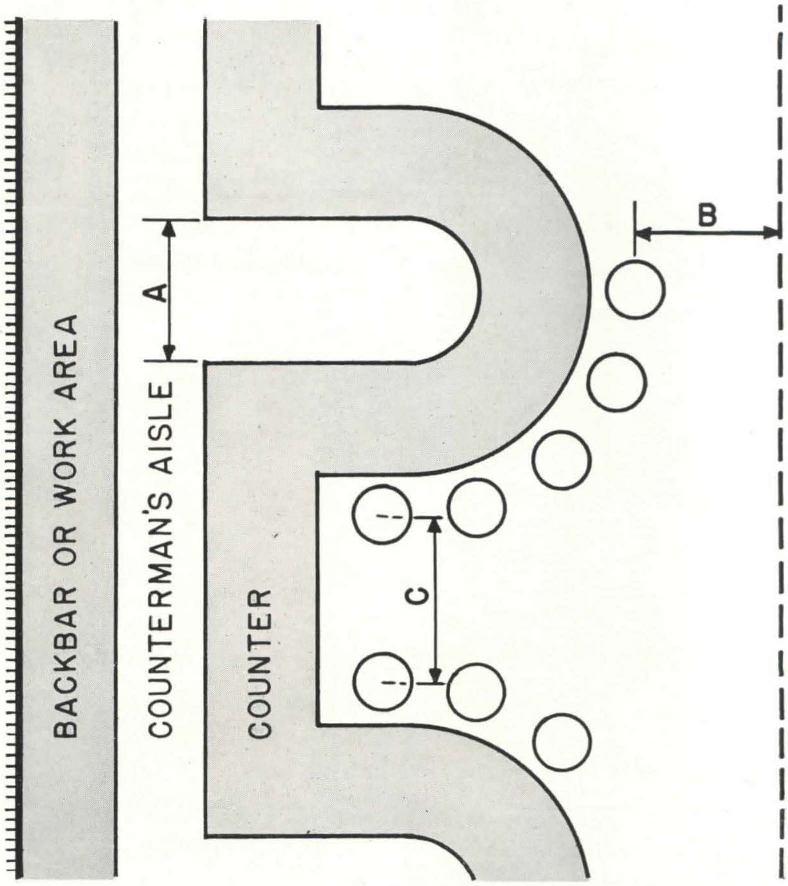
	Abs. Min.	Des. Min.	Comfortable
H	3–0 to 3–6	3–6	4–0
S	1–5 to 1–6	1–5 to 1–6	1–6
T	2–5	2–5 to 2–6	2–6
W	1–8 to 2–0	2–0 to 2–2	2–4 to 2–6
Seat	1–4 to 1–5	1–5 to 1–6	1–6 to 1–8
Splay	0 to 0–3	0–2 to 0–3	0–3½ to 0–4

FOOD BARS



STANDARD (straight) TYPE

		Abs. Min.	Desirable Min.
X	No cooking equipment	1- 6	2-0
X	With cooking equipt.	2- 0	2-6
Y	1 person	2- 0	2-3
Y	2 or more persons	2- 6	2-9
Z		1-10	2-0
E		9	1-2
Ap		3- 6	4-6
B		1- 0	1-2
CC		1-10	2-0

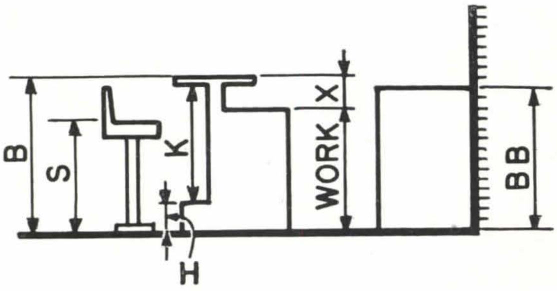


Variations in Shape

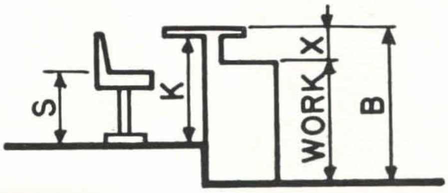
	Usual Minimum
A	2-6 to 3-6
B	2-6 to 4-6
C	2-9 to 5-6

Scale: 1/4" = 1'-0";
dimensions in feet and inches

HEIGHTS



LEVEL FLOOR

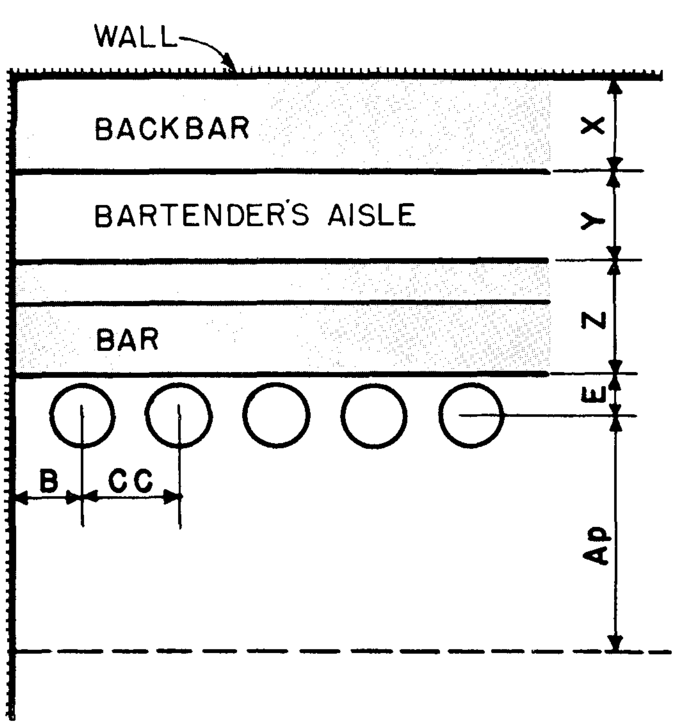


DROPPED FLOOR

	Range of Dimensions		Range of Dimensions
B	2-6 to 3- 6	X	1-2 to 1- 3
BB	3-0 to 3- 6	Work	2-4 to 2- 7
H	7 to 10	S	1-6 to 2- 6
K	2-4 to 2- 8		

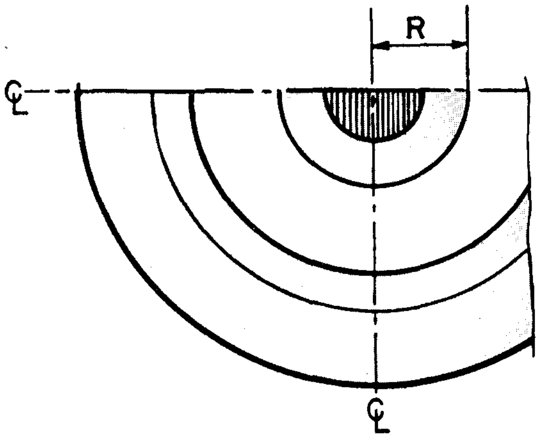
	Range of Dimensions
B	3-0 to 3- 6
K	2-4 to 2-10
S	1-6 to 2- 1
X	1-2 to 1- 3
Work	2-4 to 2- 8

LIQUOR BARS



STRAIGHT TYPE—with or without stools

	Abs. Min.	Des. Min.	Comfort-able
Ap Public aisle	3-6 to 4-6	4-0 to 5-0	4-6 to 6-0
B Stool to wall	1-0 to 1-6	1-2 to 1-6	1-4 to 1-6
CC Stool, cent. to cent.	1-9 to 2-0	2-0	2-2 to 2-6
E Stool to bar	9 to 1-0	1-0	1-1 to 1-2
X Back bar	1-6 to 1-8	1-8 to 2-0	2-0 to 2-3
Y Bartender's aisle	2-0 to 2-2	2-6	3-0
Z Bar	2-3 to 2-6	2-5 to 2-6	2-8 to 2-9



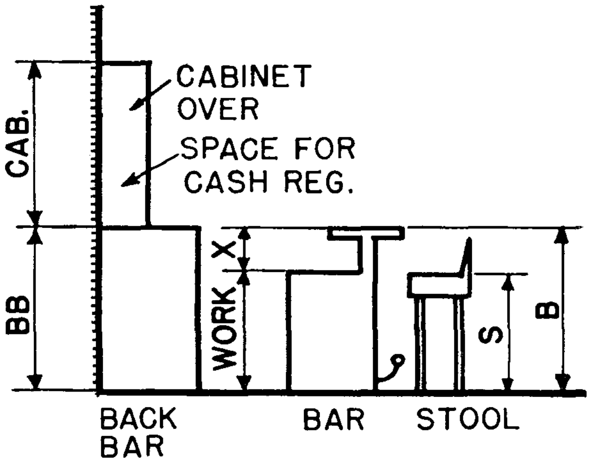
CURVED TYPES: Radius R should be at least 2 ft.; other dimensions as for straight types.

Bar length: Allow from 1 ft. 8 in. to 1 ft. 10 in. per person for standup bars; 2 ft. for each stool.

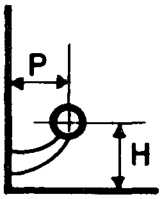
Bar depth: No increase in depth is needed for more than 1 bartender, as each man should be provided with his own "set-up" space in the work counter and back-bar.

Service bars: These are usually from 6 to 8 ft. long, for 1-man service; from 10 to 12 ft. long if 2 bartenders are needed for peak service periods. No footrail, counter overhang, or stools are required. Location is often adjacent to kitchen and concealed from patrons; however, advertising values sometimes cause it to be set in public view. In the latter case, a rope rail or similar device, to discourage patrons from standing at the bar, is often advisable.

Scale: 1/4" = 1'-0" unless otherwise noted; dimensions in feet and inches



BAR HEIGHTS



RAIL OR STEP

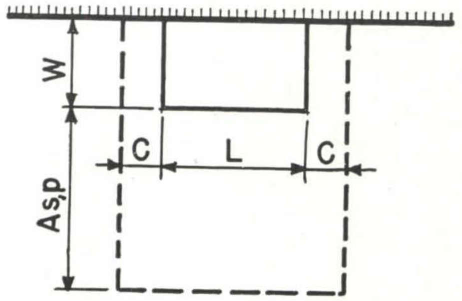
Scale 1/2" = 1' 0"

P = 7 to 10

H = 7 to 10

	Usual Min.	Usual Max.
B	3-6	3-9
BB	3-6	3-9
Cab	3-0 to 3-10	5-0 to 5-7
S	2-4 to 2-6	2-7
Work	2-4	2-6
X	1-0 to 1-2	1-2 to 1-3

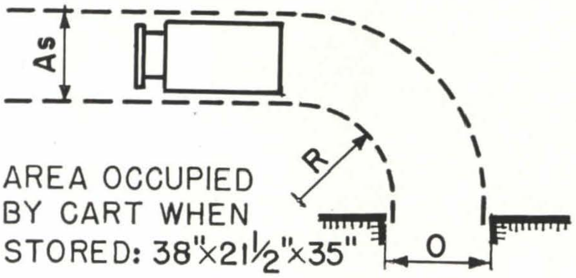
SERVING TABLE (& sideboard)



		Abs. Min.	Des. Min.	Comfort-able
As	Service only	2-6	3-0	3-6
Ap	Public circ'n	2-0	2-6	3-0
C	Clearance to adjacent units	2-0	2-3	2-6
Length **Width**	30″ x 20″ x 42″ is average.			

