

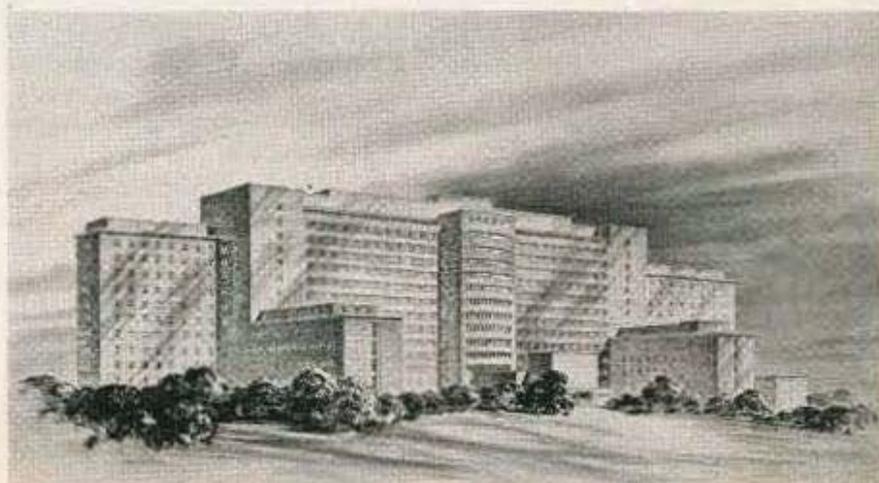
A national clinical center for chronic disease research

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THE RECOGNITION of chronic diseases as a major public health problem has emphasized the need for a coordinated research program in long term illnesses. These are now the greatest causes of disability and death in our population. With advances in the prevention and treatment of communicable disease and with the increasing number of aged persons—among whom chronic disease is most prevalent—we are confronted with an urgent need for more knowledge in the prevention and control of chronic illnesses.

The National Institutes of Health, the research arm of the Public Health Service, Federal Security Agency, conducts laboratory research in nearly all fields of medical science. Its clinical center now under construction will provide not only necessary additional laboratory facilities, but will furnish clinical facilities for the National Cancer Institute, National Heart Institute, National Institute of Mental Health, Experimental Biology and Medicine Institute, Microbiological Institute and National Institute of Dental Research as well. Thus, the clinical center will be a broad step toward conquering chronic diseases in the United States.

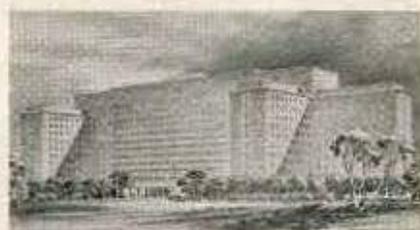
General medical facilities in the clinical center will provide for the investigation and treatment of certain patients from everywhere in the nation affected with cancer, heart disease, metabolic diseases, mental diseases and infectious and tropical diseases. The Research Facilities Planning Committee of the National Institutes of Health, responsible for the development of the building program, now is conducting a series of special studies which include planning for: (1) Psychiatric care and research, (2)



facilities for metabolic studies, (3) scientific libraries, (4) design of chemical fume hoods in laboratory planning in air conditioned buildings, (5) development of centralized services (glassware washing, cage cleaning, photography and bacteriological media preparation), (6) breeding and care of experimental animals, (7) environmental sanitation (air conditioning, lighting, safety features, equipment for food preparation and food service).

Authorization by the United States Congress for the expansion of the facilities for intramural research programs of the National Institutes of Health provided for the acquisition of an additional 213 acres of land adjacent to the present 90-acre site at Bethesda, Md., a community which is about seven miles north of Washington, D.C.

In the basic planning the Public Health Service and the Public Buildings Administration sought to design a laboratory-hospital building which would provide twice as much space for research laboratories as for direct care of patients;



THE CLINICAL center will be a 14-story structure combining hospital and research facilities. Artist's perspectives show the south view (top) and the northern exposure.

afford proximity of scientific investigators and clinicians for free interchange of ideas and knowledge; localize the basic science and clinical research laboratories and nursing units for one disease category on each floor for a coordinated team approach.

The most desired elements were utility and flexibility to meet the ever-changing requirements of laboratory research, patient care and administrative practices.

The clinical center will be an air conditioned building designed in approximately the shape of a Lorraine cross. The central stem utilizes a modified two-corridor or three-function plan, locating all

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PLANS for the National Institutes of Health include not only the new clinical center (right) but a group of service and auxiliary buildings shown at the upper left. Existing buildings, center foreground, were designed as the nucleus of a large-scale program.

patients' rooms on the south side, the nursing service units in the center, and all clinical investigation laboratories on the north side. The head house is flanked by six wings containing the basic science laboratories.

Architectural pattern, placement of passenger and freight elevator banks, centralization of certain hospital and laboratory service departments, installation of dumbwaiter pneumatic tube systems and location of auxiliary service buildings connected by an underground tunnel were determined by important considerations of vertical and horizontal traffic flow for (1) "unity with diversity," (2) flexibility in the use of space, and (3) efficiency of operation and convenience for personnel.

To guide initial program planning, the provisional allocation of bed complements and laboratory modules (12 ft x 20 ft.), follows:

	Beds	Lab ^s
National Institute of Mental Health	150	215
National Cancer Institute	125	270
National Heart Institute	100	246
Experimental Biology and Medicine Institute (Metabolic diseases)	75	160
Microbiological Institute (Infectious and tropical diseases)	50	88

Other major assignments of space for general service functions include:

1. Routine laboratories 38 modules
2. Physical medicine and rehabilitation 46 modules
3. Scientific library 60 modules
4. Surgical suite one-half tenth floor, central stem
5. Diagnostic x-ray department one-half sixth floor, central stem
6. Radiation Eight-story wing
7. Dental services 38 modules
8. General pathology 30 modules

There also are space allocations for outpatient and administrative departments and central services.

The bed capacity of the clinical center will be 500 and the number of research laboratory modules (12 ft. x 20 ft.) approximately 1,000, exclusive of modules assigned to routine diagnostic and treatment facilities and ancillary services.

In addition to the clinical center, the present construction program of the National Institutes of Health includes the following auxiliary service buildings: Temporary radioactive facilities building (now under construction); utility building (now under construction); power plant; shops, laundry and storage building; animal breeding building and animal feed building; grounds maintenance building and

underground storage vaults for combustibles.

A guiding consideration in the plan has been the location of service functions such as power and utilities, storage, maintenance shops, and laundry outside the clinical center building. This arrangement makes possible the maximum utilization of the more expensive type of construction for laboratory and patient care functions.

The major service buildings are connected with the clinical center by a nine-foot tunnel for utility lines and an adjacent nine-foot tunnel for transportation of supplies and refuse, exclusive of a 2 ft. 4 in. sidewalk for pedestrians.

The entire project is scheduled for completion in July 1952.

CLINICAL FACILITIES

Many of the standard ratios for general hospital design were necessarily modified because the categories of disease to be admitted to the clinical center involve long-term illness, including psychiatric and infectious and tropical diseases. The primary purpose of the center, moreover, is for scientific investigation as well as treatment. In addition to all of the resources and equipment of a modern general hospital, an institution for the care of chronic disease should include accommodations for special emphasis on ancillary services such as medical and psychiatric social work, public health nursing, physical medicine and rehabilita-

tion, diversional and recreational therapy and religious ministry for all faiths. The chapel, an important feature of the center, has a revolving interchangeable altar which will provide religious services for all faiths.

Patients' facilities: The patients' rooms and nursing services of the center are arranged to provide maximum comfort to the sick and working convenience to the nursing staff. The planners have had to consider the probability that the ratios of bed-bound, semi-ambulatory and ambulatory patients will vary greatly, depending on the stages of certain diseases under study at different periods.

The typical nursing unit on the east half and west half of the main stem, is in close physical relationship to the clinical investigation area on the north side. In each nursing unit, there are 13 two-bed rooms on the south side, with service units in the middle row of rooms. With exception of the floor serving pantry, which accommodates both nursing units on each floor, the middle row nursing service rooms are identical in both east and west nursing units.

