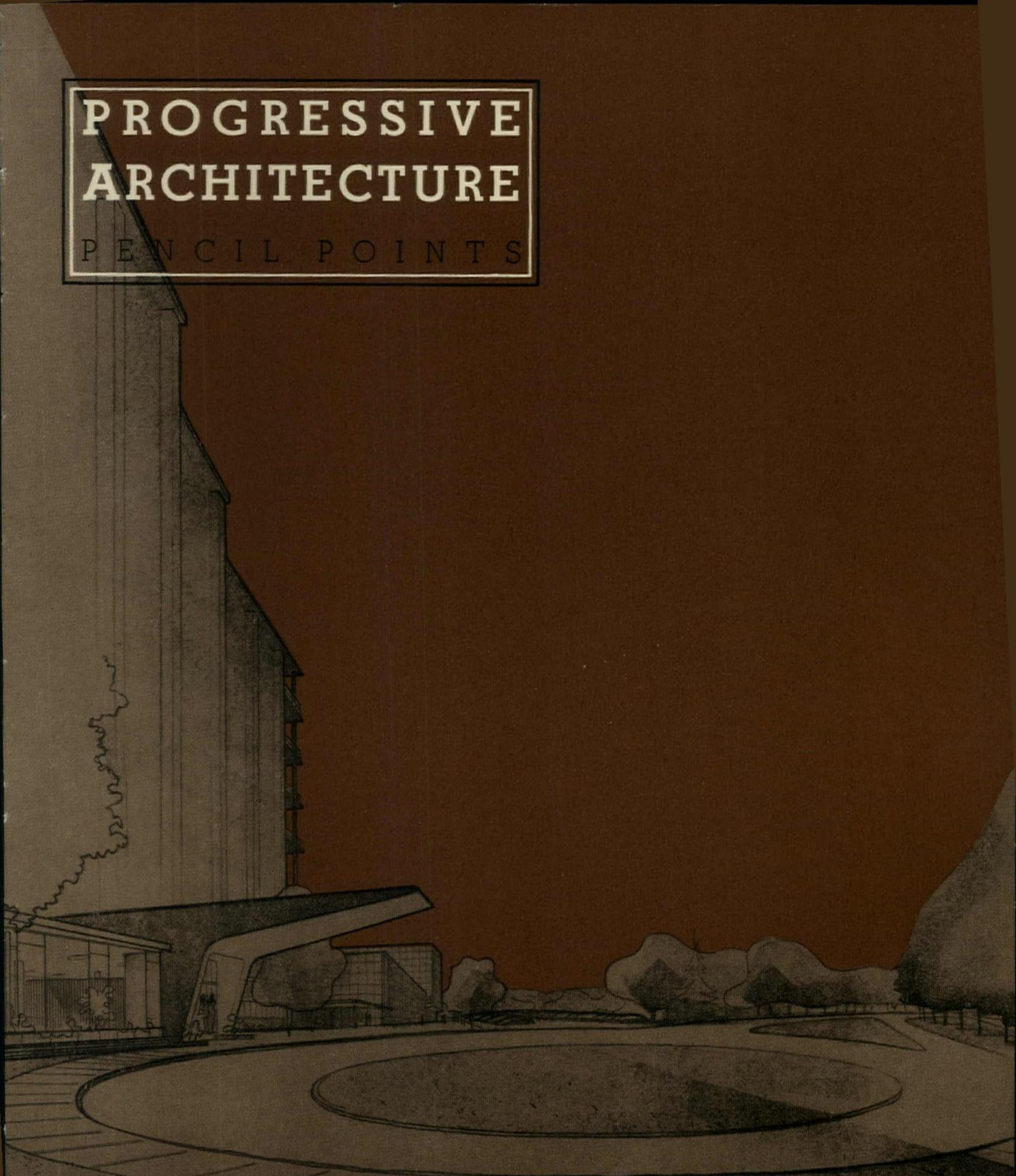
PROGRESSIVE
ARCHITECTURE
PENCIL POINTS



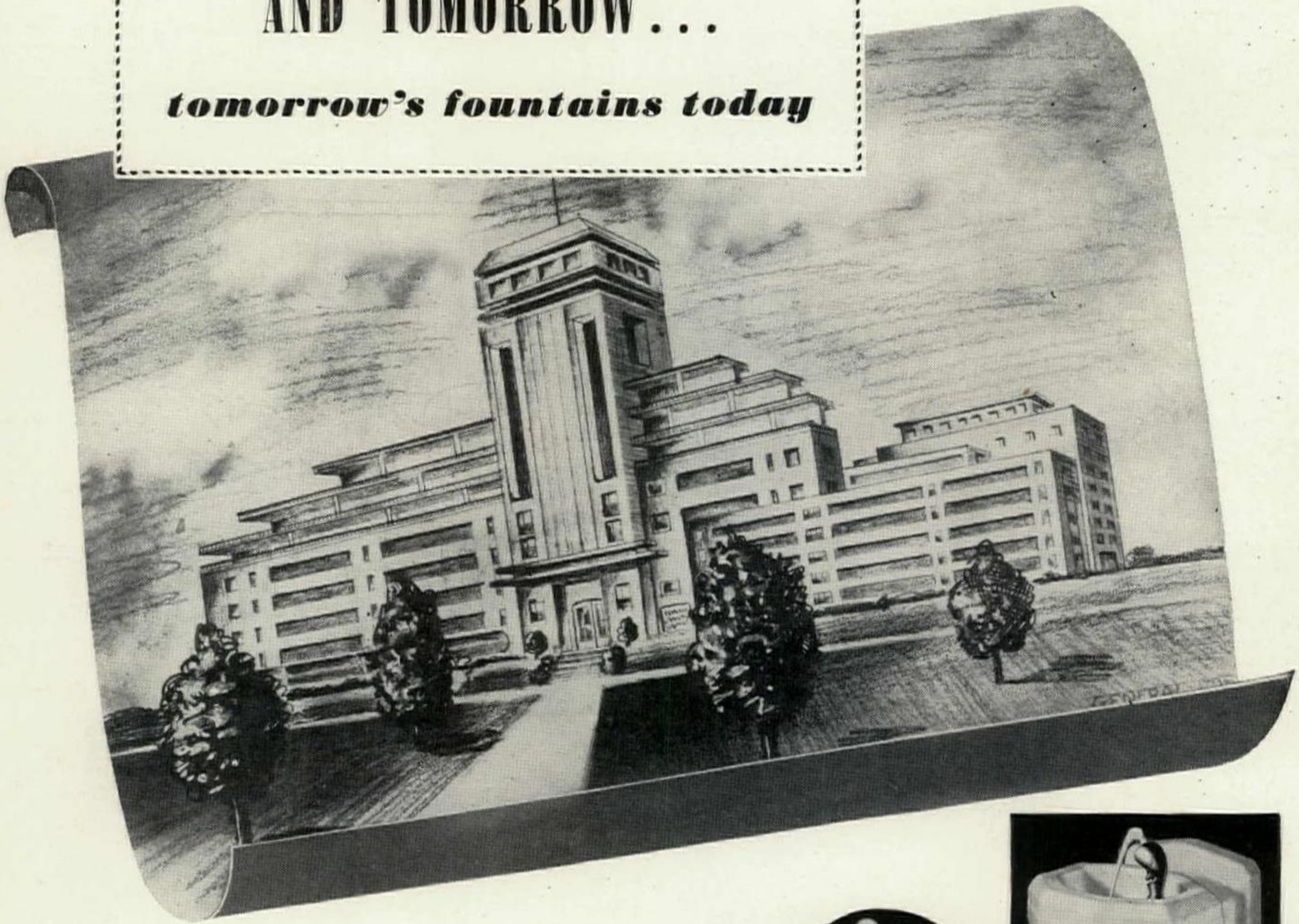
HOSPITAL CRITIQUE

WATER PIPING

NOVEMBER 1946

# FOR HOSPITALS OF TODAY AND TOMORROW...

***tomorrow's fountains today***



Architects and hospital building authorities recognize the value of health-safety in planning the installation of a drinking water system.

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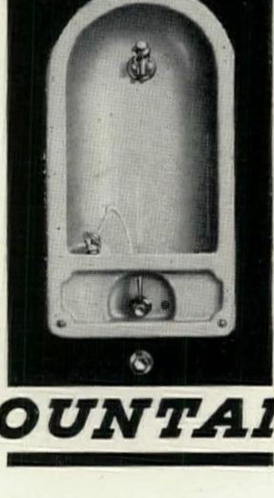
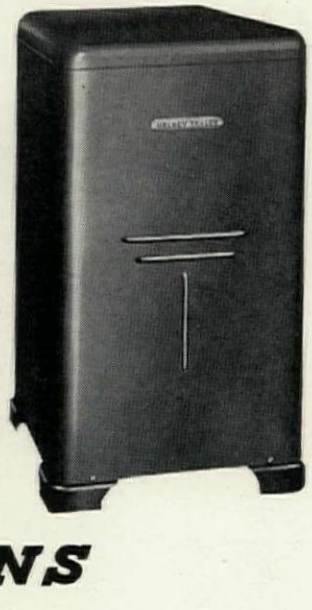




HALSEY TAYLOR

***DRINKING FOUNTAINS***

# ARCHITECTURAL CRITICISM

PROGRESSIVE ARCHITECTURE feels that full study of design possibilities in specific fields—hospitals, schools, churches, etc.—is a book function rather than a magazine function. In one issue of a magazine only the most superficial "study" can be made. Standards therein established, while they may save time, are likely to become limiting, imagination-freezing deterrents. We feel that only in a comprehensive book can all aspects of one sort of building be adequately explored. Hence the PROGRESSIVE ARCHITECTURE Library announced in our September issue: books on the modern planning of hospitals, stores, apartments, schools, and other types.

How, then, should a group of buildings all designed for the same social purpose be presented in a magazine? The professional answer apparently has been overlooked because it is so obvious. The magazine review should be an act of architectural criticism—an *evaluation* of the buildings presented, as answers to certain human needs—a critique of several solutions to the problem, not a pretense at a full study of the problem.

Architectural criticism, beyond the stage of judgment of school projects, has always remained an unrealized aim. For one reason, magazines have been restrained by the possibility of lawsuits (instances can be cited). Then there is the chance of wounding professional pride; even in closed sessions, attempts at formal criticism by various chapters of the A.I.A. have not been successful. In our own case, our continuing success depends on the good will of future contributors; if we are objectively critical, we run the risk of offending them. Yet we recognize our responsibility as editors of a magazine of architecture.

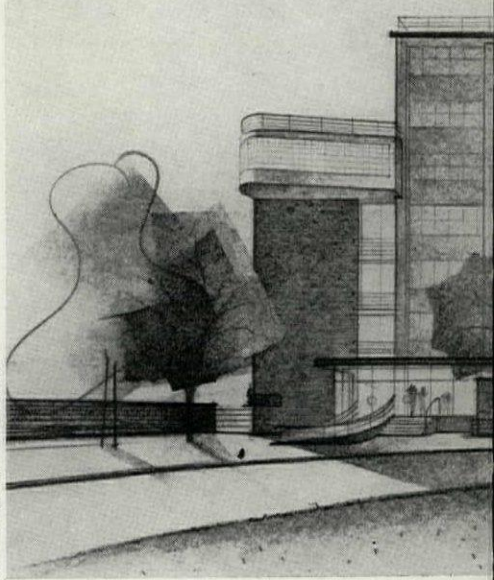
PROGRESSIVE ARCHITECTURE herewith makes an experiment. This issue is a Critique of Five Hospitals. Without altering our policy of full, professional presentation of architecture designed to better man's environment, we extend that policy, in this issue, to include more complete and more intimate criticism. We think it is a shame that full architectural criticism cannot be undertaken as readily as literary criticism, dramatic criticism, or art criticism—without tentative steps and explanatory introductions. However, we recognize the difficulties (for us) and the potential dangers (for the practising professionals) and therefore announce this critique frankly as an experiment.

Your acceptance of professional criticism will determine our development of its fuller possibilities. We will be eager for indications.

The Editors

# 5 HOSPITALS

## A CRITIQUE . . . . . by the Editors of Progressive Architecture, with Isadore Rosenfield as Consultant

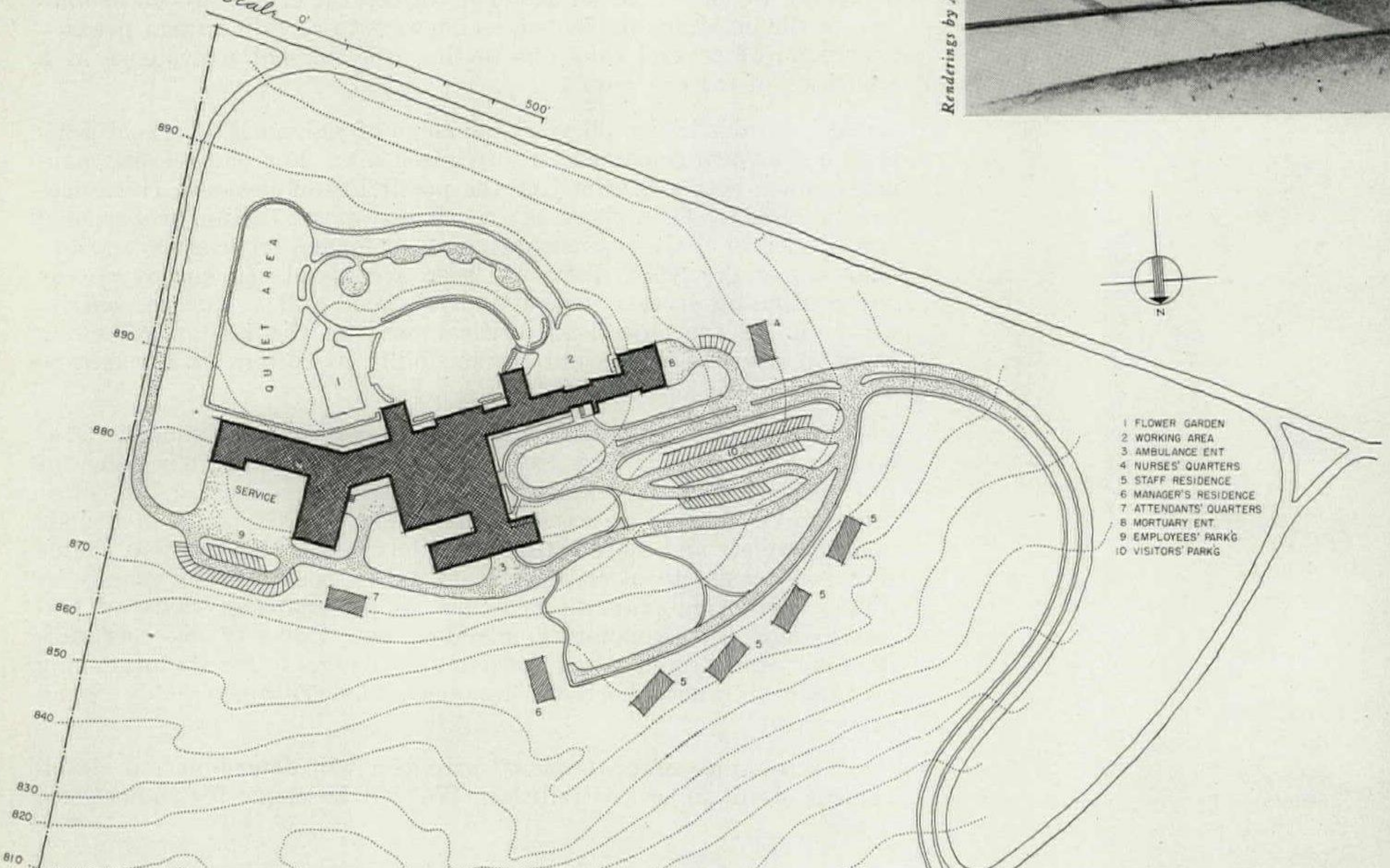


Renderings by Albert Loecher

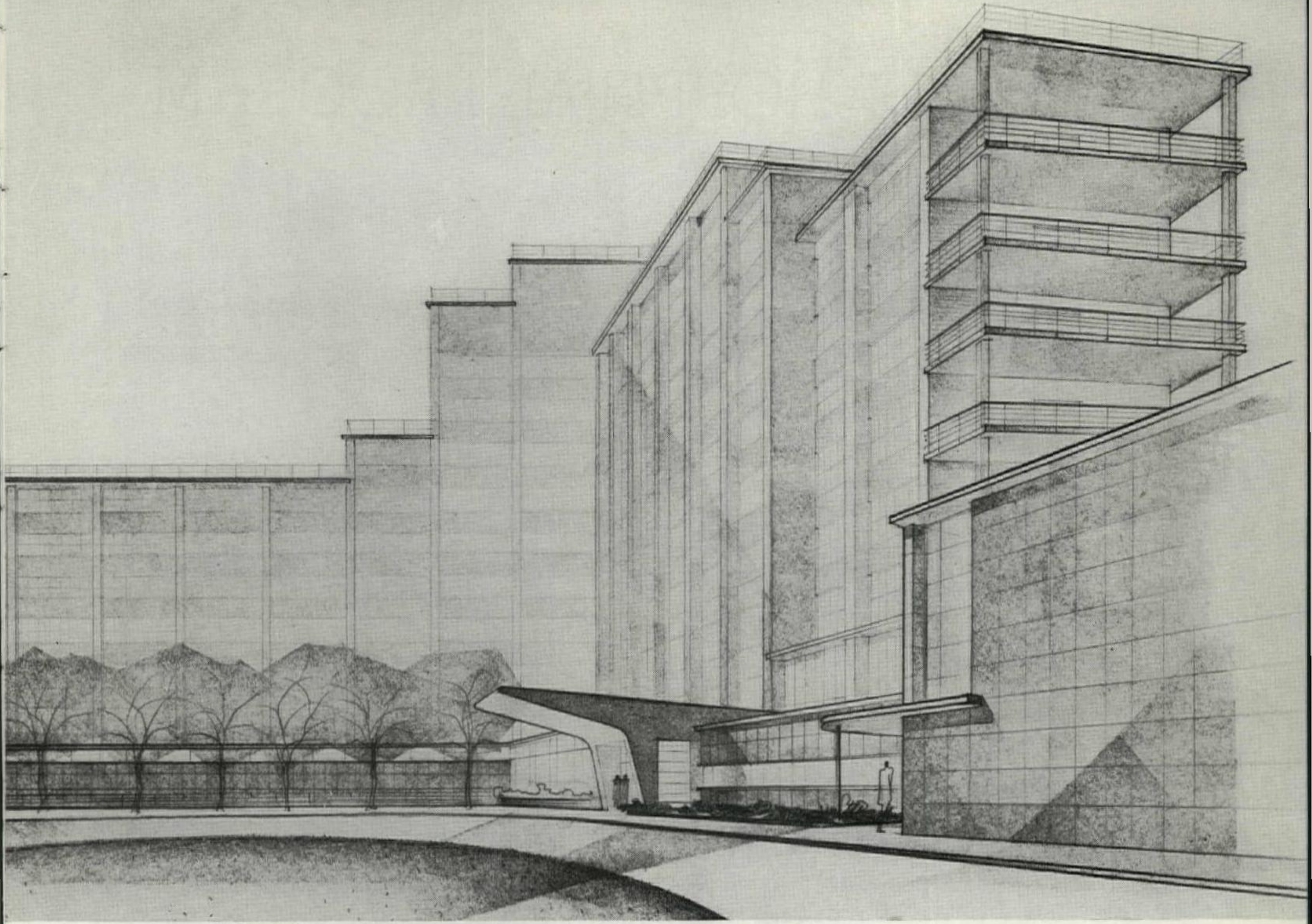
**PROGRESSIVE ARCHITECTURE here presents an analysis of five outstanding hospital designs. The selection of these five from the many excellent projects at hand is in itself an act of favorable criticism. Going further, we are attempting to judge these hospitals fairly and objectively against certain criteria of progressive design.**

**To add to our own critical judgment, we have asked Isadore Rosenfield (architect, consultant, author of "Hospitals-Integrated Design," to be published soon) to act as consultant on the entire presentation, as he is consultant on two of the hospitals presented. Most of the text that follows represents our editorial conclusions, bolstered by Mr. Rosenfield's advice; some of it is signed personal comment by Mr. Rosenfield.**

**The hospitals chosen represent the important Veterans' Hospital Program, the voluntary hospital of the type that will gain from the passage of the Hospital Survey and Construction Act, and those two special types most important today—the tuberculosis hospital and the neuro-psychiatric institution.**




Plot Plan



# 1 . . . VETERANS' HOSPITAL, WILKES-BARRE, PA.

KELLY & GRUZEN, ISADORE ROSENFIELD, Architects-Engineers

This 480-bed hospital will be one of the 137 new buildings in the 600-million-dollar Veterans' Hospital program now going forward. The total program, calling for 40,462 new beds, has been placed in the hands of the Corps of U. S. Army Engineers. The designers of this hospital say that "no architect may take full credit for the planning of a veterans' hospital," since the Army Engineers' office furnishes a "very lucid and fairly complete" program of requirements. Departures must be justified by evidence of superior knowledge of hospital function or because of special conditions surrounding a specific project.

The Wilkes-Barre hospital is located on the rim of a valley, set well back from the main highway. Orientation of patients' rooms is to the southeast, but unfortunately looking away from rather than toward the valley view. Access to the property is by one road, which widens into a visitors' and doctors' parking area near the entrance to the hospital. The same road continues to an ambulance entrance in the rear of the building, and then on to an employees' parking area adjacent to the service wing. Staff residences ring the hospital on the north side.

The plans published on the following pages have received preliminary but not final approval from the authorities. Perspective studies have not yet caught up with plan changes, and the observant reader may note some discrepancies between the plans and the perspectives. However, the visualization of the building is so straightforward and promises such an excellent design that there is value in studying these renderings as examples of work in progress.

# VETERANS' HOSPITAL PROGRAM

By ISADORE ROSENFIELD

Although the military services in the United States have planned hospital systems closely related to military needs, we have had no such planned systems in civilian life. While civilian government hospitals (federal, state, and municipal) are somewhat more knit together on their respective levels than the voluntary hospitals, even they can hardly be regarded as systems designed to meet their full measure of responsibility, and their effort is seldom integrated with the activities of the voluntary hospitals.

The only civilian hospital agency which has a legal mandate to become a complete system designed to take care of its entire responsibility within the limits of the law is the group of veterans' hospitals. They not only have the mandate; they seem determined to carry it out. Hitherto, the veterans' hospitals have been referred to by about every negative characterization in the dictionary. Under the present administration, the size, distribution, and the clinical specializations of the hospitals are determined by the needs of the men and women who have risked their lives in the service of their country. The veterans' hospitals are fast becoming a complete system, and in turn the system is being integrated with all pertinent factors in the community.

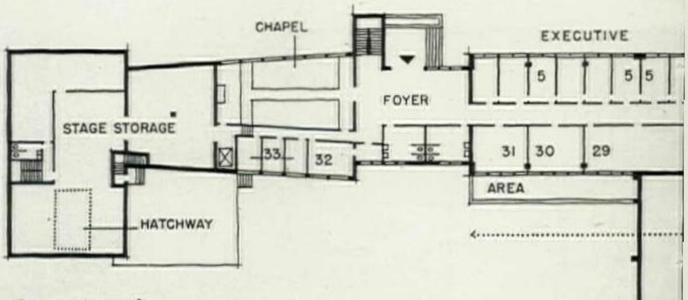
The standards of planning of veterans' hospitals are probably the highest we have yet had in the history of the United States. We have had more luxurious voluntary hospitals, but never have we had hospitals so completely planned around the idea that we must treat not only the disease, but the whole person, including his relation to the community. Social, occupational, and recreational facilities are generous. Whereas the average length of stay in a general hospital is about 12 days, in veterans' hospitals, where the nature of illness tends to be chronic, the average length of stay is about 37 days, with about 50 percent of the patients in a more or less ambulant state.

Ample visitors' space is required; as each veterans' hospital will, of necessity, cover a sizable geographic territory, some relatives may have to travel considerable distances. The diagnostic and therapeutic services are most complete and generous, and the nursing facilities are considerably above the level of provisions of most governmental hospitals.

To sum up, it seems obvious that in setting up the standards of planning for veterans' hospitals, those responsible were concerned with only one question: what provisions are necessary to do a really good job? Because of this attitude, the veterans' hospitals now being planned and about to be planned offer a promise of new departures in hospital design in the United States.

**VETERANS' HOSPITAL, WILKES-BARRE, PA.**

KELLY & GRUZEN, ISADORE ROSENFIELD
Architects-Engineers



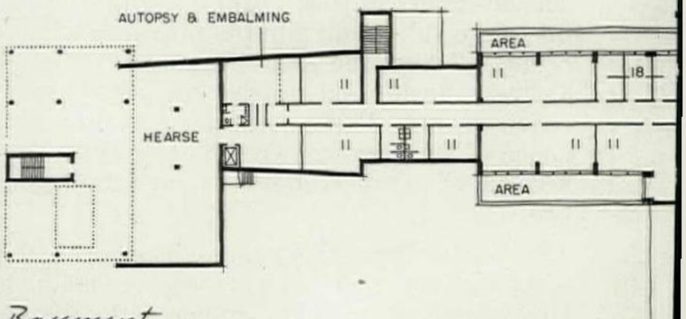

*First Floor*

**FIRST FLOOR**

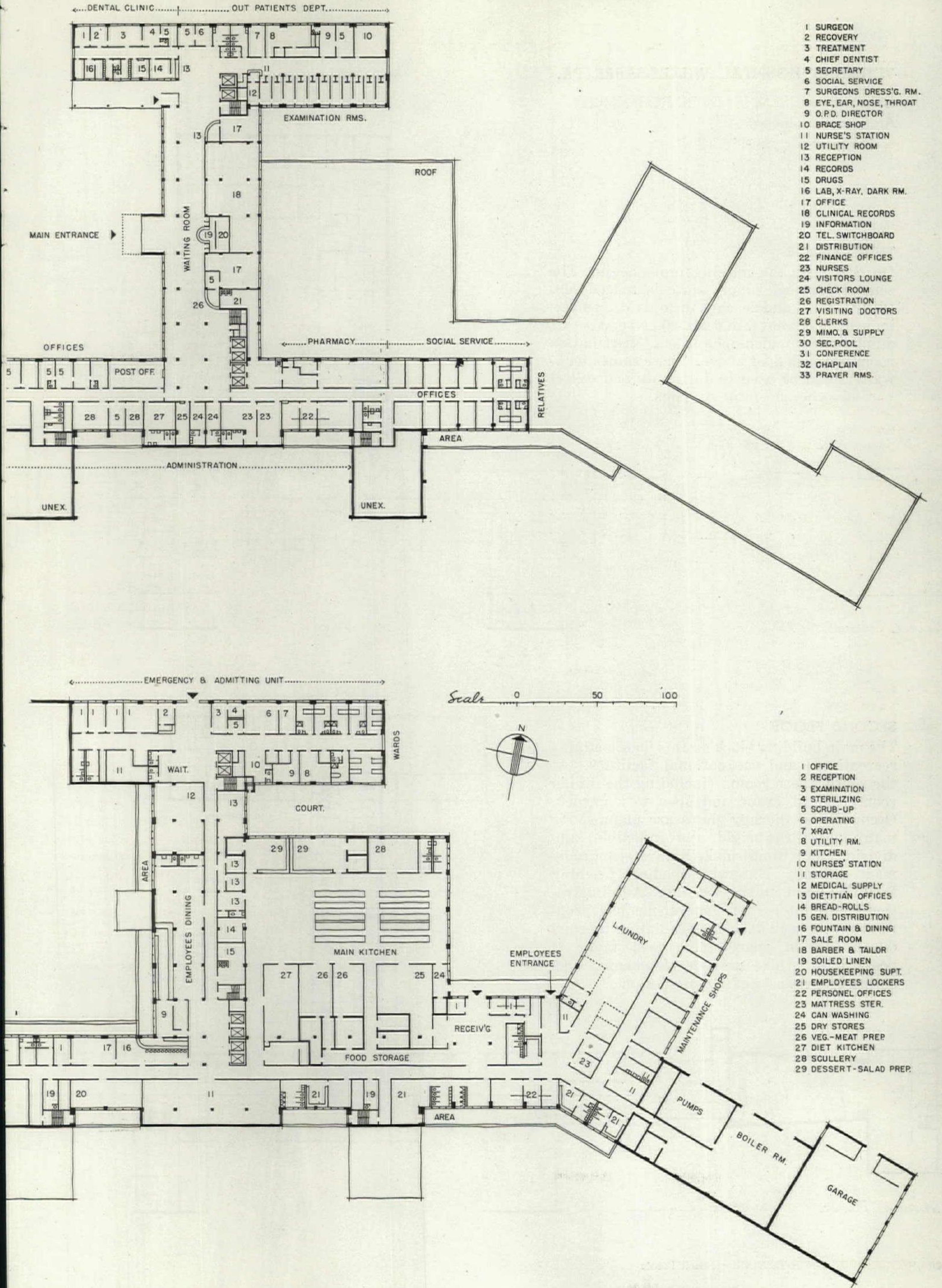
Various functions can be reached simply from an inviting lobby. The separate outpatient entrance seems unnecessary when the waiting space adjoins the main hospital entrance. A bank of elevators, in the outpatient wing, connects with the admitting rooms below and various services above which will be used by clinic visitors. At the east end are rooms for visiting relatives.

**BASEMENT**

The basement is well organized by departments, with delivery and receiving centrally located. A drop in grade allows the east service wings to be at ground level. The generous emergency and admitting unit includes a complete operating suite—a questionable feature when the operating floor is so close. Necropsy services are discreetly situated, accessible to hearse garage and chapel above. Skylights help light the large kitchen.