Display tables (hors d'oeuvres, etc.) usually 5′ 0″ x 2′ 0″; (wines), 3′ 0″ round

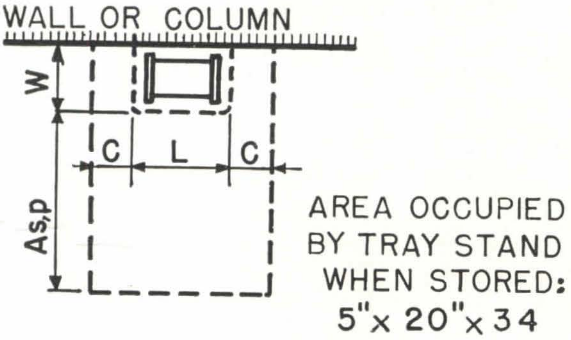
SERVING CART



		Abs. Min.	Des. Min.
As	Service only	2-0	2-6
R	Turn radius	3-0	3-6
O	Door, opening width	2-0	2-6

Approx. area when stored: 38″ x 21½″ x 35″

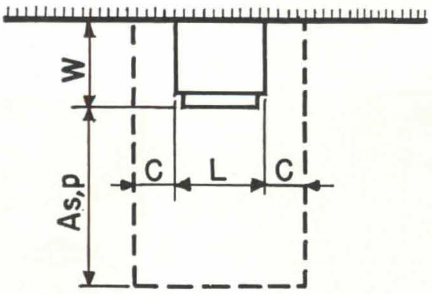
TRAY STAND



		Abs. Min.	Des. Min.	Comfort-able
As	Service only	2-6	3-0	3-6
Ap	Public circ'n	2-0	2-6	3-0
C	Clearance to adjacent units	2-0	2-3	2-6
Length (tray) **Width (tray)**	Depends on type of restaurant.			

Approx. area of stand, stored: 5″ x 20″ x 34″

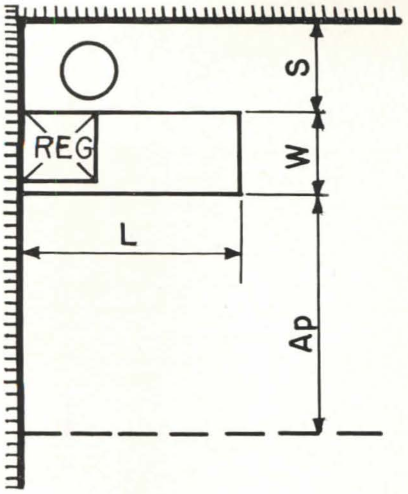
WATER COOLER



		Abs. Min.	Des. Min.	Comfort-able
As	Service only	2-6	3-0	3-6
Ap	Public circ'n	2-0	2-6	3-0
C	Clearance to adjacent units	Can arrange on top or front		
Length **Width**	Depends on capacity and if glass storage included.			

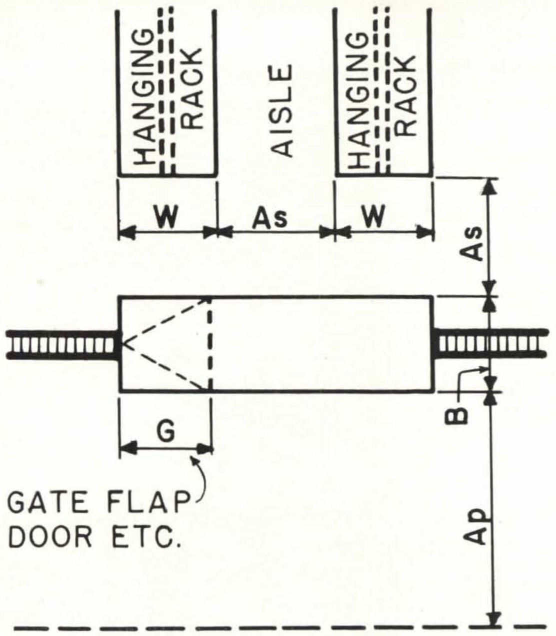
Scale: ¼″ = 1′ 0″; dimensions in feet and inches

NON-DINING SPACES



CASHIER'S DESK and COUNTER

	Usual Minimum
S Cashier's Aisle	2–0 to 2–6
Ap Public Aisle	3–6 to 5–0
Length	4–0 to 8–0
Width	2–0 to 2–4



CHECK ROOM

	Abs. Min.	Des. Min.	Com-fort-able
Ap	3–0	4–0	6–0
As	2–6	2–9	3–3
B	1–0	1–6	1–9
C	2–0	3–0	5–0
G	1–6	1–9	2–0
W	1–10	2–0	2–0

Scale: 1/4" = 1'-0"; dimensions in feet and inches

DIAGRAMS, TABLES and other data given on this page illustrate only a few of the many types of non-dining spaces and clearances required. Data included here may, however, suggest methods of solving most problems.

Cashier

Preferred location for the cashier's desk or counter, according to the Albert Pick Co., is on the right hand side of the door when leaving, in order to avoid cross-traffic and resulting congestion. Dimensions vary from those given in the table according to what merchandise is sold by the cashier and can best be determined in conjunction with each job. If quantities of tobacco, etc., are sold, a back wall case may be necessary.

Coat checking

The diagram illustrates only one type of check room layout; selection of type and size depends on the job under consideration. It is generally considered uneconomical, except in the most luxurious restaurants, to provide check rooms capable of accommodating garments for the peak load of patrons, for the following reasons: (1) Women usually do not check coats; (2) not all male patrons check coats; (3) space required can usually be used otherwise to greater advantage. The Albert Pick Co. estimates that approximately 5 garments can be hung per linear foot on each side of the type of racks diagrammed.

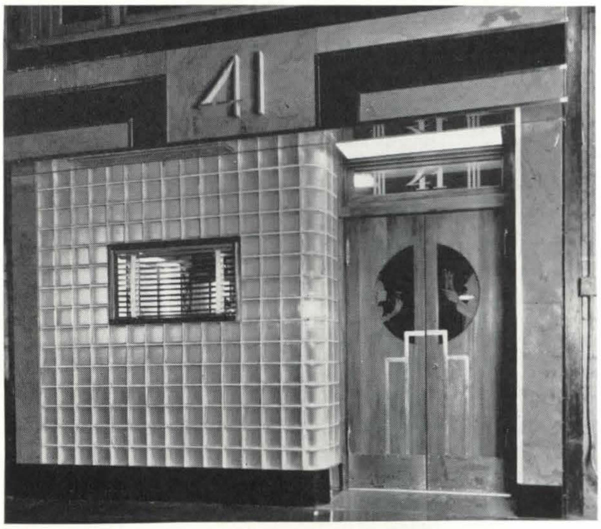
Use of coat trees in dining areas is termed "necessary but never desirable." These occupy approximately 20 by 20 in., are 72 in. high, and can accommodate 8 garments per customer. Overshoe racks are considered undesirable; umbrella racks, desirable in check rooms.

Telephone facilities

Booths are usually preferred to telephone jacks, probably because of costs of installation and of relocating wiring when redecorating or replanning. Booths should be out of direct vision yet convenient to dining and lounge areas. One booth per 125 seats is the usual recommendation, or one phone jack per dining booth.

DETAILS OF RESTAURANT DESIGN

Illustrations that report solutions to various parts of the restaurant design problem and reflect standards of planning and equipment that satisfy requirements of restaurant patrons and operators.



1

2

Gabriel Moulin

3

ENTRANCES . . . Restaurants are a special type of store. These three storefronts indicate a combination of design elements which is successful from a restaurant operator's standpoint. Display windows are subordinated, entrances emphasized by means of color, light, and contrasting materials; and signs are prominent. 1 and 2 are in San Francisco, the first designed by Dodge A. Riedy, the second by John O'Shannon. 3, designed by Paul W. Jones, architect, is in Fargo, N. Dak.

1

Wurts Bros.

2

Hedrich-Blessing

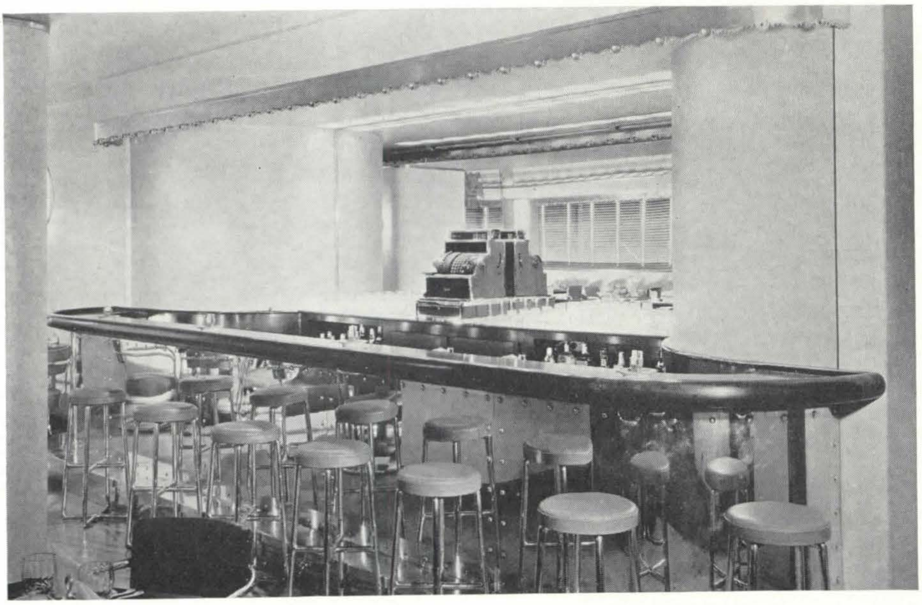
3

Chicago Arch. Photo Co.

Counters provide a means of quick service that has proved popular with patrons and profitable to operators of many large city restaurants. (See Time-Saver Standards Data, page 79.) 1, above, is an oyster bar in the basement of the Susan Palmer Restaurant, New York, for which the E. H. Faile Co. were architects and engineers; 2 is in Bolling's Restaurant in Chicago, designed by Loebl and Schlossman, architects; and 3, also in Chicago, was designed by Ralph Ward for the B/G chain of restaurants.

. . . and Liquor Bars

Hedrich-Blessing



1

Mott Studios

2

Bar equipment is fairly well standardized; but these three illustrations suggest the wide variations in type, size, and layout that may exist in the design of the bars themselves. (See Time-Saver Standards Data, page 80.) 1, above, is in the Wrigley Building Restaurant, Chicago, and was designed by Graham, Anderson, Probst and White, architects; 2 is a free-standing bar in a circular room of Carl's Viewpark Drive Inn, at Los Angeles, Cal., for which W. L. Schmolle was architect. The large bar below (3) was designed by Oman and Lilienthal, architects and engineers, for the Grille Room of the St. Clair Hotel, Chicago.

3

Chicago Arch. Photo. Co.

DESIGN DETAILS . . . . Dining Booths

1

Hedrich-Blessing

2

Chicago Arch. Photo. Co.