The service rooms for every nursing unit of 26 patients include:

A. Patients' dining room with a

total capacity of 16 patients.

B. Treatment rooms, including small laboratory bench for on-the-spot simple laboratory tests.

C. Small office for use by charge nurse, dietitian or social worker.

D. Nursing station (with separate medication room), including pneumatic tube station and single panel board for nurses' call lights, soft audible doctors' call system, pre-signal fire alarm chimes and signal light and dumbwaiter signal light.

E. Utility room.

F. Flower room.

G. Linen room (for special truck with shelves).

H. Passage to clinical research laboratories.

I. Nurses' rest room.

J. Stretcher and wheel chair room.

K. Janitor's closet and gear room.

L. Trash chute.

M. Linen chute (with adjacent mechanical washing machine for badly soiled linen).

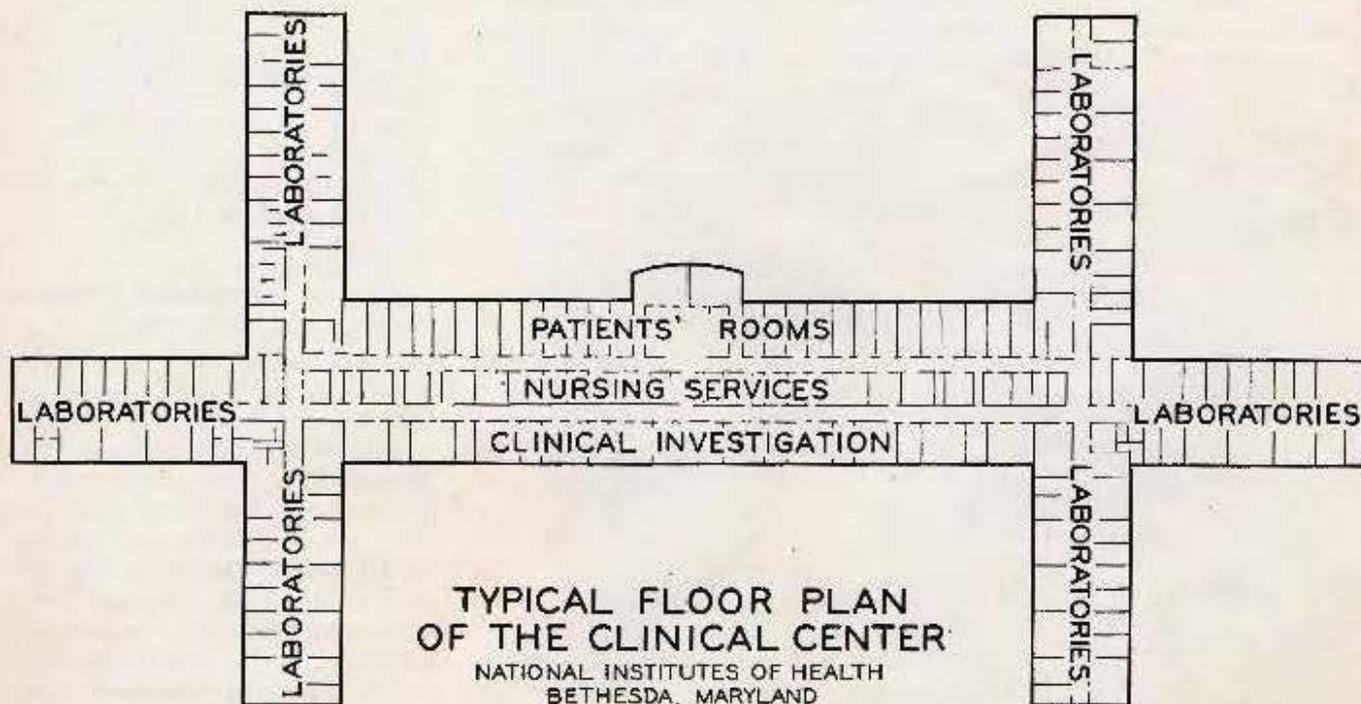
The floor serving pantry in the east nursing unit, is 17 ft. x 34 ft. It is furnished with considerable mechanical equipment for rapid assembly of food trays from electric heated food carts (sent from main kitchen via special elevator)

and prompt delivery to 52 patients. Each pantry also includes a garbage grinder disposal unit, pre-rinse double sink and two-tank mechanical dishwasher.

Corridors are eight feet wide with 4 ft. 6 in. tile dado, flush with plaster, and five-inch terrazzo base. There is a metal handrail (36 inches high) on both sides of the corridor for the convenience of semi-ambulatory patients. Recessed fire hose and extinguisher cabinets are located at 100-foot intervals and are identifiable from a distance by a light colored tile marker in the floor.

The corridor ceilings (suspended, height 9 ft., 6 in.) are treated with prefabricated acoustic tile. Illumination is furnished by hanging metal indirect incandescent light fixtures in the patient areas. Drinking fountains, with centrally supplied chilled water, are located in each nursing unit and at wing crossings.

Typical patient's room: The typical patient's room is 17 ft. x 11 ft. 6 in., designed to accommodate two beds. Construction details include an aluminum frame window 4 ft. 6 in. x 5 ft., asphalt tile floor, plaster walls painted in pastel shades, terrazzo base, plaster ceiling and steel doors four feet wide.



FLEXIBILITY combined with functional layout will make the clinical center ideal for research laboratories. Space will be allotted according to the requirements of each research group. Equipment and furnishings will be standardized for efficiency and economy.

The room is air conditioned. It contains a lavatory wash basin with mirror and two small lockers for clothes. Cubicle curtains and outlets for centralized oxygen and vacuum, electricity, telephone, radio, public address and nurses' call are available for each bed. A conduit for the future installation of central television reception has been provided. Indirect illumination will be furnished by a standing lamp with inverted bulb bowl.

There is no overhead lighting fixture, although a concealed outlet has been built into the ceiling for future use, if necessary. A night light is situated on the far wall 18 inches from the floor. An improved reading lamp for attachment to the wall or head bedpost now is being designed.

Inasmuch as many patients will be ambulatory or semi-ambulatory at different periods of study and treatment, a variety of beds

will be available for each floor. Moreover, several types of highly mobile beds for easy transportation of bed-bound patients will be given pilot study during the construction of the clinical center. The width of the doors of bedrooms and clinical research laboratories and elevator entrances are dictated by the greater-than-normal traffic involving beds, stretchers and scientific apparatus in a research institution.

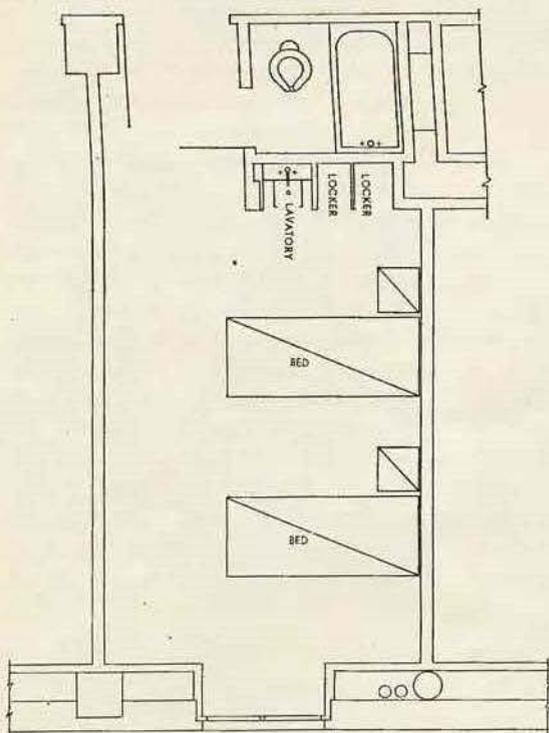
Adjacent to each patient's room will be a bathroom containing a bathtub and showerhead, toilet, bedpan washing hose and storage rack. A metal pull-up bar and emergency nurses' call bell are provided beside the toilet seat for the semi-ambulatory patient. A safety bar is to be provided on the wall over the bathtub. The exhaust ventilation duct for the bedroom is in the ceiling of the bathroom.