*Basement*



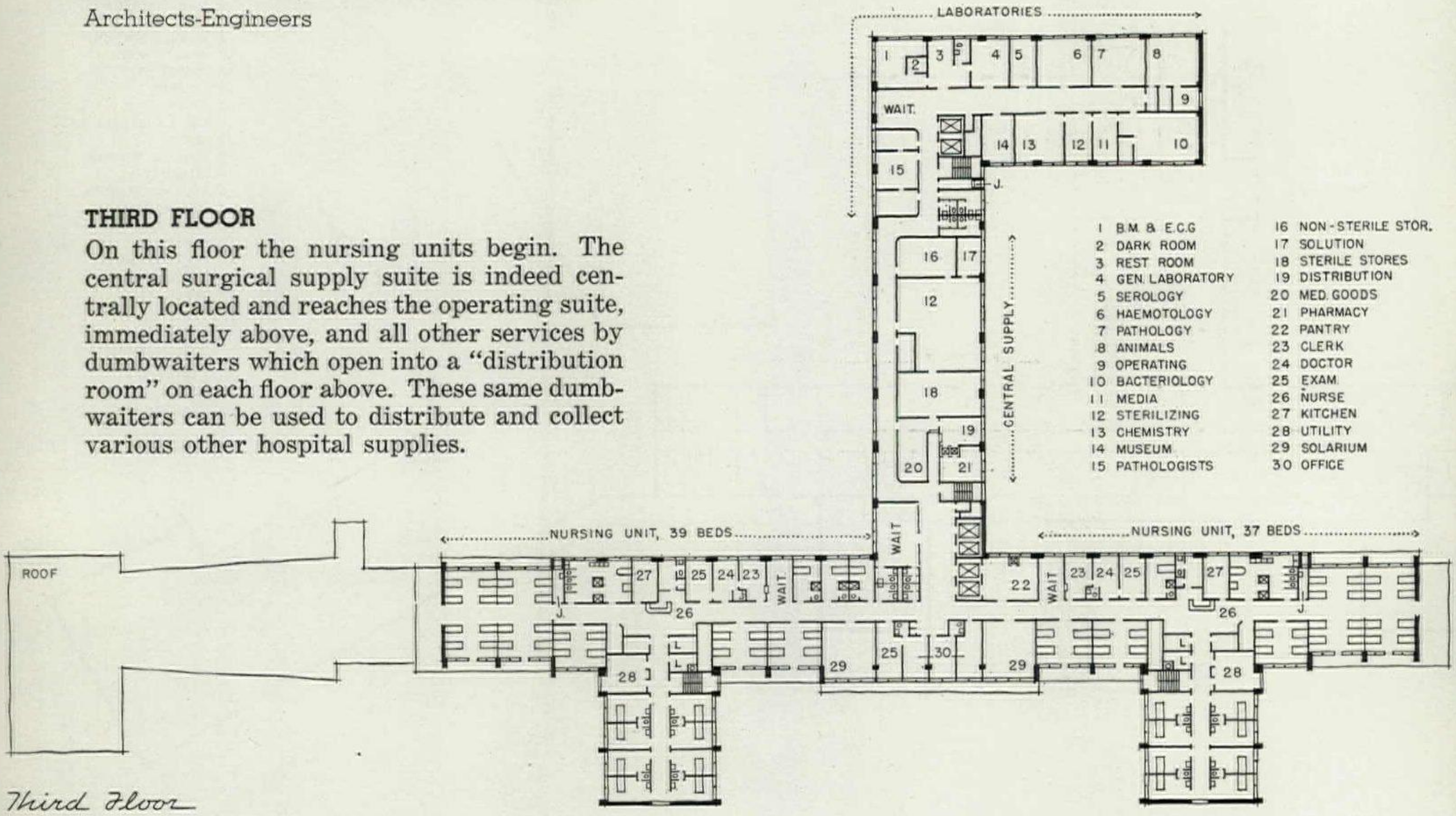
DENTAL CLINIC
OUT PATIENTS DEPT.
EXAMINATION RMS.
ROOF
MAIN ENTRANCE
WAITING ROOM
OFFICES
POST OFF.
PHARMACY
SOCIAL SERVICE
OFFICES
RELATIVES
AREA
ADMINISTRATION
UNEX.
UNEX.
1 SURGEON
2 RECOVERY
3 TREATMENT
4 CHIEF DENTIST
5 SECRETARY
6 SOCIAL SERVICE
7 SURGEONS DRESS'G. RM.
8 EYE, EAR, NOSE, THROAT
9 O.P.D. DIRECTOR
10 BRACE SHOP
11 NURSE'S STATION
12 UTILITY ROOM
13 RECEPTION
14 RECORDS
15 DRUGS
16 LAB, X-RAY, DARK RM.
17 OFFICE
18 CLINICAL RECORDS
19 INFORMATION
20 TEL. SWITCHBOARD
21 DISTRIBUTION
22 FINANCE OFFICES
23 NURSES
24 VISITORS LOUNGE
25 CHECK ROOM
26 REGISTRATION
27 VISITING DOCTORS
28 CLERKS
29 MIMO. & SUPPLY
30 SEC. POOL
31 CONFERENCE
32 CHAPLAIN
33 PRAYER RMS.
EMERGENCY & ADMITTING UNIT
WARDS
WAIT.
COURT.
AREA
EMPLOYEES DINING
MAIN KITCHEN
EMPLOYEES ENTRANCE
RECEIV'G
FOOD STORAGE
LAUNDRY
MAINTENANCE SHOPS
PUMPS
BOILER RM.
GARAGE
AREA
Scale 0 50 100
N
1 OFFICE
2 RECEPTION
3 EXAMINATION
4 STERILIZING
5 SCRUB-UP
6 OPERATING
7 X-RAY
8 UTILITY RM.
9 KITCHEN
10 NURSES' STATION
11 STORAGE
12 MEDICAL SUPPLY
13 DIETITIAN OFFICES
14 BREAD-ROLLS
15 GEN. DISTRIBUTION
16 FOUNTAIN & DINING
17 SALE ROOM
18 BARBER & TAILOR
19 SOILED LINEN
20 HOUSEKEEPING SUPT.
21 EMPLOYEES LOCKERS
22 PERSONEL OFFICES
23 MATTRESS STER.
24 CAN WASHING
25 DRY STORES
26 VEG.-MEAT PREP.
27 DIET KITCHEN
28 SCULLERY
29 DESSERT-SALAD PREP.

**VETERANS' HOSPITAL, WILKES-BARRE, PA.**

KELLY & GRUZEN, ISADORE ROSENFIELD
Architects-Engineers

**THIRD FLOOR**

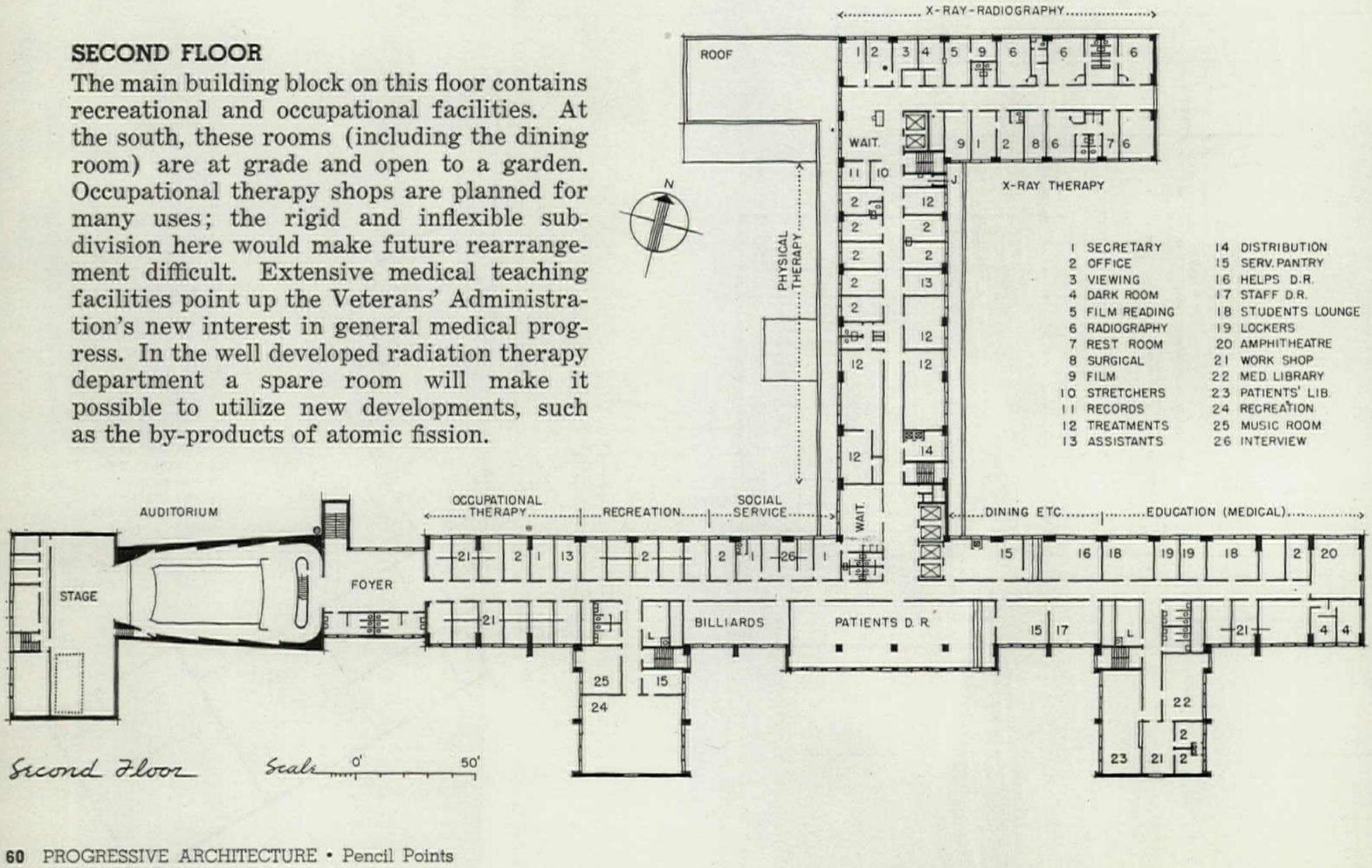
On this floor the nursing units begin. The central surgical supply suite is indeed centrally located and reaches the operating suite, immediately above, and all other services by dumbwaiters which open into a "distribution room" on each floor above. These same dumbwaiters can be used to distribute and collect various other hospital supplies.




*Third Floor*

**SECOND FLOOR**

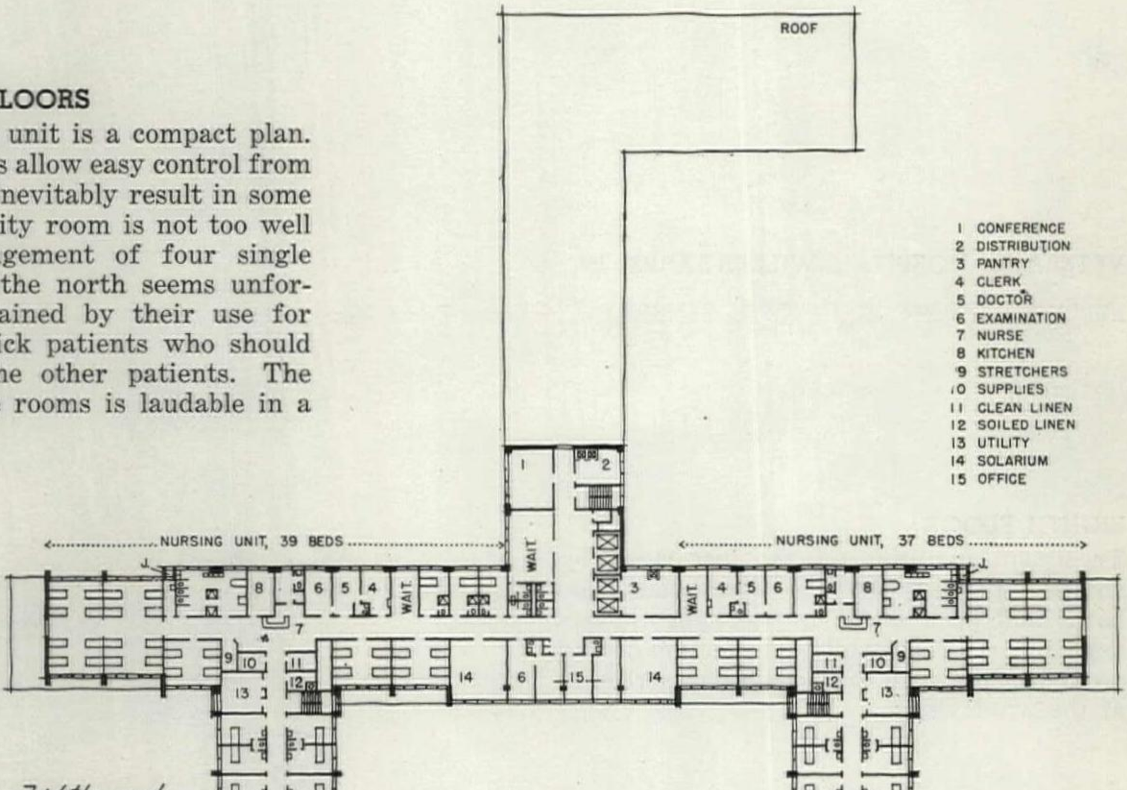
The main building block on this floor contains recreational and occupational facilities. At the south, these rooms (including the dining room) are at grade and open to a garden. Occupational therapy shops are planned for many uses; the rigid and inflexible subdivision here would make future rearrangement difficult. Extensive medical teaching facilities point up the Veterans' Administration's new interest in general medical progress. In the well developed radiation therapy department a spare room will make it possible to utilize new developments, such as the by-products of atomic fission.




*Second Floor*

## FIFTH AND SIXTH FLOORS

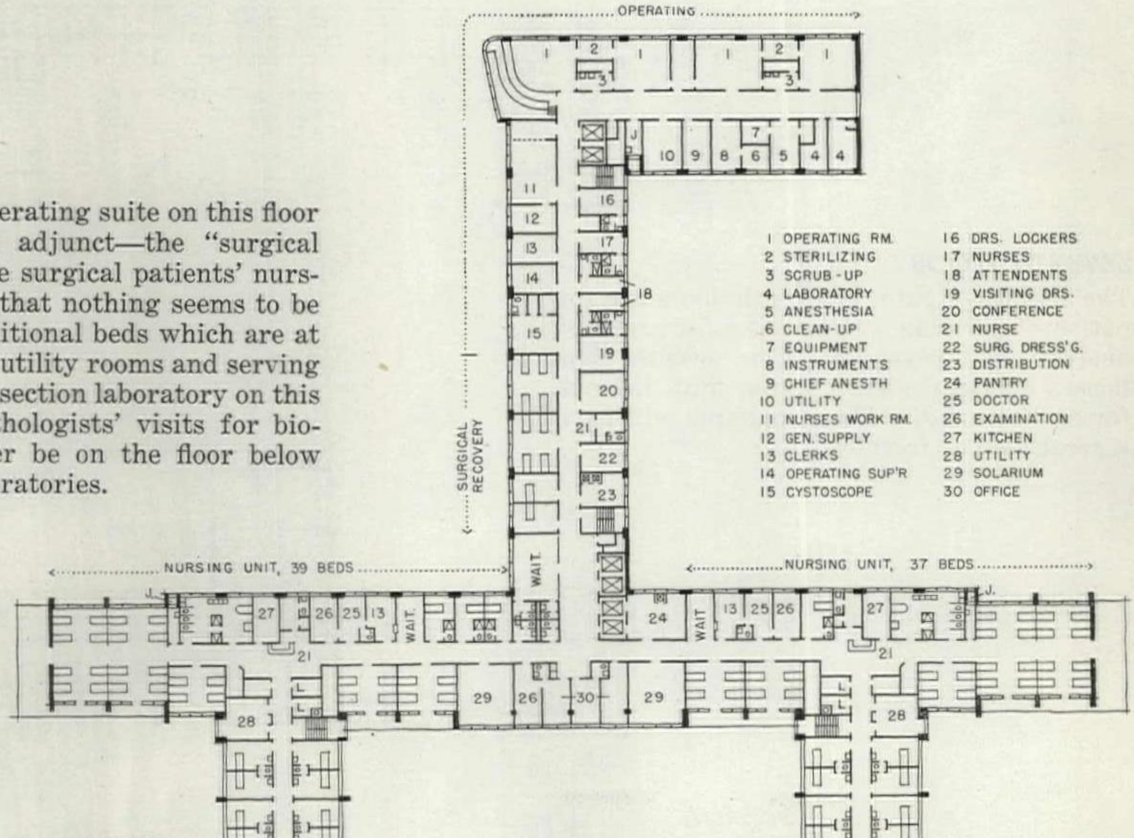
The typical nursing unit is a compact plan. The projecting wings allow easy control from a central point but inevitably result in some dark space: the utility room is not too well lighted. The arrangement of four single patients' rooms on the north seems unfortunate, but is explained by their use for incoming or very sick patients who should be isolated from the other patients. The proportion of single rooms is laudable in a "free" hospital.



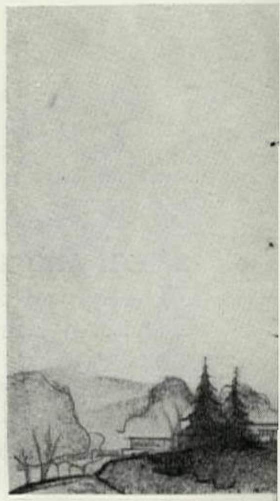

*Fifth and Sixth Floor*

## FOURTH FLOOR

The well planned operating suite on this floor has a questionable adjunct—the "surgical recovery beds." The surgical patients' nursing unit is so close that nothing seems to be gained by these additional beds which are at some distance from utility rooms and serving pantry. The frozen section laboratory on this floor, requiring pathologists' visits for bioassays, might better be on the floor below with the other laboratories.




*Fourth Floor*



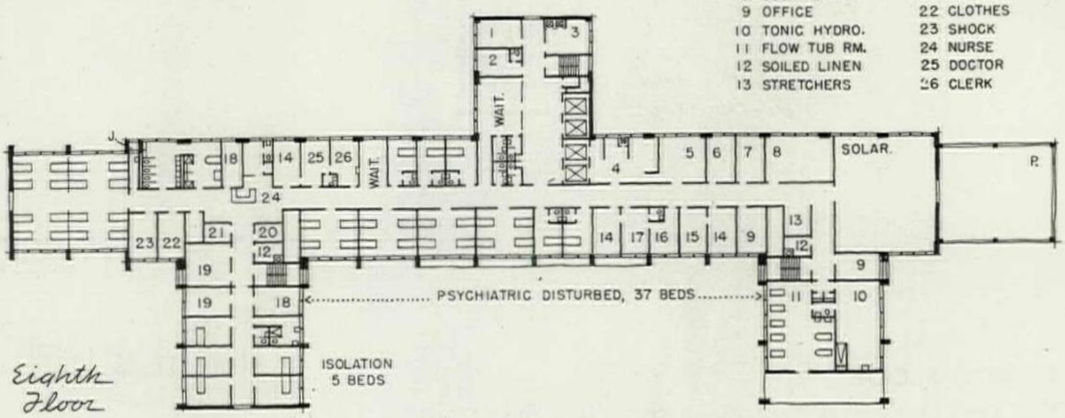
## VETERANS' HOSPITAL, WILKES-BARRE, PA.

KELLY & GRUZEN, ISADORE ROSENFIELD, Architects-Engineers

### EIGHTH FLOOR

Treatment facilities for the disturbed psychiatric patients include continuous flow baths and pack tables in the hydrotherapy department. There will be protection devices on this floor, such as psychiatric screening at the windows.

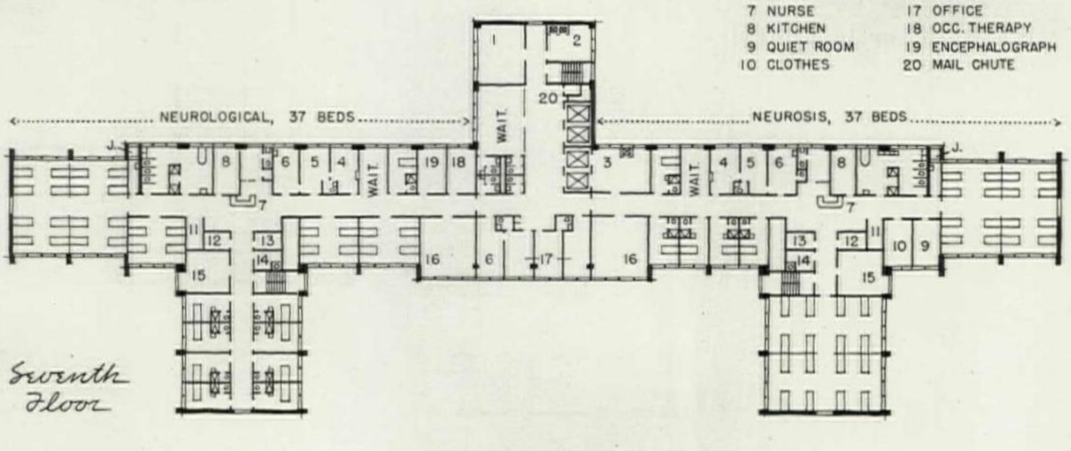
1 SOCIAL SERVICE
2 FLOOR SUP'R.
3 DISTRIBUTION
4 SERVING KITCHEN
5 CAFETERIA
6 CHIEF NURSE
7 RECORDS
8 OCC. THERAPY
9 OFFICE
10 TONIC HYDRO.
11 FLOW TUB RM.
12 SOILED LINEN
13 STRETCHERS
14 EXAMINATION
15 PSYCHOLOGIST
16 SECRETARY
17 PSYCHIATRIST
18 KITCHEN
19 UTILITY
20 CLEAN LINEN
21 SUPPLY
22 CLOTHES
23 SHOCK
24 NURSE
25 DOCTOR
26 CLERK

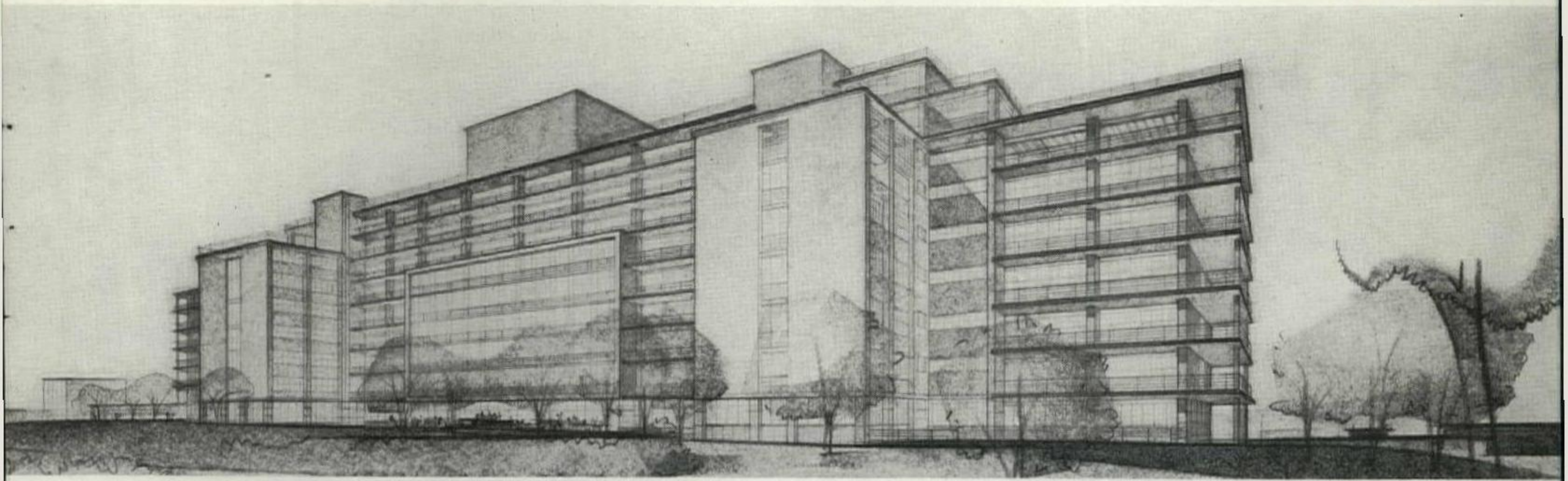



### SEVENTH FLOOR

The seventh, eighth, and ninth floors are for patients suffering from various degrees of neurosis and psychosis. The seventh floor houses a neurological nursing unit and one for early neurosis. These patients will have a great deal of freedom.

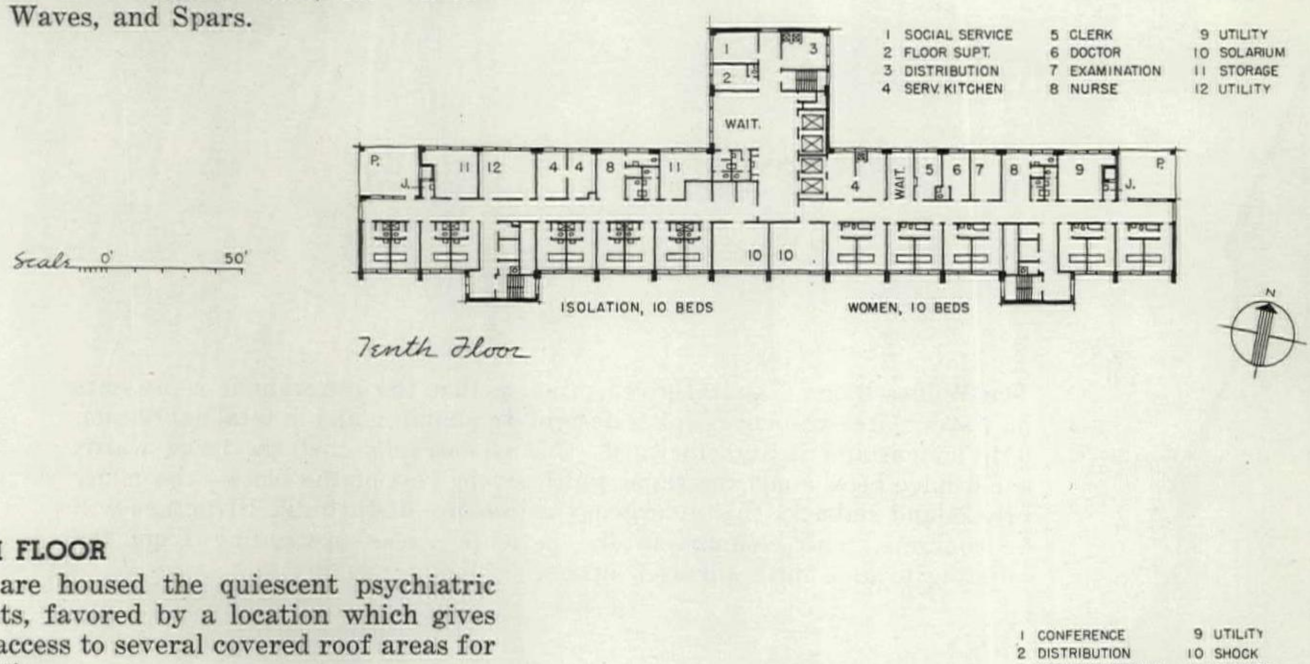
1 CONFERENCE
2 DISTRIBUTION
3 PANTRY
4 CLERK
5 DOCTOR
6 EXAMINATION
7 NURSE
8 KITCHEN
9 QUIET ROOM
10 CLOTHES
11 STRETCHERS
12 SUPPLY
13 CLEAN LINEN
14 SOILED LINEN
15 UTILITY
16 SOLARIUM
17 OFFICE
18 OCC. THERAPY
19 ENCEPHALOGRAPH
20 MAIL CHUTE





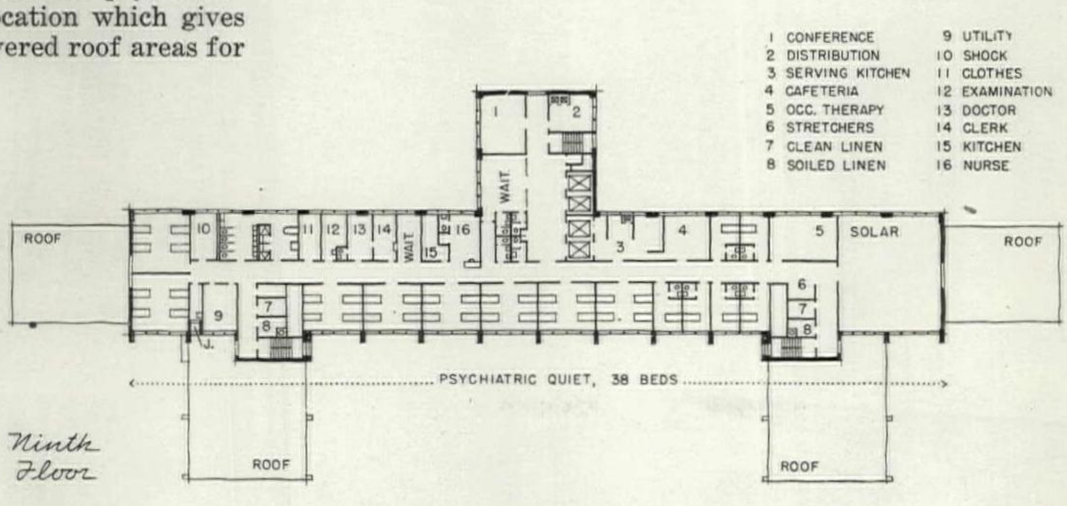
## TENTH FLOOR

Two nursing units smaller than those below occupy this floor. The west end of the floor is devoted to contagious diseases, and the east end to a women's unit, for veteran Wacs, Waves, and Spars.




## NINTH FLOOR

Here are housed the quiescent psychiatric patients, favored by a location which gives them access to several covered roof areas for recreation.

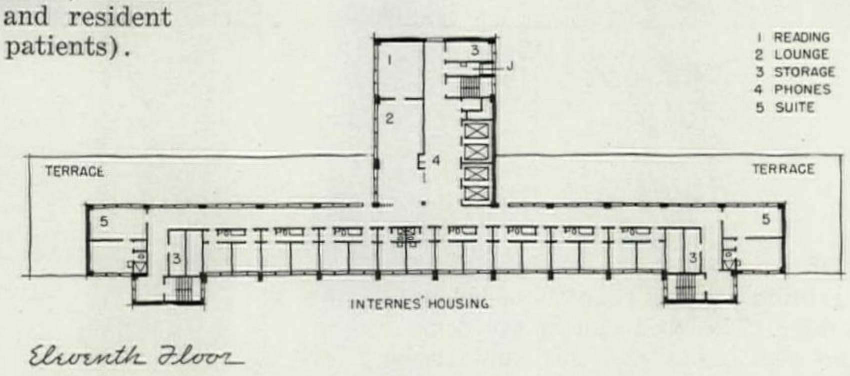


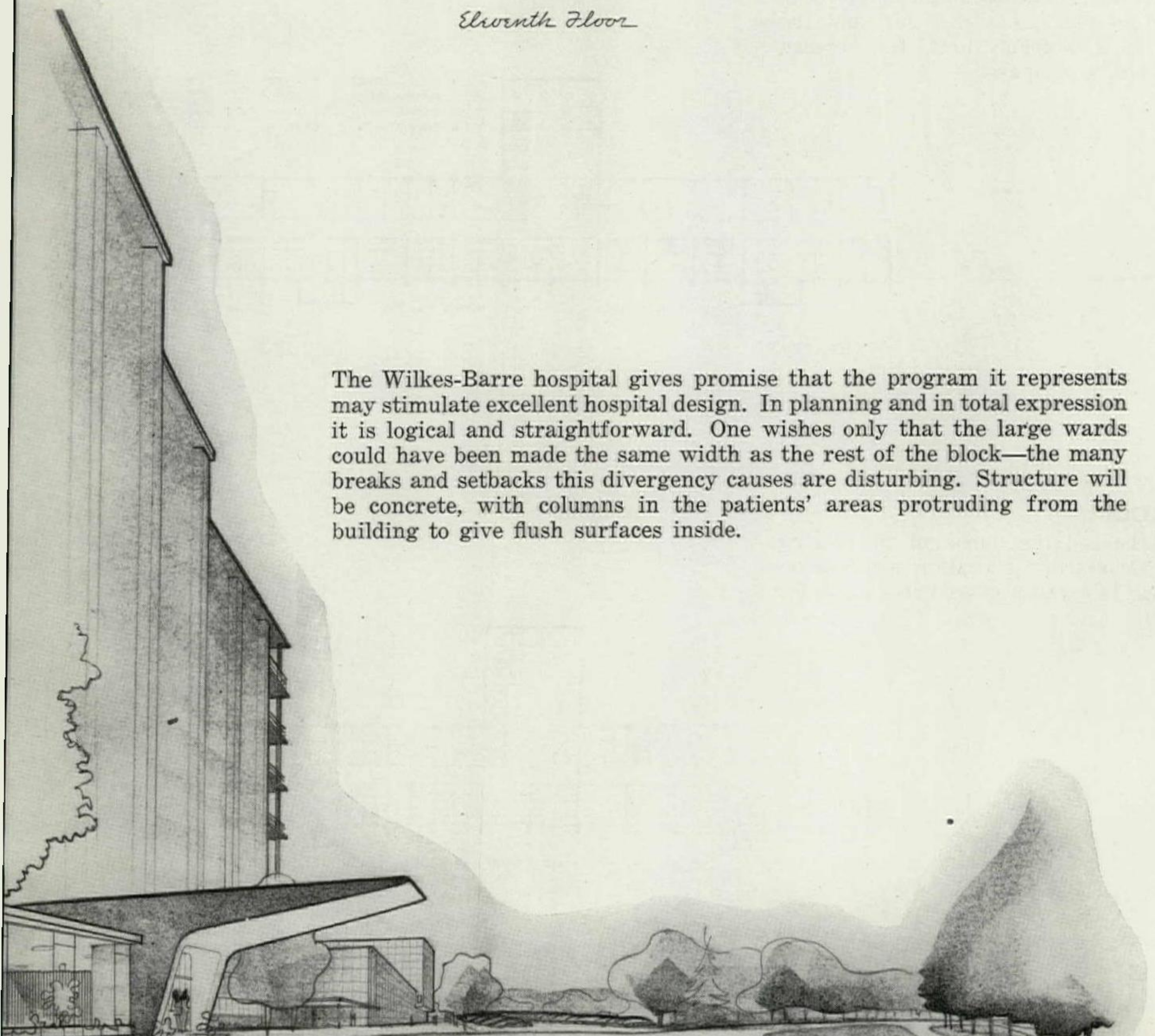
**VETERANS' HOSPITAL, WILKES-BARRE, PA.**

KELLY & GRUZEN, ISADORE ROSENFIELD, Architects-Engineers

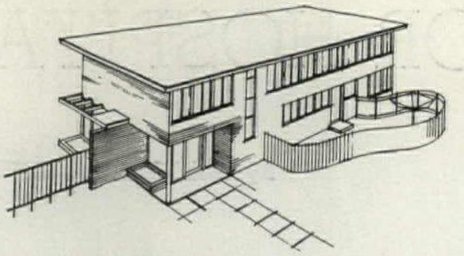
**ELEVENTH FLOOR**

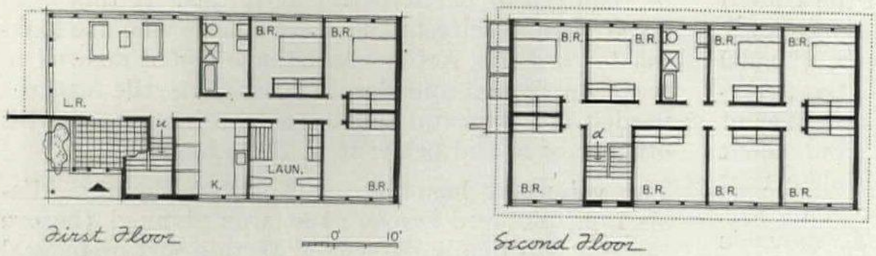
The hospital provides, on its top floor, for the housing of its large interne and resident physician staff (one to each 15 patients).