3

Chicago Arch. Photo. Co.

Built-in booths afford a degree of privacy, may conserve floor areas and often simplify the problem of interior design. For these reasons they are popular with restaurant patrons and operators. (See Time-Saver Standards Data, page 78.) These illustrations—all taken in Chicago restaurants—show: 1, part of the Bolling Restaurant, Loebl and Schlossman, architects; 2, bar and cocktail room of the Great Northern Hotel, L. R. Solomon, architect; and, 3, the same area in the St. Clair Hotel, Oman and Lilienthal, architects and engineers.

CONTROLLING ELEMENTS OF DESIGN

Information in accompanying paragraphs was compiled from data supplied by the following designers and equipment specialists: Charles F. Plummer, office of Plummer, Wurdeman and Becket, architects; Louis A. Brown, architect; Loebl and Schlossman, architects; James B. Newman, office of Ely Jacques Kahn, architect; A. W. Forbriger, The John Van Range Co.; Fred Schmid, the Albert Pick Co. . . . Effort has been made to report standards of good practice that tend to control restaurant design. But readers are reminded that each design involves a number of special conditions; and though statements here will hold generally true, each should be analyzed in detail before being adopted as a basis for solution of any local problem.

GENERAL

RESTAURANT DESIGN is subject to so many variations that design elements and procedure have not been standardized to any appreciable extent, either on the basis of scientific investigation, or technical practice. Experience of designers, restaurant operators, and those manufacturing organizations which specialize in the layout and installation of restaurant equipment has proved the value of but few general rules-of-thumb. These are reported in the following paragraphs, but necessarily constitute only an expression of collective opinion. Information cannot be regarded as mandatory, but can serve as a general guide to good practice in restaurant design—subject in all cases to a more detailed analysis in view of special and local factors.

Floor loads

In service areas, the design criterion is a live load of 100-125 lbs. per sq. ft. In dining areas, a live load of 75 lbs. per sq. ft. is an average requirement, although some sources of information recommend as low an average as 50 lbs., others as high as 100 lbs. per sq. ft. Live loads recommended for dance floors are 100-120 lbs. per sq. ft.; store rooms, 100 lbs. per sq. ft. and loads for toilet rooms, locker areas, etc., 80 lbs. per sq. ft. In all cases these recommendations should be checked against local code requirements.

Floor areas

No general standard exists for allocating the proportion of gross area to the various space elements of a restaurant plant, because extremely wide variations exist according to type of menu and service offered, methods of management and physical limitations of the restaurant layout.

For restaurants which offer waiter service, dining area occupies approximately 40-50% of the gross area. Areas for liquor service—cocktail lounges, bars, service bars, etc.—require from 10-20% and kitchen and pantry spaces between 30-40% of the gross area. Where restaurant size and management policies make employees' service areas necessary or desirable, about 10% of the gross area can safely be alloted to this service.

Service areas—including kitchen, pantry, and storage spaces—in a large restaurant offering an elaborate menu may occupy 50% of the total area; in a self-service type, allocation for service spaces may only be 15 or 20% of the entire plant.

Public lounges, check and toilet rooms, etc.

Provision of these depends largely upon the type of food and service offered. Restaurants with a low-average check—from 25 to 60c—seldom include check rooms or public lounge space. In some instances, even public toilets are omitted, although this provision is usually governed by local codes.

When provided, the lounge is preferably located near the public entrance with check rooms immediately adjacent. However, in some instances a lounge has been successfully incorporated as a part of the liquor service area.

Employees' spaces

Provision for locker and toilet rooms, recreation space, employee dining areas, etc., depends also upon the size and type of restaurant. Chain restaurants ordinarily have an established—though not necessarily a standardized—policy regarding these items of space and equipment. In most large restaurants and those which employ union help, separate locker and toilet rooms for employees of both sexes are required. Dining space for employees is usually necessary in large establishments, but recreation areas are not generally considered essential.

Location of employees' spaces should be as close as practical to the service entrance, but completely separated from kitchen and pantry spaces and all public areas.

Public entrances

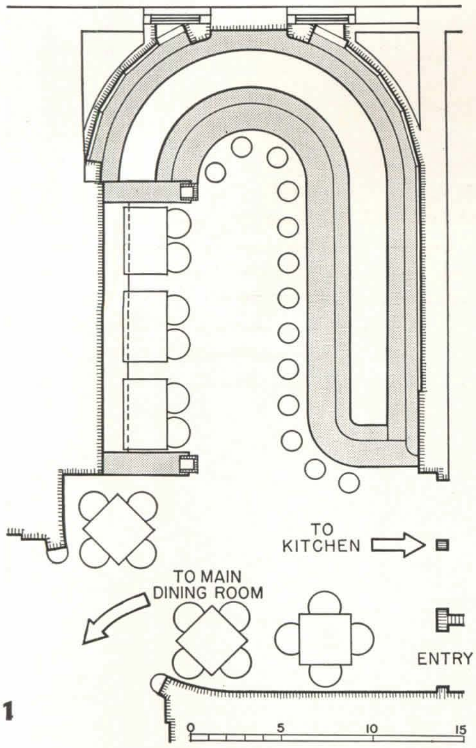
A vestibule with swinging doors or a revolving door entrance is desirable to prevent drafts and to facilitate operation of air-conditioning equipment. Vestibules or lobbies should be sufficiently segregated from dining areas to avoid congestion. In restaurants with higher-than-average checks, a public lobby or waiting room has proved an advantage. Location is preferably between the entrance and the main dining area. Both dining areas and liquor service areas should be easily accessible from the lobby.

Signs, windows, etc.

Character of the facade is almost completely dependent upon the policy of the restaurant and the ability of the designer. A sign of some kind is essential; show windows are generally not. Specialists have no common opinion regarding the necessity of marquees or other such elements of facade design. It is generally considered desirable, however, to provide a permanent place for exhibit of a daily menu.

Stairs

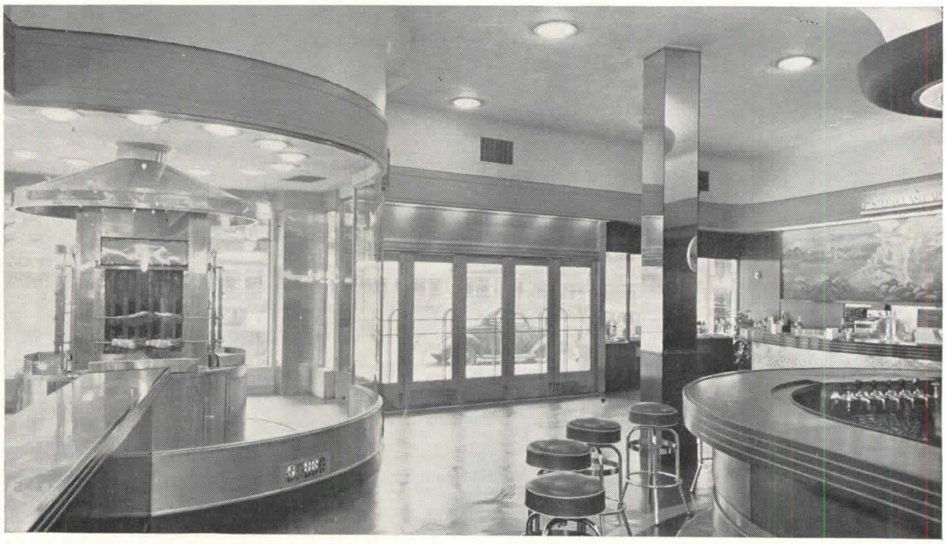
Location of stairs is of less importance than type. "Easy" stairs are necessary with a riser-tread proportion on the order of 6½-12. Variations in tread and riser should be avoided, as should winders and turns



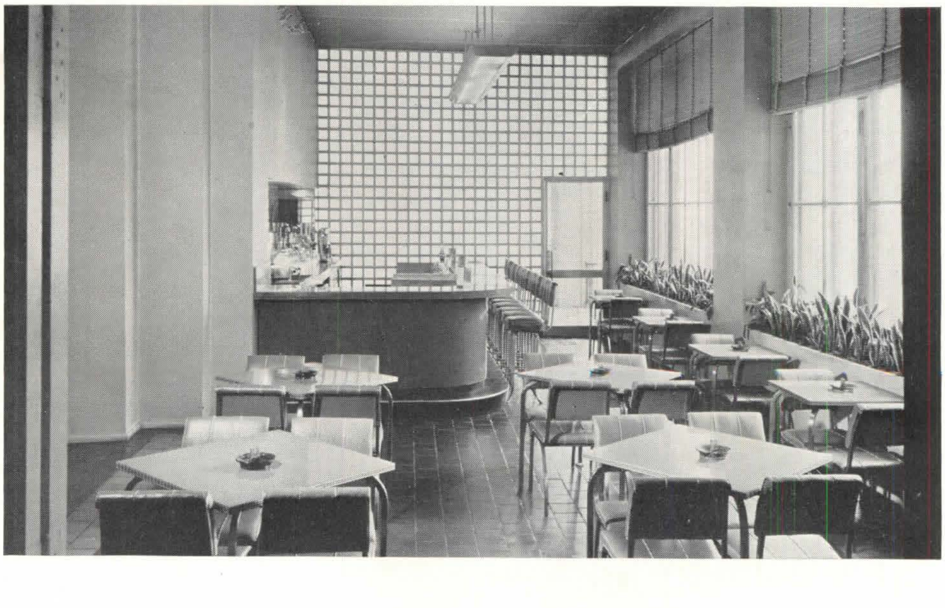
1

Jessie Tarbox Beals

2



3



Hedrich-Blessing

Three restaurants that contain out-of-the-ordinary details of design. In Knoll's Cocktail Lounge (1, top), designed by William P. Wachsman as part of a Chicago restaurant, privacy is gained by the dropped ceiling over the bar and the two open partitions at the left. 2 shows the interior of McGinnis's Restaurant, New York, Charles and Selig Whinston, architects. The front is largely glass and contains a revolving rotisserie (left in picture) as an effective utilitarian advertisement. Service equipment was planned and installed by Nathan Straus-Duparquet, Inc. 3, at right, is the Fountain Room, designed for the Chicago Beach Hotel by James F. Eppenstein, architect. Glass blocks, used at both ends of the room, provide natural lighting but desirable privacy. Artificial lighting is entirely indirect, except over the back bar and over plant boxes at the windows where direct lights are concealed in soffits.

Robert E. Coates

An unusual seating arrangement combining chairs, booths, and benches, developed by Bloch and Hesse, architects, for a Schrafft's Restaurant in New York.

without full-width landings. A single step constitutes a danger source to patrons and employees. Where an equivalent change of a level is necessary, a ramp is more desirable. All stairs should be lighted so that each individual step is clearly evident. Hand rails are required on each side of a stair over 4 ft. in width. Some form of non-slip tread or nosing should be used on both service and public stairs. Carpeting, or other form of stair-covering, is not desirable in the majority of cases.

Interior partitions

Partitions are not generally desirable in the main dining area. To give the impression of privacy, however, partitions—often of a sectional and movable type—approximately 7 ft. high are widely used. Screens are used to answer the purpose, as are built-in booths; selection depending upon the type of food and service and the policies of management.