UTILITY ROOMS

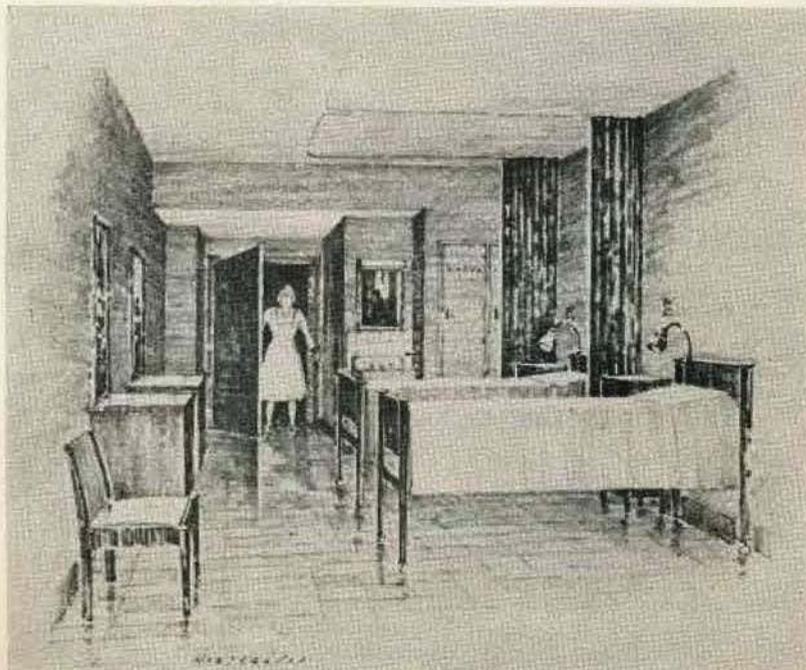
The utility rooms, centrally located in the middle row of service rooms in each nursing unit are 16 ft. x 17 ft., with separate in and out doors. No attempt has been made to achieve so-called separation between clean and dirty areas. It is believed that the size of the room and the location of equipment will encourage separation better than subdivision by various types of physical barriers. There are no bedpan washing facilities in the utility rooms, since bedpans are cleansed and stored in the toilets adjacent to the patients' rooms. Ice cubes for chilled drinks are supplied to the nursing staff in the floor pantry rather than in the utility room.

METABOLIC KITCHENS

On the west nursing units of the seventh, eighth and ninth floors there are metabolic kitchens for the preparation of special diets in nutrition studies (see page 55). Another type of metabolic kitchen, designed for the north side laboratory area of the clinical center by Dr. Russell Wilder and his associates at the Mayo Clinic is being considered also. These special food service units provide for the most meticulous preparation of carefully analyzed food stuffs, beyond the degree of accuracy which usu-



PATIENTS' rooms in the center will accommodate two beds and include toilet facilities as well as locker space for clothes. Each room will be air conditioned and equipped with oxygen, vacuum, telephone, radio, public address and nurse call outlets. A conduit for the future installation of central television reception also will be available.



ally can be handled in the special diet kitchens of hospitals.

INFECTIOUS DISEASE UNIT

The basic floor plan has been modified in one nursing unit of the eleventh floor for the care of infectious disease patients (see page 56). Each of the 13 rooms is a self-sufficient unit which insures maximum protection and efficiency and thus permits the concurrent investigation and treatment of several types of communicable diseases. The length of the typical bedroom has been reduced from 17 feet to 15 ft. 1 in. The patient's lavatory has been recessed in the bathroom and a shower substituted for the tub.

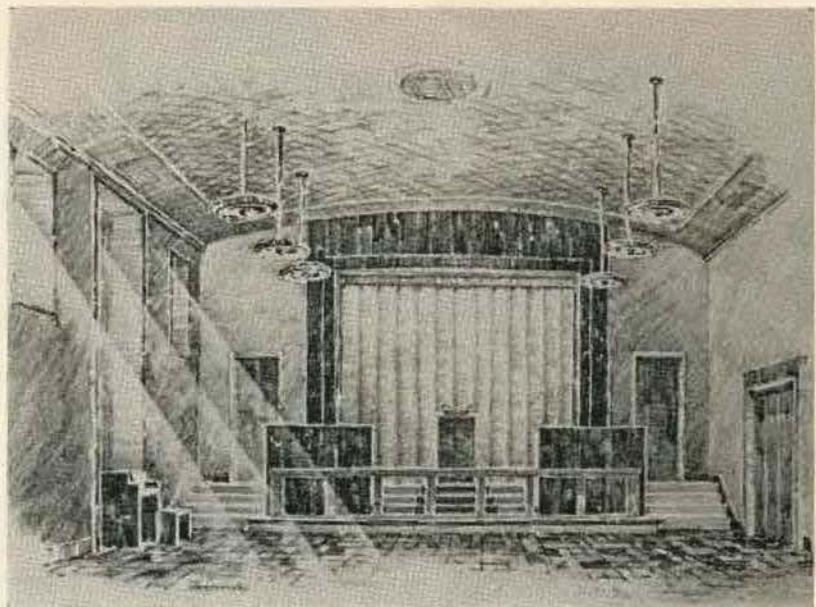
Personnel in contaminated gowns, masks and caps are to be restricted to the bedrooms, thus reducing the possibility of contamination of corridors. This plan permits free use of the corridor for normal traffic. A recessed area in each patient's room, fitted with a foot control lavatory, facilitates aseptic techniques by providing hand washing facilities and essential supplies (clean gowns, masks and caps) in a "clean" area immediately adjacent to the source of contamination.

NEUROPSYCHIATRIC SERVICE

The integration of patient care, clinical investigation and basic science research in neuropsychiatry with other disease categories is a significant feature of the comprehensive program of the National Institutes of Health. The 150 beds and 215 laboratory modules assigned to the intramural program of the National Institute of Mental Health represent the greatest allocation of space among the six institutes within the new clinical center.

The planning of the second through the fifth floors provides accommodations for psychiatric patients ranging from the seriously disturbed to those with minor emotional disorders. This wide range is necessary because the proposed research program covers all psychiatric and neurologic conditions.

The patients' facilities provided for the National Institute of Mental Health differ from the typical nurs-



A REVOLVING interchangeable altar has been designed for the chapel at the center. This will provide religious services for all faiths and will contribute to the well-being of patients. The altar here is arranged for non-sectarian services.

ing area previously described as follows:

1. The second, third and fourth floor units accommodate an average of 16 patients instead of 26. The fifth floor conforms to the typical plan. The capacity of the bedrooms ranges from one to six patients. Four special security rooms for disturbed patients are on the third floor. These are provided with a special light signal and intercommunicating systems for nursing personnel in case of emergency.