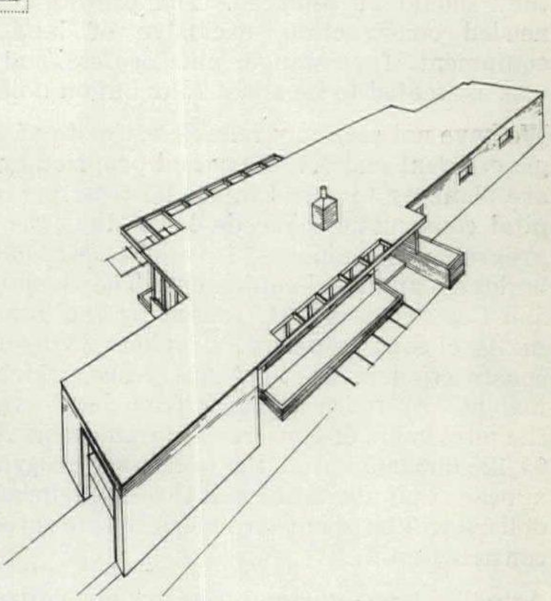



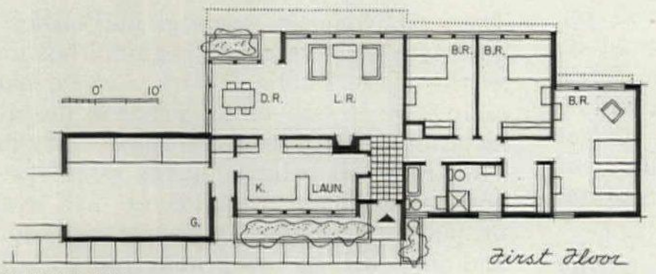
The Wilkes-Barre hospital gives promise that the program it represents may stimulate excellent hospital design. In planning and in total expression it is logical and straightforward. One wishes only that the large wards could have been made the same width as the rest of the block—the many breaks and setbacks this divergency causes are disturbing. Structure will be concrete, with columns in the patients' areas protruding from the building to give flush surfaces inside.



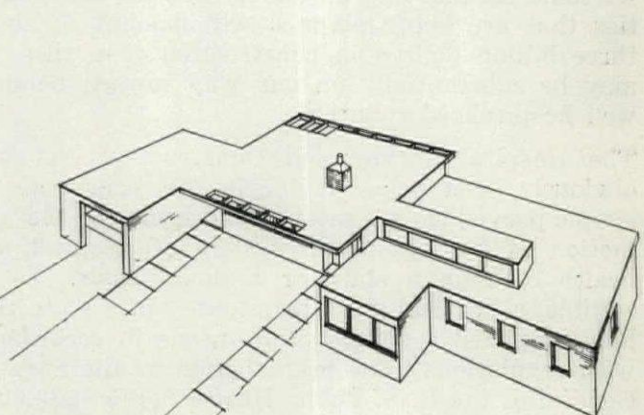



NURSES' RESIDENCE





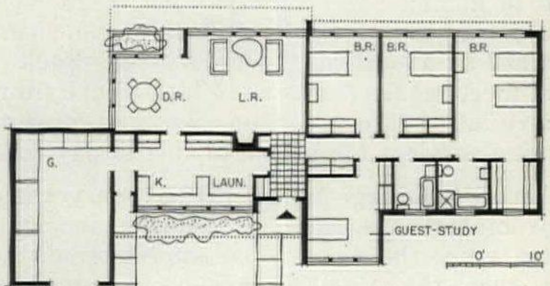

STAFF RESIDENCE



## RESIDENCE BUILDINGS

Three types of individual residences are planned, to be built north of the hospital itself, for nurses, for staff members, and for the hospital manager.

Each nurses' house will contain eleven individual bedrooms, with a bath for each pair of rooms, a large living room on the first floor, and a lounge in the pleasantest corner of the second floor. The staff houses and the manager's house have very similar plans, except that in the case of the latter an additional room, for use as a guest room or as a study, has been added. In each case the plan is a simple, workable small house arrangement. Storage has been taken care of by the provision of bins at one side of the garage.




MANAGER'S RESIDENCE

# A PROGRAM . . . . . FOR HOSPITAL ARCHITECTURE

By ISADORE ROSENFIELD

There is a great shortage of hospitals in the United States. It is estimated that in 1939 this country needed 180,000 new general hospital beds, 130,000 mental hospital beds, and 50,000 beds for the tuberculous. In addition we need an enormous number of health centers and outpatient facilities, and about half of our existing hospitals are so obsolete that they should be replaced. The prewar cost of this needed construction, exclusive of land, movable equipment, furnishings, and professional services, was estimated to be about four billion dollars.

We have not seen any reliable estimate of what local government and voluntary and proprietary hospitals are planning to spend in the postwar period on hospital construction. We do know that the veterans' program will amount to about $612,000,000 for buildings and fixed equipment. The Hospital Survey and Construction Act, passed by the last Congress in its closing moments, provides $375,000,000 for construction in the next five years, which must be matched by twice as much from local funds. Thus the total value of construction under this Act will be $1,125,000,000. Add the veterans' program and it appears that about one and three-quarters billions of dollars will be spent on federally sponsored hospital construction.

Actually, many communities are not entirely basing their construction programs on any outside aid. If we could assume that all the civilian hospital facilities that are being planned will amount to about three billion dollars in construction cost, then we may be substantially on our way toward being a well hospitalized country.

The Hospital Survey and Construction Act will obviously be a prime factor in this program. Its simple provisions are most encouraging for the promotion of an integrated system of hospital and health care on a state or regional basis. To be eligible, a hospital must be situated in a state that has completed a survey of its needs in accordance with regulations to be promulgated by the Surgeon General of the U. S. Public Health Service; $3,000,000 has been appropriated to assist states that need help to finance their surveys. All dealings will be through a state agency; all federal funds must be matched by a local sum twice as large. Each project must meet requirements as to lack of discrimination on account of race, creed, or color, and must provide hospital services for people unable to pay full rates.

Although the Surgeon General has not yet had time to promulgate the rules, procedures, and standards under which the Act will be administered, the very fact that the USPHS has been advocating an integrated system of hospitals would lead one to hope that being part of such a planned system will be required of participating hospitals. If this is to be so, then architects and their clients who are looking toward this Act for assistance would do well to tread slowly and consider, in their plans, the features needed in a hospital that would be integrated with others above and below it in the scheme.

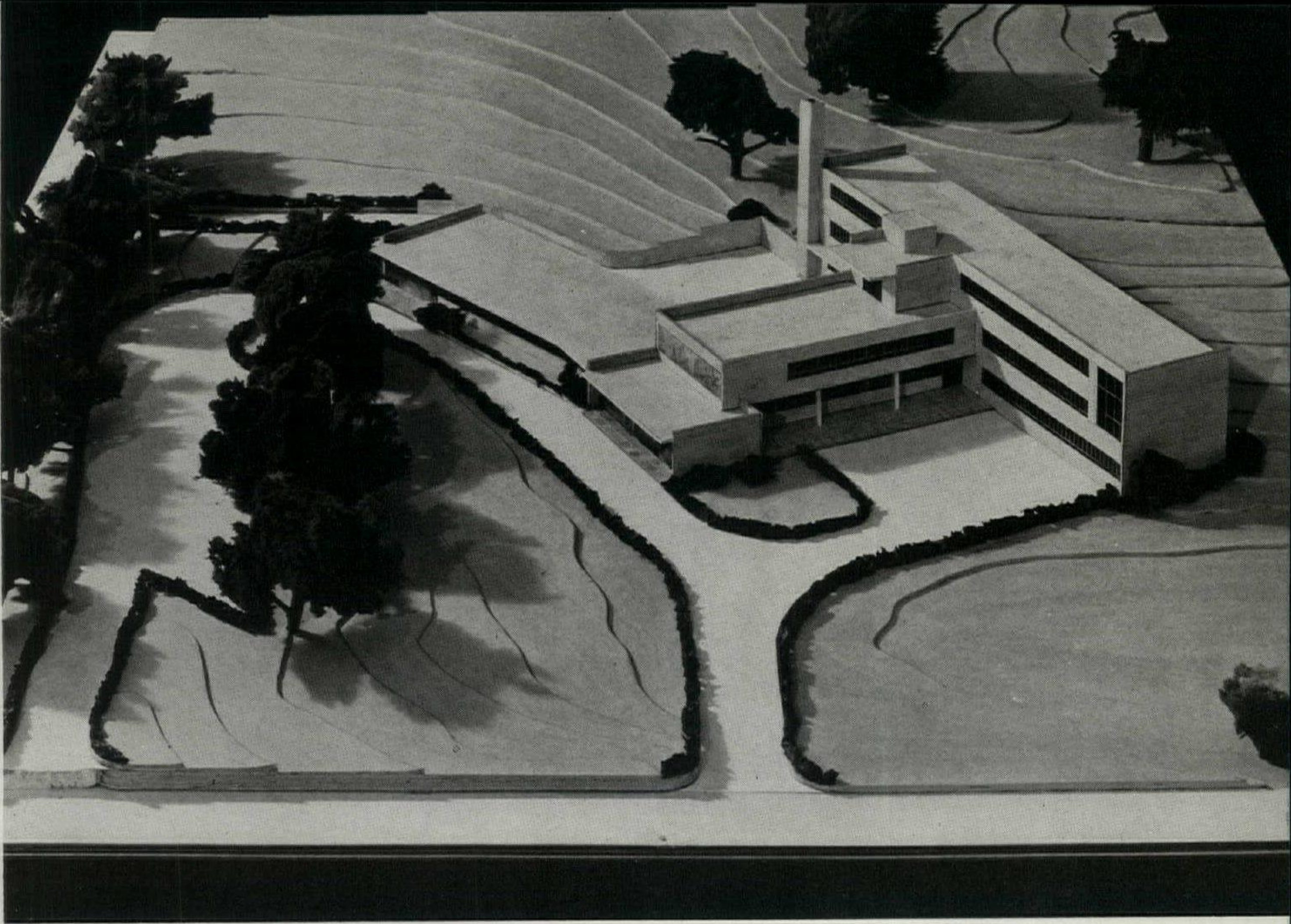
The voluntary hospital for Noxubee County, Mississippi, pictured across page, was planned (before the Act was finally passed) with this sort of federal assistance in mind. The architects made a study of the hospital needs in Noxubee County, and found that the county population of 25,000—at the rate of 4.5 beds per thousand—requires 112 beds, while existing facilities provide 25. The population is about half white, half negro. It is also known that "the arrangement and construction of existing facilities are not suitable for use in the furtherance of public health and safety."

The new Noxubee Hospital will either be a unit in an integrated system of regional hospital care, such as the U. S. Public Health Service has been advocating, or it will be an isolated hospital trying to meet its obligations to the community fighting alone. The architects believe, on the basis of a state survey now being made, that "there will eventually be a properly distributed balance of all hospital-facilities, and they will be integrated and coordinated."

If it is to be part of an integrated scheme, it will have scattered around it health centers where the more intimate home care and outpatient work of an educational, preventative, and therapeutic nature will take place. In that case, serving a population of 25,000 in Noxubee County and using the existing 25 beds, the 50 beds planned should be sufficient. That will take care of the "run-of-the-mill" cases that require hospitalization at the rate of 2½ beds per thousand of population; and will at the same time act as a clearinghouse for the more serious cases for whom there will be 1½ beds per thousand at the nearest "district" hospital and ½ bed per thousand (for the cases that require the attention of specialists) at the nearest regional or "base" hospital.

On the other hand, if Noxubee remains an isolated hospital, its 50 beds will obviously not be enough to meet needs, even in Noxubee County alone. In supplying only one-half the beds which the community needs, it would most likely have to practice discrimination as to whom it would admit and who would be condemned to do without hospital care.

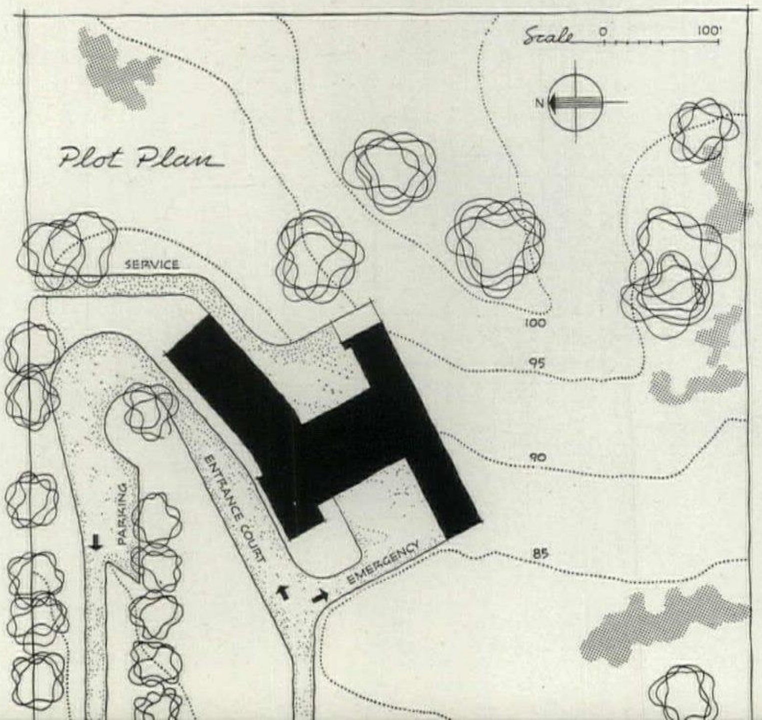
Otherwise, in its planning Noxubee has little to fear. The architects have provided a clean, modular solution, and give evidence of intelligent study of available sources. Some items which might be questioned are discussed in the following pages.



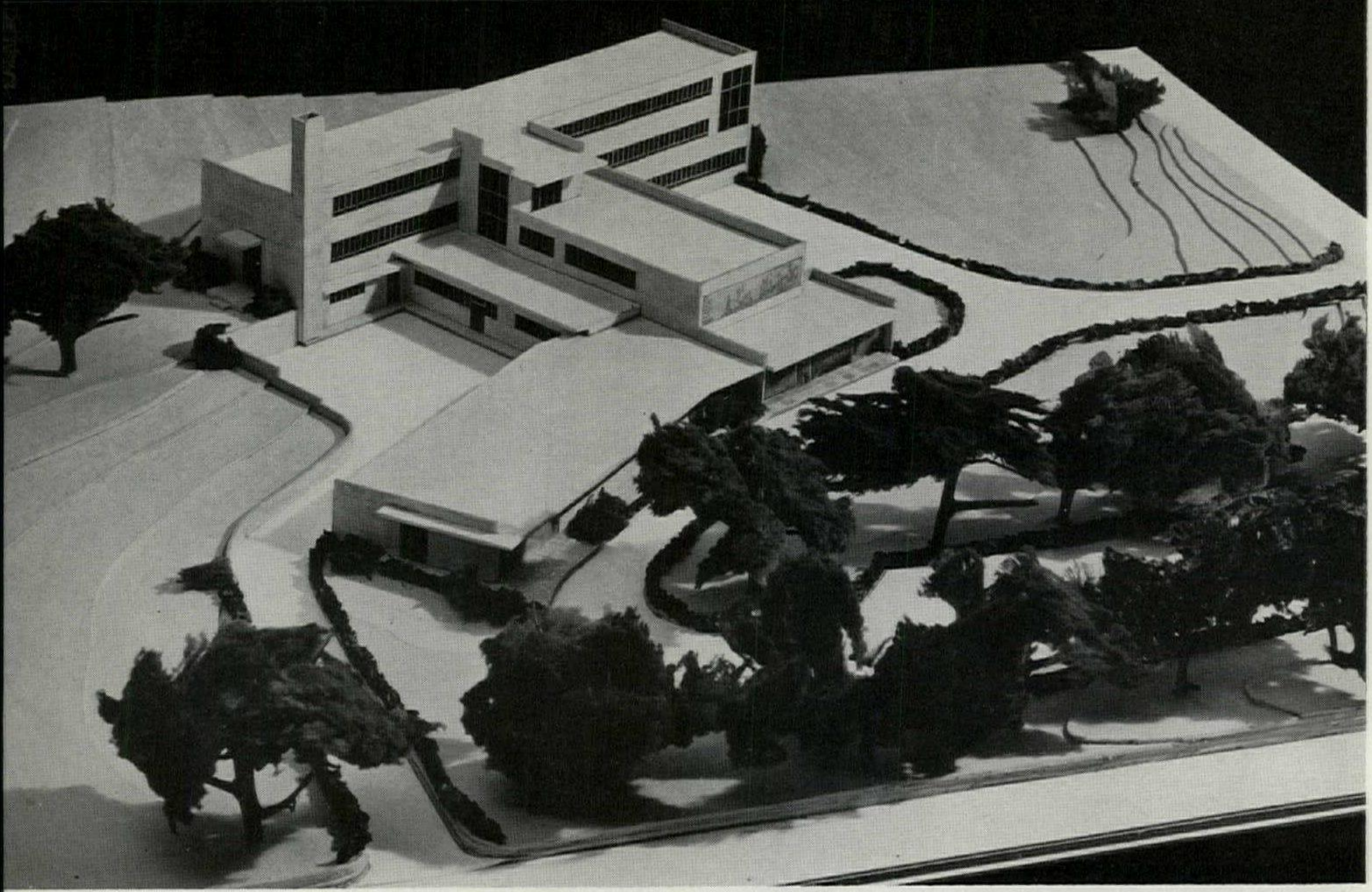
Photos of models by Hitchings

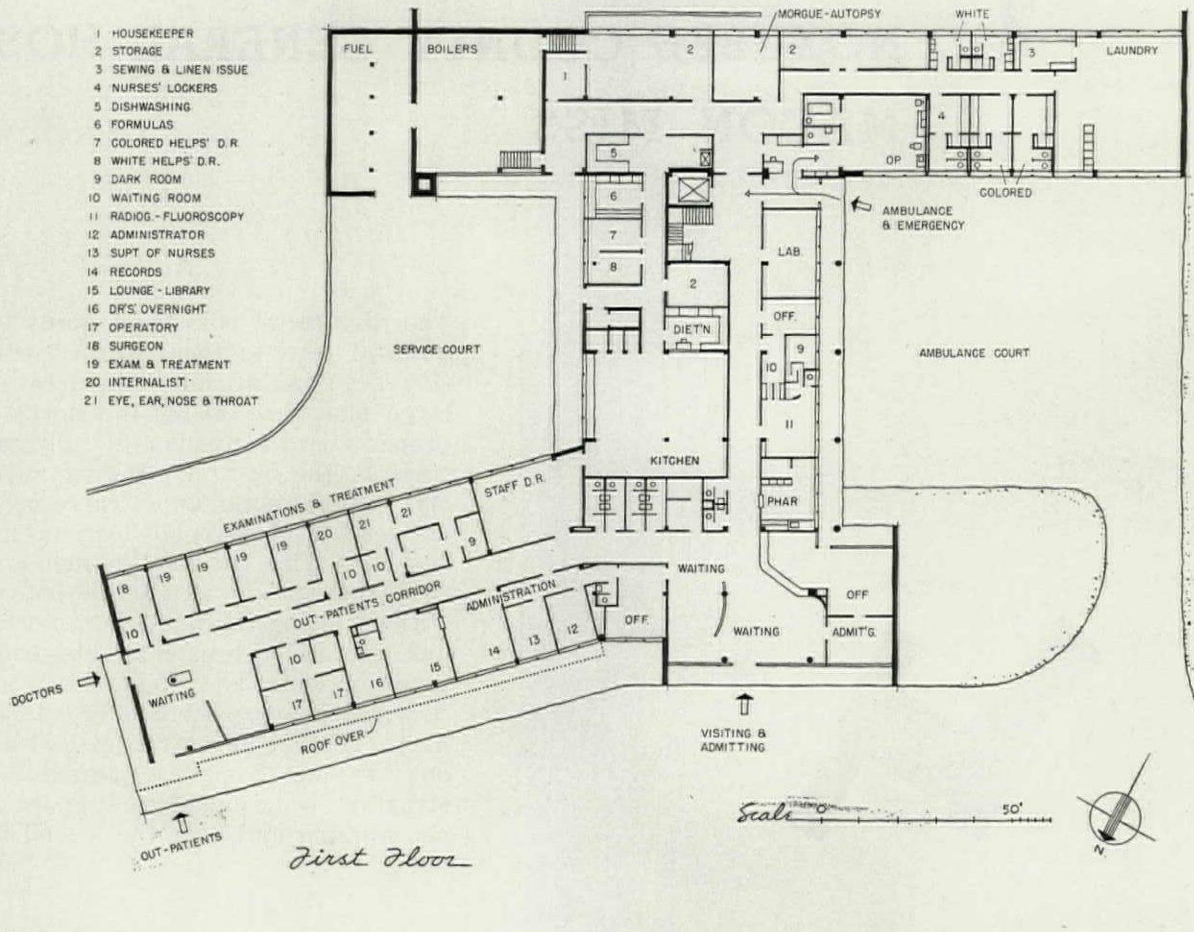
# 2 ... NOXUBEE COUNTY GENERAL HOSPITAL
## MACON, MISS.

DENT & AYDELOTT, Architects




The architects took great pains to relate the hospital plan to the natural elements of the site, even taking into consideration a line of large elm trees along the north side of the property and a number of fully mature pecan trees to the east. By taking advantage of a rise in the ground, an entrance on grade at the east end of the second floor nursing unit was possible. The patients' rooms are turned to the southeast to avoid the hot western sun without losing the temperate morning sunlight and prevailing breezes. This orientation also turns patients away from main street noises. Services and outpatient wing extend toward the north, so that all entrances and all traffic are out of view from the patients' rooms. The structure is designed to support a future 20-bed nursing unit over the second floor surgical wing.





1 HOUSEKEEPER
2 STORAGE
3 SEWING & LINEN ISSUE
4 NURSES' LOCKERS
5 DISHWASHING
6 FORMULAS
7 COLORED HELPS' D.R.
8 WHITE HELPS' D.R.
9 DARK ROOM
10 WAITING ROOM
11 RADIOG.-FLUOROSCOPY
12 ADMINISTRATOR
13 SUPT OF NURSES
14 RECORDS
15 LOUNGE - LIBRARY
16 DR'S. OVERNIGHT
17 OPERATORY
18 SURGEON
19 EXAM. & TREATMENT
20 INTERNALIST
21 EYE, EAR, NOSE & THROAT
FUEL
BOILERS
MORGUE-AUTOPSY
WHITE
LAUNDRY
OP
COLORED
AMBULANCE & EMERGENCY
LAB.
OFF.
DIET'N
SERVICE COURT
AMBULANCE COURT
KITCHEN
PHAR
EXAMINATIONS & TREATMENT
STAFF D.R.
WAITING
OUT-PATIENTS CORRIDOR
ADMINISTRATION
OFF.
OFF
ADMIT'G.
DOCTORS
ROOF OVER
VISITING & ADMITTING
OUT-PATIENTS
Scale
50'
N

First Floor

## NOXUBEE COUNTY GENERAL HOSPITAL

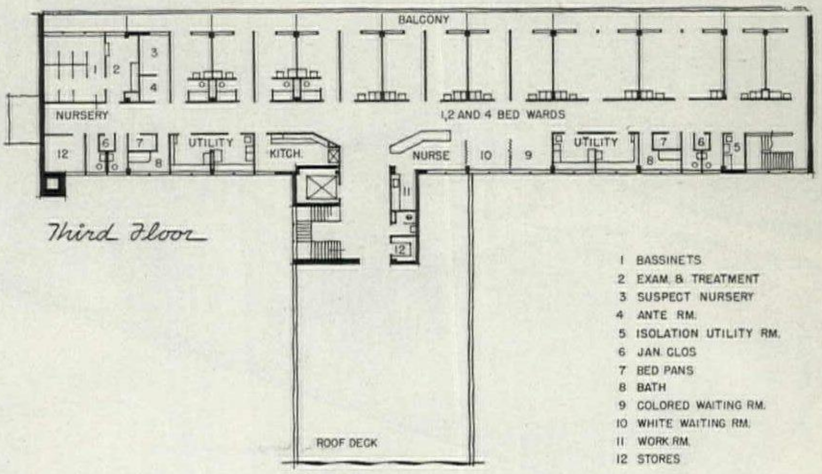
DENT & AYDELOTT, Architects

On the first floor (opposite page) the inviting main entrance leads through a narrowing corridor to the elevator and stair serving the nursing units above. Food preparation spaces are well isolated at one side of the central block, and the outpatient department occupies a separate one-story wing thoughtfully related to administration and record offices. The number of individual entrances to the building might be questioned; particularly the separate one for doctors. Modern practice would even make it unnecessary to have a separate outpatients' entrance, so closely related are the treatments of those patients who are in bed and those who are able to call on foot.

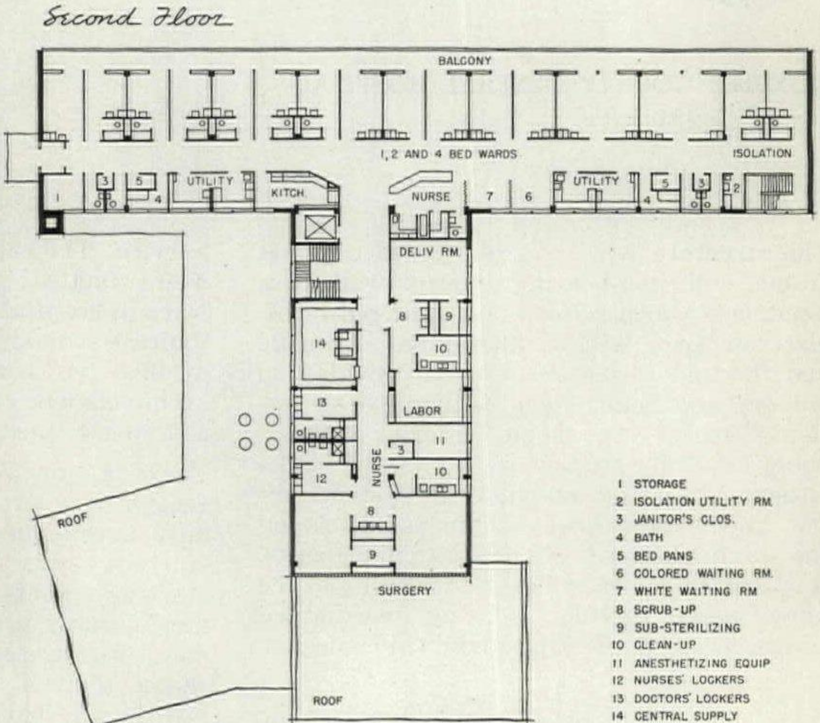
On the second floor, surgical and medical patients occupy the nursing unit, with surgical and obstetrical suites in the north wing. There is economy in this layout, although ideally the delivery suite should be on the maternity floor. All patients' rooms have desirable orientation; a cheerful expanse of glass is indicated, well protected by a continuous balcony; service rooms, nurses' station, and visiting space are conveniently located. In the surgical wing a central supply room serves delivery and operating rooms, and is well located for service to the nursing units.

The maternity division is located on the third floor. Again patients' rooms are well placed and have the use of a continuous balcony. At the east end of the floor, past the line of general traffic, an adequate nursery suite is planned with cubicle separations in the main room, an adjacent preparation room, and a suspect nursery for isolation cases. On this floor the corridor gives access to the roof deck over the north wing, which may be used as a solarium.

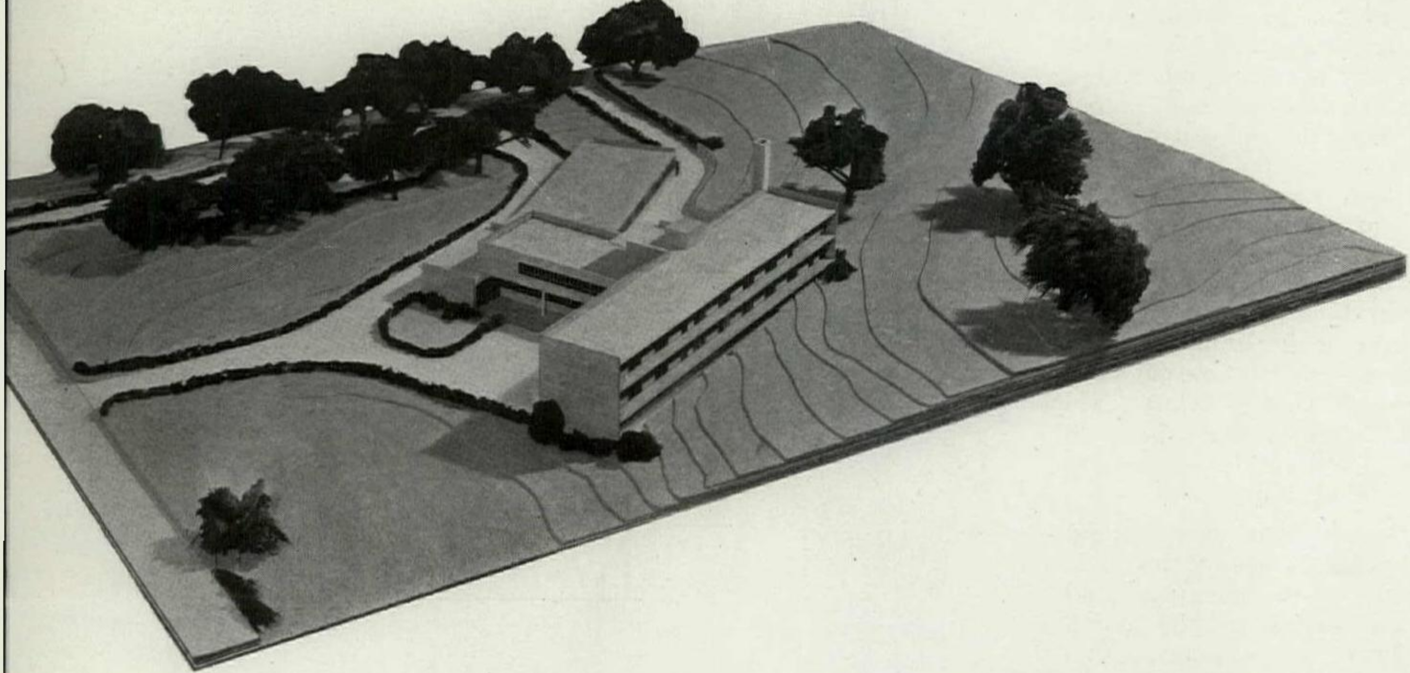
Horizontal and vertical circulation within the building has been carefully studied, and there is little to criticize in the planning. Influence of the USPHS standards is evident.