Seat layouts

This depends almost entirely upon restaurant size, the character of expected clientele, type of food and service offered, and interior mechanical appointments. All these factors refer to restaurants with waiter service. Space allocation per diner varies between 11½ and 16 sq. ft., desirable averages for comfort being 12 to 15 sq. ft. per person.

Square tables occupy more floor space than round tables of comparable dimensions, but will hold more dishes. Where used, square tables should have the corners rounded on about a 6 in. radius to minimize chances of accident and permit a more economical floor arrangement. In the opinion of some specialists, diagonal spacing is generally best, even though it occupies more area than minimum rectangular spacing. Proportion of 2-seat tables to 4-seat or 5-seat tables depends upon restaurant type and location and policies of management. In general, the 2-seat tables or booths should be in the majority. They are best located so they can be combined, where required, to form a 4-seat unit (see T.-S.S. data, pp. 75-78).

The most efficient layout for both dining and service areas can be produced only from a study of all local factors.

EQUIPMENT

Service equipment

The layout and installation of mechanical equipment for kitchen and pantry areas has become a specialty, because of an almost complete lack of standardization in requirements and methods of meeting them. Provision of an adequate complement of cooking and serving units and utensils, and the best relative locations for each piece of equipment can be determined only from a survey and analysis of local conditions. Therefore, it is generally recommended that a designer consult a restaurant specialist for the detailed solution to all such individual problems.

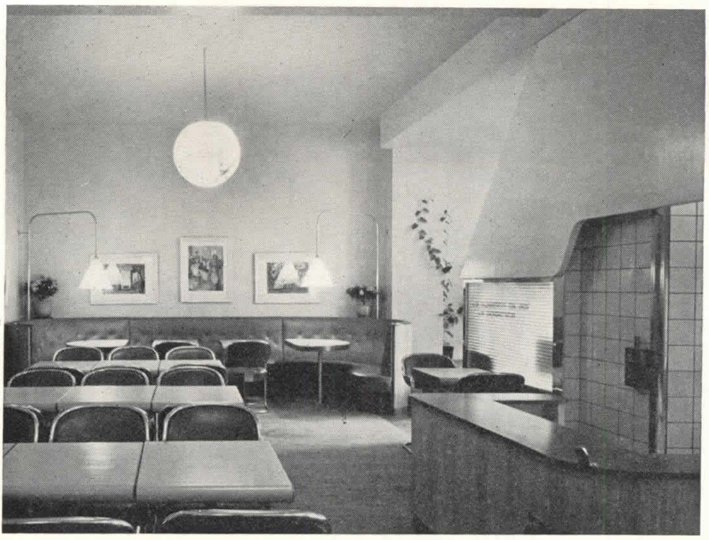
Air conditioning

Opinion is divided upon the necessity of complete air conditioning in service areas, although it is generally recommended for dining areas of all types. Locality has a great deal to do with the need for air conditioning in any part of the restaurant; and often a good system of ventilating with a comparatively high rate of air change per hour will suffice in lieu of complete air conditioning. This is particularly true if the restaurant is small and of the low-average check type.

Good ventilation is essential in the kitchen, and the system should be operated under slight vacuum to prevent intrusion of odors into dining areas. In large restaurants, it is generally desirable to provide separate ventilating systems for dining and service areas.

Satisfactory performance requirements for air conditioning set a maximum of a 15° F. temperature differential, with 10-12° F. as desirable. Relative humidity of from 45-50% is desirable. Air motion should be so slight as to be barely perceptible; and one specialist recommends a maximum of 6 fpm at the breathing line. Outlets should be either the diffusing or long-throw type designed to prevent draft or high velocity injector noise.

Location of mechanical and distribution units depends largely upon structural and spatial design factors of individual problems. In general, a series of zoned systems or a central system with a zoned control is desirable when a number of separate spaces are to be



Photos by C. G. Rosenberg

In this Swedish restaurant — The Norma in Stockholm designed by Kjell Westin, architect—the lighting installation is particularly noteworthy in comparison with usual practices in this country. General illumination is predominant, no table lamps are used, and intensities are comparatively high.

conditioned. Zoned equipment should be such that within dining areas, approximately ⅔ of the air can be recirculated. Standards for air purity are comparable to those for office building installation (see AR, 12/38, pp. 92-93, 102).

Acoustic control

This is desirable in dining spaces of higher-than-average check restaurants and necessary for comfort in service areas of practically all types of restaurants. The noise level in dining areas can be controlled partly by floor coverings and other furnishings and partly by use of sound-absorbing materials on ceilings. In kitchens and pantry spaces sound-absorbing material should be used on all ceilings; and partitions between dining and service areas should have a sound reduction factor between 40-60 decibels.

The desirable noise level in dining areas will vary with noise factors incident to location. It is not generally considered good practice to have a restaurant as quiet, for example, as a private office. A noise level of from 60-75 decibels would be regarded as generally satisfactory.

Lighting

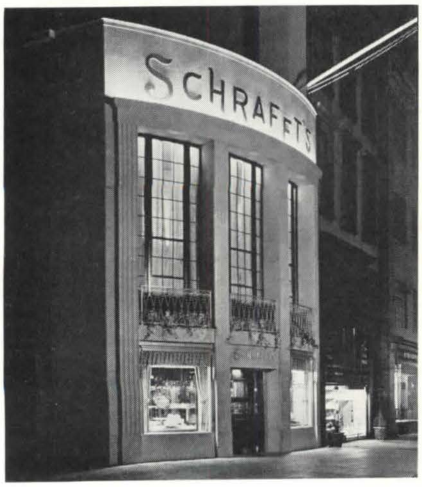
Lighting tolerances and standards are well established. Their application to dining areas, however, is not standardized; for there appears to be no general agreement regarding a desirable proportion between general and local illumination. Choice of this depends largely on the decorative scheme employed in dining rooms and the general system of illumination. Opinion is also divided as to the desirability of direct or indirect lighting in public dining areas.* The restaurant interior is a space where light is employed for its decorative value quite as much as for its utilitarian value; and within limits of comfortable seeing, the location of lighting units, the type, and the intensities produced are matters which are controlled largely by individual tastes and policies.

General illumination can be from 3-5 footcandles and local illumination on tables is usually not over 10 footcandles. In all cases, the source of light should be screened, shaded, or entirely concealed, a high surface brightness of lighted panels or spots avoided. It is desirable, in general, that restaurant lighting be of comparatively low intensity, free from glare and produced so that strong shadows are absent.

ILLUSTRATED CASE STUDIES

Photos by Gottscho

TWO-LEVEL RESTAURANT AND STORE



SCHRAFFT'S RESTAURANT, 61 Fifth Avenue, New York

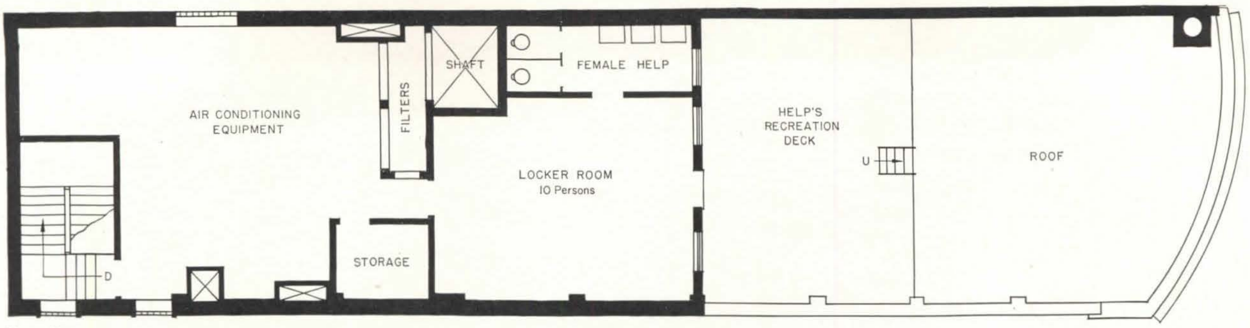
BLOCH and HESSE, Architects

George C. Hannon, Mech. Engr.

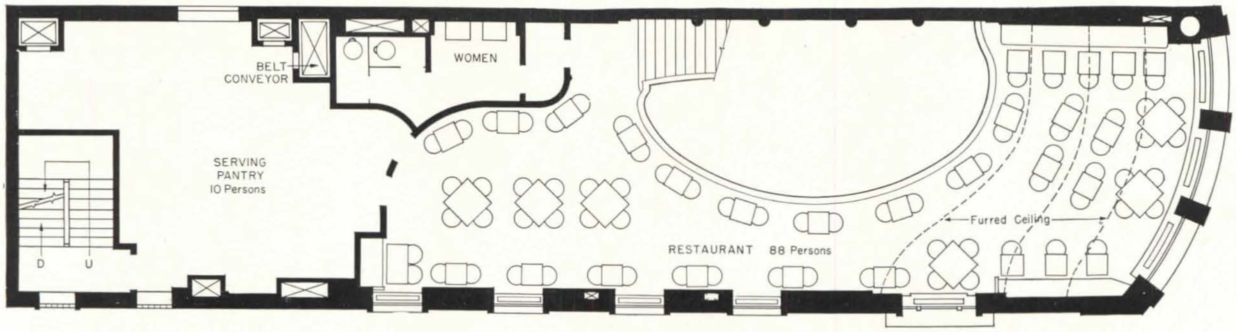
Approximately 155 persons can be seated in the two-level restaurant space; in addition, the store, which includes a soda fountain and candy and baked goods counter, is planned to accommodate 24 persons. In this type of establishment costs per seat cannot be definitely allocated, since store patronage is variable.

Placement of the stair and large open well are intended to unify the two floors and to open up the interior before incoming patrons. Advertising potentialities of the corner location were the reason for the building's curved front, which is visible for some distance up Fifth Avenue.