2. There is additional day room space, with removable partitions for flexibility.

3. Doctors' office suite is provided with examining room, one-way mirror screens and recording apparatus.

4. A substation for admitting procedures is provided.

5. A hydrotherapy room with continuous flow bath is planned.

6. Safety glass and brackets for installation of safety screens are to be used on all windows, except the fifth floor.

7. Outlets in all patient rooms will permit microphone hook-up to central recording equipment.

8. A separate key system has been provided.

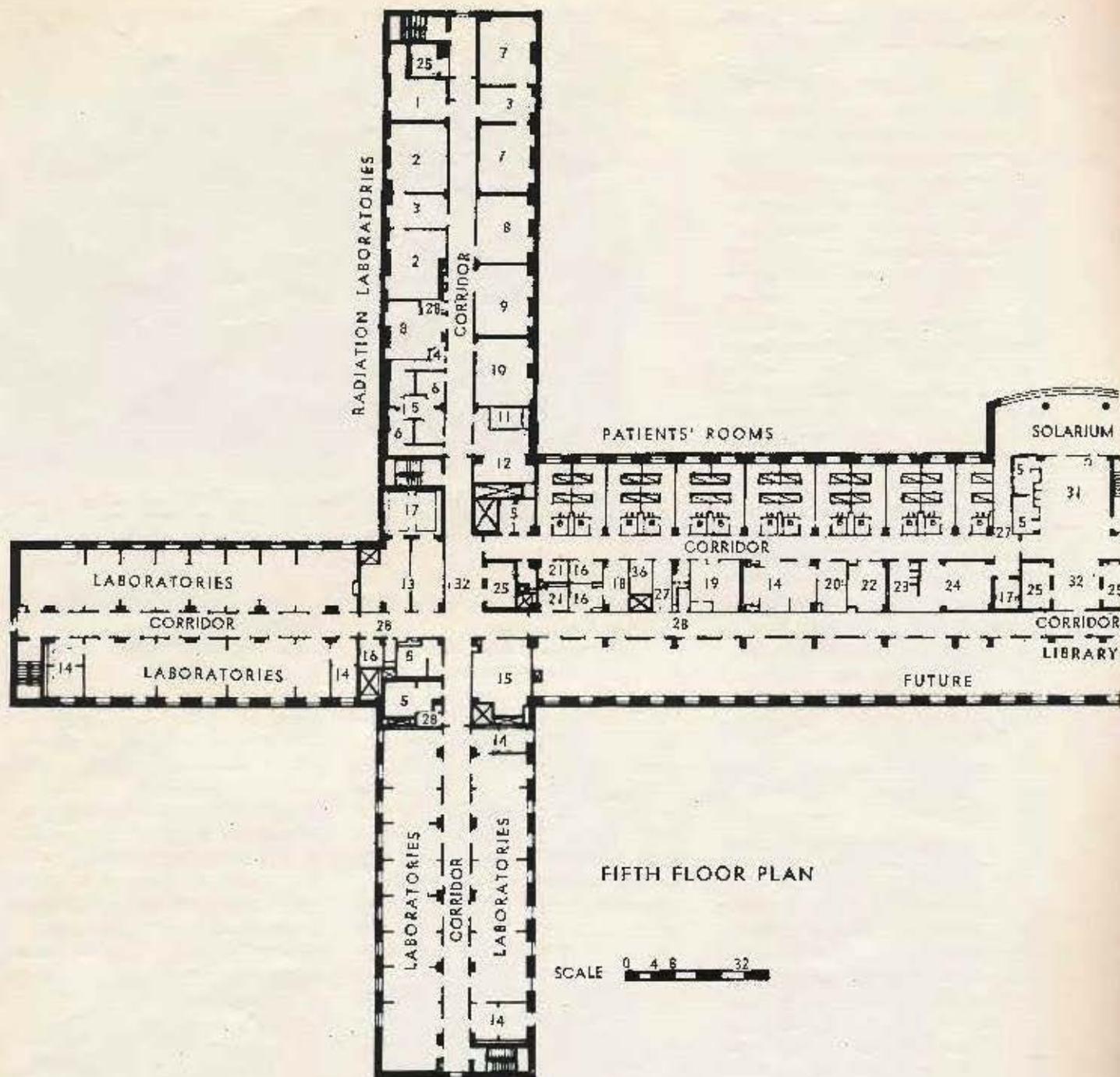
There also is one room for local occupational therapy activities, as in the nursing units of other institutes.

The physical relationships of the hospital and laboratory units for neuropsychiatry offer opportunities for conducting multiple research projects with wide variations in content and techniques. The proximity of the patients' accommodations and research staff to the other categorical services in the clinical center promise close collaboration among staff members in (1) applying the disciplines of the biological sciences to neuropsychiatric research and (2) emphasizing the emotional aspects of organic illness in cancer, cardiac, metabolic, infectious and tropical and dental diseases.

SURGICAL SUITE

The surgical suite will occupy the west half of the tenth floor of the central stem. The 84-foot width of the head house afforded an interesting opportunity for the layout of the surgical facilities. The supporting concrete columns, however, were limiting factors in room design in some areas.

There are eight operating rooms, two endoscopy rooms, one plaster room and one electroencephalographic recording room. The average operating room is about 18 ft. x 20 ft. There are no visitors' bleachers. Scrub-up rooms are adjacent to each operating room. Space has been assigned for a central television projection control



FIFTH FLOOR PLAN

room, but rapid developments in this field have made it difficult to anticipate its ultimate requirements.

The ventilation, electrical wiring and equipment, standards for movable equipment and specifications for conductive terrazzo floors conform to the recommendations recently issued by the Committee on Explosions in Hospital Operating Rooms of the Public Buildings Administration.

In an attempt to eliminate the maze of wires and suction lines which usually clutter the floor

around the operating table, a stainless steel monitor box 12 in. x 18 in. (with the base six inches above the floor), is to be built immediately to the left of the anesthetist's table in each operating room. The underfloor conduits to the monitor will carry three electric lines (safety plugs), two vacuum lines, one sound system line and one blank for eventual hook-up for television or various types of scientific recording devices.

Each operating room has an adjoining anesthesia room, approximately 8 ft. x 10 ft., equipped with

central suction, emergency signal to the offices of the chief anesthetist and surgical supervisor and a wall bracket spotlight (for final check on the "prep" area).

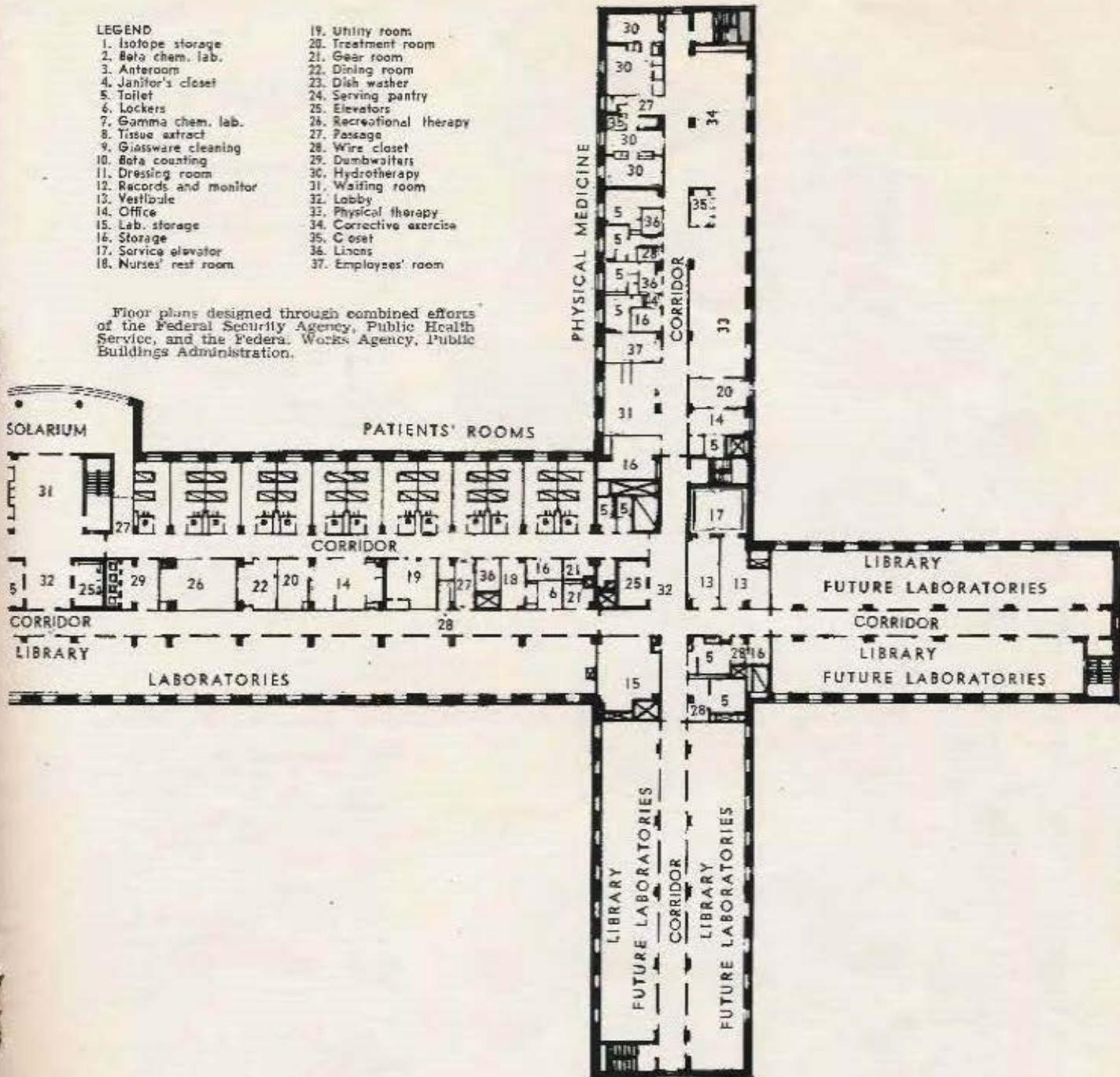
The recovery room is about 40 ft. x 9 ft. with sliding doors to the corridor. It is equipped with central oxygen and suction supply and an emergency intercommunicating system to the office of the surgical supervisor. There is an adjacent utility room and auxiliary blood bank. The surgical suite also contains the following:

1. A bank of four dumbwaiters

LEGEND

- | | |
|-------------------------|--------------------------|
| 1. Isotope storage | 19. Utility room |
| 2. Beta chem. lab. | 20. Treatment room |
| 3. Anteroom | 21. Gear room |
| 4. Janitor's closet | 22. Dining room |
| 5. Toilet | 23. Dish washer |
| 6. Lockers | 24. Serving pantry |
| 7. Gamma chem. lab. | 25. Elevators |
| 8. Tissue extract | 26. Recreational therapy |
| 9. Glassware cleaning | 27. Passage |
| 10. Beta counting | 28. Wire closet |
| 11. Dressing room | 29. Dumbwaiters |
| 12. Records and monitor | 30. Hydrotherapy |
| 13. Vestibule | 31. Waiting room |
| 14. Office | 32. Lobby |
| 15. Lab. storage | 33. Physical therapy |
| 16. Storage | 34. Corrective exercise |
| 17. Service elevator | 35. C. closet |
| 18. Nurses' rest room | 36. Linens |
| | 37. Employees' room |

Floor plans designed through combined efforts of the Federal Security Agency, Public Health Service, and the Federal Works Agency, Public Buildings Administration.



to the central sterilization and supply room and pharmacy.

2. A setup room with complete sterilizer facilities as an alternate to central supply service.

3. Nurses' work room and sterile supply storage.

4. Locker rooms.

5. Offices for surgical supervisor, chief surgeon and chief anesthetist.

6. Dictation room for surgeons and clerical-stenographic room.

7. Stretcher alcove and general utility room.

The nearby wings provide liberal laboratory facilities for immediate tissue sections and other urgent diagnostic procedures.

The main corridors and lead-off corridors are all eight feet wide, with acoustic tile ceilings and recessed fluorescent lights.

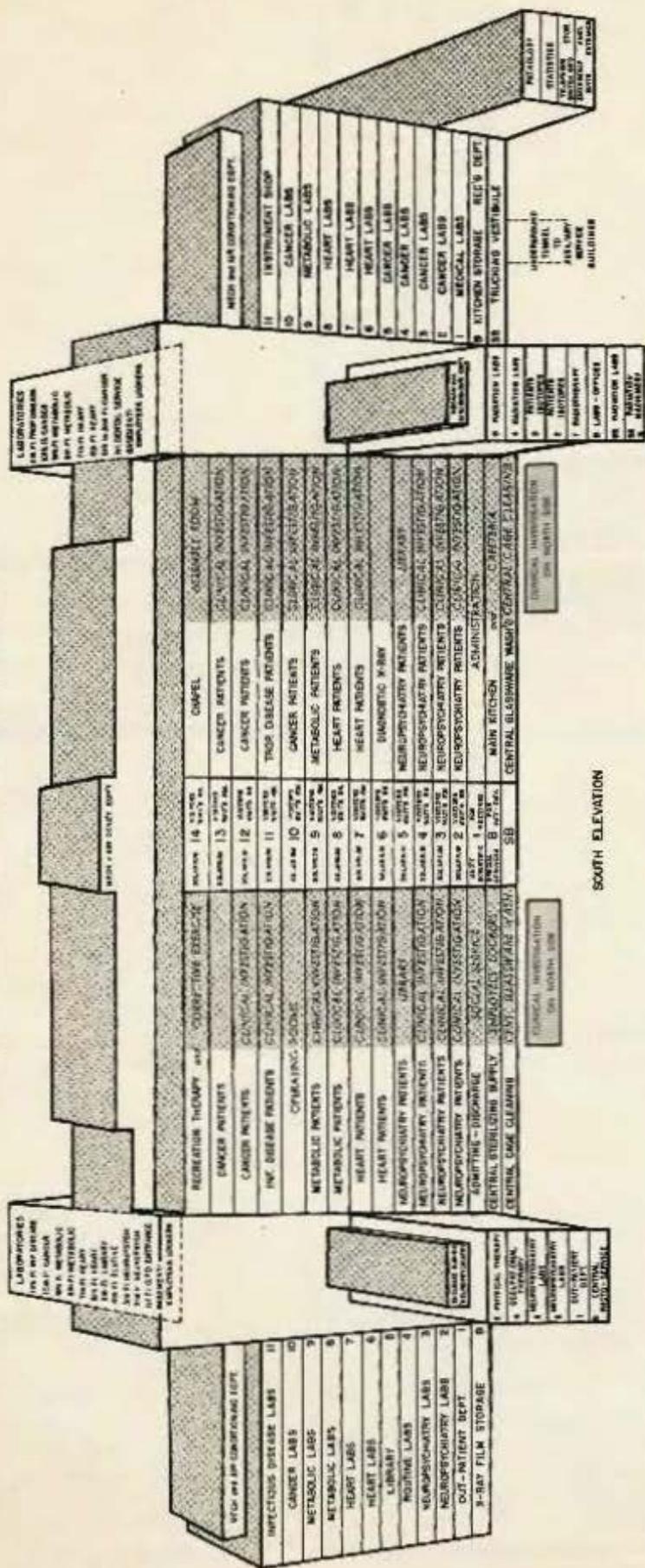
OUTPATIENT DEPARTMENT

The outpatient department will serve follow-up patients, special investigative projects for ambulatory patients and the employees' health service. It has been difficult to project the anticipated patient visit load. An area of approximately 14,700 net square feet in the

west half of the main floor and the adjacent three wings has been assigned for ambulatory patients' services.

Flexibility in the reallocation of space in future years is achieved through the use of demountable metal partitions. There is a separate entrance to the outpatient department. The waiting rooms have been decentralized and office space has been assigned for the staff of the social service, nutrition, health education and rehabilitation departments. Special facilities for the observation of children at

THE CLINICAL CENTER
NATIONAL INSTITUTES OF HEALTH
PUBLIC HEALTH SERVICE FEDERAL SECURITY AGENCY



Architectural and

Construction
 Reinforced concrete beam and slab on caissons.

Overall length
 780 ft., with longitudinal axis east-west.

Width
 Central stem, 84 ft. (floors 2-14).
 Wings, 54 ft.

Height
 Central stem, 182 ft.
 Wings, 75 ft.-150 ft.; 5 to 11 stories.

Size
 1,266,400 square ft.
 16,465,600 cubic ft.

Exterior
 Red brick, grey mortar joints and limestone trim, matching present laboratory buildings.

Fenestration
 12-ft. module arrangement.
 Aluminum window frames and sash, casement type, 4 ft. 6 in. by 5 ft., swinging in [for cleaning only since entire building is air conditioned].

Roofs
 Flat, with built-up composition roofing.
 Sun decks are of promenade tile.

Floors
 Weight bearing load: General, 90 lbs.; special, 150 lbs.
 Patient area: Asphalt tile.
 Operating rooms: Conductive terrazzo (cement carbon matrix or magnesium oxychloride matrix).
 Kitchens: Quarry tile.
 Lobbies: Terrazzo and wood.

Partitions
 Patient area: 4-in. terra cotta, plaster.
 Laboratories: See below.
 Public toilets and locker rooms: Ceiling hung steel, porcelain enamel.