1 BASSINETS
2 EXAM. & TREATMENT
3 SUSPECT NURSERY
4 ANTE RM.
5 ISOLATION UTILITY RM.
6 JAN. CLOS
7 BED PANS
8 BATH
9 COLORED WAITING RM.
10 WHITE WAITING RM.
11 WORK RM.
12 STORES




1 STORAGE
2 ISOLATION UTILITY RM.
3 JANITOR'S CLOS.
4 BATH
5 BED PANS
6 COLORED WAITING RM.
7 WHITE WAITING RM
8 SCRUB-UP
9 SUB-STERILIZING
10 CLEAN-UP
11 ANESTHETIZING EQUIP
12 NURSES' LOCKERS
13 DOCTORS' LOCKERS
14 CENTRAL SUPPLY



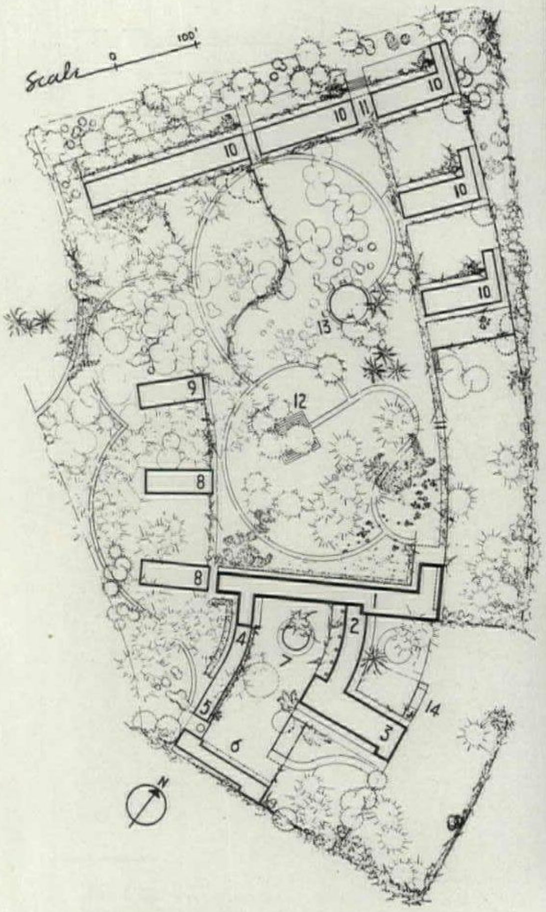
**NOXUBEE COUNTY GENERAL HOSPITAL**

DENT & AYDELOTT, Architects

The structure will be a reinforced concrete frame, with non-bearing exterior walls of a handmade warm salmon and light red brick. Exterior trim will be aluminum. Acoustic and thermal insulation will be provided on laundry and boiler room ceilings where patients' spaces are above. Interior color is being carefully studied for its effect on the patients. Heating and lighting systems are still undetermined, but emphasis will be on the elimination of all dust-catching units. A system of sound baffles in the ceiling of the nursery unit corridor is being investigated as a means of preventing sound transmission.

Noxubee is one of the most intelligent of the many translations that are being made of the prototype plans prepared by the Hospital Facilities Division of the U. S. Public Health Service. The value of these studies cannot be overestimated; they mark a long step forward in hospital planning in this country and indicate a final rapprochement between the medical people who know the needs and the architects who can translate those needs into a properly functioning building.

There is, however, one danger that must be recognized; in some instances, through a misunderstanding, the documents are considered rigid, invariable rules instead of starting points from which, in capable hands, many proper solutions may result in many regions, on many sites. It would be a shame if such useful tools should make us lose the originality and the freshness evident, for instance, in the Haifa hospital that follows, designed without benefit of the USPHS studies.




1 MAIN HOSPITAL
2 BRIDGE
3 OUT-PATIENTS DEPT. & OPERATING THEATRES
4 SERVICES
5 CHAPEL
6 GARAGES AND HELPS' QUARTERS
7 CISTERN
8 NURSES' QUARTERS
9 DOCTORS' QUARTERS
10 FEVER PAVILIONS
11 PERGOLA
12 AN ANCIENT PYRAMID
13 POOL
14 CARETAKER'S LODGE

# 3 ... GENERAL HOSPITAL HAIFA, PALESTINE

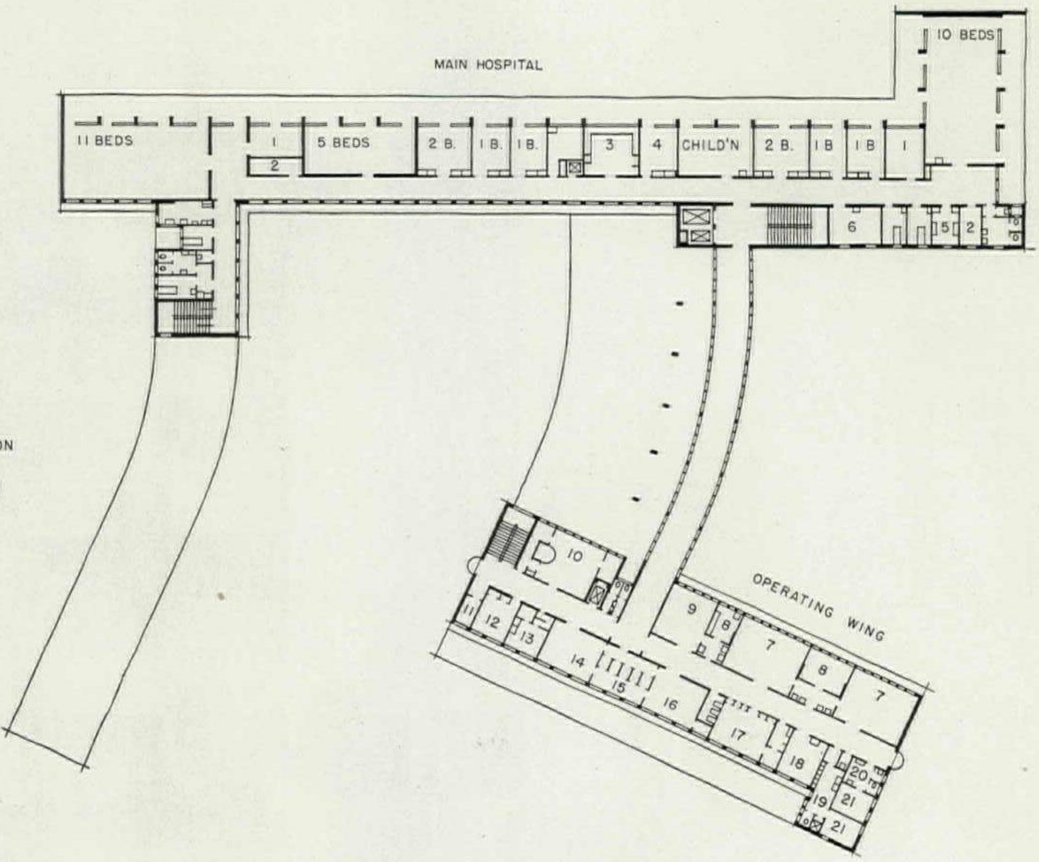
ERIC MENDELSOHN, Architect

This government hospital group, built in 1937, consists of several blocks connected by covered walks. Following the curve of the seashore, it houses, in all, 220 patients, 35 attendants, and 65 staff members. It arrives at a contemporary solution with unusual sureness and sense of proportion, adapting itself to local conditions and a beautiful site. Some planning elements that seem wrong to us, with our present knowledge of hospital routines, may be traced to the fact that the program follows policy laid down by the British Colonial Office. For instance, there is strict segregation of the white people (English citizens and army personnel) from the natives; a policy which does not seem to be producing amity in Haifa at the moment. Yet we feel that the openness of the plan and the simplicity of the scheme are refreshing and stimulating after many antiseptic translations of aseptic standards.

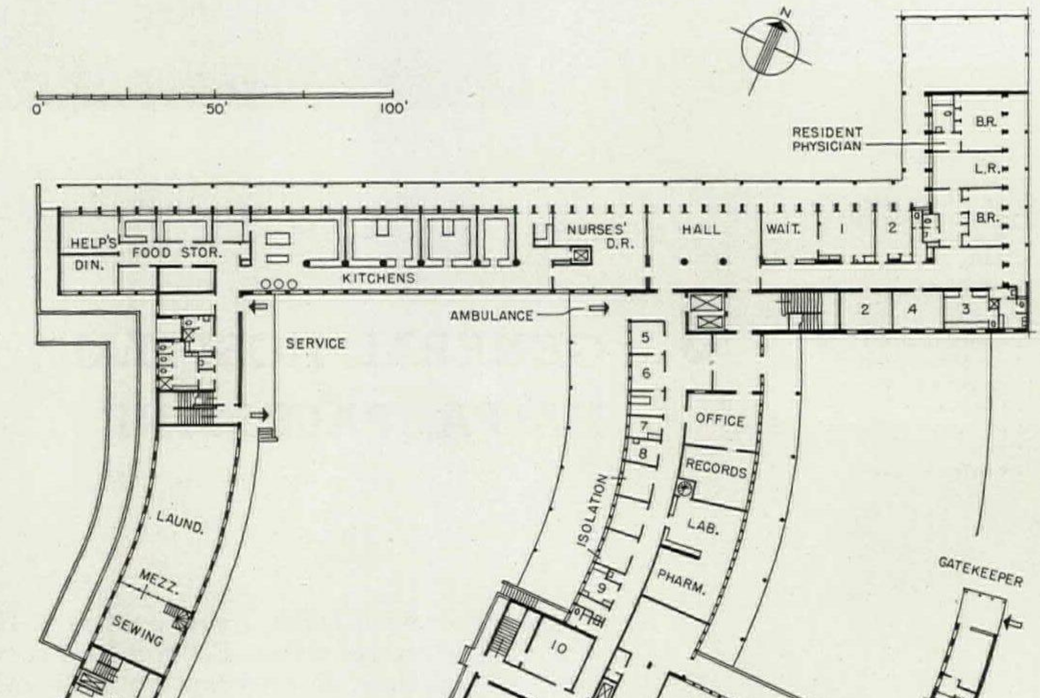
## GENERAL HOSPITAL, HAIFA, PALESTINE

ERIC MENDELSOHN, Architect

1 DAY ROOM
2 LINEN
3 SERVICE KITCHEN
4 DUTY ROOM
5 SINK ROOM
6 ISOLATION
7 OPERATING ROOM
8 STERILIZING
9 SEPTIC OPERATIONS
10 CONFERENCE ROOM
11 RECORDS
12 VIEWING ROOM
13 DARK ROOM
14 RADIOGRAPHY
15 CONTROL ROOM
16 FLUOROSCOPY ROOM
17 AUTOCLAVE PREPARATION
18 ANAESTHESIA
19 SURGEON'S WASH ROOM
20 NURSES' WASH ROOM
21 REST ROOM



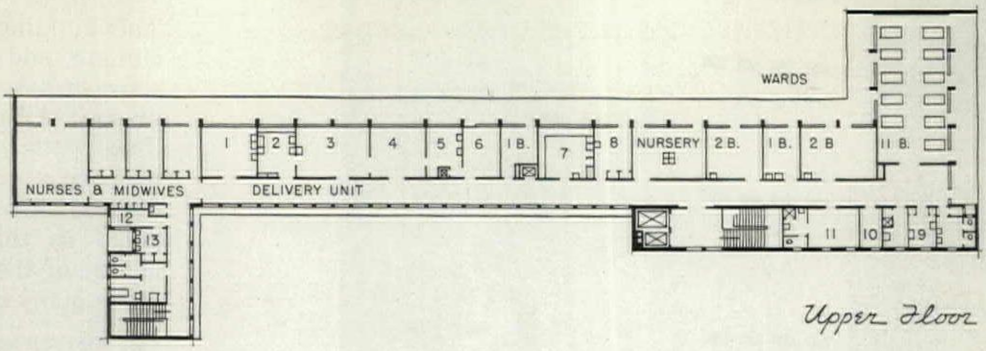

*First Floor*




1 SURGEON
2 MATRON
3 LOCKER ROOM
4 MEDICAL OFFICER
5 FIRST AID
6 EXAMINATION
7 CLOTHING
8 NURSE
9 SINKS
10 OPHTHALMOLOGY
11 SURGEON DRESSING
12 CONSULTATION
13 GYNECOLOGY
14 RECOVERY ROOM
15 MINOR SURGERY
16 RITUAL PREPARATION

*Ground Floor*

1 SEPTIC DELIVERY ROOM
2 STERILIZERS
3 DELIVERY ROOM
4 LABOR ROOM
5 PREPARATION
6 WAITING ROOM
7 SERVICE KITCHEN
8 DUTY ROOM
9 SINKS
10 STORE ROOM
11 ISOLATION
12 TRUNKS
13 ABLUTION

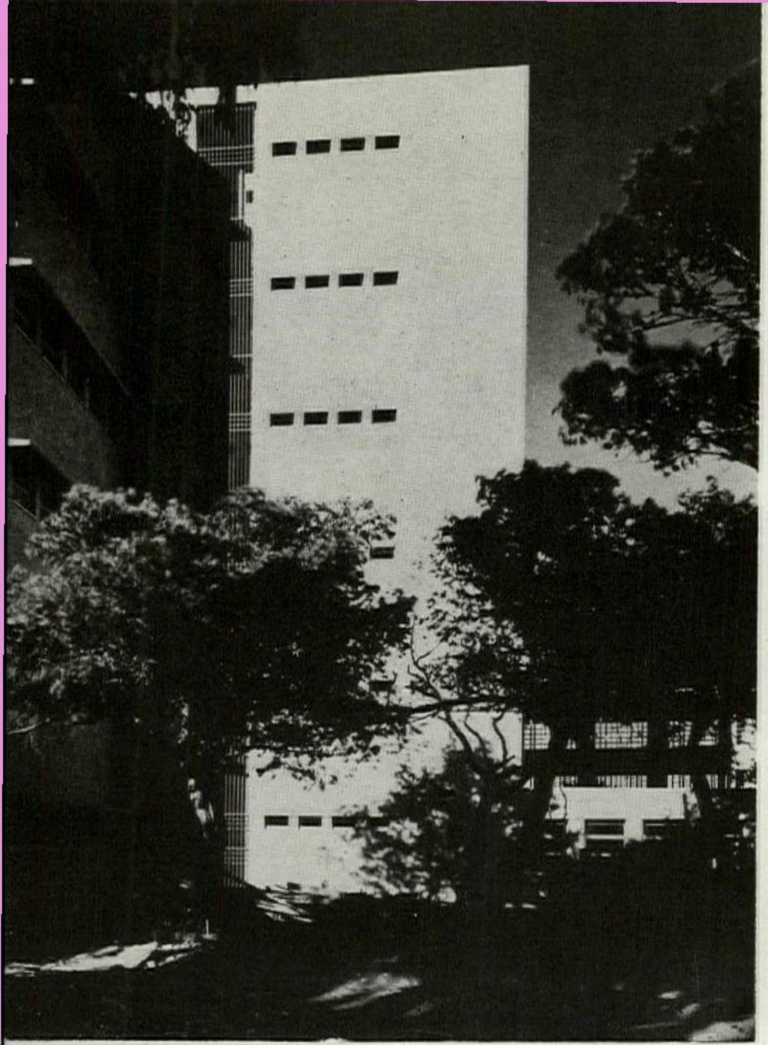



*Upper Floor*

On the ground floor, the outpatient department, facing due north to avoid the low, hot rays of the sun, is separated from the main hospital by a wing containing the admitting and emergency rooms. By our standards the outpatient "hall" would be large and unnecessarily isolated from treatment rooms; the size of this space, and the separation of O.P.D. from the hospital are explained by the fact that O.P.D. facilities are for natives. This also necessitated a wall between the space where natives wait and the treatment rooms where white doctors officiate.

On the first floor, the operating and X-ray suites occupy the southern block, above the outpatient department, connected by a passage to the surgical patients' rooms. All bedrooms have desirable northwest exposure. Nine-foot-wide terrace balconies along the wards act as sunshades and allow patients to be wheeled out from their rooms. Above the first floor, typical units are repeated.

On the fifth floor, the main hospital block is devoted to maternity; delivery rooms, nursery, and maternity wards are on this floor. (The maternity section is a purely "white" facility.) While modern aseptic techniques seem to be violated in the placing of delivery and labor rooms and a group nursery on a corridor, the architect points out that the corridor is an internal one, and has no through traffic.



LOOKING TOWARD THE MAIN HOSPITAL BLOCK from the west. The small windows are to service rooms off the ward floors; the grille encloses an open pipe shaft which also acts as a light well for several toilets.

This building, though well related to site and climate, and a pleasure to look at, still falls short of being a well planned hospital by our present standards. It is no secret, of course, that, while we ourselves have a great deal to learn about hospital planning, such planning outside of the U. S. has been notoriously poor. In this instance, the discriminatory nature of the program forced the architect to make many compromises with good practice.

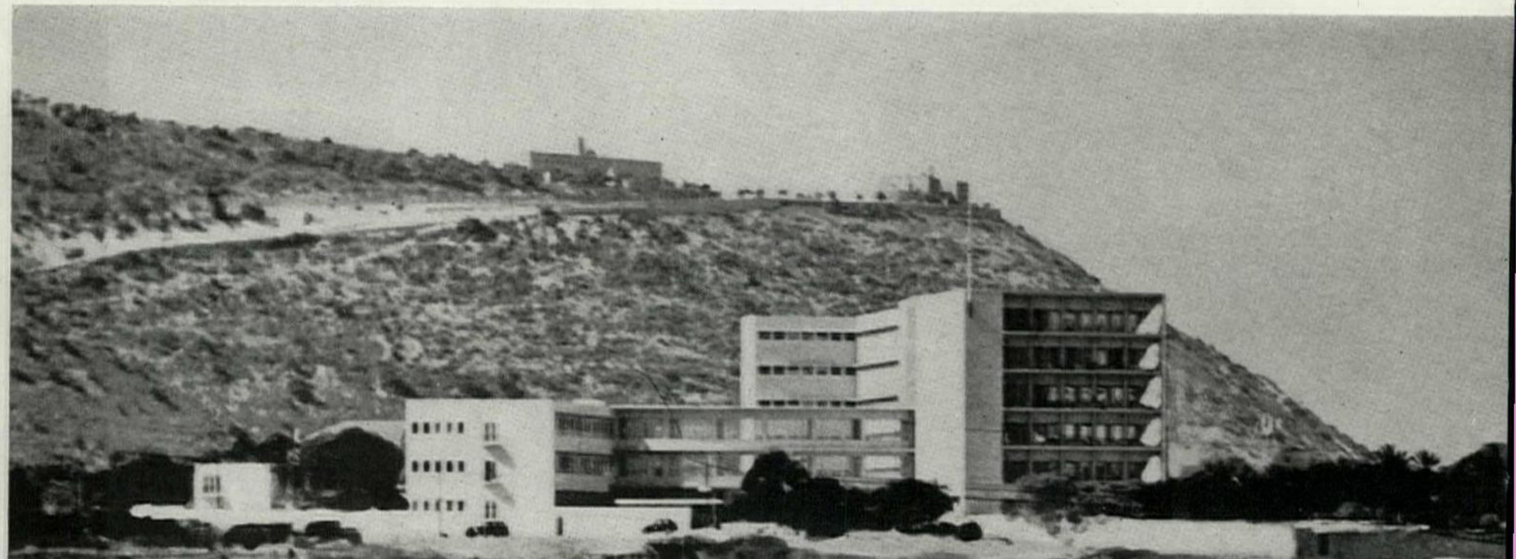
For instance, segregation required that the O.P.D. X-Ray-Operating block be pulled away from the main building. Obviously, it would have been better functionally if this block were placed perpendicular to the main building, thus shortening the line of travel and reducing the hazard involved in long post-operative transportation.

The maternity delivery section would normally have been placed over the operating department and the nursery and the children's ward on the first floor at some end position.

The ten- and eleven-bed perimeter wards are remnants of the traditionally English "pavilion type." A Rigs-type ward would have been more appropriate in a region characterized by very bright sunlight.

An architect must always work within a given program and within limitations imposed on him by the client. Criticism of this hospital becomes largely criticism of the program, rather than the solution.

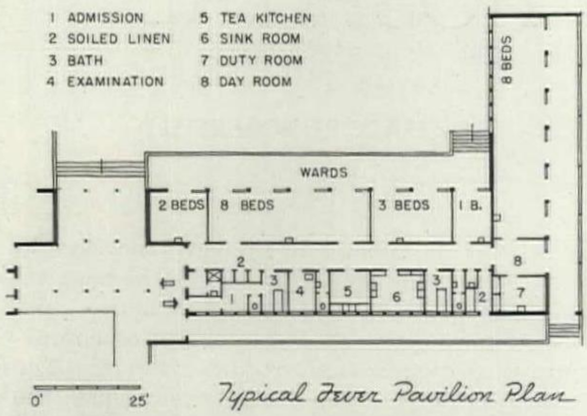
**Comment by ISADORE ROSENFIELD**



MAIN HOSPITAL BLOCK

**GENERAL HOSPITAL    HAIFA, PALESTINE**

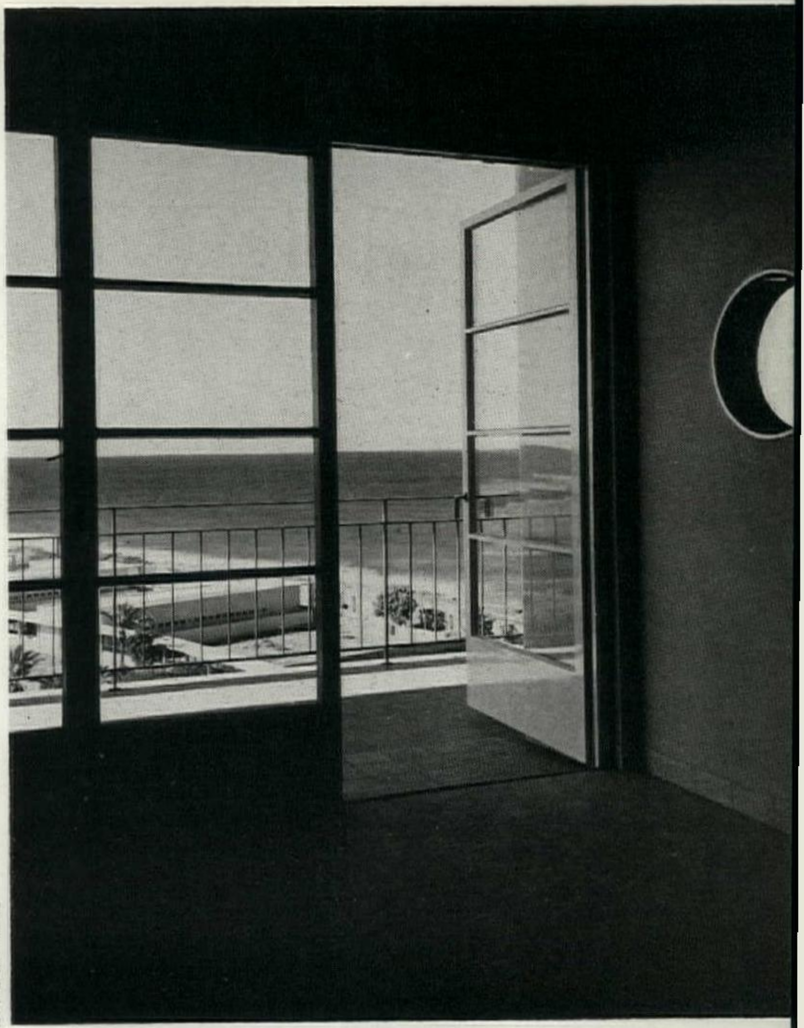
ERIC MENDELSOHN, Architect




*Typical Fever Pavilion Plan*

**All patients' rooms face toward the desirable exposure; all services are across the corridor. Covered terraces run continuously along all ward spaces.**

Five isolation buildings—"fever pavilions"—are situated west of the main hospital building, connected to it by a covered walk for the use of doctors and nurses and the delivery of food. The isolation group has its own amphitheater. A total of 90 isolation cases can be cared for, including criminal patients, in one of the pavilions.



*Alfred Bernheim*

**FEVER PAVILIONS**, seen from a ward in the main building.

**FEVER PAVILIONS**

# THE TUBERCULOSIS HOSPITAL

By ISADORE ROSENFIELD

**PROGRESSIVE ARCHITECTURE presents, beginning on the next page, plans for a 100-bed tuberculosis hospital. Architectural criticism involves in this case more than esthetics and circulation. In his comment below, Mr. Rosenfield takes a vigorous stand against tuberculosis hospitals so small, and his point of view has other adherents. On the opposite page, the USPHS presents its reasons for preparing plans for a hospital of this size.**

**The discussion is one into which will be drawn many an architect with a commission or the hopes of a commission. We feel that it is necessary for those progressive designers who look beyond the drawing board to be familiar with the issues and the arguments in a socio-economic planning question of this sort. Hence we present both sides of the matter, in addition to an admirable solution of a given problem.**

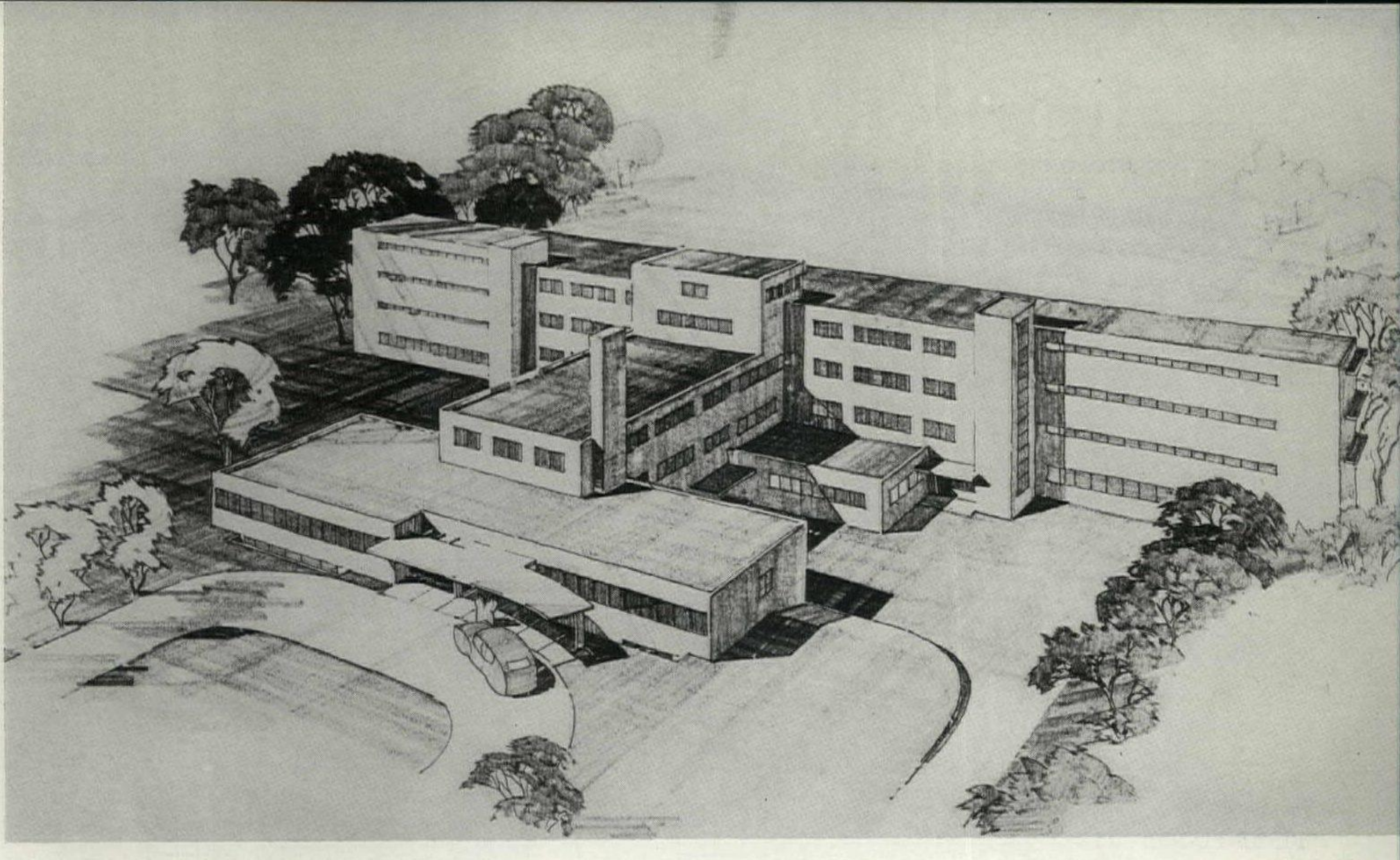
In the early days of understanding tuberculosis, the treatment consisted largely of aiding nature to overcome the disease; as knowledge of tuberculosis increased, the methods of diagnosis and treatment became more and more complex. The early institutions were country sanatoria; next came a movement toward establishing tuberculosis wards in general hospitals; today progressive communities erect tuberculosis hospitals in or near the larger city centers, or in wholly separate buildings with independent medical boards as part of existing general hospitals. Many features mark the modern tuberculosis hospital. Screens dividing bed groups are full partitions going to the ceiling; ward ceilings are acoustically treated. On every ward floor there is a suite of rooms known as the pneumothorax suite, consisting of a pair of treatment rooms with a fluoroscopy room between. Sputum technique requires flushing-rim dental bowls in the bathing and toilet sections, as well as a sputum disposal incinerator in the basement. Other peculiar requirements occur in the operating department, the laboratories, and the X-ray, dietary, recreation, and outpatient departments.

The USPHS tuberculosis hospital, beginning on the facing page, seems to fulfill all the requirements of a good design except in one very important particular —size. In my opinion, "there ought to be a law" against 100-bed tuberculosis hospitals. The Puerto Ricans have a law against governmental hospitals of less than 300 beds. In the State of New York the law provides that if a county does not have a sufficient population to sustain a tuberculosis hospital several such counties may combine and have the state build and operate one for them.

Everyone who is a student of this problem knows that, other things being equal, the larger the hospital the more economical is cost of construction and operation, the more possible is attraction of competent technical personnel and medical talent. The USPHS knows these facts even better than the writer does. Despite their statements to the contrary, there is the danger that they may be interpreted as saying that a 100-bed unit is the proper size; there is danger that the country may be dotted with 100-bed hospitals which will be poverty-stricken and medically inefficient. Or should their action be explained as a defeatist assumption that it is better to have many small, admittedly inefficient hospitals than none at all?

From a functional point of view, the plans presented are almost perfect. One might question only a few minor items. For example, while it is of course laudable to place "patient activities" on a level with the grounds, it does not seem wise to bring patients to the basement, where they will be bound to encounter the rough movement to be expected there. In a larger hospital, this can be avoided. Then I feel sure that the main lobby on the first floor will prove too small during visiting hours. Visitors to a tuberculosis institution must be studiously encouraged, as patients who don't receive visitors are apt to leave because of boredom before completing their course of treatment, which averages about nine months. The series of spaces marked "storage area" in the basement does not distinguish between "stores"—new goods and supplies under the steward's care before they are issued to any department —and "storage space," where each department may keep apparatus, goods, etc., after they have been issued. Finally, it would seem that the corridor in the rear wing on each floor is too narrow; it should be at least as wide as the nursing unit corridors. In the basement laundry trucks will be going back and forth; on the first floor stretchers will go to the X-ray room; on the second floor stretchers will be needed for the pneumothorax facilities and the operating room.

Some may regard the architecture of the USPHS as perhaps a bit on the frigid side, but to me the clean order and strict adherence to a module are as stirring as a Bach symphony. We also know that this spells economy of construction if it is carried through into working drawings.