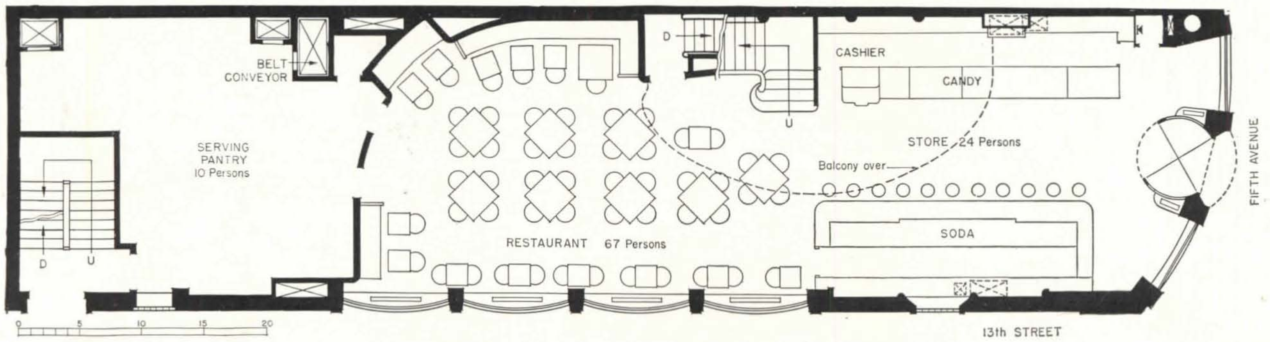
TWO-LEVEL RESTAURANT AND STORE



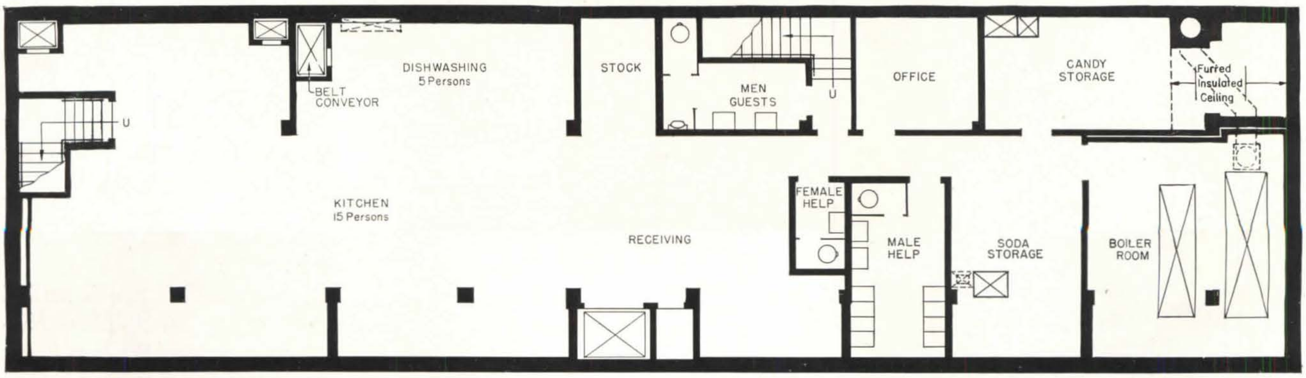
Penthouse



Second floor



First floor



Basement

Penthouse level is used for employees' recreation space as well as mechanical equipment. Photographs: 1, first floor dining area; 2, second floor dining area; 3, store containing candy and baked goods counter, cashier's desk, and soda fountain


1


2


3

Photos by Gottscho

MATERIALS AND EQUIPMENT

FOUNDATION

Brick foundation walls on concrete footings; pits of poured concrete, waterproofed

STRUCTURE

Fireproof throughout; combination wall-bearing and structural steel; reinforced concrete floor and roof slabs

EXTERIOR

Walls: Solid brick with 1¼ in. and 2 in. thick facing slabs of South Dover marble. Face brick, Harvard
Windows: In service portion, Insulux glass brick, Owens-Illinois Glass Co.; restaurant portion, Lupton steel casements, Michael Flynn Mfg. Co.; double hung windows, S. H. Pomeroy Co., Inc.
Doors: Revolving, International Revolving Door Co., mahogany door and vestibule

INTERIOR

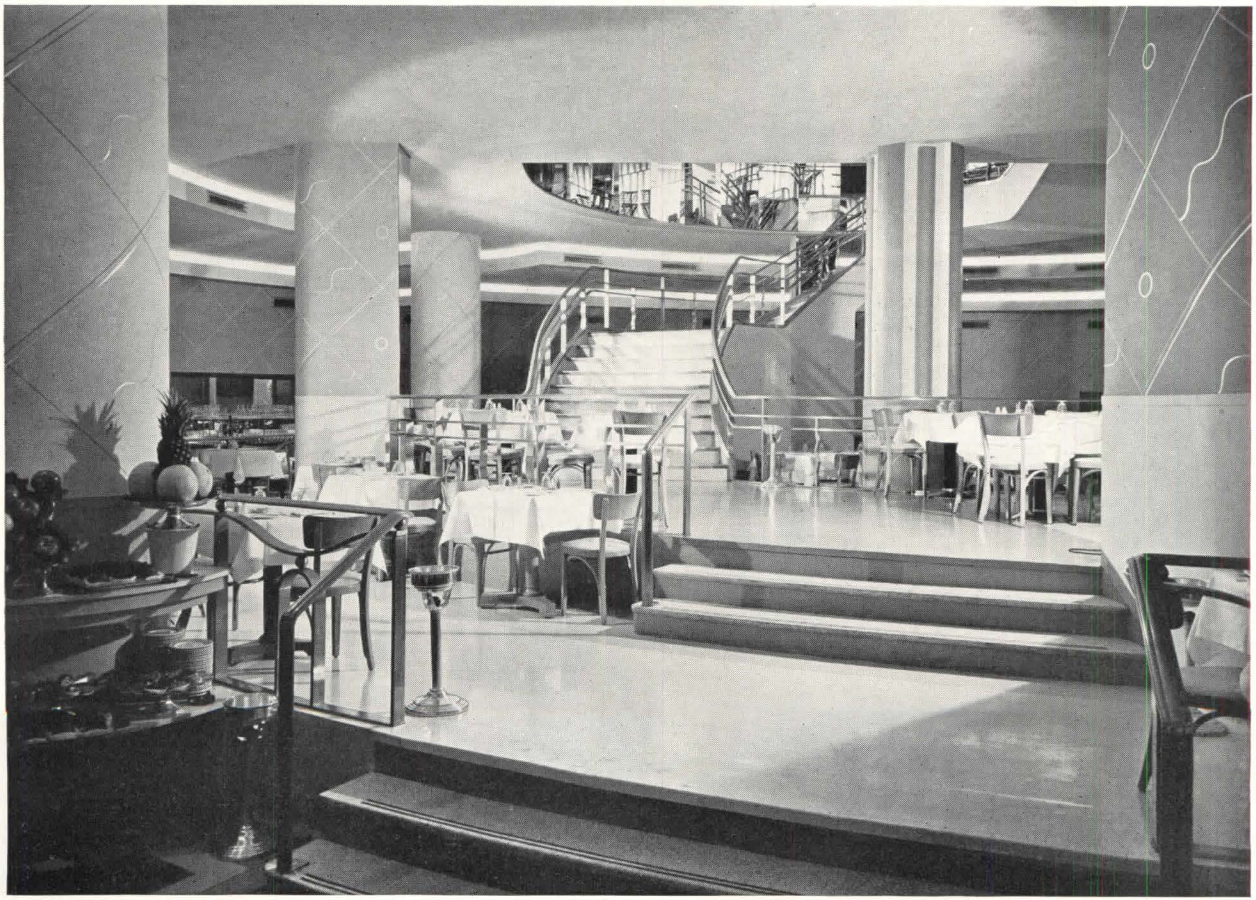
Floors: Composition finish floors in all service portions throughout, Marbleoid, Inc.; all restaurant portions, toilet rooms, terrazzo
Partitions: all interior partitions terra cotta block, plastered
Stairs: All service portions, steel stairs with steel safety treads and pipe railings; guest stairs to mezzanine and cellar of steel construction with terrazzo steps and risers and bronze handrails; mezzanine stairway and well has a balustrade of alternating plate glass panels and crystal pilasters
Ceilings: Serving rooms sound-insulated with Sanacoustic tile; restaurant, Acoustex tile, Johns-Manville Corp.
Wainscoting: All service portions wainscoted 6 ft. high, cement plaster, Portland Cement Assn.; guest stair to cellar wainscoted with Hauteville marble; first floor of restaurant wainscoting and counters of African mahogany; wainscoting of mezzanine floor, Idaho knotty pine
Walls: Wall surfaces above wainscoting have floral paintings on canvas by George Stonehill; first floor murals, apple blossems on beige background; mezzanine murals, Colonial flowers on coral background;; triptych over stairway painted by Mary Stonehill, early Fifth Ave. scenes.
Mirrors: All gold color, copper backed
Settees: Finished in mahogany trim, upholstered with jade imitation leather

EQUIPMENT

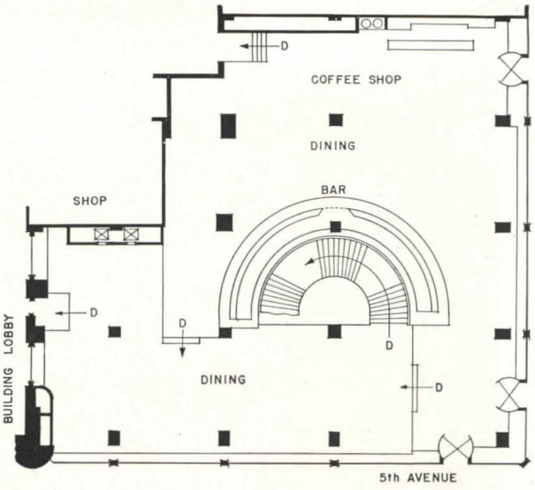
Compressors: Frigidaire Division, General Motors Sales Corp.
Boilers: International Boiler Works Co.
Refrigerators: General Elec. Co.
Trayveyors and dumb-waiters: John W. Kiesling & Sons, Inc.

FIVE-LEVEL RESTAURANT WITH COFFEE SHOP AND BAR

Photos by Ezra Stoller

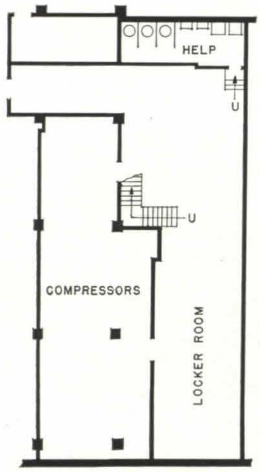


ELY JACQUES KAHN, Architect;
WINOLD REISS and ALBERT CHARLES SCHWEIZER,
Designers and Decorators



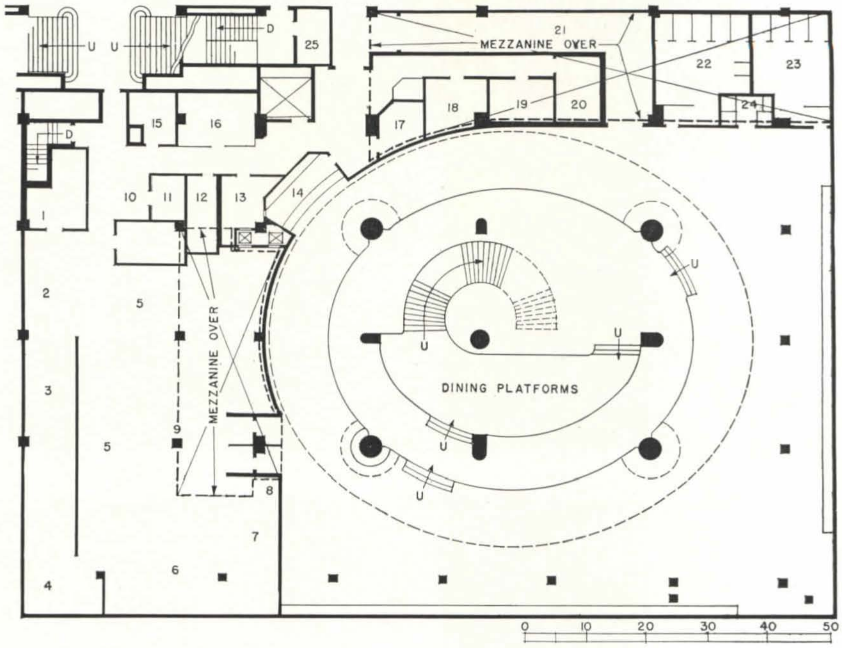
First floor

Sub-basement



Basement

1. Meat refrig.
2. Butcher
3. Vegetables
4. Scullery
5. Cooking
6. Salads
7. Pastry
8. Coffee
9. Checker
10. Fish prep.
11. Fish refrig.
12. Steward's refrig.
13. Wine room
14. Service bar
15. Linen
16. Stores
17. Ice
18. Beer
19. Dairy
20. Garbage
21. Passage
22. Men guests
23. Women guests
24. Phones
25. Meters



RESTAURANT LONGCHAMPS in the Empire State Building, New York City

THE DIMINISHING series of dining levels, rising from the basement floor to the stair and reflected in large mirrors which line the stair well and stair-encircling bar, serve to combine both floors into one unified whole. The mirrors also make apparent to most persons entering the first floor the extent and character of basement dining areas, thus overcoming the difficulty of persuading expected types of patrons to descend to a basement. Bar location serves further to concentrate attention on the dominant stairwell-platform unit. Anticipated peak load is 1,100 persons, at approximately 12 to 15 sq. ft. per seat, although 1,200 have been accommodated. Location of compressors (for both air-conditioning and refrigerators) in sub-basement space, dissociated from dining areas, minimizes their operating noises.