Corridors
 Width: 8 ft.
 Wainscot 4 ft. 6 in. tile; 5-in. terrazzo base.
 Asphalt tile floor.
 Acoustic tile ceilings with suspended fixtures, incandescent lighting.

Ceilings
 Patient area: 9 ft. 6 in., suspended, plaster.
 Waiting rooms, offices, corridors: Acoustic tile.

Engineering Data

Load: 300 lbs.

Signal lights at nurses' station. Three dumbwaiters operated via central station; one operated via "call and send."

Pneumatic tube system

Constant running.

Vacuum type incorporating twin tube and independent lines.

57 substations.

Carrier container: 14 in. by 2.75 in.

Fire protection

Fireproof materials throughout.

Sprinklers: laundry chutes and laundry collection rooms; trash chutes; stage of auditorium.

Fire alarm system, including chime and light signals at nurses' station.

Fire detection unit thermostat (or pneumatic tube) system in all laboratories.

Watchman's report system.

Fire squad.

Clock system

Electrical: Minute impulse type, central control.

Housecleaning vacuum system

Capacity of 22 sweepers operating simultaneously. Vacuum inlets at 50 ft. intervals in all corridors.

Emergency electrical power system

For lighting of (1) corridors and exits and (2) operating rooms; for current to (1) five elevators and (2) fire alarm system and (3) central oxygen system alarm.

Typical laboratory

Module: 12 ft. by 20 ft.

Floor: Grease-proof asphalt tile.

Partitions: Metal demountable including waistscot for exterior wall.

Ceiling: Unfinished concrete; height, 11 ft. 6 in.

Doors: 3 ft., plus 1 in. panel, steel.

Windows: Aluminum, 4 ft. 6 in. by 5 ft.

Lighting: Fluorescent, direct; 40-ft.-candels illumination at bench top.

Automatic fire detection system.

Air conditioning

Building completely air conditioned. Heating and cooling tower equipment located in power plant; steam, hot water and chilled water lines run via tunnel to clinical center. High pressure air duct method of air conditioning used throughout except in middle row nursing service rooms of central stem which use low pressure ducts. Enclosed window air conditioning units temper heated (or cooled) air from high pressure ducts by hot or chilled water in secondary coils in units. Laboratories and bedrooms furnished with 2.5 fresh air changes per hour. No recirculation of spent conditioned air. Window units extract secondary air from room and produce 10 to 12 air turnovers per hour. Patients' rooms equipped with electric thermostat controls. Laboratories equipped with pneumatic thermostat controls.

Cost

\$1.80 per cubic foot (estimated). Sub-structure and superstructure contracts indicate cost will be within this estimate.

play have been installed for the National Institute of Mental Health.

DIAGNOSTIC X-RAY

The diagnostic x-ray department will occupy the east half of the eighth floor, an area of about 14,000 square feet. Here, too, the 84-foot width of the main stem of the building offers an unusual opportunity to utilize a two-corridor plan. The central row of rooms has been designed for dark rooms, developing and drying mechanical equipment, viewing rooms (wet film viewing, departmental staff reading and dictating room, and hospital staff auxiliary viewing rooms), current film filing and clerical stenographic room. The pneumatic tube system will convey small x-ray films to all parts of the building. Liberal provision has been made for offices for the full-time staff and for separate waiting rooms for stretcher cases, ambulatory inpatients and outpatients.

The department is planned for an estimated load of 150 cases per day, with due consideration for the more time-consuming types of examinations in clinical research programs. For example, the cardiovascular unit includes provision for angiocardiology, cardiac catheterization and electrokymography.

One operating room within the x-ray department is equipped for cystoscopic examinations, another operating room is planned for ventriculography. Space also has been allocated at the lateral-most portion next to the wing laboratories for animal radiographic studies.

Extensive storage space for x-ray films has been allocated in one sub-basement wing.

With the exception of one x-ray apparatus adjacent to the autopsy room, a photofluorographic unit in the outpatient department and small dental units, all diagnostic radiological equipment is centralized in the diagnostic x-ray department. Electrical outlets for mobile x-ray apparatus are provided in all nursing units and in one surgical suite operating room.

PHYSICAL MEDICINE

Physical therapy: The physical therapy division of the department of physical medicine occupies the

fifth floor of one wing, an area of about 5,700 net square feet. Provision is made for all therapy modalities (including electricity, light, heat and water), corrective exercises, physicians' office space and examination rooms, waiting rooms, linen rooms, lockers and toilets. The hydrotherapy section also includes two sunken baths, approximately 8 ft. x 4 ft., equipped with a water agitation device and thermostatic controls, for the treatment of rheumatism and various types of muscle paralysis. Two typical laboratory modules are included for research in the effects of physical agents. These will contain special equipment such as a plethysmograph, spirometer, vital capacity apparatus, self-recording thermocouples and dermometer.

On the roof above the division of physical therapy will be an enclosed sundeck for heliotherapy.

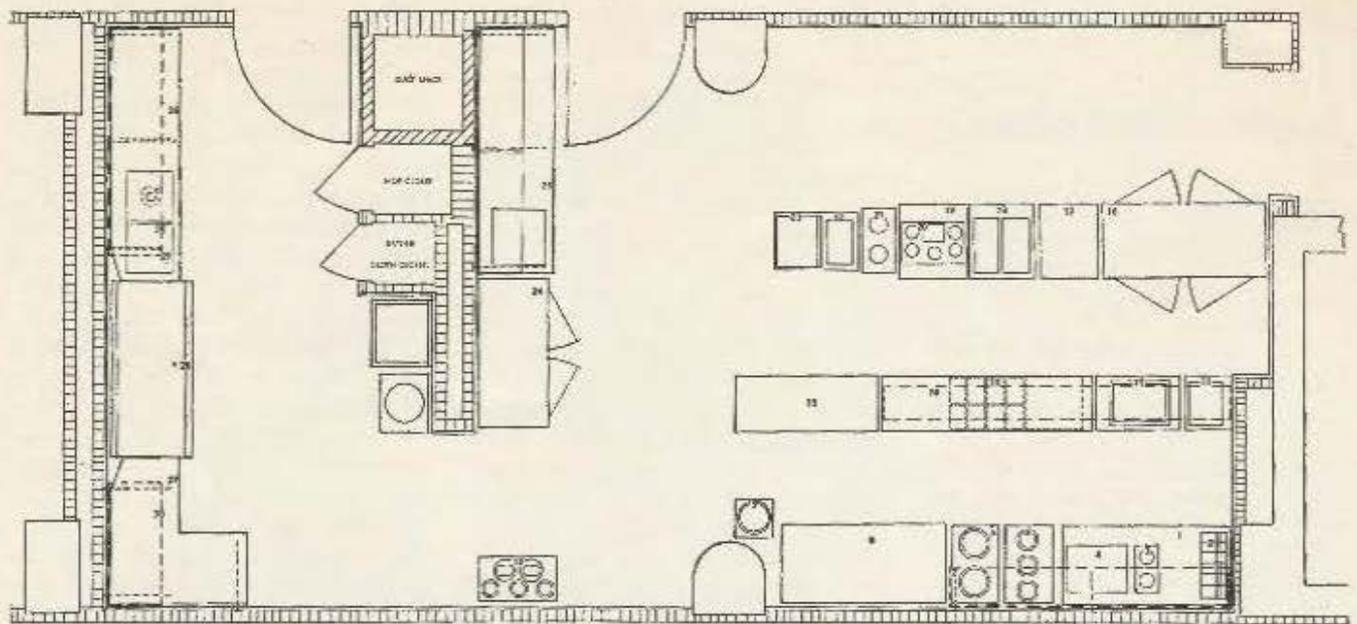
On the second, third and fourth floor nursing units, to be occupied by neuropsychiatric patients, there will be two rooms approximately 12 ft. x 17 ft., for continuous flow baths for disturbed patients.

Occupational therapy: The occupational therapy division of the department of physical medicine occupies one wing floor, approximately 5,300 net square feet in the same wing and immediately beneath the physical therapy service. Metal demountable partitions will permit the size of rooms to be adjusted for various forms of occupational therapy.