# 4 .... 100-BED TUBERCULOSIS HOSPITAL

HOSPITAL FACILITIES DIVISION, U. S. Public Health Service

**The 100-bed tuberculosis hospital here pictured was designed by the Hospital Facilities Division of the U. S. Public Health Service, at the request of the Tuberculosis Control Division of that agency. The design, and the statement below, have been approved by the American Trudeau Society, Medical Section of the Committee on Sanatorium Planning and Construction. Extensive data were collected through personal visits to sanatoriums and reviews of earlier plans by authorities in the fields of medicine, surgery, and administration. The designers point out that the design presented here should be considered as an illustration to meet general requirements and not as a proposal of any specific project.**

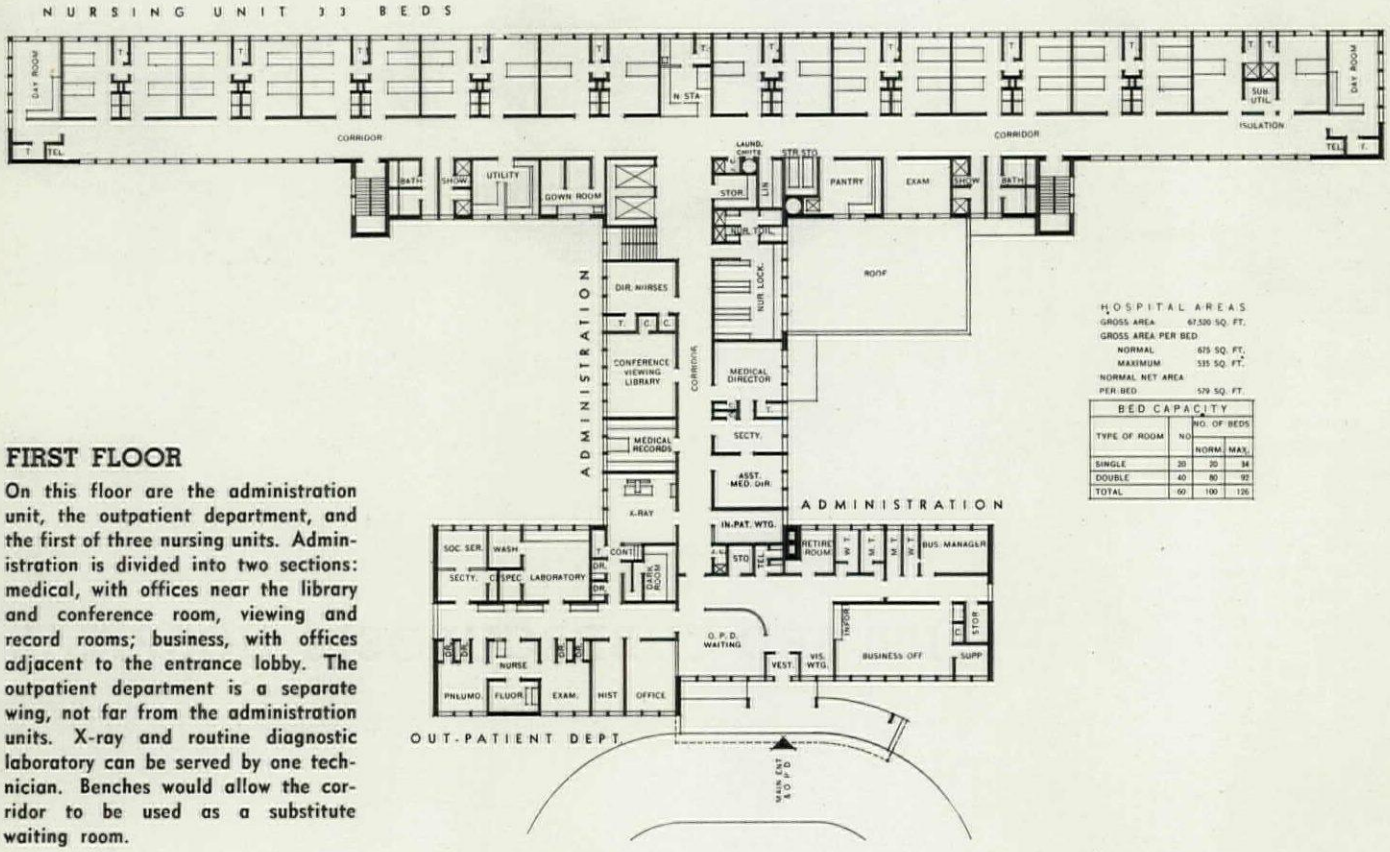
The Tuberculosis Control Division recommends tuberculosis hospitals of at least 200 beds, but there have been so many requests for 100-bed units that they have requested the Hospital Facilities Division to prepare plans for such a 100-bed unit to meet this need. The Tuberculosis Control Division and the Hospital Facilities Division have 200- and 400-bed plans in the process of preparation which will be recommended for most conditions. If modern techniques requiring surgical facilities and auxiliary methods of treatment are to be included, it would seem that the 100-bed hospital is too small to be economically sound. However, there are many exceptions to this general rule; in numerous areas the small tuberculosis hospital may be advisable due to local conditions such as low density of population, or minimal need for tuberculosis beds. There are a few areas where an entire state may be adequately served by a unit of this size.

In many communities, tuberculosis hospitals of 100 beds or less are, at present, meeting all requirements. To abandon them, or to convert them to other purposes, would be costly. In communities where only a few small tuberculosis hospitals are in operation, and where large, fully equipped, fully staffed tuberculosis hospitals are readily accessible, the small units may be used for the non-treatment patient, who can be transferred to the large hospital for specialized services.

Whatever the size of the unit, all tuberculosis sanatoria should be built within a short distance of general surgical and medical services. If these conditions are looked upon as requirements, the 100-bed hospital can be a practical unit, and will serve within a general integrated service pattern.

**REQUIREMENTS**

1. Patients' accommodations located for southern orientation, prevailing breezes, freedom from inside and outside disturbances, and proximity to necessary service facilities.
2. Segregation of patients according to sex, stage of disease, and general disposition.
3. Medical and surgical facilities adequate to meet all needs, isolated from other hospital activities but close to the patients they serve.
4. Facilities for efficient receiving, cooking, and serving of food, as well as for the washing and storing of dishes.
5. Provision for the sanitary disposal of sputum,




HOSPITAL AREAS

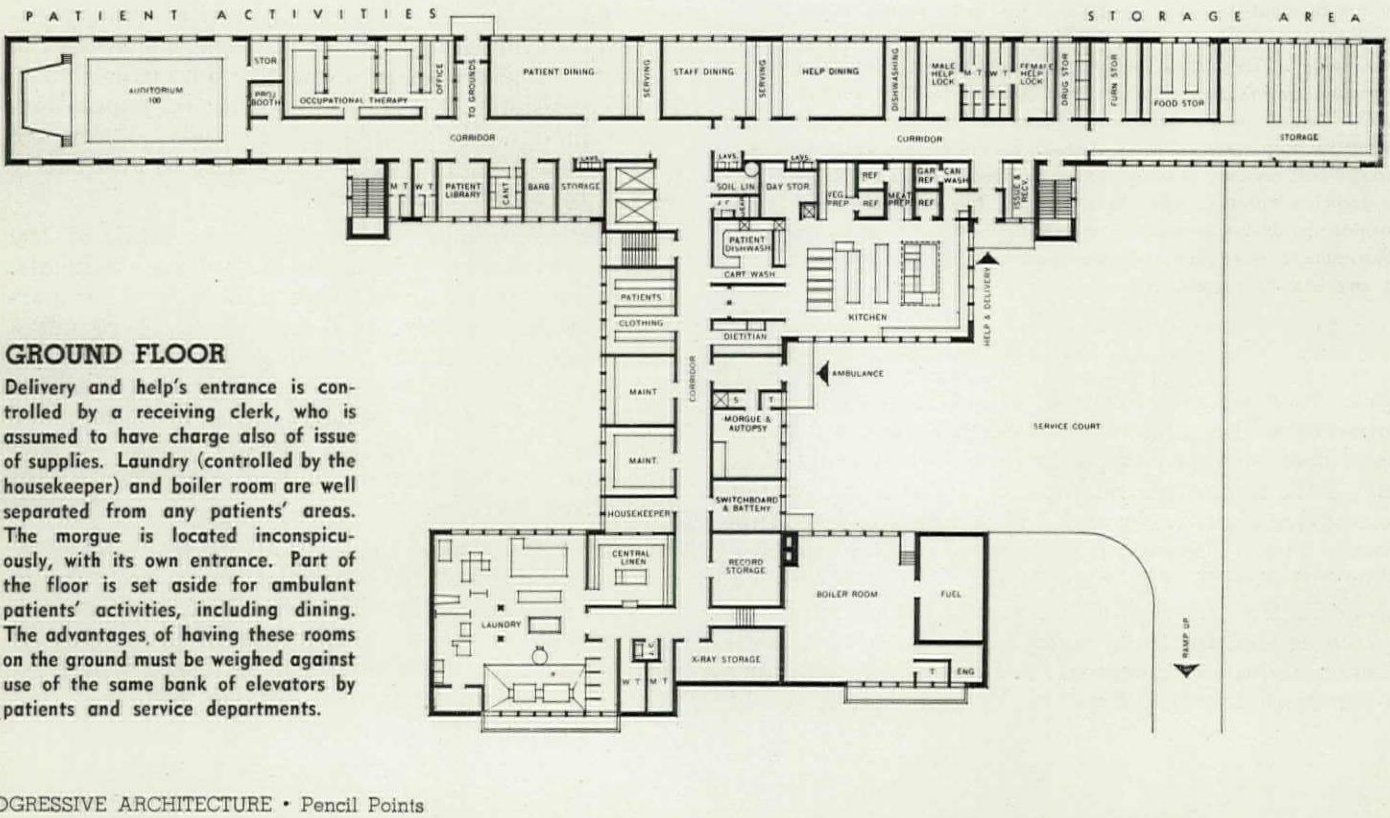
| | |
|---|---|
| GROSS AREA | 67,520 SQ. FT. |
| GROSS AREA PER BED | |
| NORMAL | 675 SQ. FT. |
| MAXIMUM | 535 SQ. FT. |
| NORMAL NET AREA PER BED | 579 SQ. FT. |

BED CAPACITY

| TYPE OF ROOM | NO. | NO. OF BEDS NORM. | NO. OF BEDS MAX. |
|---|---|---|---|
| SINGLE | 20 | 20 | 34 |
| DOUBLE | 40 | 80 | 92 |
| TOTAL | 60 | 100 | 126 |

## FIRST FLOOR

**On this floor are the administration unit, the outpatient department, and the first of three nursing units. Administration is divided into two sections: medical, with offices near the library and conference room, viewing and record rooms; business, with offices adjacent to the entrance lobby. The outpatient department is a separate wing, not far from the administration units. X-ray and routine diagnostic laboratory can be served by one technician. Benches would allow the corridor to be used as a substitute waiting room.**

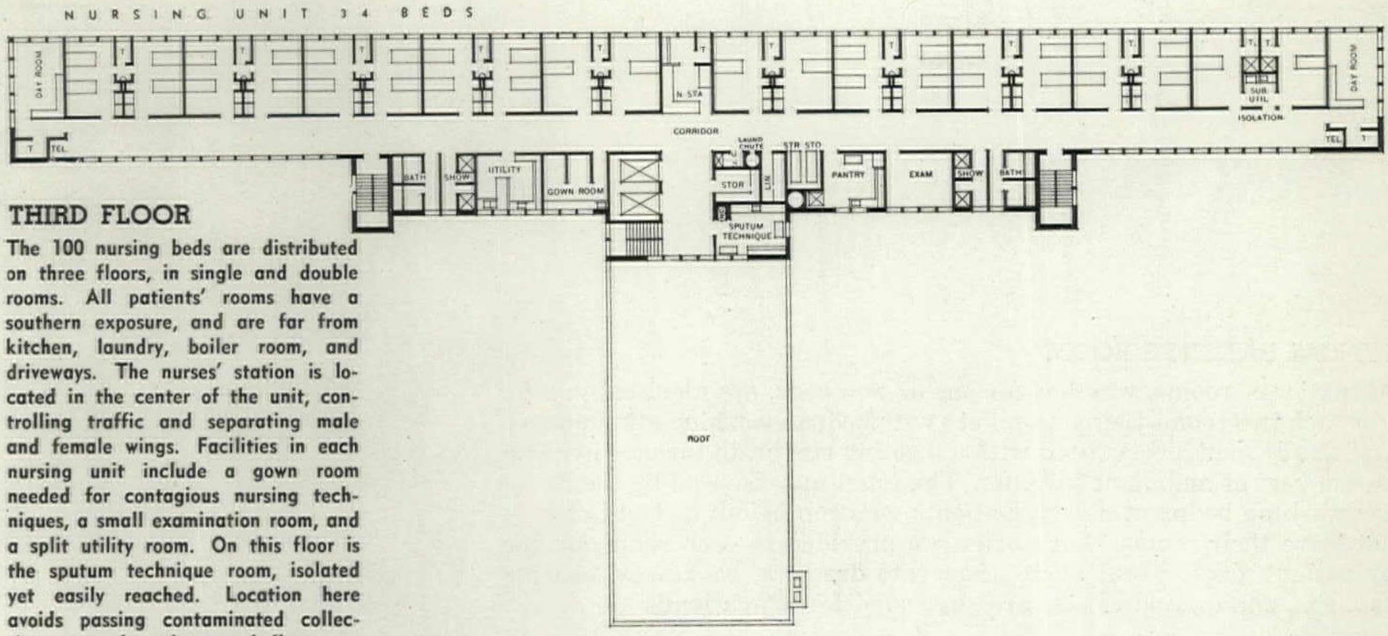



## GROUND FLOOR

**Delivery and help's entrance is controlled by a receiving clerk, who is assumed to have charge also of issue of supplies. Laundry (controlled by the housekeeper) and boiler room are well separated from any patients' areas. The morgue is located inconspicuously, with its own entrance. Part of the floor is set aside for ambulant patients' activities, including dining. The advantages of having these rooms on the ground must be weighed against use of the same bank of elevators by patients and service departments.**

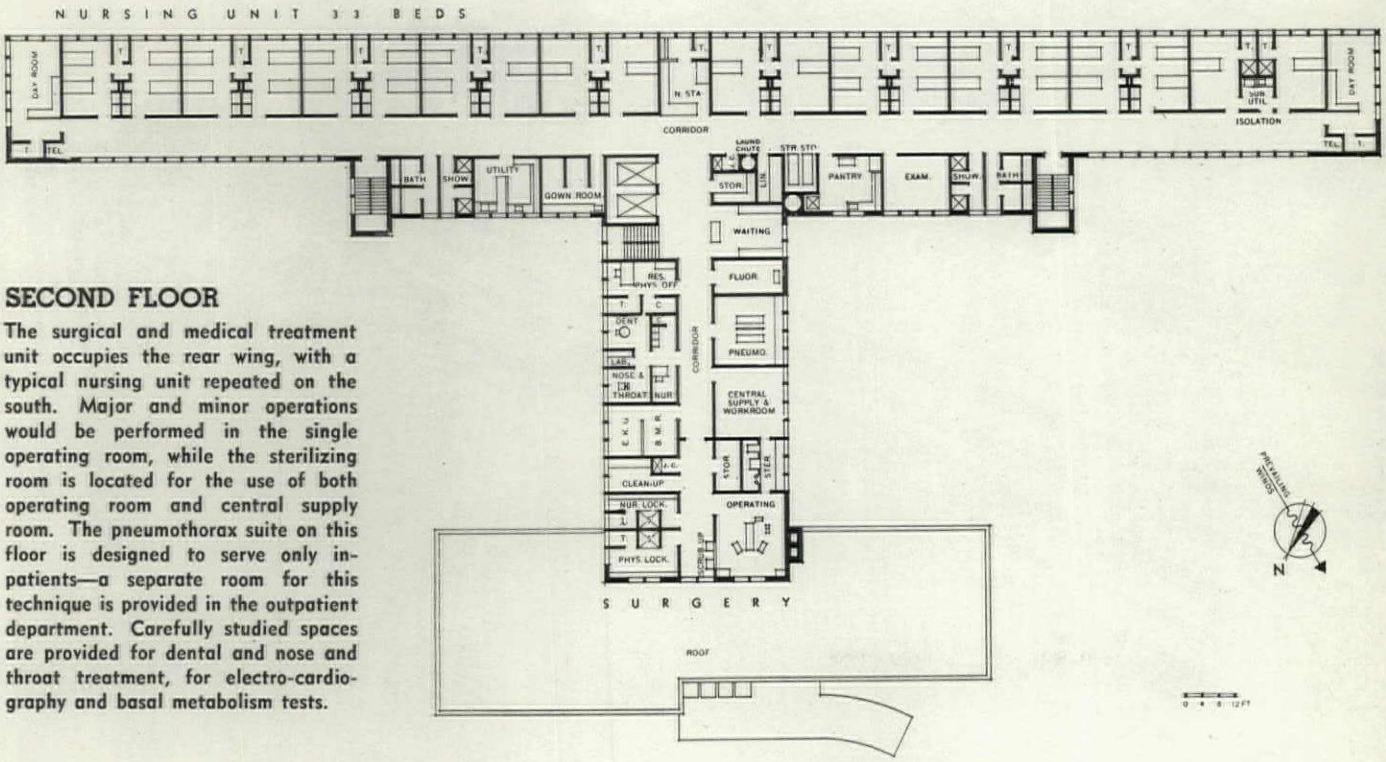
and for carrying out protective nursing techniques.
6. Outpatient department, complete in itself, for diagnosis, ambulatory treatment, and after-care.
7. Administration unit, centrally located.
8. Adequate and attractive accommodations for occupational therapy rehabilitation and for the activities of ambulant patients.
9. Laundry and boiler room; within the building but isolated from patient areas.
10. Provision for storage of all supplies and equipment.
11. Dining room, locker rooms, and toilets for staff and help.

**100-BED TUBERCULOSIS HOSPITAL** HOSPITAL FACILITIES DIVISION, U. S. Public Health Service




## THIRD FLOOR

The 100 nursing beds are distributed on three floors, in single and double rooms. All patients' rooms have a southern exposure, and are far from kitchen, laundry, boiler room, and driveways. The nurses' station is located in the center of the unit, controlling traffic and separating male and female wings. Facilities in each nursing unit include a gown room needed for contagious nursing techniques, a small examination room, and a split utility room. On this floor is the sputum technique room, isolated yet easily reached. Location here avoids passing contaminated collection carts through ground floor corridors.

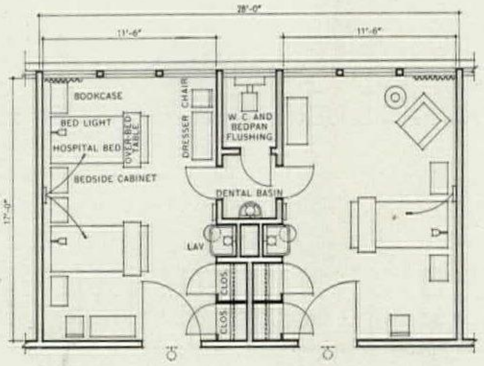



## SECOND FLOOR

The surgical and medical treatment unit occupies the rear wing, with a typical nursing unit repeated on the south. Major and minor operations would be performed in the single operating room, while the sterilizing room is located for the use of both operating room and central supply room. The pneumothorax suite on this floor is designed to serve only inpatients—a separate room for this technique is provided in the outpatient department. Carefully studied spaces are provided for dental and nose and throat treatment, for electro-cardiography and basal metabolism tests.

**100-BED TUBERCULOSIS HOSPITAL**

HOSPITAL FACILITIES DIVISION, U. S. Public Health Service

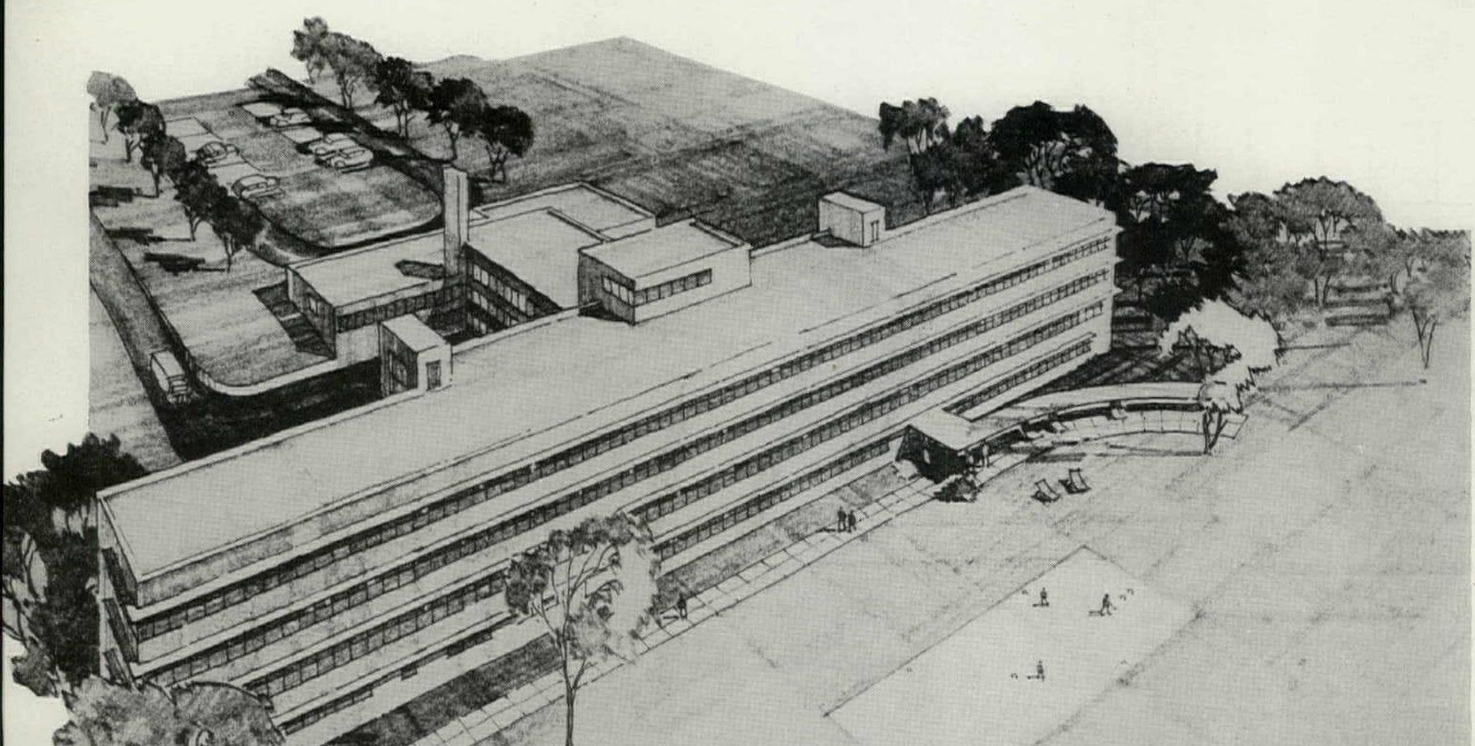


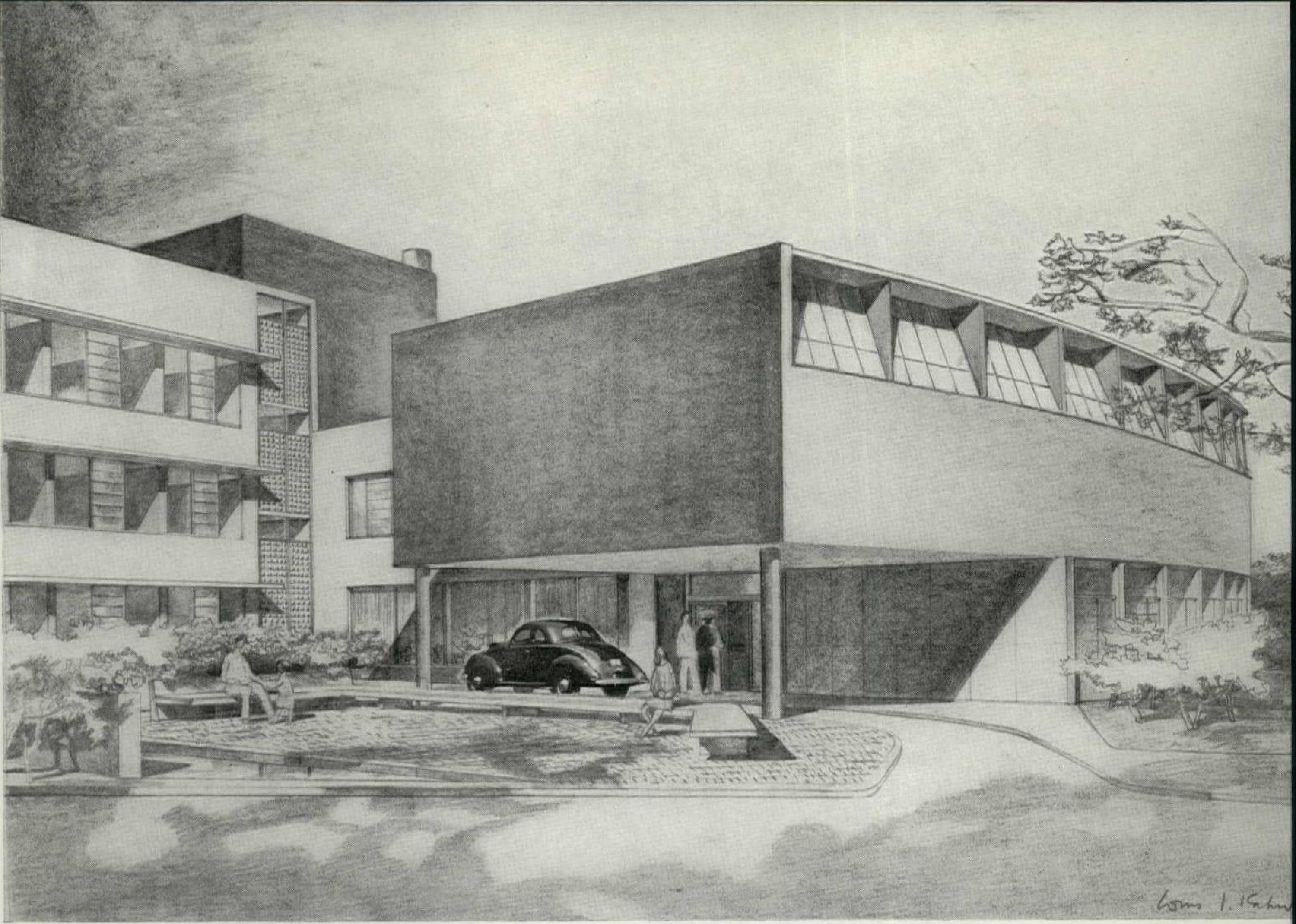

PLAN OF TYPICAL PATIENT ROOM

GRAPHIC SCALE

## TYPICAL PATIENT'S ROOM

All patients' rooms, whether for one or two beds, are identical in size. For each two rooms there is a toilet (with bedpan washing attachment) and an adjacent alcove fitted with a flushing rim basin for oral hygiene on the part of ambulant patients. The toilet may be used by the nurse for washing bedpans, and by patients who can be out of bed but may not leave their rooms. Lavatories are provided in each room for use by patient, doctor, and nurse. Separate dressers, bookcases, bedside cabinets, chairs, and closets are suggested for all patients.





# 5 .... PHILADELPHIA PSYCHIATRIC HOSPITAL PHILADELPHIA, PA.

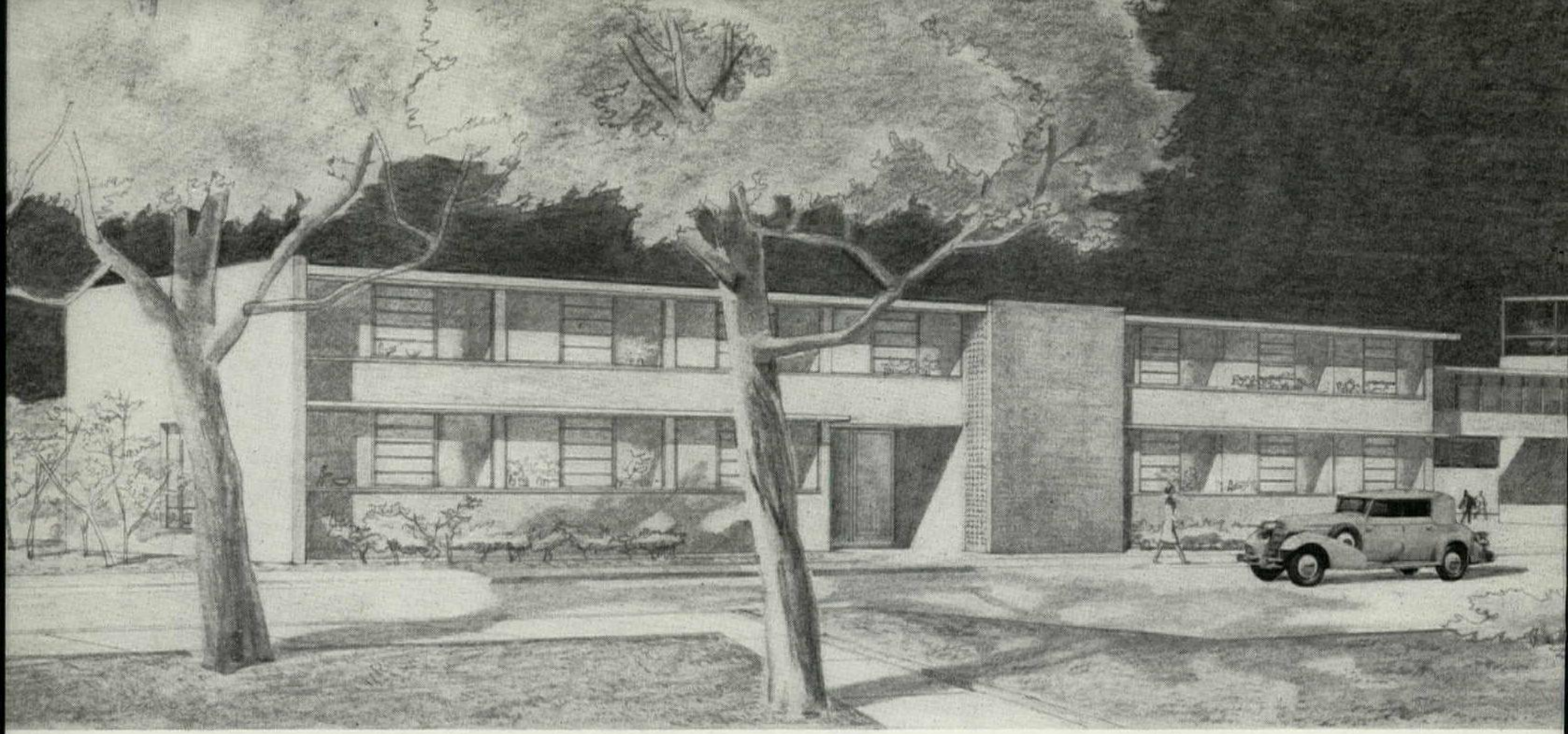
OSCAR STONOROV and LOUIS I. KAHN, Architects

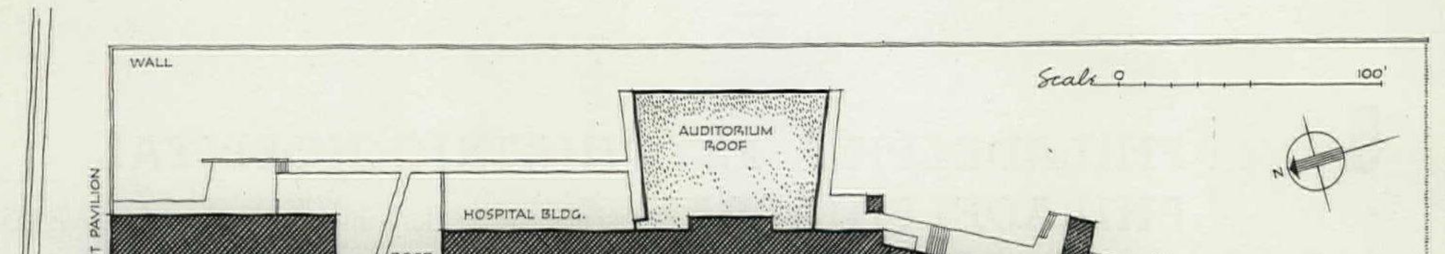
ISADORE ROSENFIELD, Hospital Consultant

Begun in 1937 with 13 beds, this voluntary hospital moved in 1940 to a new building of 62 beds, on a $5\frac{1}{2}$ acre site. An advanced psychiatric institution, it soon outgrew, in medical practice and size, the present quarters. Especially lacking were provisions for incoming disturbed patients, separated facilities for the convalescent and for those merely neurotic, and occupational and recreational facilities. Even the diagnostic and therapeutic provisions had become inadequate.

The new plans call for what promises to be a handsome addition dwarfing the present building with a connected convalescent pavilion and a nurses' home. Total number of beds will be 130, plus 10 for disturbed patients and 32 used solely for treatment purposes.