Heating is accomplished by a combination of convectors under windows, unit heaters at entrance doors, and 6 zones of all-year air condiitoning. Steam is taken from building supply. Total air used amounts to 55,000CFM, split between evaporative condensers (15,000), and kitchen and restaurant (40,000). From 18 to 20 air changes are supplied to dining areas. Of these, 7 or 8 (approx. 16,000CFM) are outdoor air.

Cooling units were designed for 650 patrons in mid-day, mid-summer weather; ventilating units, for full capacity under somewhat less severe conditions. This is because the management expects less than capacity crowds at noon in July, close to capacity on summer evenings or in winter.

Fresh air comes, pre-filtered, from the building's F. A. I. tunnels, which run beneath sub-basement corridors, and from which a 2-speed fan draws variable quantities according to condenser requirements. Dining area conditioning units, 3 for the basement, 3 for the first floor, are in mezzanines located with reference to occupancy, exposure, etc. of areas served. Flexibility is gained by installing 2 stages of direct expansion (Freon) cooling in each unit, which operate automatically according to demand. Controls consist of 1 humidistat per floor and 1 thermostat for each zone.

Grilles were designed to minimize air flow obstructions and yet provide maximum directional control. Exhaust from dining areas centers mainly over stair; with a few ceiling exhausts in low-headroom areas, and along the path taken by "sizzling platters" to remove smoke and cooking odors.

FIVE-LEVEL RESTAURANT WITH COFFEE SHOP AND BAR

Photos by Ezra Stoller

Above, the sparkle of glass, liquor, and ornamental metals, and the inlaid rubber bar facing combine to attract attention to the horseshoe bar which curves around the stair well.

On the opposite page are two views of the main dining area at basement level; the lower shows the service bar. Light coves, which follow in general the stepped ceiling curves, are so designed that persons descending the stairs cannot see bare lamps. These are ordinary Type A "Mazda", closely set at the fronts of coves behind low screening fascias. Parabolic trough reflectors at backs of coves reflect light horizontally out and up to the ceiling, whence it is re-reflected down on tables.

At intervals, in concealed coves which throw light toward outer walls, are built masked and lensed spotlights which illuminate the murals.

MATERIALS AND EQUIPMENT

EXTERIOR

Signs: Claude Neon Lights, Inc.

INTERIOR:

Structure: Alterations and new mezzanines, structural steel
Floors: Cinder concrete arches, fill and cement finish; main floor areas, stairs, toilet rooms, terrazzo, The Ravenna Co.; rubber wainscoting and floor work
Walls and ceiling: Plaster, acoustically treated, Jacobson & Co., Inc.; toilet room walls, tile, Atlas Tile & Marble Works, Inc.
Stairs and iron work: Madison Iron Works
Metal work: Generally nickel silver, Allied Bronze Corporation; miscellaneous ornamental work, Leon J. Arnold, Inc.
Doors: Hollow metal doors and bucks, Triangle Steel Products Corp.; nickel silver, bronze revolving doors, Van Kannel Revolving Door Co.; Micarta covering on doors exposed to dining areas in basement
Waterproofing: Membrane waterproofing under kitchen and refrigerator areas

EQUIPMENT

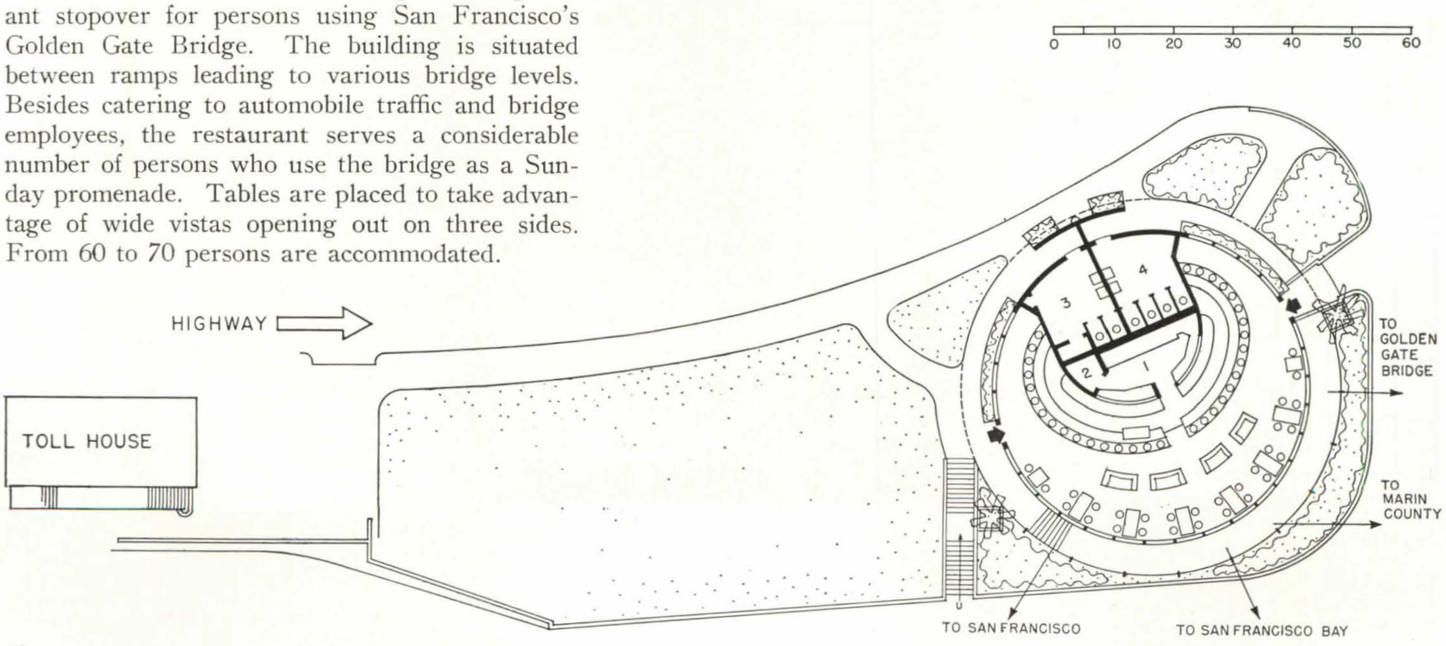
Plumbing: Fixtures, Kohler Co.
Electrical: Lighting, indirect; electric eye equipment, Stanley Works; steplights, Mitchell-Vance Co.
Hardware: Finishing hardware, Norwalk Lock Co.
Cabinet work: Henderson-Baumgard Co.
Trayveyor: Sam'l Olsen Mfg. Co.
Dumbwaiter: Otis Elevator Co.
Metal toilet partitions: Philadelphia Fire Retardant Co., Inc.
Kitchen: Nathan Straus-Duparquet, Inc.
Furniture: Thonet Bros., Inc.
Draperies: Charles L. Hesselbach & Sons