In addition, some decentralization of occupational therapy is possible through assignment of one room in most nursing units in the central stem for group work by the visiting occupational therapist.

RADIATION WING

The activities of the radiation wing will represent one of the most important parts of the clinical center program. Research will be conducted to extend the knowledge of the biologic effects of ionizing radiations. It also will expand the usefulness of radiation therapy (external as well as internal) and improve the use of radioactive isotopes as diagnostic tools (e.g., the use of "tracers" in metabolic investigations).



FLOOR KITCHEN PLAN UNIT 2
 1/4" = 1'

- | | | | | |
|--------------------------|--------------------------|-------------------------|---------------------|-------------------------|
| 1. Counter | 7. Shelves | 13. Counter | 19. Table | 25. Counter, cabinet |
| 2. Egg boiler | 8. Bulk food cart | 14. Shelves | 20. Coffee maker | 26. Soiled dish table |
| 3. Hot plate | 9. Plate Cover dispenser | 15. Patients' tray cart | 21. Plate dispenser | 27. Clean dish table |
| 4. Griddle | 10. Bowl-dish dispenser | 16. Refrigerator | 22. Table | 28. Dishwashing machine |
| 5. Cereal bowl dispenser | 11. Sink | 17. Table | 23. Toaster | 29. Sink |
| 6. Plate dispenser | 12. Tray dispenser | 18. Cup-pot dispenser | 24. Refrigerator | 30. Shelf |
| | | | | 31. Garbage grinder |

KITCHENS will be located on floors two to five and seven to 13, inclusive, and will provide space for the most modern of equipment. This plan shows the large working areas and ample storage space provided for housekeeping supplies, utensils and dish dispensers.

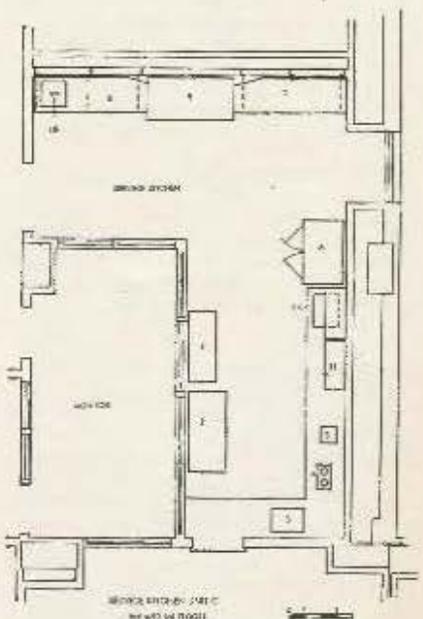
There is urgent need for more fundamental radiobiologic research with high energy radiations by teams of investigators representing many scientific specialties such as physics, biochemistry, physiology, pathology and genetics. Moreover, there appear to be many promising avenues of clinical research in high energy radiations which may yield better results in radiotherapy.

One entire wing, extending three stories under the ground and five stories above ground, has been built for the investigation and diagnostic and therapeutic application of ionizing radiations. The eight floors provide an area of 35,000 square feet of working space. Extraordinary precautions must be exercised in the use of radiations in the multimillion volt range and in the handling of all radioactive substances, especially in hospitals. For this reason the design and construction of this portion of the clinical center has raised many difficulties and complicated problems of shielding, ventilating, plumbing, laboratory equipment and floor surfaces.

All available data have been applied to insure the greatest possible safety for personnel and patients. Many items such as dishes, clothing, cages and instruments cannot be serviced through central facilities and must be handled in the radiation wing, creating unavoidable duplication of equipment because of the hazards involved. As in all radiation installations, the rigid enforcement of safety regulations will be the responsibility of specially trained health personnel assigned to duty on each floor.

Lower floors are devoted to apparatus and laboratories for external radiation. The equipment will include six standard 250 KV x-ray apparatuses for radiotherapy; a 50-million electron volt synchrotron or induction accelerator for the study of high energy x-ray and electron therapy; two electrostatic generators of two million electron volts for the development of new techniques with highly penetrating x-ray beams.

There also will be a 12-million volt electrostatic generator for experimental research and therapy



- | |
|--------------------------------|
| 1. Patients' tray cart |
| 2. Bulk food cart |
| 3. Griddle |
| 4. Coffee maker |
| 5. Toaster |
| 6. Refrigerator |
| 7. Clean dish table |
| 8. Soiled dish table |
| 9. Dishwashing machine |
| 10. Garbage grinder |
| 11. Counter, sink and cabinets |

SERVICE Kitchens for floors two and three are furnished with mechanical equipment for rapid assembly of food trays. Dishwashers and a garbage grinder unit are provided.

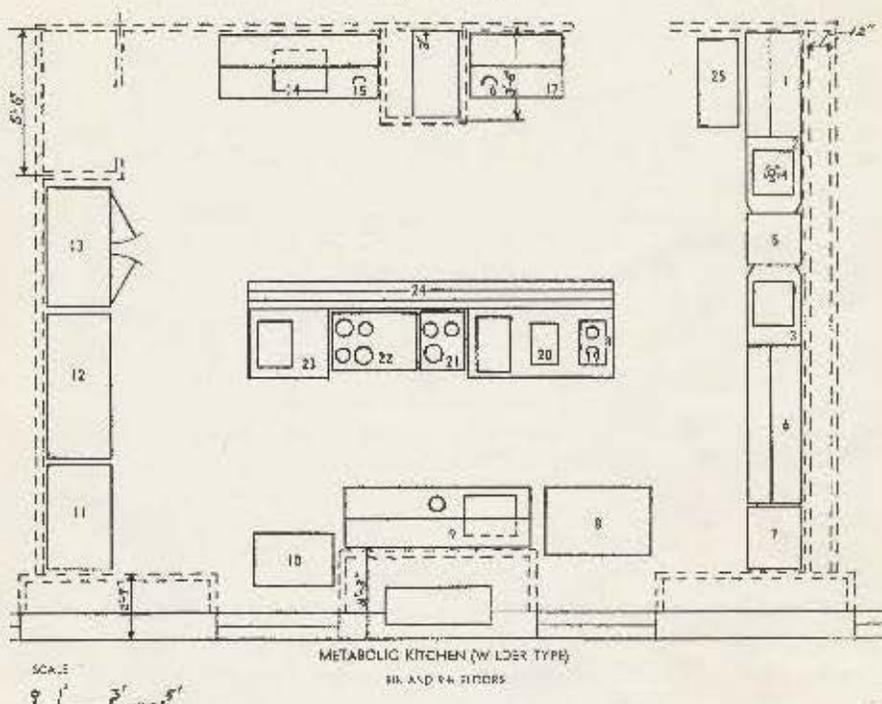
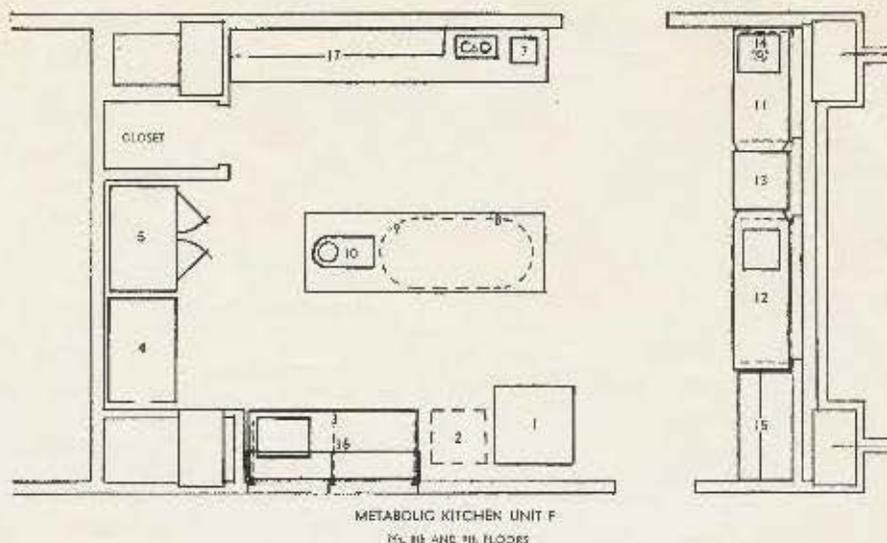
with radiations such as neutrons, protons, deuterons and electrons. The machine will be especially valuable because it is one of the "work horses" of the radiation laboratory and because with it rigid control of irradiation conditions are possible. This Van de Graaf accelerator is also extremely useful for producing shortlived radioisotopes for essential studies of the effect of radioactive materials on living things.