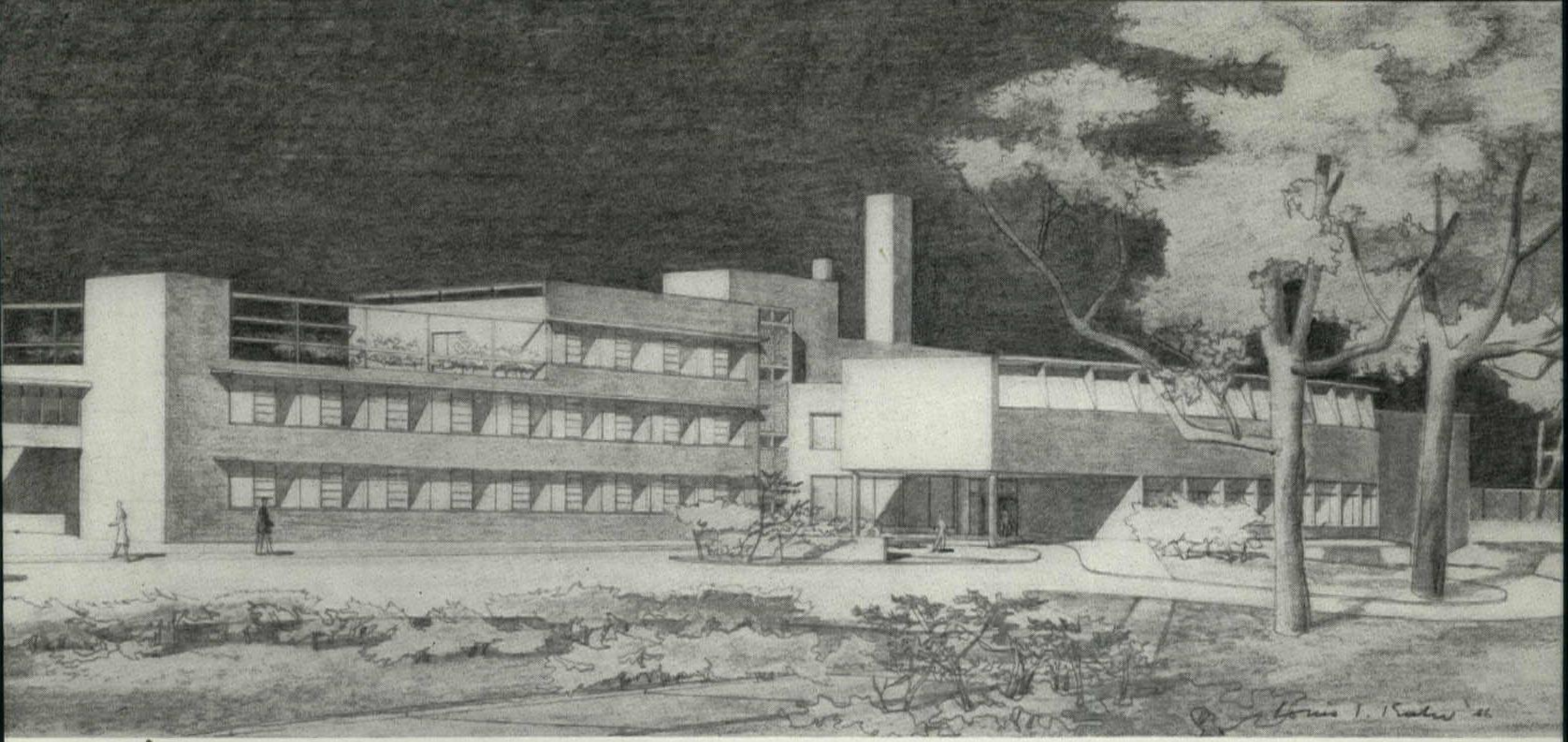
There are several outstanding features. Occupational and therapeutic facilities will be more complete than those provided in any other voluntary psychiatric hospital. The outpatient department will be one of the largest—in fact, one of the few—devoted to psychiatric treatment. Finally, there are facilities for electric and insulin shock treatment, studied and planned as an architectural problem for the first time.






*Plot Plan*

**A tight plot made planning difficult. Patients' recreational yard is given privacy by a wall.**



**PHILADELPHIA PSYCHIATRIC HOSPITAL, PHILADELPHIA, PA.**

OSCAR STONOROV and LOUIS I. KAHN, Architects

ISADORE ROSENFIELD, Hospital Consultant

**Commentary by ISADORE ROSENFIELD**

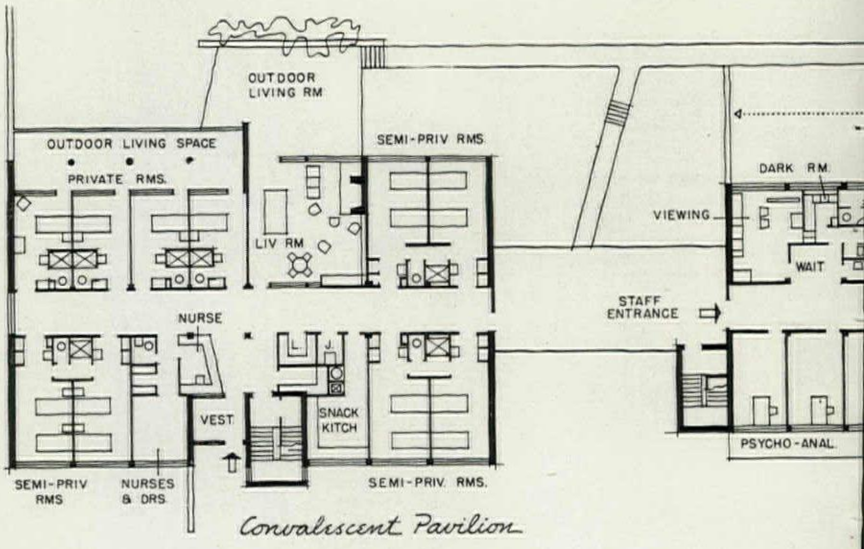
We have accomplished some improvements in the field of institutional care for the mentally sick, but we have yet a long way to go to make them modern, humane, and scientific institutions. Our mental patient population averages 430,000* in housing designed for about 391,000. In other words, on a nationwide basis there is an average overcrowding of 10 percent. But this is not evenly distributed. In Pennsylvania, where the project of our discussion is located, there is 24 percent overcrowding. With 2.75 mental beds per 1000 of population, Pennsylvania stands thirteenth from the bottom. New York with its large state postwar mental hospital construction program apparently admits that its high figure of 5.95 is not enough. Elsewhere in this issue we state that the countrywide shortage in mental hospital facilities amounts to 130,000 beds.

Under these circumstances, one may wonder what is accomplished by a puny effort such as that represented by the 130 beds of the Philadelphia Psychiatric Hospital. The explanation is that mental hospitals have been traditionally the responsibility of the states. The Philadelphia Psychiatric Hospital is a voluntary pioneering effort which came into being to supply a type of service which the state does not attempt.

Not having enough accommodations is not our principal difficulty. A more significant fact is that our existing institutions are largely custodial in nature. When people are sufficiently out of their minds to be "put away" they are sent to a state institution where they stay in the state's custody indefinitely or until they are "paroled" as quiescent. Treatment of mental disease is generally most embryonic and frequently nil. Under these circumstances we have what may be termed a cumulative census. We have no organized program of prevention of mental disease. Outpatient mental hygiene clinics are a rarity. Research is puny. There is a woeful shortage of psychiatrists and other trained personnel, and training facilities are conspicuously deficient.

We need quantity at this time, but what we need even more is quality. The field of mental hygiene is practically virgin soil in all its facets, even in its architecture. The Philadelphia Psychiatric Hospital will not contribute perceptibly to the numerical deficiency in psychiatric beds in Pennsylvania, but it may point the way toward humanized and scientific care in a significant manner.

* Figures from "Patients in Mental Institutions," 1943, U. S. Dept. of Commerce, Bureau of the Census.



*Convalescent Pavilion*

## PSYCHIATRIC HOSPITAL
## PHILADELPHIA, PA.

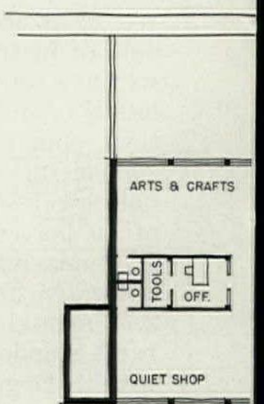
OSCAR STONOROV and LOUIS I. KAHN
Architects

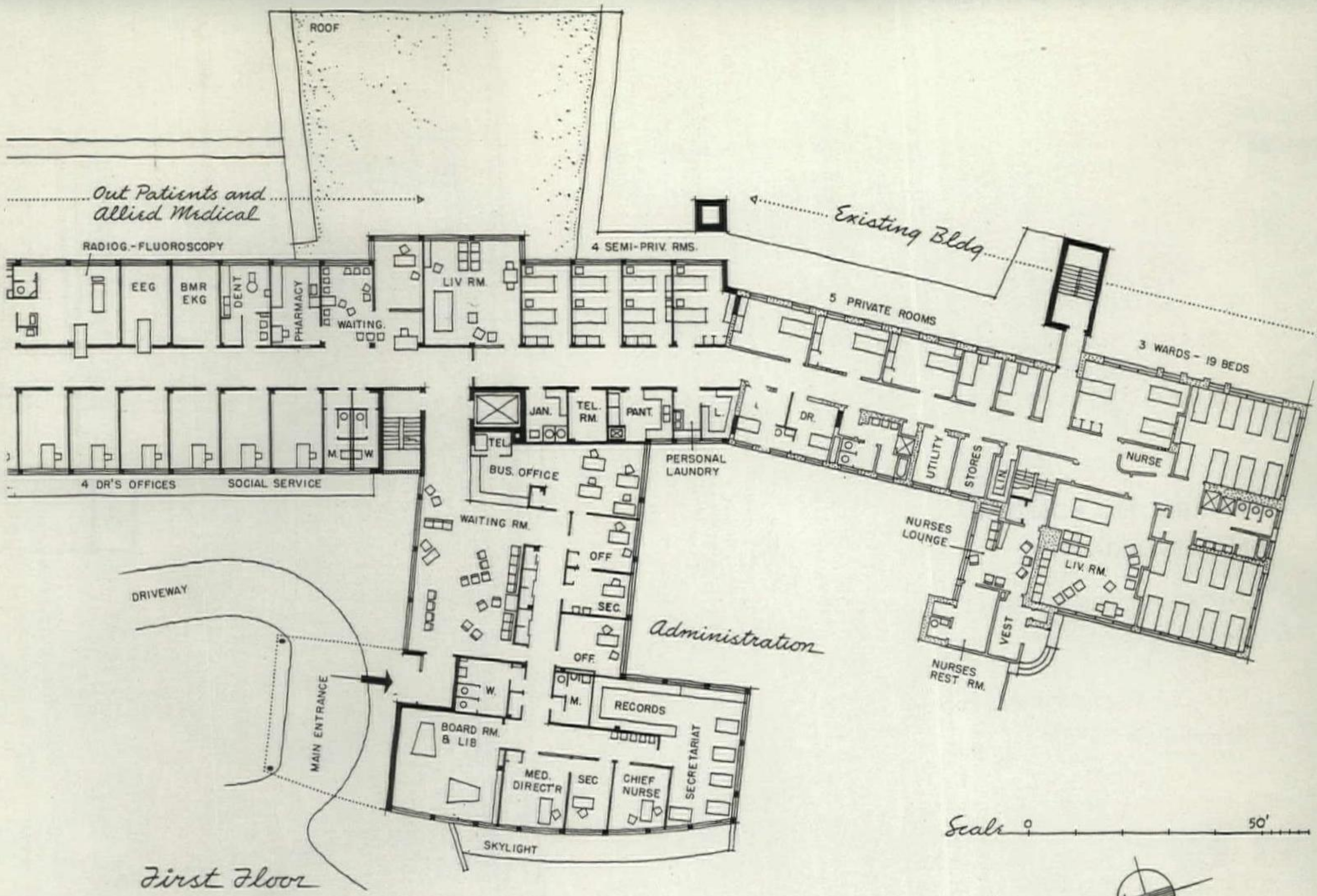
ISADORE ROSENFIELD
Hospital Consultant

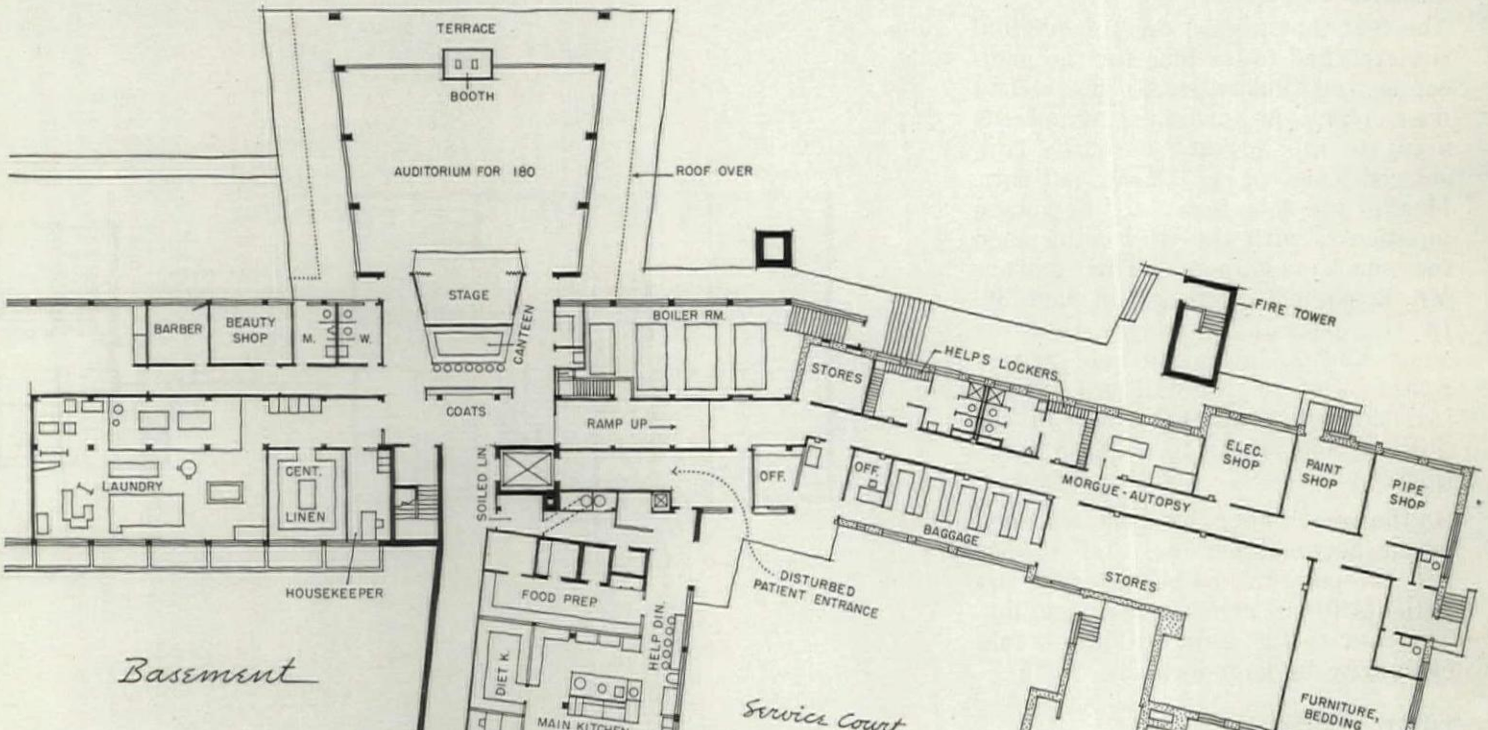
**BASEMENT**
A large part of the basement floor is almost level with the recreation grounds. The auditorium on this floor is planned with side walls that can be lifted upward, making the space usable for entertainment and play directly connected with the outdoors. Circulation by means of a single elevator is nicely controlled, although one wonders about possible delays or breakdowns; the one car serves occupational therapy, recreation, and dining spaces, and even picks up, on its other side, disturbed patients who enter through the service court. Although the disturbed patients' entrance to the building is well handled for privacy, it seems a shame it must be through the service court.

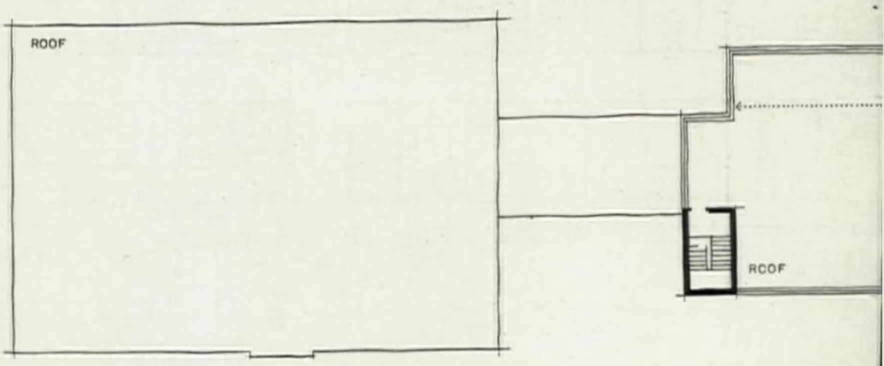
**FIRST FLOOR**
On the first floor, an attractive, well lighted common lobby leads to the hospital proper and to the outpatient department. At the south end of this floor (in the old building) are the male inpatients' rooms. It is interesting to note the attention given to recreational needs, even to the extent of providing a living room for the ward patients.

**CONVALESCENT PAVILION**
The convalescent-neuropsychiatric pavilion is at the north end of the property. Patients in this building will go to the main hospital for treatment and meals, but they have their own recreation garden, separated from the rest of the grounds by the auditorium.




ROOF
Out Patients and Allied Medical
Existing Bldg
RADIOG.-FLUOROSCOPY
EEG
BMR EKG
DENT.
PHARMACY
WAITING.
LIV RM.
4 SEMI-PRIV. RMS.
5 PRIVATE ROOMS
3 WARDS - 19 BEDS
JAN.
TEL. RM.
PANT.
TEL
M.
W.
4 DR'S OFFICES
SOCIAL SERVICE
BUS. OFFICE
PERSONAL LAUNDRY
DR.
UTILITY
STORES
LIN.
NURSE
NURSES LOUNGE
LIV. RM.
VEST
NURSES REST RM.
WAITING RM.
OFF
SEC.
OFF.
Administration
DRIVEWAY
MAIN ENTRANCE
W.
M.
RECORDS
BOARD RM. & LIB
MED. DIRECT'R
SEC
CHIEF NURSE
SECRETARIAT
SKYLIGHT
Scale 0 50'
N
First Floor


TERRACE
BOOTH
AUDITORIUM FOR 180
ROOF OVER
STAGE
CANTEEN
BARBER
BEAUTY SHOP
M.
W.
BOILER RM.
FIRE TOWER
STORES
HELPS LOCKERS
COATS
RAMP UP
LAUNDRY
CENT. LINEN
SOILED LIN.
OFF.
OFF.
MORGUE - AUTOPSY
ELEC. SHOP
PAINT SHOP
PIPE SHOP
BAGGAGE
HOUSEKEEPER
DISTURBED PATIENT ENTRANCE
STORES
FOOD PREP
HELP DIN.
DIET K.
MAIN KITCHEN
OFF
M.
W.
OFF.
DISHWASHING
SERVING
DINING ROOMS
Basement
Service Court
FURNITURE, BEDDING




## PSYCHIATRIC HOSPITAL
## PHILADELPHIA, PA.

OSCAR STONOROV and LOUIS I. KAHN
Architects

ISADORE ROSENFIELD
Hospital Consultant

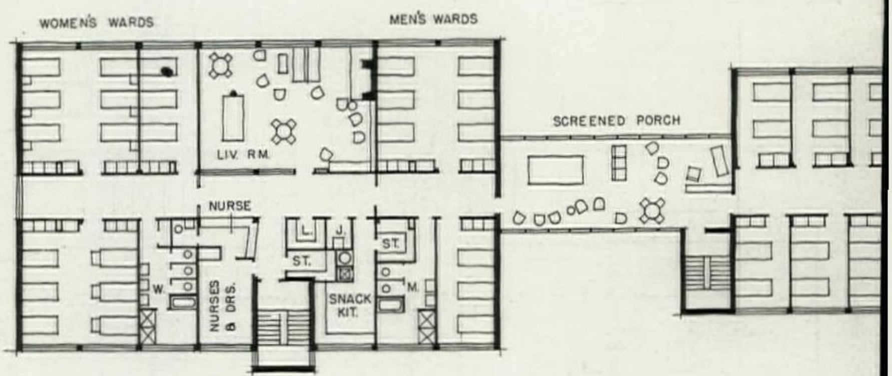
### SECOND FLOOR

The fact that a good deal of original research had to be done for the project is well illustrated by the second floor plan; no ordinary standards apply to this private, carefully considered care of psychotic patients. Most of the floor is devoted to women inpatients, with the west wing used for shock treatment. This feature Mr. Rosenfield discusses on page 88. In the patients' quarters there is again unusual attention paid to recreation. One small detail annoys: the inclusion of a nurses' toilet in the utility room seems to confuse functions.

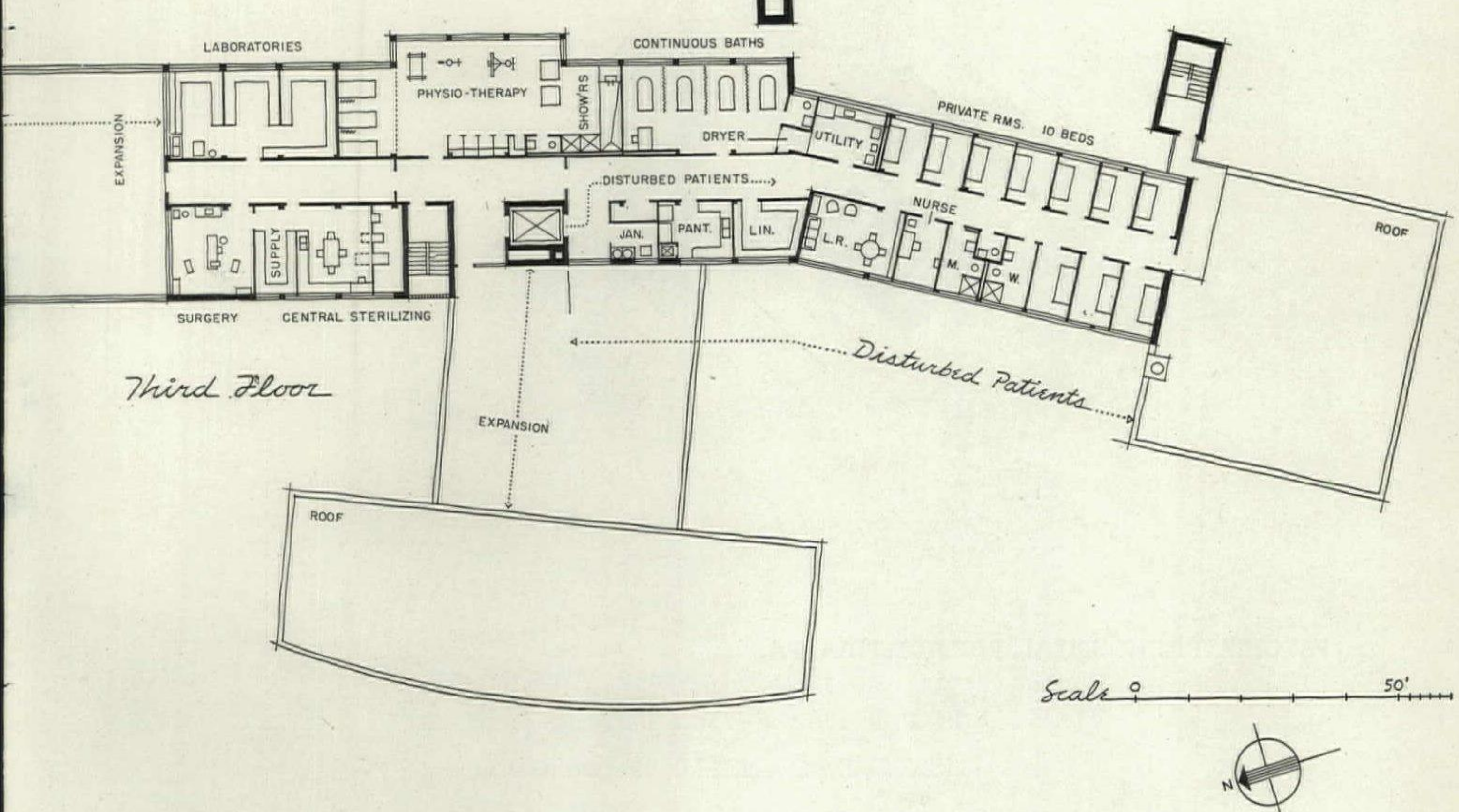
On the second floor there is a screened porch between the hospital proper and the pavilion, to be used only by patients in the convalescent pavilion. The door to the main building would ordinarily be kept locked.

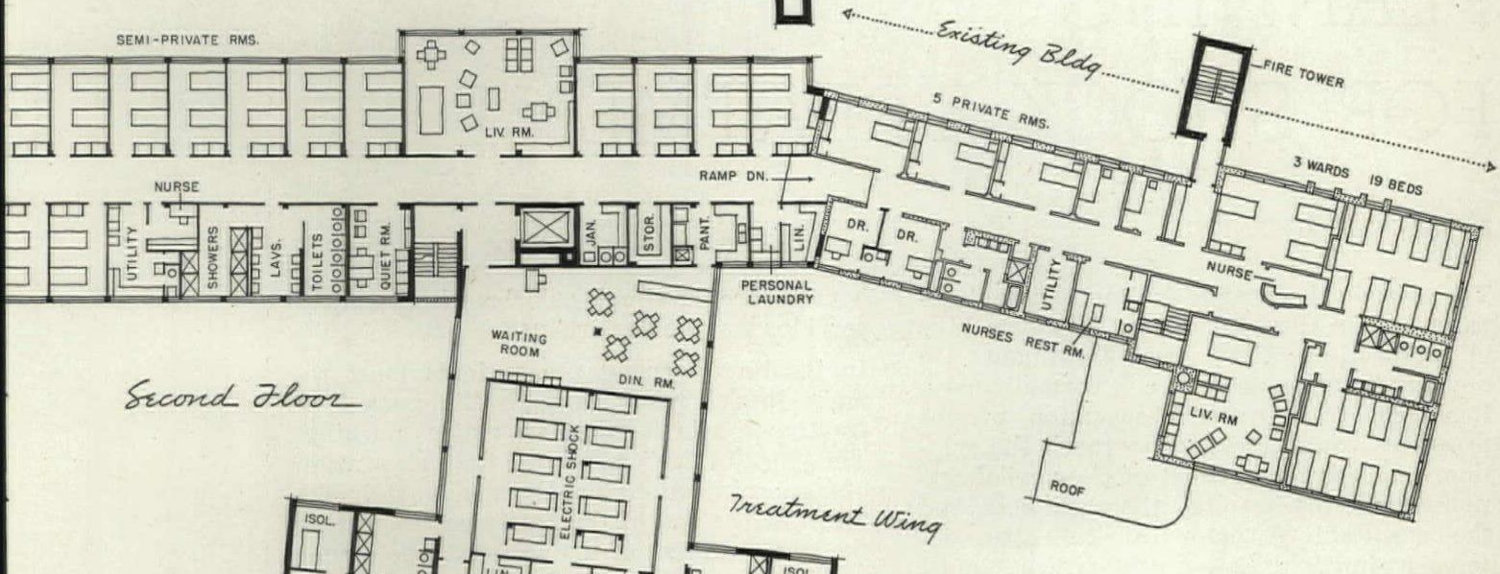
### THIRD FLOOR

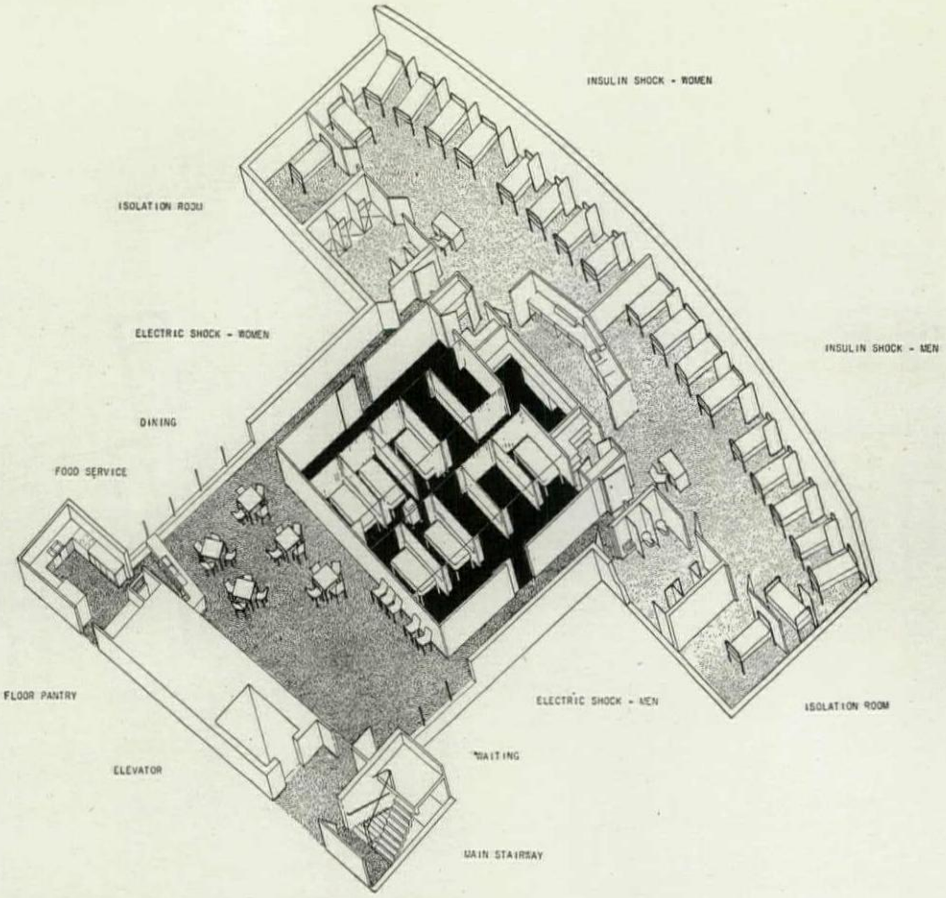
Disturbed patients are on the third floor. Here also are the continuous flow baths. Worth noting is the dryer placed adjacent to the utility room so that it can be used for packs administered at the bedside.




Convalescent Pavilion


LABORATORIES
PHYSIO-THERAPY
CONTINUOUS BATHS
SHOW'RS
DRYER
UTILITY
PRIVATE RMS. 10 BEDS
EXPANSION
DISTURBED PATIENTS
NURSE
JAN.
PANT.
LIN.
L.R.
M.
W.
SUPPLY
ROOF
SURGERY
CENTRAL STERILIZING
Disturbed Patients
Third Floor
EXPANSION
ROOF
Scale 0
50'
N


Existing Bldg
SEMI-PRIVATE RMS.
FIRE TOWER
5 PRIVATE RMS.
LIV. RM.
3 WARDS 19 BEDS
RAMP DN.
NURSE
DR.
DR.
UTILITY
SHOWERS
LAVS.
TOILETS
QUIET RM.
JAN.
STOR.
PANT.
LIN.
UTILITY
NURSE
PERSONAL LAUNDRY
NURSES REST RM.
WAITING ROOM
DIN. RM.
LIV. RM
Second Floor
ROOF
ELECTRIC SHOCK
Treatment Wing
ISOL.
ISOL.
LIN.
CLOS.
LIN.
INSULIN BAR
MEN
WOMEN
INSULIN SHOCK & HELIOTHERAPY




**PSYCHIATRIC HOSPITAL, PHILADELPHIA, PA.**

OSCAR STONOROV and LOUIS I. KAHN, Architects

ISADORE ROSENFIELD, Hospital Consultant

# PLANNING FOR SHOCK TREATMENT

**By ISADORE ROSENFIELD**

The electric shock and insulin treatment department on the second floor is shown here in perspective. Where these treatments are now given, converted space is normally used. Research, travel, and observation of the processes were necessary to reach the solution, which is the product of close collaboration among the hospital, the architects, and the consultant. A common waiting space adjoins a dining area—insulin patients must be given nourishment immediately after treatment—and from there on the unit is split evenly down the middle, men on one side and women on the other.

Electric shock takes only a split second, and the patient generally walks off within a half hour; hence the simple cubicles with a central corridor for the doctors' use.

In insulin treatment the patients must remain in full view through the period of treatment, which takes an entire morning. The "insulin bar" serves for the preparation of insulin injections and the medicinal drinks given at the end of the treatment to restore the sugar content of the patient. The corner isolation rooms are for the purpose of giving special attention to a patient who may have reacted negatively to treatment. Patients use showers immediately after treatment because of excessive perspiration; it is very desirable to air condition this section in order to avoid drafts.

# RESIDENTIAL WATER SUPPLY PIPING DESIGN

## IMPORTANCE OF HYDRAULIC ANALYSIS

By LEWIS H. KESSLER,* Professor of Sanitary Engineering, Northwestern University

**Correct size of service piping is vital for adequate water service. Few people ever turn on two or three faucets simultaneously when examining a house. Disappointment comes later when the flow of water is inadequate, sometimes if two fixtures are used simultaneously, almost always when three are operated at once. This reflects on the capabilities of both architect and plumber. An ample flow of water does not mean waste, or even increased use of water. It means obtaining sufficient water at each fixture when it is wanted, without waiting, which is no more than the satisfaction people expect from modern equipment.**

There is a minimum size of service piping and supply lines which should not be disregarded even though the cost is about $30 more than if the next smaller size is specified. Replacing the system—if it is ever actually done—would cost more than the original faulty installation. Most plumbing contractors agree that one-inch is a good working minimum service-pipe size.[1]

There are several reasons for installing pipe of larger size than is common. These may be possible additions to the family involving greater water use, new bathrooms and powder rooms, new facilities in recreation rooms, a new dental lavatory, addition of showers to existing tubs, automatic washing machines, electric dishwashing machines, garbage disposal units, water softeners, more sill cocks and garage faucets, new lawn sprinklers, air conditioning apparatus. Adequate water pressure and supply will provide properly for such modern conveniences, reduce fixture noise, eliminate scalding hazard, and afford some protection against back-siphonage on the upper floor.