Photos by Esther Born

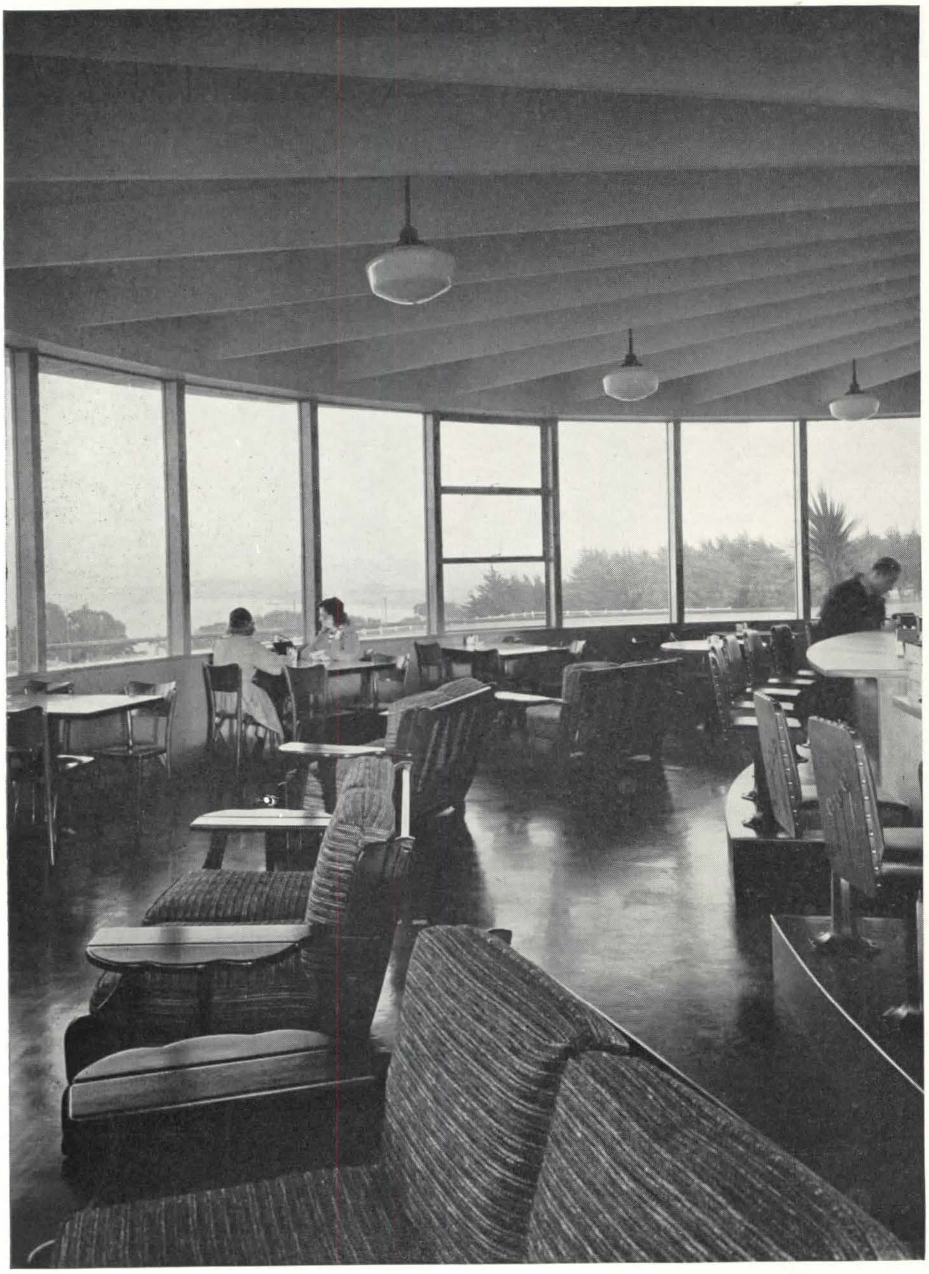
RESTAURANT OVERLOOKING THE GOLDEN GATE

VINCENT G. RANEY, Architect

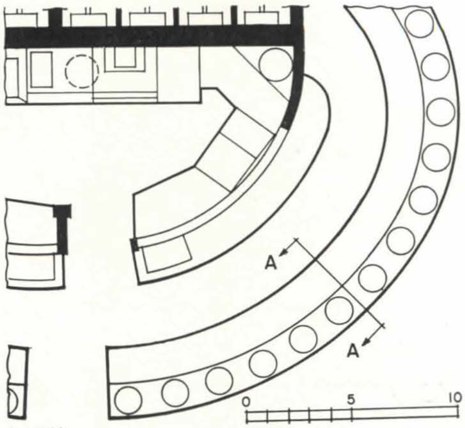
THIS RESTAURANT is intended to provide a pleasant stopover for persons using San Francisco's Golden Gate Bridge. The building is situated between ramps leading to various bridge levels. Besides catering to automobile traffic and bridge employees, the restaurant serves a considerable number of persons who use the bridge as a Sunday promenade. Tables are placed to take advantage of wide vistas opening out on three sides. From 60 to 70 persons are accommodated.



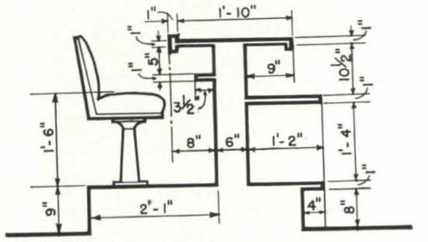
Plan: 1, kitchen; 2, stores; 3, men; 4, women



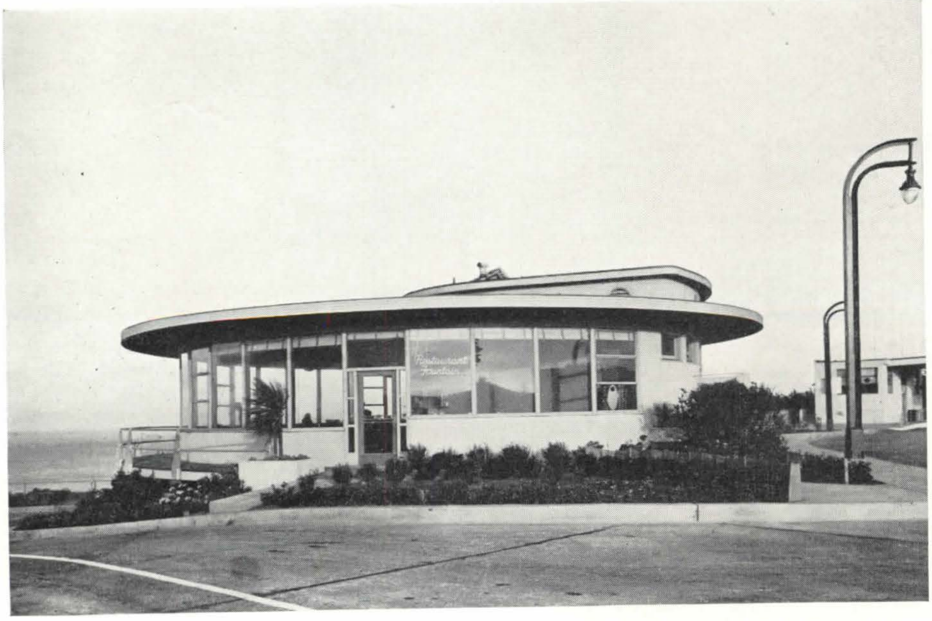
Photograph at left shows the combination of tables, settees with arm-rests, and counter which constitute the seating facilities; lower photograph, exterior from the main highway, showing the toll house to the right. Details of the soda fountain and food bar are given below.



PLAN



SECTION A A



MATERIALS AND EQUIPMENT

FOUNDATION

Reinforced concrete

EXTERIOR

Walls: Plaster stucco
Trim: Redwood
Sash: Fixed, wood frames

INTERIOR

Floors: Terra cotta linoleum, Sloane-Blabon Corp.
Walls: Plaster, painted deep gray blue
Ceiling: Oregon pine painted light pink
Trim: Philippine mahogany
Table tops and counter: Table tops, Micarta; counter, linoleum, Sloane-Blabon Corp.
Stool upholstery: "Fabricoid," E. I. duPont de Nemours, Inc.

EQUIPMENT

Plumbing: Cold-water pipes, wrought iron, A. M. Byers Co.; hot-water pipes, copper, "Streamline"; fixtures, "Standard" (Pacific)
Paint: Fuller & Co.
Glass: Pennvernon," Pittsburgh Plate Glass Co.
Hardware: Sargent & Co.

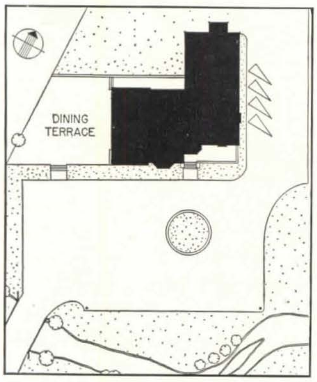
Total cost: $15,000; cost per seat, $250

Photos by Alexander Paget

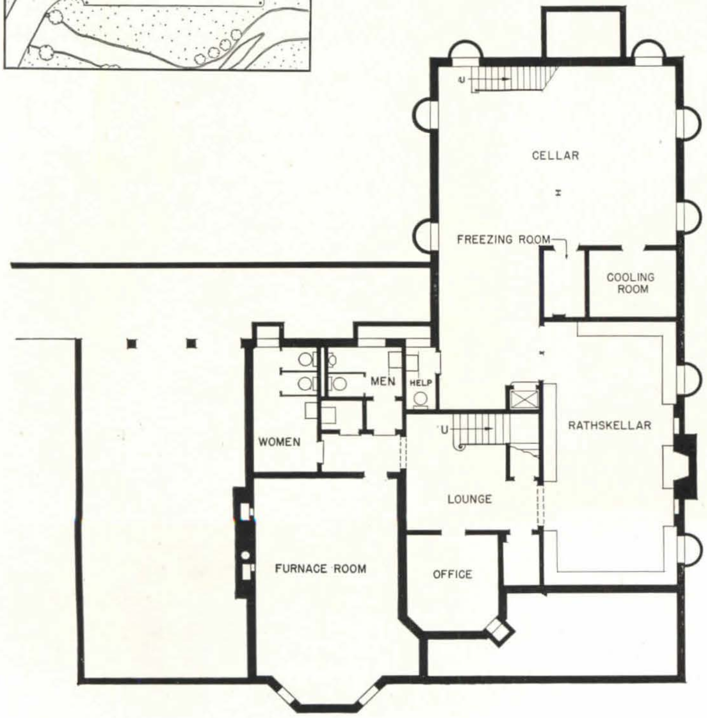
COUNTRY RESTAURANT and RENDEZVOUS

HUGO K. GRAF, Architect

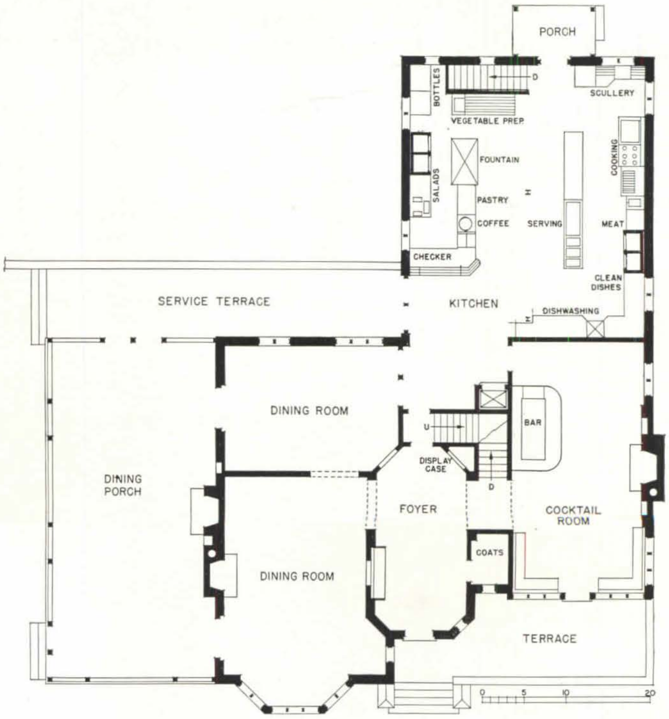
Plot plan



Basement



First floor



Interior photographs at right: 1, view through foyer into one of the main dining rooms; 2, cocktail room; 3, dining porch

LE CHATEAU RESTAURANT

St. Louis County, Missouri

THIS IS a country restaurant catering to bridle and hunt clubs, informal gatherings, etc.; hence, the subdivision of the plan into several moderate sized dining areas. Approximately 200 patrons can be accommodated in the building; gardens are used in warm weather for additional tables. The establishment is located close to an intersection of secondary and trunk highways.

MATERIALS AND EQUIPMENT

FOUNDATION

Duntile concrete blocks in concrete footings, Marcrome Art Marble and Cast Stone Co.

STRUCTURE

Concrete first floor, with wood frame above

EXTERIOR

Walls: Cinder blocks 8 and 12 in. thick. Exterior left unfinished

Roof: "Creo-Dipt" red stained cedar shingles; yellow pine sheathing spaced 2 in; flashing, gutters, and leaders, 26 ga. "Toncan," Republic Steel Corp.

Sash: "Pella" wood casements; weatherstripping and screens, Rolscreen Co.

Doors: White pine

Insulation: "Fibertherm", 6 in. thick, over ceiling

Painting: Windows and wood trim in lead and oil

INTERIOR

Walls: Metal lath, three coats gypsum plaster painted and papered

Floors: Cocktail room, lobby, and dining rooms, carpeted, Bigelow-Sanford Carpet Co., Inc.; foyer, inlaid carpet; porch and basement floor stained with ceramic stain, Floor-Wall Corp.; kitchen, concrete treated

Trim: Poplar trim throughout

Painting: Ceilngs painted, lead and oil, stippled; trim enameled, paint by Cook Paint & Varnish Co.

EQUIPMENT

Heating and air conditioning: Two-pipe steam; boiler, Kewanee Boiler Co. and Freeman stoker; thermostat, Minneapolis-Honeywell Regulator Co.