While service-pipe size is paramount, it is illogical to lose pressure carried in city mains by installing inadequately sized piping within the house itself. In my opinion ¼" and ⅜" pipe should never be used—except, possibly, to circulate hot water from a fixture to a supply tank, or for very short pipe stubs to a tank closet. The architect should never permit installation of piping adequate for the use of only one principal fixture at a time. He should, at the least, insist on piping adequate for average expected use, so that several fixtures can be used simultaneously. Piping adequate to supply *all* principal fixtures simultaneously, with some provision for planned future fixtures, should be encouraged; and when the budget permits, piping adequate for carrying all principal fixtures simultaneously, with *full* provision for added facilities and extra capacity as a safety factor, to permit adequate flow even though scale and corrosion deposits accumulate with age, is desirable.

In this paper, principles of hydraulics are applied to prove that the average 55-to-65-foot length of house service and 48 feet of piping in the house, including all friction losses, cannot provide a *minimum* adequate flow with simultaneous use of two or more fixtures, **unless one-inch service pipe is used.** This does not even take into account tuberculation or scale, which reduce the effective area of supply pipe and increase the friction factor in hydraulic formulae. But before we proceed that far we must define adequacy of flow.

### What Is Adequate Flow?

All plumbing codes I have seen insist on "adequate" or "ample" water supply to fixtures. These are, unfortunately, general terms. The modern water supply system has to meet the demands of convenience in keeping with a rising standard of living as well as of health. If the consumer need not wait to the point of impatience for a fixture to fill, the rate of supply is adequate. Total daily water consumption has nothing to do with the problem. In 1929 the U. S. Department of Commerce issued a report, *Recommended Minimum*

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* Formerly Chief, Water & Sewage Unit, Repairs & Utilities, Office of the Quartermaster General and Office Chief of Engineers, War Dept., Wash., D. C., and Professor of Civil Engineering, University of Wisconsin; now associated with The Technological Institute, Northwestern Univ., and Consulting Engineer, Wade Mfg. Co.

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[1] First advocated in 1933; see "*Interior Water Supply Piping for Residential Buildings,*" by F. M. Dawson and J. S. Bowman, Univ. of Wisconsin Experimental Station, Bulletin No. 77.

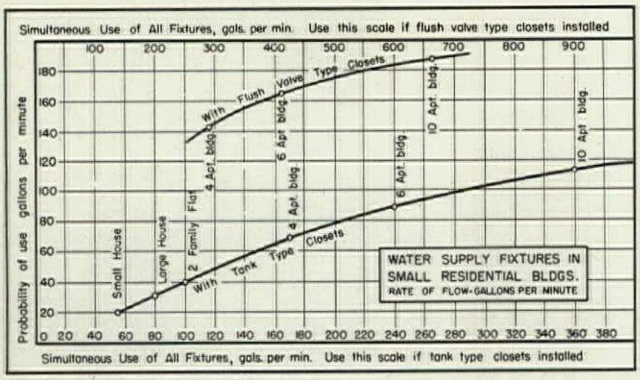



**FIGURE 1**

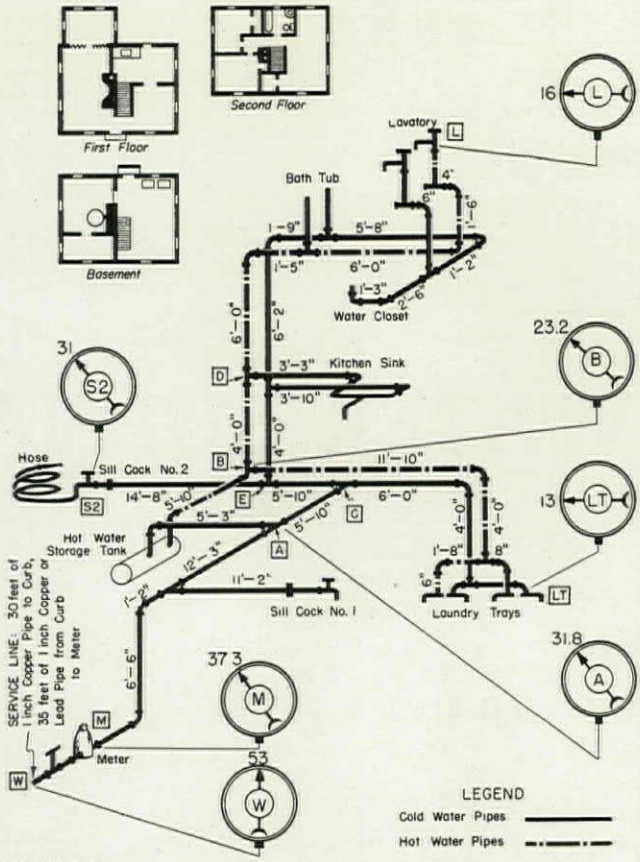



**FIGURE 2**

**TABLE I—RATES OF FLOW FOR DETERMINING WASTE PIPE SIZE**

| Fixture or Group (one of each) | Fixture Units | Gal per Min |
|---|---|---|
| Lavatory or wash-basin | 1 | 7.5 |
| Kitchen sink | 1½ | 11.25 |
| Bathtub | 2 | 15.0 |
| Laundry Tray | 3 | 22.5 |
| Combination fixture | 3 | 22.5 |
| Urinal | 3 | 22.5 |
| Shower bath | 3 | 22.5 |
| Floor drain | 3 | 22.5 |
| Slop sink | 4 | 30.0 |
| Water-closet | 6 | 45.0 |
| Bathroom group (1 water-closet, 1 lavatory, 1 tub with shower; or 1 w.c., 1 lav., 1 shower compartment | 8 | 60.0 |

**TABLE II—RATES OF FLOW FOR DETERMINING WATER SUPPLY PIPE SIZE**

| | HOUSE SERVICE | BRANCH LINES | |
|---|---|---|---|
| Type of House and Fixture | Total gpm (all fixtures) | gpm, fixtures in simultaneous use | Minimum gpm recommended* |
| **Small Single Family House** | | | |
| 2 Sill Cocks | 10 | 5 | 4.3 |
| 2 Laundry Trays | 20 | 10 | 8.2 |
| 1 Kitchen Sink | 7½ | .... | .... |
| 1 Lavatory | 5 | 5 | 5.0 |
| 1 Water Closet | 2½ | .... | .... |
| 1 Bath Tub | 10 | .... | .... |
| | **55** | **20** | **17.5** |
| **Large Single Family House** | | | |
| 2 Sill Cocks | 10 | 5 | 4.3 |
| 2 Laundry Trays | 20 | 10 | 8.2 |
| 1 Kitchen Sink | 7½ | .... | .... |
| 3 Lavatories | 15 | 5 | 5.0 |
| 3 Water Closets | 7½ | 2½ | 2.5 |
| 2 Bath Tubs | 20 | 10 | 8.0 |
| | **80** | **32½** | **28.0** |

Note: All water closets assumed to have tanks.
* Author's opinion

*Requirements for Plumbing,*[2] popularly called the "Hoover Code." This "code" was the result of several years of study by a committee of men nationally prominent in the field, in cooperation with master plumbers and the Bureau of Standards, which conducted extensive experiments on full-size installations.

This report deals primarily with waste disposal—that is, the capacity of soil and waste pipes; but to determine these capacities it was necessary to establish the rate of flow in gallons of water per minute, which is expressed in "fixture units" of 7.5 gpm. A lavatory, for instance, is rated as one fixture unit. **Table I** lists the report's conclusions. Unfortunately the report did not define a satisfactory supply of water. It stated, "The water service pipe of any building shall be of sufficient size to permit a continuous *ample* flow of water on all floors at a given time," leaving the designer, plumber, and inspector still in the dark. In 1932, F. M. Dawson, J. S. Bowman, H. Pommerenck, A. W. Kotz and others attacked the problem directly. There is not space to discuss their method completely; but they concluded that, for general conditions, **the rate of flow to each fixture should approximately equal 2/3 of the discharge rate for waste pipes as shown in Table I.**

**Table II** below is prepared largely on the above basis. Rates in first column are *fixture rates,* for use in determining the maximum rate of flow in the house service by adding the rates shown for such fixtures as may be assumed to be simultaneously in operation. For the design of hot or cold water branch lines the values in the second column are recommended; except that when there are both hot and cold water faucets at a fixture, these values are assumed as 3/5 those in the first column. This allows slightly more than half the fixture rate for each of two faucets, so that one alone can deliver a fairly satisfactory rate of flow. The third column

[2] Superintendent of Documents, Wash., D. C., price 35 cents.

TABLE III—EQUIVALENT LENGTH OF 1" NEW GALVANIZED PIPE FOR IDENTICAL FRICTION LOSS AND DISCHARGE RATE

| Pipe, Fitting, or Appurtenance (See Fig. 2) | Feet of Equivalent New Galv. 1" Pipe |
|---|---|
| **Cocks and Faucets**[1] | |
| Slow self-closing basin cock | 3700 |
| Old style goose-neck cock | 2080 |
| Spring self-closing cock | 1920 |
| Basin cock | 1460 |
| ⅜" compression sink faucet | 1120 |
| Hose cock bib and combination compression sink | 480 |
| ½" compression sink faucet | 370 |
| Combination compression bath tub faucet (both open) | 350 |
| Laundry compression faucet (both open) | 290 |
| ½" laundry bib, old style (both open) | 145 |
| **Corporation Cocks and Connection** | |
| ⅝" corp. cock for lead service | 90 |
| ¾" corp. cock for lead service | 29 |
| 1" x 1" corp. cock for lead service | 7 |
| **Curb Cocks** | |
| ¾" for lead service | 26 |
| ¾" for copper service | 7 |
| 1" for lead service | 3 |
| **Elbows 90 Degree (pipe ends reamed)** | |
| ⅜" | 6.6 |
| ½" | 3.8 |
| ¾" | 1.0 |
| 1" | 0.4 |
| **45 Degree (pipe ends reamed)** | |
| ⅜" | 50.0 |
| ½" | 20.0 |
| ¾" | 8.0 |
| 1" | 3.2 |
| **Garden Hose and Fixtures**[2] **(¾" stop and waste,** | |
| ¾" hose cock, 50 ft. of ¾" rubber-lined garden hose) | 3850 |
| **Gate Valves** | |
| ½" | 6 |
| ¾" | 3 |
| 1" | 1 |
| **Globe Valves** | |
| ½" | 238-288 |
| ¾" | 32- 48 |
| 1" | 8- 40 |

| Pipe, Fitting, or Appurtenance (See Fig. 2) | Length | Diameter | Feet of Equivalent New Galv. 1" Pipe |
|---|---|---|---|
| **Check Valves & Specials** | | | |
| 1" vertical check | | | 10- 26 |
| 1" lift check | | | 16-120 |
| 1" swing check | | | 3- 20 |
| 1" right angle | | | 3- 9 |
| **Hot Water Storage Tanks (30 gal capacity)** | | | |
| Vertical ¾" tubes, 3 ft-9½" long | | | 56 |
| Horizontal ¾" tubes 11" long | | | 16 |
| **Pipe or Tubing** | **Length** | **Diameter** | |
| ⅜" galv. | 1 ft | 0.494" | 33.3 |
| ½" galv. | 1 ft | 0.614" | 12.5 |
| ½" copper or lead | 1 ft | 0.527" | 17.9 |
| ⅝" lead | 1 ft | 0.62 " | 8.2 |
| ¾" galv. | 1 ft | 0.82 " | 3.2 |
| ¾" copper or lead | 1 ft | 0.745" | 3.9 |
| 1" galv. | 1 ft | 1.035" | 1.0 |
| 1" copper or lead | 1 ft | 0.995" | 0.83 |
| **Service Line Fitting**[3] **(compression stop & waste)** | | | |
| ¾" x ¾" (possibly poor design) | | | 185 |
| 1" x 1" | | | 38 |
| **Side Reduction Tees (flow end to side, pipe ends reamed)** | | | |
| ¾" x ¾" x ⅜" | | | 83 |
| ¾" x ¾" x ½" | | | 40 |
| ¾" x ¾" x 1" | | | 20 |
| 1" x 1" x ⅜" | | | 83 |
| 1" x 1" x ½" | | | 44 |
| 1" x 1" x ¾" | | | 14 |
| **Tees (end to end; pipe ends reamed)** | | | |
| ⅜" | | | 6.6 |
| ½" | | | 3.8 |
| ¾" | | | 1.0 |
| 1" | | | 0.4 |
| **Tees (end to side; pipe ends reamed)** | | | |
| ⅜" | | | 50.0 |
| ½" | | | 20.0 |
| ¾" | | | 8.0 |
| 1" | | | 3.2 |
| **Water Meters (no valves included)**[4] | | | |
| ⅝" with ½" connections | | | 90 |
| ⅝" with ¾" connections | | | 64 |
| ¾" with ¾" connections | | | 45 |
| 1" with 1" connections | | | 30 |
| 1¼" with 1" connections | | | 14 |

[1] Losses in cocks and faucets vary somewhat for different makes. Values given, however, are representative.

[2] Equivalent length for garden hose will vary with the nature of nozzle, cocks, and hose. Values given are results of a limited series of tests at University of Wisconsin.

[3] These values are not to be interpreted as being exactly what will result for any particular set-up. They do, however, show what may be expected.

[4] Losses in water meters of the same size, but of different manufacture, vary greatly, especially for ⅝" meters. The equivalent lengths given may be accepted as ample for well known makes.

is my opinion of the minimum satisfactory flow rate, based on tests in two houses I have occupied and in those of several friends.

#### Simultaneous Fixture Use

The factor of "simultaneous fixture use" obviously varies with the type of building, occupants' habits, and climatic conditions peculiar to different sections of the country. For instance, in any combination the sill cock must be considered; but if the region enjoys average rainfall, lawn sprinkling may be restricted to evening hours when only the kitchen sink will be in use, whereas in arid regions lawns may be watered in the morning when other fixtures including laundry trays, which have a higher flow rate than the kitchen sink, will be in use. To offset this difference, however, more bathroom fixtures will probably be used in the evening because the family is home. If lawn irrigation must be extensive, it is wise to consider this use separately so that the meter size and service-pipe diameter only—not the size of interior piping—are affected.

A lavatory may be in use at any time; dissatisfaction with low flow is apt to occur first at this fixture, since it is often located on the second floor where water pressure is lowest. This fixture must be included in any hydraulic analysis in determining satisfactory flow for the number of simultaneous uses defined in Table II. Figure 1 gives the curves arrived at for residences and smaller apartment houses.

Simultaneous fixture use is little understood by the average client, particularly the client who occupies a detached dwelling where the use of all fixtures involved is subject to family control and where the users are apt to be owners rather than tenants, as in the case of apartment buildings. On the one hand there is the ultimate in convenience and unlimited use of fixtures; on the other is the practical limit to the number of fixtures which can operate simultaneously with reasonable cost of piping; these factors must be balanced.

TABLE IV—FRICTION LOSS IN 100 FT OF ONE-INCH GALVANIZED PIPE AT VARIOUS DISCHARGE RATES

| Discharge Rate (gpm) | Friction Loss (psi) |
|---|---|
| 1 | 0.06 |
| 2 | 0.2 |
| 3 | 0.4 |
| 4 | 0.7 |
| 5 | 1.1 |
| 6 | 1.6 |
| 7 | 2.1 |
| 8 | 2.5 |
| 9 | 3.2 |
| 10 | 3.8 |
| 11 | 4.5 |
| 12 | 5.3 |
| 13 | 6.1 |
| 14 | 7.1 |
| 15 | 8.1 |
| 16 | 9.1 |
| 17 | 10.2 |
| 18 | 11.3 |
| 19 | 12.5 |
| 20 | 13.8 |

TABLE V—RATES OF FLOW AND CHANGES IN STATIC PRESSURE

| Part of Piping System | Rate of Flow (gpm) and Kind of Service | Change in Elev. (ft) | Change* in Static Pressure (psi) |
|---|---|---|---|
| Main to M | 17.5 (cold water) | —— | —— |
| M to A | 17.5 (cold water) | +6.5 | −2.8 |
| A thru C, E, and S 2 | 4.3 (cold water) | —— | —— |
| A to B | 13.2 (hot water) | —— | —— |
| B to L | 5.0 (hot water) | +12.7 | −5.5 |
| B to LT | 8.2 (hot water) | −4.6 | +2.0 |

*At 0.433 psi per ft height of water

#### Water Mains Are Not at Fault

In almost all cases municipal water departments have kept abreast of demand for greater pressure and quantity by rehabilitation of water supply systems. In the office of the Chief of Engineers, U. S. Army, is a unit responsible for the operation of water supply and sewerage systems at all Army posts in the continental United States. Out of a group of some 300 cities from which this unit purchased water, in only one case—a small town which had old wooden pipes and did not dare raise pressure above 25 psi—was municipal pressure inadequate. Furthermore, water demand was often far in excess of the demands of any modern house. In some instances higher pressures were requested for fire protection; not all municipalities could meet this requirement. Some did, but in almost all cases where the pressure was raised, pressure reducing valves were later installed, because the high pressure caused such troubles as water-hammer. The increased cost of water production was actually thrown away.

#### Average Static Main Pressure

During my four years' experience with the Corps of Engineers, we found the average static main pressure of all purchased water service, which covered some 800 locations, for many varying types of buildings, to be **53 psi**. This may have risen somewhat at a later date; but in my own and my associate's experience it was ordinarily satisfactory and is not likely to have changed substantially. 53 psi is therefore the main pressure used in the following illustrative problem.

#### Water Piping in a Specific House; the Equivalent Pipe Method

In Fig. 2 hydraulic pressures at critical points in the water distribution system of a small house are examined. In any such system, the rate of flow at a given fixture is determined by (1) pressure necessary to overcome pressure loss in a given faucet; (2) length and kind of pipe; (3) number and type of fittings and the manner in which they are inserted in the line. The first column in **Table III** is a list, or tabular analysis, of all pipe lengths, sizes, fittings, and appurtenances contained in Fig. 2. There is nothing unusual.

TABLE VI—COMPUTATION OF EQUIVALENTS (Based on Table III)

| Part of System and Components | Number of Fittings or ft length | | Equivalents (From Table III) | | Total Equiv. 1" pipe (ft) |
|---|---|---|---|---|---|
| **FROM WATER MAIN THROUGH METER M (COLD WATER)** | | | | | |
| 1" corp. cock & connect. | 1 | x | 7 | = | 7 |
| 65 ft 1" copper or lead pipe | 65 | x | 0.83 | = | 54 |
| 1" curb cock for lead serv. | 1 | x | 3 | = | 3 |
| 1" comp. stop & waste | 1 | x | 38 | = | 38 |
| Water meter ¾" x ¾" with ¾" conn. | 1 | x | 45 | = | 45 |
| (1) **Equivalent Length Main Thru M =** | | | | | **147** |
| **FROM M TO A (COLD WATER)** | | | | | |
| 21 ft of 1" galv. pipe | 21 | x | 1 | = | 21 |
| Two 1" 90° Ells | 2 | x | 2.2 | = | 4.4 |
| (2) **Equivalent Length M to A =** | | | | | **24.4** |
| **FROM A THROUGH C, E, AND S2 (COLD WATER)** | | | | | |
| 6 ft of 1" pipe (C to E) | 6 | x | 1 | = | 6 |
| One tee 1" x 1" x ¾" (end to end at A) | 1 | x | 3.2 | = | 3.2 |
| 5 ft of ¾" galv. pipe | 5 | x | 3.2 | = | 16.0 |
| One tee at C, ¾" x ¾" x 1" (side to end) | 1 | x | 20 | = | 20 |
| One ¾" tee (end to end) | 1 | x | 1 | = | 1 |
| 15 ft of ¾" galv. pipe | 15 | x | 3.2 | = | 48 |
| 50 ft hose, cock, nozzle | 1 | x | 3850 | = | 3850 |
| (3) **Equivalent Length A thru S2 =** | | | | | **3944.2** |
| **FROM A TO B (HOT WATER)** | | | | | |
| One tee 1" x 1" x ¾" (side reduction) | 1 | x | 14 | = | 14 |
| 13 ft of ¾" galv. pipe | 13 | x | 3.2 | = | 42 |
| Three 90° Ells, ¾" | 3 | x | 5.4 | = | 16.2 |
| Horizontal hot water storage tank conn., ¾" | 1 | x | 16 | = | 16 |
| Globe valve, ¾" | 1 | x | 48 | = | 48 |
| (4) **Equivalent Length A to B =** | | | | | **136.2** |
| **FROM B TO L (HOT WATER)** | | | | | |
| 12 ft of ¾" galv. pipe | 12 | x | 3.2 | = | 38.4 |
| Two 90° Ells, ¾" | 2 | x | 5.4 | = | 10.4 |
| Two tees, ¾" (end to end) | 2 | x | 1.0 | = | 2.0 |
| 6 ft of ½" galv. pipe | 6 | x | 12.5 | = | 75.0 |
| Two 90° ½" Ells | 2 | x | 13.8 | = | 27.6 |
| Basin cock | 1 | x | 1460.0 | = | 1460.0 |
| (5) **Equivalent Length B thru L =** | | | | | **1613.8** |
| **FROM B THROUGH LT (HOT WATER)** | | | | | |
| 27 ft of ½" galv. pipe | 27 | x | 12.5 | = | 338.0 |
| Three 90° ½" Ells | 3 | x | 13.8 | = | 41.4 |
| Two tees, ½" | 2 | x | 3.8 | = | 7.8 |
| Hose cock bib, comb. comp. sink faucet | 1 | x | 480.0 | = | 480.0 |
| (6) **Equivalent Length B thru LT =** | | | | | **867.2** |
| **USING ¾" SERVICE PIPE FROM WATER MAIN TO POINT A** | | | | | |
| ¾" corp. cock & connect. | 1 | x | 29 | = | 29 |
| 65 ft ¾" copper or lead pipe | 65 | x | 3.9 | = | 254 |
| ¾" curb cock for lead serv. | 1 | x | 26 | = | 26 |
| ¾" x ¾" stop & waste | 1 | x | 185 | = | 185 |
| Water meter, ⅝", with ¾" conn. | 1 | x | 64 | = | 64 |
| 21 ft of ¾" galv. pipe | 21 | x | 3.2 | = | 67 |
| Two ¾" 90° Ells | 2 | x | 5.4 | = | 11 |
| (7) **Equivalent Length, ¾" Service Main to A =** | | | | | **646** |

TABLE VII—COMPUTATION: CHECKING PRESSURES AND RATES OF FLOW

| Part of Piping System | Rate of Flow gpm[a] | Friction Loss per 100 ft 1" pipe psi[b] | Equiv. Lgth. 1", hundreds of ft[c] | Pressure Loss Psi | Static Pressure Change[e] | Pressure (psi) Available at Start[d] | Pressure at Discharge psi[e] |
|---|---|---|---|---|---|---|---|
| Main | | | | | | | |
| (W) to M | 17.5 | 10.7 | 1.47 | —15.7 | 0.0 | (W) 53 | (M) 37.3 |
| M to A | 17.5 | 10.7 | 0.254 | — 2.7 | —2.8 | (M) 37.3 | (A) 31.8 |
| A to S2 | 4.3 | 0.8 | 39.44 | —31.6 | 0.0 | (A) 31.8 | (Nozzle)[f] 0.2 |
| A to B | 13.2 | 6.3 | 1.36 | — 8.6 | 0.0 | (A) 31.8 | (B) 23.2 |
| B to L | 5.0 | 1.1 | 16.13 | —18.0 | —5.5 | (B) 23.2 | (Faucet)[f] —0.3 |
| B to LT | 8.2 | 2.8 | 8.67 | —24.3 | +2.0 | (B) 23.2 | (LT) 0.9[f] |

[a] From Table V.
[b] From Table IV.
[c] From Table VI.
[d] Assumed 53 psi at main (see text). Pressures at subsequent points from Col. 8, preceding line.
[e] Sum of Cols. 5, 6, 7.
[f] These pressures should be zero. Since variation from zero is relatively small, it is justifiable to assume that pipe sizes are adequate to permit hose nozzle at S2, faucet at L (lavatory) and faucet at LT (laundry tray) to deliver the desired flow simultaneously.

**In the equivalent pipe method** of hydraulic analysis the friction loss (at a given rate of flow) caused by pipe, fittings, or appurtenances is expressed in terms of a common standard, which is the friction loss of 1-inch new galvanized iron pipe. Using the loss in a one-foot length of such pipe as unity, we can express the loss caused by any other type or size of pipe, or by any faucet, valve, or other fitting or appurtenance. Example: 1 ft of ½" copper tubing is equivalent to 17.9 ft of 1" galv. pipe; 1 ft of ¾" copper tubing is equivalent to 3.9 ft, etc. A ½" gate valve is equivalent to 6 ft of 1" galv. pipe; a ⅝" water meter, to 90 ft.

The second column of **Table III** contains equivalents for all elements of Fig. 2, which include those encountered in the average small house. Data are based on full-scale laboratory tests made at the University of Wisconsin Hydraulic Laboratory, and used by Mr. S. E. Kotz and the author in preparing simplified short courses in plumbing.

In addition to the equivalent length, two factors are necessary; **the static pressure at the water main** (here assumed as stated, to be 53 psi); and the **friction loss at various rates of flow in 100 ft of 1" galvanized pipe** (friction loss varies at different rates of flow or discharge; this information is contained in **Table IV**). Using these to examine the water supply system analytically makes it easier to understand the performance of water piping and to locate "bottle-necks," or sections highly resistant to flow.

In **Table V** are summarized minimum requirements, obtained from Table II. In addition, flow will have to be adequate to overcome changes in static pressure due to differences in elevation of various parts of the piping system. These changes also appear in Table V. **Table VI** gives the total "equivalent length" of 1" galvanized iron pipe in any given section of the system. Pressure at the discharge point, or end of the section under consideration, appears in **Table VII**. If piping size is adequate to deliver the assumed pressure, values in last column of Table VII for ultimate discharge points—hose nozzle, faucets, etc.—should be zero or very close to it; all pressure is dissipated when the faucet or nozzle is opened.

If only one faucet is used—rather than the two or three for whose simultaneous use a system should be designed—there may be "too great" a flow, but the user normally opens the faucet only part way, and thus consumes pressure by restricting the orifice. Such devices as fixed orifices or restrictions in the branch, or lengths of smaller pipe, should be employed only after careful consideration of the requirements of simultaneous use.

#### What Happens with ¾" Service Pipe?

How much pressure would have to be available in the main if ¾" service were used? First, we have to maintain a pressure at A of 31.8 psi. Assume the 1" pipe (short run) from A to C is not disturbed. Item (7), Table VI, shows 6.46 hundreds of feet of 1" from Main to A. With a discharge of 17.5 gpm we have 10.7 psi x 6.46 = 69.2 psi lost. Adding 2.8 psi because A is higher than M, we have 69.2 + 2.8 + 31.8 = 103.8 psi, or say 104 psi. This is almost double the 53 psi originally assumed available for 1" service. Lower pressure would reduce flow below the standard we have set as adequate, unless we can find a curb cock, stop, and waste that cause less pressure loss. I understand one of the latter, now on the market, can test as low as 77 ft of 1". Under this condition we could save the equivalent of 108 ft of 1" pipe loss. Pressure would be reduced about 10 psi, or from 104 to 94 psi.

With ¾" service, if 5 gpm are flowing at L only, pressure in main could drop to 38 psi. If 5 gpm is the flow at L and 8.2 gpm at LT, and both are used simultaneously, main pressure must be 78 psi. *When pressure is less than 78 psi in the main, ¾" service can be called "adequate" only if use can be limited to a single fixture at a time.*

TABLE VIII—COMPUTATION: PRESSURE IN PIPING AT FIXTURE

| Pressure Gage at | Flow gpm[a] | Loss in Equiv. 1" pipe caused by faucet[b] | Gage Reading psi[c] |
|---|---|---|---|
| L | 5.0 | 14.6 x 1.1 | 16 |
| LT | 8.2 | 4.8 x 2.8 | 13 |
| S2 | 4.3 | 38.5 x 0.8 | 31 |

[a] From Table II.
[b] From Tables III and IV.
[c] Pressure required to overcome friction in the faucet or hose connection. Note that a common recommendation is "about 15 psi" at the usual house fixtures—which obviously cannot apply at a sill cock with hose and nozzle connected; yet this rule of thumb has some basis in practical performance since pressures at L and LT close to 15 psi are required.

#### Summary

Special attention is called to the fact that, with 1" house service pipe, the equivalent length of 1" pipe from main through garden hose in the problem described is 147 + 25.4 + 3,994, or 4,116.4 ft—more than ¾ of a mile. The average residence water supply, a serious hydraulic problem, requires more than casual attention.

A ¾" house service increases the length 11.5%, or about 475 ft of equivalent 1". However, equivalent length of pipe from main to lavatory is 1921 ft of 1"; ¾" service increases this length 25%. Equivalent length of 1" from main to laundry tray is 1165 ft; ¾" service increases this length 40%. This illustrates the importance of pipe sizing and its effect on performance of the entire residential water supply system. *When water main pressures encountered are below 90 psi, the designer should investigate the hydraulics of the ¾" service before specifying it.* Some runs may be short and may be justified. Most clients are going to be disappointed in flow rates if ¾" services are used.

**The effectiveness of zoning laws so far developed throughout the nation was put to a severe test by war activity and the emergency demand for housing for industrial and war workers. A great deal of building had to be done quickly and economically. Large-scale demand had to be satisfied by quantity operations. The experience gained in group design points definitely to need for reform in zoning legislation. Unless revision can be undertaken speedily and intelligently, our postwar housing will fall far below the standards which the public has a right to expect.**

# ZONING.... AN IMPEDIMENT

**By ARTHUR C. HOLDEN, F.A.I.A.**

Many architects who were brought into contact with the multiplicity of regulations which governed war housing found that the best of regulations often seemed to impose unreasonable restrictions upon development of a really satisfactory design. Certainly a large number of architects, experienced enough to understand fully the purpose and value of zoning, were surprised, when presented with the opportunity to design a whole community, to find that existing types of zoning legislation actually seemed to forbid the most desirable solution of the plan.

### Zoning Has Been A Remedial Measure

Perhaps the explanation lies in the fact that zoning was developed as an instrument only after it was realized that damage had been done by earlier failure to regulate abuse of community amenities. The primary aim of zoning was to protect public health, safety, and convenience. Zoning law says to the individual, you shall not come into a particular neighborhood and build more intensively than the standard set by law, nor may you build in front of the building line which has been established for the particular community. You must place your living units in such and such a way which has been established as desirable for the particular zone. It also says you must not place a non-conforming use within a district where specific types of uses have been established.

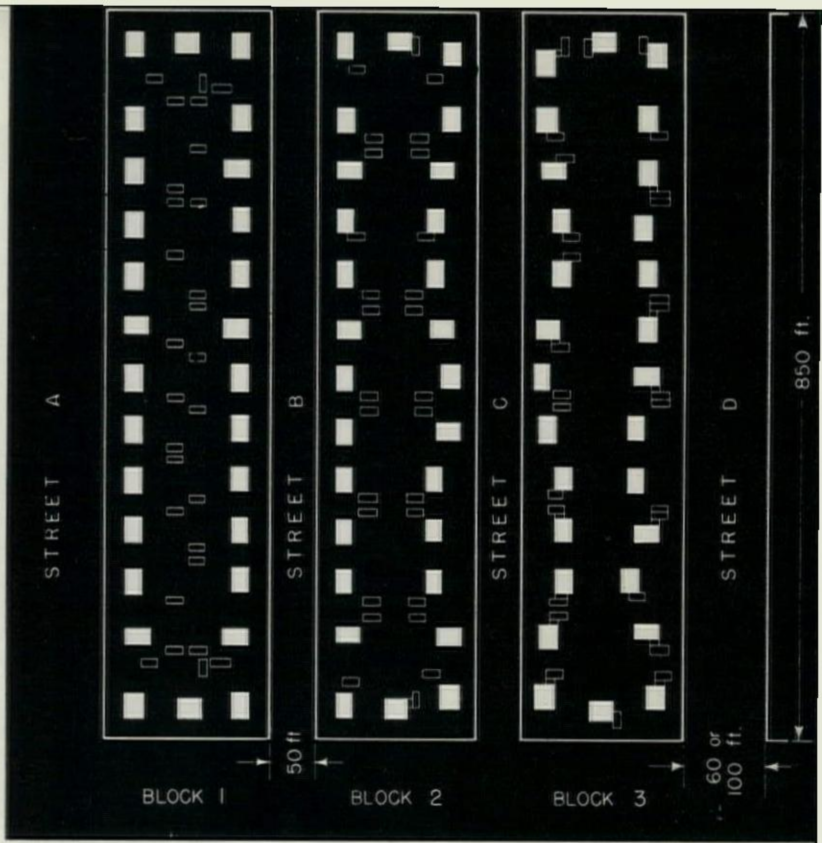
This sort of regulation, designed originally to safeguard health by prohibiting dangerous congestion in crowded metropolitan centers, was extended to prevent an individual owner from coming into a district where most of the houses are set back from the street, and building out to the front property line or side lot line in such a way as to jeopardize the value of neighboring properties.