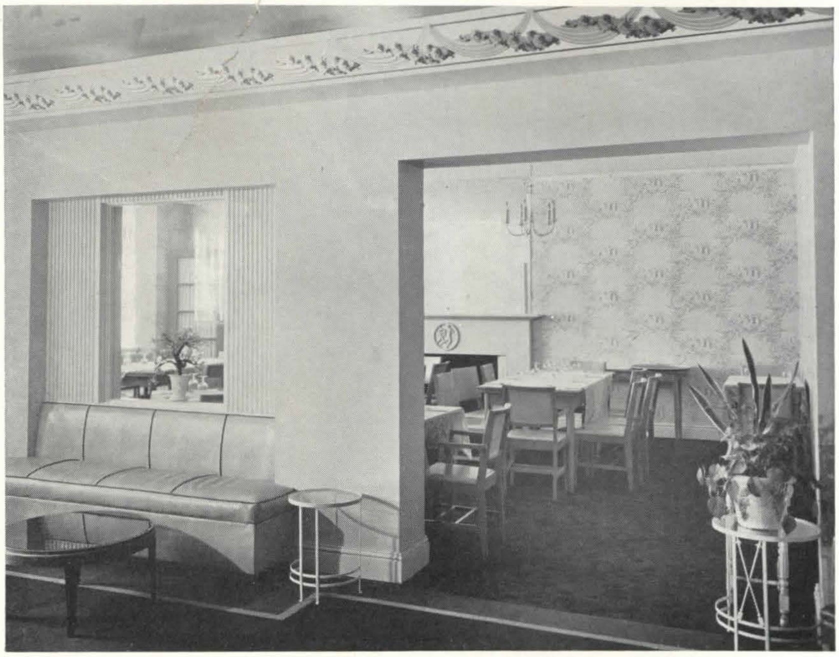
Plumbing: Standard Sanitary Mfg. Co.

Hardware: Solid brass, Sargent

Glass and mirrors: Zeiser Bros.

Electrical installation: Rigid conduit wiring

Total cost: $45,000, including landscaping, excluding fees; cost per seat: approx. $225



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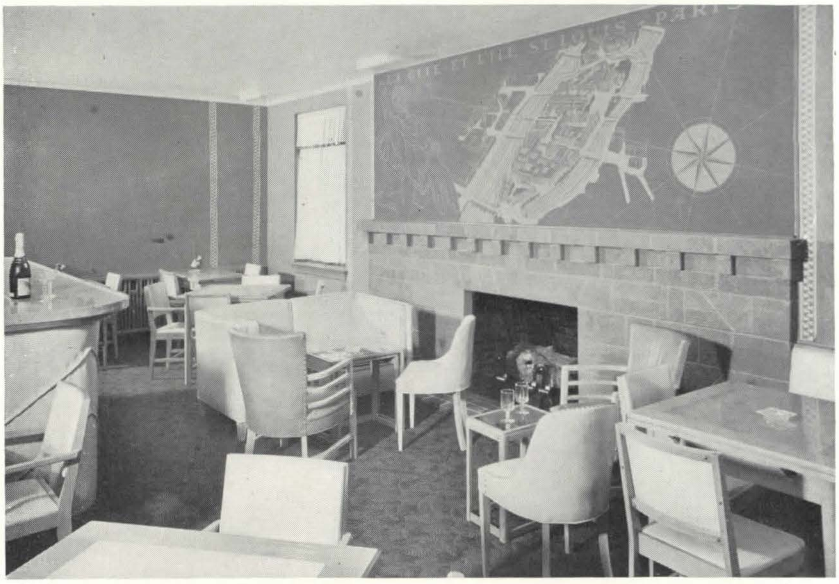

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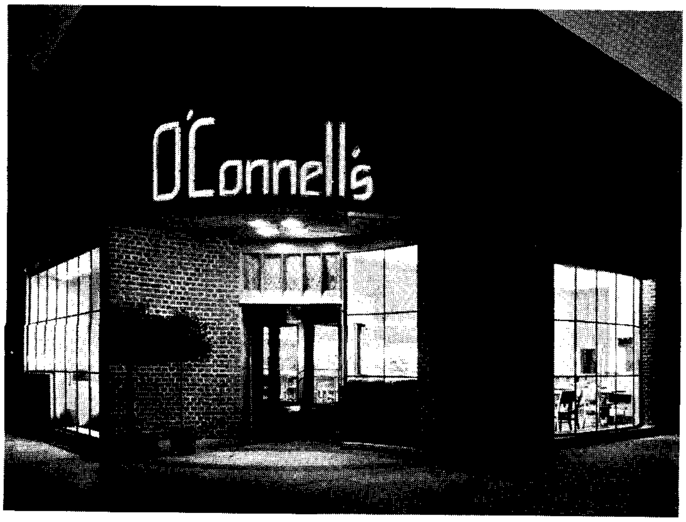
Photos by Hedrich-Blessing

COUNTER and TABLE SERVICE RESTAURANT

O'CONNELL'S RESTAURANT, Chicago, Illinois
LOEBL and SCHLOSSMAN, Architects



MATERIALS AND EQUIPMENT

EXTERIOR

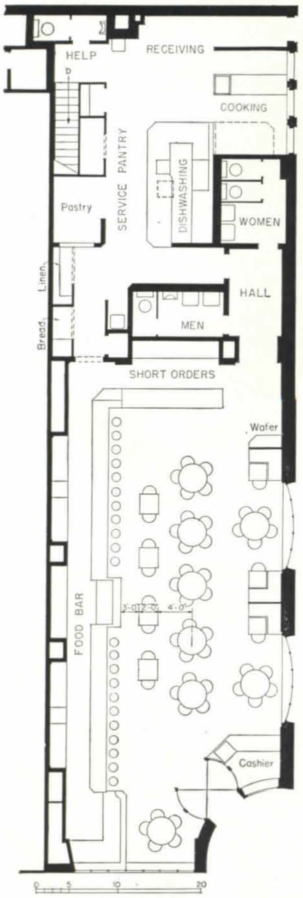
Facing: Granite, Cold Spring Granite Co.; and face brick
Sash: Steel, Illinois Bronze Co.
Doors: Revolving, Van Kannel Door Co.
Signs: Neon sign work, Flashtric Sign Co.

INTERIOR

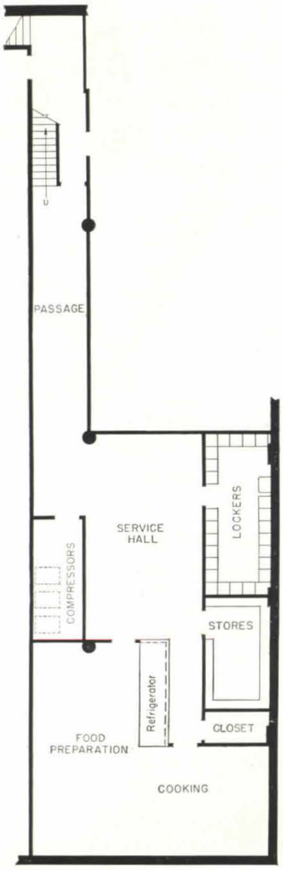
Walls: Paneled oak, Bauman Mfg. Co.; stone jambs and facing around serving unit, Carl Stein & Sons; mirrors and glass, Hamilton Glass Co.
Floors: Floor and base, terrazzo, service area, red quarry tile, Illinois Terrazzo & Tile Co.
Ceiling: Dining room, Acousti-Celotex plaster domes, Celotex Corp.; service area, Sanacoustic tile, Johns-Manville Corp.
Counter and table tops: Brown Formica, Formica Insulation Co.

EQUIPMENT:

Patrons' lavatories: Fixtures, Weil-McLain Co.
Lighting: Generally indirect fitxures in domes, Solar Light Co.; bracket lights on side walls; mechanizing illumination over displays
Chairs, stools, and tables: Booths, stools, and chairs upholstered in green leather; tables, Bauman Mfg. Co.; stools and chairs, Marshall Field & Co.
Kitchen and serving equipment: Stainless steel, except ranges, broilers, etc., designed by Loebl & Schlossman, fabricated by Stearnes Co.

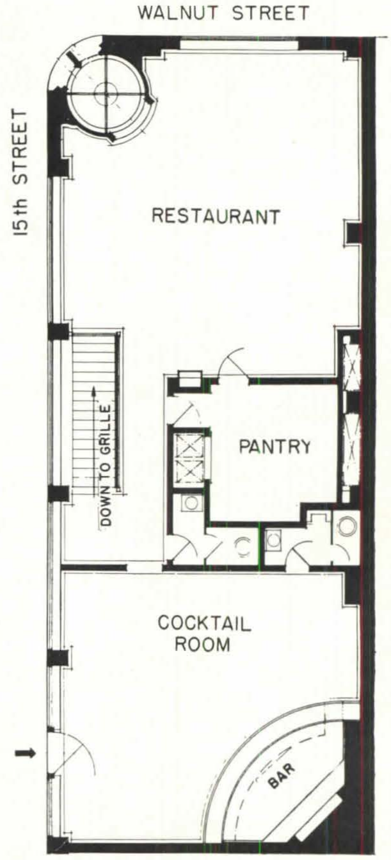


First floor



Basement

The large sidewalk-level windows serve a dual purpose: as an advertising medium, and as a pleasant outlook for patrons. Booths shown in lower photo are unusual in that they accommodate three persons each. All tables for more than three persons are round.



First floor

BAR and GRILL

FLANDERS RESTAURANT, Philadelphia, Pennsylvania

LOUIS A. BROWN, Architect

MATERIALS AND EQUIPMENT

EXTERIOR

Signs: Gold and blue neon tubes, Claude Neon Sign Co.

INTERIOR

Floors: Bar, black and gray linoleum; restaurant, brown and bone linoleum, Armstrong Cork *Prods. Co.*; basement grill, cement
Base: Bar, hardwood stained black; restaurant, hardwood stained walnut; basement grill, cement
Walls: Bar, white finish plaster painted with gray paint, flat finish; restaurant, white finish plaster painted with ivory flat finish paint; basement grill, white finish, painted
Ceilings: Bar, red paint, flat finish; restaurant and basement grill, painted ivory
Windows: Bar and restaurant, natural wood venetian blinds with brown straps; bar, red and white draperies lined white; restaurant, brown and white draperies lined white, Schumacher's Fabrics; glass, Pittsburgh Plate Glass Co.
Tables: Bar, cast iron bases, gray Formica blister-proof tops, red stripes; restaurant, cast-iron bases, brown Formica blister-proof tops, ivory stripes, Formica Insulation Co.; basement grill, walnut
Chairs and stools: Bar, Howell tube steel, gray leather seats, red backs and arms; bar benches, gray leather, spring cushion seats, red imitation leather upholstered backs, chrome feet; restaurant chairs, wood seats, ivory leather padded, upholstered backs in brown imitation leather; restaurant benches, ivory leather spring cushion seats, brown imitation leather upholstered backs; basement grill chairs, walnut
Bar: Amazon mahogany top, linoleum covered back bar, chrome rail, plate glass shelves

EQUIPMENT

Electrical: Fixtures, chrome and satin-finish metal, frosted glass segments; restaurant, 3 circuits to control illumination, Voigt Co.
Kitchen: Magic Chef range, American Stove Co.; refrigerators, Westinghouse
Dumbwaiters: Paris Elevator Co.
Ventilating: Fans, B. F. Sturtevant

Cost, total: $12,500; per seat, approx. $100.