When, however, a whole neighborhood is planned and built at one time, there is an opportunity for placing the houses in such a way that one house is a protection to the others, and so that the relation of the houses one to another can be varied. A minimum setback line serves to line houses up with undesirable uniformity and practically without regard to the development of outdoor spaces, vistas, and enclosures, which can so greatly enhance the interrelation between the outdoors and the interior of the home. It is true that during the war regulations of the War Production Board, designed to conserve critical materials such as pipe and electric cable, imposed definite *maximum* limits for setbacks. Thus it was a combination of the two sets of regulations which compelled sterile straight-line street frontage for war housing communities. Nevertheless, economy of material in the past restrained the average developer from setting back further than the minimum required by zoning. There is little incentive in the average zoning ordinance to plan for the type of amenities that are only possible through group design.

Similar difficulties are encountered when zoning regulations prescribe too explicitly both minimum width and depth of lots and also set a minimum area. Such provisions put a premium on rectilinear design of lots and consequently upon rectilinear street design, thus frustrating the designer who realizes that variety of frontage has both social and esthetic advantages, and who has found that flexibility also is a practical necessity to overcome the special difficulties of grouping houses around the corners of blocks and arranging for desirable space between them.

### Arbitrary Control of Land Use

Zoning restrictions have also been unreasonable in stipulating and classifying housing types and restricting whole zones to particular house types. At the time zoning laws were framed, there had been a tendency to invade suburban




**LIBERALIZED ZONING FOR RESIDENTIAL AREAS is necessary if land use is to benefit from design. Diagram shows effects of eliminating two common restrictions, the usual uniform setback and resulting prohibition of street-front garages. Block 1 shows ordinary layout in typical rectangular subdivision, uniform setback required and rear yards cut up by garages. Street B shows monotonous uniform setback, both sides; Street C, effect of variable setback. Block 2 shows rear yards improved by grouping garages. In Street D, wider and carrying considerable traffic, not only is setback varied, but garages are placed at front to screen living quarters from traffic noise. In Block 3, design of rear yards is much improved when freed of accessory buildings.**

# TO GOOD DESIGN?

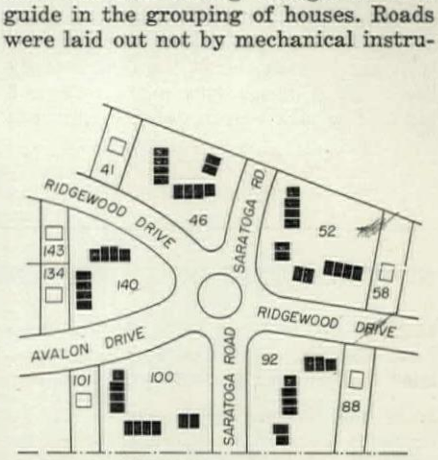
neighborhoods with city types of apartment houses built up to the lot line with only shallow courts and yards. Protection was sought against this "invasion"; apartments were restricted to segregated zones. In other neighborhoods composed of substantial homes, there was fear of invasion by so-called "jerry builders" with flimsy construction. The form of protection resorted to was prohibition of construction of a house costing less than a stipulated sum. In cases where this type of restriction was invalid under enabling legislation, it was frequently imposed through deed restriction. Whole districts were designated for particular housing types: single-family, two-family, four-family, multi-family, etc. Zoning has tended to follow this pattern.

Far better protection can be given by intelligent group design than by arbitrary rules. Flexibility has distinct esthetic as well as practical advantages. Everyone realizes when he sees it that a neighborhood composed solely of small homes suffers because it lacks the satisfying effect of variation in mass. This can be overcome by intelligent grouping of large and small units. Even in neighborhoods where there are no families that can afford large homes, variety of mass can be achieved by interspersing two-family houses among individual detached homes. It is also possible to use row houses in combination with both single and two-family houses, and achieve results that would be impossible when uniform standards are imposed by the ordinary types of zoning legislation.

American zoning laws have also unfortunately copied one another in stipulating uniform minimum lot areas for particular zones. The usual pattern is to designate zones by the letters, A, B, C, D, etc. Minimum frontages and depths are usually given, controlled, of course, by a minimum required area. A is usually the most intensive zone. It is likely, too, that the ordinance will go on to stipulate minimum front, side, and rear yards. The framers of this type of law have apparently been quite oblivious of the effect of the imaginary lines which they were drawing upon the landscape. In any terrain, except one which is absolutely flat, it ought to be apparent that restrictions of this character are contrary to nature.

**Reasonable Control Imposed by Nature**

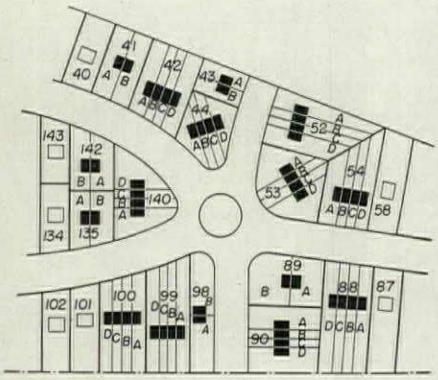
It is the designer's task to get the most out of nature. The early New England pioneers, without benefit of formal design, knew how to place their houses and barns for best exposure or in order to enjoy shelter from the north wind. In the earlier American towns, tradition was still strong enough to be a guide in the grouping of houses. Roads were laid out not by mechanical instruments but by the human eye. All advantage possible was taken of natural contours. Boundaries, too, were estab-




**CASE OF THE TOWN OF "X": Zoning ordinances required individual houses in this subdivision, but proportion of street area to private property was economically unsound; it had defaulted on taxes. Above, scheme with undivided property, designed for investment ownership, rental occupancy. See also following page.**

lished because of natural desirability.

It is true that with the rapid expansion of the country, urgency for haste and quantity destroyed a large part of the understanding that had been tradi-




**TOWN OF "X": Same subdivision shown on preceding page, but with all property in private hands, suggesting difficulty of establishing satisfactory individual lot lines for good distribution of open space.**

tional. Exaggerated ideas of the value of land prevented men from realizing how greatly the desirability of property depended upon the amenities of design and the arrangement of improvements, one with respect to another. Of course, zoning was a valuable step. It definitely laid down the principle that some restraint upon the individual was necessary in the interest of the community. Unfortunately, the words of law must be precise. It is not possible either to lay down a fiat that a high standard of design must be followed or that bad design must be prohibited; but assuredly it can be recognized that the remedy lies in good design rather than in good laws. The task before us is to rephrase our legislation so that it may protect against violation of rights without setting up imaginary lines that become unreasoning barriers to the natural laws of design.

The great fault of zoning is that it has been forced to adhere too greatly to generalizations. The direction of the remedy may be indicated by taking a particular case where zoning has failed to preserve or create the amenities desired, and to apply to this particular case the natural remedy of intelligent design.

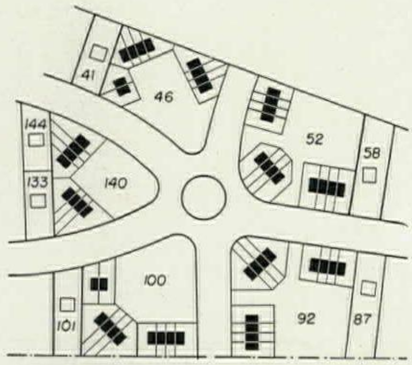
#### Case of the Town of "X"

A case in the town of X is offered. Here is a subdivision originally laid out in lots which varied from 25 to 40 feet in width and averaged 130 feet in depth. Paved streets, water, and sewer were installed. The lots were too narrow for individual family houses as called for by the zoning regulations. The proportion of street area to private property area was too high for the economic solvency of the property. Local regulations discriminated against group and row housing. To utilize the property, a rearrangement of lots and a greater flexibility of housing types was essential. A layout was prepared which would increase the amount of open space between the houses, create a project of greater desirability, and make carrying the project economically feasible. Since the property had been in default for taxes, the town of X had a major interest in its successful development. In making the presentation, several alternates were suggested to provide for the preservation and maintenance of open spaces to be assigned to specific properties as well as those spaces to be assigned to community use. Irrespective of the interest of the town, which was anxious to put the property back on the tax roll, the project was abandoned because the local zoning regulations were inflexible. There was absolutely nothing in the code which took maintenance into consideration.

The inflexibility of the prevalent type of zoning ordinance has not only operated to prevent the intelligent solution of planning problems through competent design, but it has accentuated the difficulties encountered by builders who have been compelled to adhere to restrictions such as were set by the War Production Board for the conservation of materials.

#### Crises May Breed Poor Planning

While the war was going on, special regulations had to be passed to reduce required setbacks within the limits set




**SAME SUBDIVISION: Company-maintained open spaces for group use, combined with private rented lots; for investment ownership, rental occupancy; common open spaces located to south.**

by allotments of piping and wiring. The shortage of materials following the war has tended to accentuate the impasse. Group design is likely to be put in a strait jacket while men who want to get things done build thousands of houses each on its individual lot, each

## NOTES ON TYPE OF AMENDMENT PROPOSED for Liberalizing Sections for Typical Zoning Ordinance

**SEC. Conditions Under Which Variations From Housing Types and Standards Stipulated for Particular Zones May Be Permitted:**

**1.** In any zone where a proposal is presented to house 75 or more families and the plan is made for carrying out the work at one time or by steps such as meet the approval of the board or authority having jurisdiction, a permit may be granted to allow the accommodation of not more than one-third of the families in such a project in types of housing for which the requirements of lot lines, setbacks, types of buildings, etc., may vary from the types required for the zone.

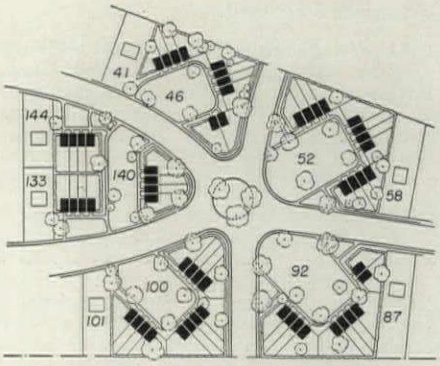
**2.** No permit for such variation may be granted unless, in the opinion of the board or authority having jurisdiction, the variation granted does, by reason of greater freedom of arrangement and plan, constitute an improvement in the group design of the community. The board may require that covenants shall be entered into by the interest controlling the property to assure the proper maintenance of adequate open space between the groups of houses and to insure the equitable distribution of the cost of maintenance of such open spaces among the families benefited.

**3.** No variation from the type of housing designated for a zone shall be permitted unless the nearest wall of a group or a row of houses shall be at least 100 feet distant from the nearest house previously erected, or unless the owners of surrounding properties shall consent to the placing of the proposed group. Under no circumstances shall the wall of a group or row of houses be placed nearer than 30 feet to the property line which separates it from the prevailing type of house specified for the zone.

**4.** In cases where a project calls for development by gradual stages, group row houses shall be permitted only to the proportion specified by this section after the completion of the requisite proportion of houses in conformity with the zoning requirement. When, however, a bond satisfactory to the authority having jurisdiction is given for the completion of all the housing proposed for a project, then it may be permitted to commence with the group row housing.

**5.** In any zone where the minimum standard of house types is designated as single-family detached residences or two-family attached residences, or 3- or 4-family houses, row with front, side, and rear yards in strict conformity with zoning regulations. Perhaps it is fortunate that a definite effort to avoid waste and conserve materials should offer a challenge to current zoning theory. Any builder, who aims to give value where it is most effective, must constantly strive to eliminate waste where it can be avoided. Those who seek to develop zoning so that it may be an aid rather than a hindrance to good design should be prepared to utilize war housing experience in liberalizing and developing our understanding of zoning principles.

In the first place, where a large development is planned at one time and built according to a coordinated plan, the restrictions which apply should be very different from the restrictions imposed to protect districts which are




**SIMILAR TO PRECEDING SCHEME, but with common open spaces in front, tenants' private yards in rear.**

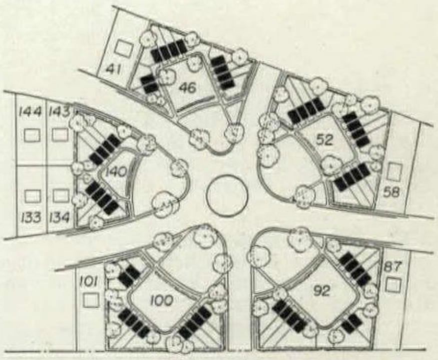
already established, or where use and character have already been set.

### A Legislative Way To Flexibility

The enabling legislation of New York State has been amended (see Section 37, General City Law) to allow cities and local communities to amend their zoning ordinances in the interest of new, large-scale developments. Local boards in New York may, under safeguards, approve a plan for a new subdivision which follows standards different from those stipulated for specific zones, and by such approval of a plan of development, the zoning ordinance is construed to be amended in respect to the area for which the plan is adopted. Many cities in New York State have added to their local ordinances the sections required to realize the benefits possible through the making of large-scale subdivision plans, where variance from specific zoning standards is both permissible and advisable because of the greater protection afforded through group design and coordinated development. Nevertheless the full implications of this type of regulation are not yet widely understood. As yet it appears that little advance has been made in developing a technique under which effective planning of this type can be carried on in cooperation with existing planning boards.

Quite a different reason for deviation from specific zoning standards is to be found in older blighted districts. Where a district has already become blighted or where economic or social changes may point to the need for working out a transition from one type of use to another, ordinary types of zoning regulation generally constitute a deterrent rather than an incentive to improvement. Every modern zoning ordinance should contain a section based on powers similar to those granted by Section 37 of the New York State enabling act, which should provide for methods for adopting zoning variations designed to stimulate the improvement of blighted areas.

It would have been unwise to advocate a wholesale rewriting of zoning codes immediately following the war. There are, however, certain principles which should be recognized and which certain agencies, both public and private, ought to study in advance and be prepared to recognize by amendment. Prior to the close of the war, the writer attempted to frame a declaration of principles




**LIKE TWO PRECEDING SCHEMES, this has tenant yards to the rear, but individual lots front on common courts which open out to a public park achieved by utilizing the open corners. Despite obvious advantages of these schemes, project was dropped because the Town of "X" had inflexible zoning laws, and taxes continue to be defaulted.**

which might be adopted by the zoning board of a medium sized city where administration has been reasonably intelligent. Since these particular principles were drafted with a view to improving the design of large-scale housing enterprises, a copy was placed at the disposal of the Land Planning Division of FHA. The suggestion was made that after study a circular of information with regard to zoning revisions should be sent out to zoning boards throughout the nation.

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houses may be permitted provided that no more than 8 families are accommodated in houses with common party walls without the intervention of a court. Such court shall be at least two-thirds the depth of the building adjoining and shall be at least half the width of the nearest row of buildings. Such a court may be formed by an offset of the wall which faces the nearest street, or by a change in direction of the line of the front walls of a group.

**6.** No group row housing, as above defined, shall be permitted in a zone where the prevailing type of housing is specified for single-family detached houses or two-family attached houses, unless every house in a group in which there are common party walls shall touch upon an open area containing not less than 7,000 square feet free from any building. The minimum dimension of such area shall not be less than 80 feet in cases where 8 families are housed in groups of houses having a common party wall. In cases where not more than six families are housed in groups having a common party wall, the minimum dimension of the required open area may be 60 feet.

**7.** This section shall not be construed so as to permit the erection of an apartment house or portion thereof in a zone, where apartment types are permitted, which shall be more intensive in coverage than is permitted in the ordinance for such zone, unless in the opinion of the board or authority having jurisdiction a compensating openness of plan or reduction in coverage is achieved for the accommodations provided for at least two-thirds of the families to be housed.

**8.** In specific cases where the approval of 60% of the frontage of abutting properties shall have been secured and with the affirmative vote of ¾ of the board or authority having jurisdiction, inoffensive types of business and industrial uses may be permitted in a residential neighborhood provided that a plan is adhered to which provides for the protection of the abutting properties by the arrangement of a residential fringe or parked strip. The latter shall not be less than 30 feet wide at its narrowest point. The plan shall provide covenants for the maintenance of the protective strip satisfactory to the authority having jurisdiction. This section shall not be so construed as to destroy the character of a community already established by the invasion of business or industrial uses which are unrelated to the character of the district already established.

# MANUFACTURERS' LITERATURE

★ *Editors' Note: Items starred are particularly noteworthy, due to immediate and widespread interest in their contents, to the conciseness and clarity with which information is presented, to announcement of a new, important product, or to some other factor which makes them especially valuable.*

### Air and Temperature Control

**3-66.** *The Weather-Man Controls Building Temperature from the Outside (Bulletins A-446, B-546)*, Automatic Devices Co., Weather Controls. Reviewed October.

**3-67.** *Special-Built Time Switches for the Volume User (Bulletin T-55)*, Automatic Temperature Control Co., Inc. Reviewed October.

★ **1-55.** *Dunham Baseboard Simplicity Heating Systems (Bulletin 639)*, 6-p. illus. booklet; baseboard heating system with one continuous pipe. Includes installation details, tables of heat output. C. A. Dunham Co.

**1-56.** *Small High Pressure Pumps (D-446)*, 4-p. folder, illus.; ES boiler-feed pump for pressures up to 200 psi. Details, charts, dimensions. Economy Pumps, Inc.

**1-68.** *Fitzgibbons R-Z-U Junior Steel Boiler, AIA 30-C-1*, 6-p. illus. folder on coal, oil, gas, or stoker-fired boiler for large residences, small apartment, institutional, and business buildings. Engineering data, drawings. Fitzgibbons Boiler Co., Inc.

**8-138.** *The Answer Book on Home Heating (SP-00-90)*, General Electric Co. Reviewed October.

**8-139.** *Hoffman Economy Heating Pumps, AIA 30-C-5 (Cat. VCP 1045)*, Hoffman Specialty Co. Reviewed October.

**22-18.** *Ilg Ventilating Fans (Bulletin A-1041)*, Ilg Electric Ventilating Co. Reviewed October.

**1-57.** *Carefree, Dependable Warmth (Form 4609)*, 14-p. illus. booklet; automatically fired coal and oil heating systems for residences. Brief descriptions, advantages. Iron Fireman Mfg. Co.

★ **1-58.** *How to Control Radiant Heating (Booklet B)*, 18 pp., illus. Discussion of radiant heat systems, methods of control; explanation of "Duostat" (controls heating medium according to outdoor temperature). Typical layouts. Johnson Service Co.

**1-69.** *Series "A" Blower Assemblies (Cat. 502)*, 8 pp., illus. Dimensions and performance data on die-formed blower unit; selection data; term definitions; fan law interpolations. Lau Blower Co.

**1-59.** *Corrosion Control in Air Conditioning—The Chromate Treatment of Their Water Systems (Serial 35)*, 16-p. booklet; use of chromate for controlling corrosion in water-cooled air conditioning systems. Graphs, examples, tests; results from field and laboratory research. Mutual Chemical Co. of America.

**8-140.** *Precision-Built Clark, AIA 30-G-1*, National Oil Burner Co. Reviewed October.

**8-141.** *Rutledge Steel Water Tube Heating Boilers*, R. W. Rutledge Water Tube Boiler Co. Reviewed October.

8 folders on "Silent Glow" oil burners. Parts illustrated, operations described; detail drawings, specifications. Silent Glow Oil Burner Corp.:

**1-60.** *Junior Defender Model 600.*

**1-61.** *Air-Seel Model 800.*

**1-62.** *Senior Defender Model 1200.*

**1-63.** *Model 1800.*

**1-64.** *Model 2800.*

**1-65.** *Model 3800.*

**1-66.** *Model 6800.*

**1-67.** *Model 8800.*

**8-150.** *Thatcher New V Series Comfortmaster*, Thatcher Furnace Co. Reviewed October.

**1-70.** *Protection and Control for the Modern Home*, 4-p. illus. folder on control valves for plumbing and heating systems. Watts Regulator Co.

### Doors and Windows

**4-62.** *Adlake Aluminum Windows, AIA 16-E-1*, 14-p. illus. booklet; details and data on aluminum window units. Installation details, specifications. Adams and Westlake Co.

**4-66.** *Bilco Copper Steel Bulkheads*, 4-p. illus. folder; cellar bulkheads for frame and masonry construction. Descriptions, data, diagrams. The Bilco Co.

**23-74.** *Light Up Your Living*, Curtis Companies, Inc. Reviewed October.

**4-63.** *Ellison Balanced Door Unit*, 10-p. illus. booklet; prefabricated entrance doors; offset hinges for wide opening; details, specifications, recommendations. Ellison Bronze Co., Inc.

**8-137.** *Hardware for Casement Windows*, H. S. Getty & Co. Reviewed October.

★ **4-64.** *Standard Thermopane Sizes, AIA 26-A-1946*, 4-p. illus. folder announcing standard modular sizes of Thermopane now available; for residential steel sash, picture, and double-hung windows; capacities, glazing details, instructions. Libbey-Owens-Ford Glass Co.

**4-67.** *Steel Basement Windows, (P&P 200)*, illus. sheet; steel basement windows and frames. Specifications, prices. Machine and Tool Co.

★ **4-65.** *Truscon Steel Windows and Industrial Doors, 1946 Edition*, 70-p. illus. catalog; specifications, installation details; standard modular sizes of steel windows, prefabricated double glazing, and doors. Truscon Steel Co.

### Electrical Equipment and Lighting

★ **5-35.** *Main and Range Service Equipment, AIA 31-D-3, (Bulletin 74)*, 4-p. illus. booklet; "Pulfuzswitch"—equipped service entrance, type MR, for houses having heavy-capacity appliances. Two models. Descriptions, advantages, specifications, prices. Frank Adam Electric Co.

**5-36.** *Type AC Circuit Breakers, AIA 31-D-3, (Bulletin 75, replaces Bulletin 63)*, 6-p. illus. booklet. Specifications, details, and tables for service equipment and load centers. Capacities, wiring data, prices. Frank Adam Electric Co.

**8-136.** *Authotone Chimes (No.110)*, Auth Electrical Specialty Co., Inc. Reviewed October.

**12-80.** *How To Get The Most From Fluorescent Lighting*, Day-Brite Lighting, Inc. Reviewed October.

From General Electric Co. (5 cents per copy—make check or money order payable to General Electric Co.) Reviewed October:

**12-81.** *A Ceiling of Light for Tomorrow's Classrooms, Y550.*

**12-82.** *Arches of Light for Modern Schoolrooms, Y551.*

**12-83.** *Remodeling With Light To Streamline Office Space, Y552.*

**5-34.** *Handbook of Farmstead Wiring Design, AIA 31-C-61*, Industry Committee on Interior Wiring Design. (40 cents per copy—make check or money order payable to the Industry Committee on Interior Wiring Design.) Reviewed October.

**5-40.** *Claude Banks Fluorescent, AIA 31-F (Supp. to Cat. 40)*, 14-p. illus. catalog on industrial and commercial fluorescent lighting fixtures; advantages, applications, dimensions, price lists; also exterior lighting fixtures. The Kirlin Co.

**12-84.** *Ceilings Unlimited*, The Miller Co. Reviewed October.

**5-37.** *Pittsburgh Permaflector Lighting, AIA 31-S-2, (Cat. 46)*, 126 pp., illus.; incandescent lighting equipment and accessories for interior and exterior use. Light-distribution charts, installation diagrams, product details, prices. Pittsburgh Reflector Co.

**5-38.** *Radiant Lamps for Educational Institutions*, illus. folder (4 x 6); weatherproof lamps from 50 to 10,000 watts. Uses, types, advantages. Radiant Lamp Corp.

**5-39.** *Roebling Electrical Wires and Cables (J-883)*, 22 pp., illus. General catalog; electrical wires, conductors, cables, coverings; data, dimensions, use, construction. John A. Roebling's Sons Co.

**12-85.** *Fluorescent Lamps, A-4759*, Westinghouse Electric Corp. Reviewed October.

### Finishers and Protectors

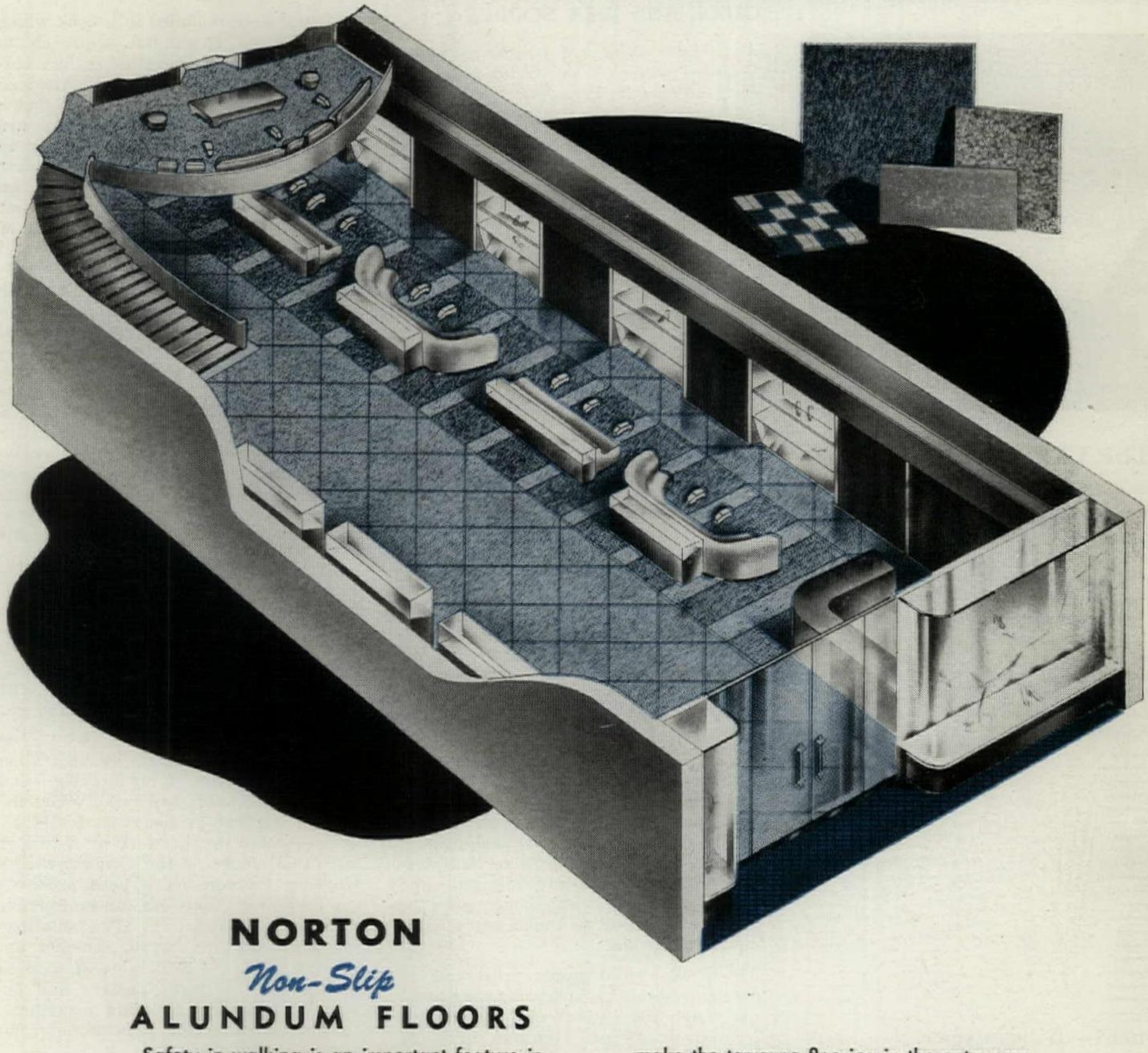
**6-74.** *Bondex Waterproof Cement Paint*, folder (4 x 6½); waterproof cement paint color chart, color schemes. For exterior, interior use. Brown Rogers Dixson Co.

**6-75.** *Martin-Senour Color Packs*, color chips (2½x2½); "Kolor Brite" enamel. Uses, advantages. The Martin-Senour Co.

**6-76.** *Maintenance and Sanitation Products for Hospitals*, 4-p. illus. folder on equipment and supplies for hospital maintenance. Brief descriptions. Midland Laboratories.

**16-115.** *Painting for Light and Decora-*

# Safety in Walking—An Important Feature In a Shoe Store of Distinction



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# REVIEWS

## GUIDE AND IDEA SOURCE

*Airport Planning. Charles Froesch and Walter Prokosch. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y., 1946. 251 pp., illus. $7.00*

This is an important contribution to technical literature on airport design and related facilities. Most of the available literature on this subject has been published in pamphlet or periodical form and covered only limited aspects of the problems involved. The rapidity with which the art and science of airport planning was advanced during the war years rendered much material obsolete shortly after it was published. Consequently, there existed a need for a good sound fundamental treatise on the subject.

The experience of the authors in the field of air transport has made them extremely cognizant of the dynamic nature of their subject. They therefore elected to treat the functional factors and basic fundamentals governing airport design and related facilities rather than specific design detail.

The authors' prime objectives were to indicate the proper relationship of landing facilities to communities or regions they are to serve; to analyze the characteristics of aircraft which affect the planning and design of landing facilities; and to strike a correct balance among the various elements of landing facilities. These objectives are achieved through a logical, well organized presentation of innumerable factors affecting or governing airport design, size, capacity, lighting, site selection, terminal design, hangar design, and special services. Supplementing the text are a number of tables and numerous illustrations.

The book should prove invaluable to everyone with an airport planning problem, from the student and the teacher to the practicing architect and the engineer. It is not, however, a book which can be used as a ready reference unless the user has thoroughly perused the entire text and thoughtfully studied the illustrations. The book presents no set formulae for airport design but rather acts as a guide to the airport planner and as a source from which ideas can be developed. For this reason it may have a longer-than-average life for a book on such an evolving subject.

The weaknesses of the book are few. The authors have been forced, for lack of up-to-date material illustrating the latest thinking on airport design, to use some illustrations which might better have been left unpublished. It is regrettable that illustrations of the Washington National Airport Terminal Building were included in a book which espouses the functional approach to design. Also to be regretted is the inclusion of (Parks Air College) illustrations of airparks wherein trees are shown at ends of runways. These trees are definite obstructions and hazards to flight and are in contravention to what the authors state in their section on obstruction and zoning. The greatest weakness of the book is in its lack of emphasis and material on proper and adequately planned buildings and facilities for the fixed base operator and the private flyer. Too little thought has been given to this phase of aeronautical activity which, according to the experts, will account for a major portion of the national total activity. More sound material must be published as a guide and source of ideas if the smaller airports and airparks are to be successful elements of communities and not eyesores, as so many filling stations and garages are today.

FRANCIS R. MEISCH

## HOUSING DOWN UNDER

*Homes in the Sun: The past, present, and future of Australian housing. Walter Bunning. W. J. Nesbit, 124 Liverpool Street, Sydney, 1945. 100 pp., 182 illus.*

What has gone wrong in the Australian past in the fields of home design and community planning to bring about the present critical problems is forcefully demonstrated in this work by a former executive officer of the Commonwealth Housing Commission. These problems as described have an uncomfortable similarity to our own. The solutions recommended are sound, sensible applications of the principles of modern architecture to home design, and accepted community planning procedures to provide a better general environment for living.

To exemplify his theories the author chiefly relies on illustrations from non-Australian publications, especially from American periodicals. Those chosen display his good judgment and taste as they are some of the best that have appeared here. Unfortunately for us we have not begun on any large scale to approach their high level.

Capable sketches by the author enliven the text, which briefly develops the needs of the individual family, of the community, and of the larger community—the region. The book is climaxed by a final plea for cooperation from each citizen in support of a constructive housing and planning policy.

LAWRENCE E. MAWN