The upper floors of the wing are devoted to laboratories and 22 bedrooms (for patients temporarily transferred from other nursing units) for internal radiation studies. There are also separate facilities for animal quarters. Some special laboratories in the radiation wing are to be utilized for preparation of medications containing radioisotopes and their subsequent extraction, purification and chemical analysis from excretions of patients and animals and from animal tissues. Similarly, these facilities provide for physical measurement of radioactivity in substances before administration and after excretion.

It is the group judgment of the radiation specialists and consultants of the National Institutes of Health that at the present stage of knowledge, the prudent application of most radioactive materials such as radioisotopes requires special facilities for patients and should not be used in the general patient areas of the clinical center.

TYPICAL LABORATORY AREAS

The six wings and north side of the central stem afford laboratory space twice that assigned for clinical care. The ever-changing demands of research programs make flexibility the paramount consideration in the planning, construction and management of laboratories. The individual rooms in the laboratory areas are readily interchangeable as animal rooms, offices, laboratory units for chemistry, physics and bacteriology. The design of the clinical center laboratories is on the moduc (12 ft.) principle. A wide range of adaptability is thus possible through availability of grouped service line outlets at regular intervals in all wings and on the



TWO types of metabolic kitchens are being considered for the preparation of special diets in nutrition studies. Dr. Russell Wilder designed a special unit for the north side laboratory area (legend at right).

1. Range
2. Future vegetable steamer
3. Table
4. Frozen food refrigerator
5. Refrigerator
6. Coffee maker
7. Toaster
8. Table
9. Pot rack
10. Mixer
11. Soiled dish table
12. Clean dish table
13. Dishwashing machine
14. Garbage grinder
15. Counter and cabinet
16. Cabinets
17. Counter and cabinets

1. Cabinet and base
2. Soiled dish table
3. Clean dish table
4. Garbage grinder
5. Dishwashing machine
6. Cabinet and base
7. Broom closet
8. Table
9. Cabinet and base
10. Desk
11. Frozen food refrigerator
12. Table
13. Refrigerator
14. Cabinet and base
15. Food mixer
16. Beverage mixer
17. Cabinet and base
18. Counter
19. Coffee maker
20. Toaster
21. Range
22. Range
23. Counter
24. Tray slide
25. Patients' tray cart

north wall of the head house; installation of demountable partitions; standardization of laboratory benches, furniture and equipment; and air conditioning.

The utility service lines are in modules 12 feet on centers. The vertical risers which run in the outside wall of the entire building, except the patients' area on the

south side of the main stem, carry the following every 12 feet: 120-208 volt three phase, four wire, 60 cycle power; hot water; cold water; laboratory drain; vent; compressed air; vacuum and illuminating gas. Every 24 feet the vertical risers also carry steam and every 48 feet, distilled water.

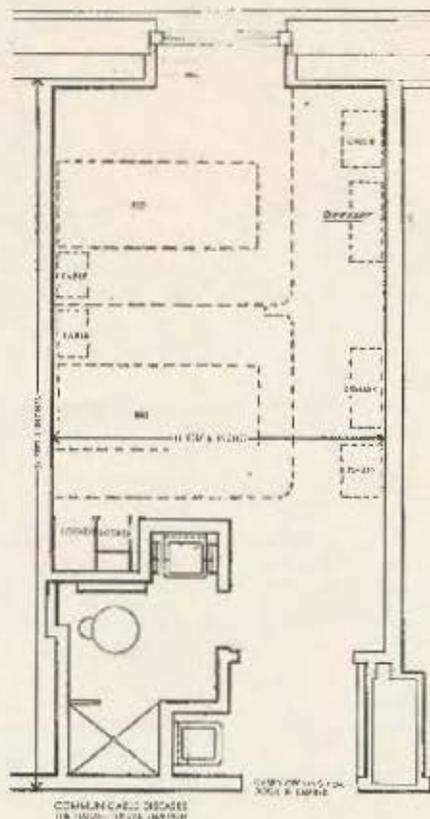
An exhaust duct for a chemical fume hood can be made available in each laboratory module. The operation of many chemical fume hoods in an air conditioned building raises very complicated technical problems in ventilation. A special pilot study now is being conducted by the staff of the Research Facilities Planning Committee to determine exact specifications.

The demountable partitions are in 3 ft., 6 in. panels, consisting of slabs of two layers of enameled sheet metal separated by three inches of fireproof insulation material. The partitions may have interlaboratory windows and escape panels. Some of the doors have a three-foot wide active leaf and a one-foot hinged panel which ordinarily is kept bolted.

There will be no permanent installation for constant temperature rooms. A demountable unit for walk-in refrigerated space or incubator will be utilized as a "room within a room," so that it can be relocated as the occasion arises in a reassignment of space.

Laboratory benches, furniture and equipment are to be standardized as much as possible. The details of laboratory bench design, sinks, trough drains and cup drains and drawer and cabinet units now are being studied by the staff members of the institutes.

The details of a typical laboratory room are presented in the summary of architectural data on page 52. It should be noted that the laboratory windows are uniform with those in the hospital area. The 4 ft. 6 in. x 5 ft. window is deemed ample since most laboratory work is done with artificial illumination and larger windows—such as those now being designed for some research institutions—may introduce the problem of glare, requiring larger shades. At the intersection of the laboratory wings there are two passen-



PATIENTS with infectious diseases will occupy 13 rooms, each of which will be a self-sufficient unit providing for maximum cleanliness and vital isolation facilities.

ger and two freight elevators. The door openings of the freight service elevators are five feet wide and can be increased to seven feet for the transportation of large equipment. The laboratory areas also have pneumatic tube stations in the general system of the center.

A fire detection system extends throughout all laboratory areas for maximum safety.

One wing of the eleventh floor is equipped as an instrument design office and small machine shop. In the basement areas there are central cage washing, glassware washing, media preparation and photographic service departments. The laboratories also are serviced by the auxiliary group of buildings, connected by tunnel, for central incineration, animal food and bedding, animal breeding, and maintenance and fabrication shops.

EXTENSIVE SERVICES

The clinical center will admit for treatment patients from all parts of the country who are suffering from the particular type of cancer, heart disease, mental dis-

ease, metabolic disease, or infectious or tropical disease under investigation by the various institutes. The sole criterion for admission will be the appropriate, confirmed diagnosis during the period the category is under study at the National Institutes of Health. Referrals for admission are to be made by private physicians, hospitals and health agencies. Upon discharge, the patient will be referred back to the physician or to the agency.

It is believed by the staffs of the National Institutes of Health that the integration of fundamental and clinical research with advanced methods of diagnosis and treatment will yield a high quality of patient care. It is hoped that the constant, intimate collaboration among specialists in many branches of medicine and science will result in an increase in the knowledge needed for greater insight into the treatment and prevention of chronic illnesses.

ACKNOWLEDGMENTS

The directors of the six institutes and other members of the Research Facilities Planning Committee were responsible for the major planning decisions of the clinical center. The execution of the detailed planning for the construction of the center would not have been possible without exceptional efforts of staff members in all branches of the Public Health Service and Public Buildings Administration.

The National Institutes of Health gratefully acknowledges the active interest and helpfulness of many consultants who have participated in this project. We also are indebted to the staffs of a large number of industrial laboratories, universities and hospitals throughout the country for the hospitality extended to our representatives during visits in the past two years.

In the study of the clinical facilities we owe a special word of thanks to Dr. Basil C. MacLean and James Edmunds, Dr. A. C. Bachmeyer and Carl Erickson, Dr. Claude W. Munger and Aaron Kiff, Lenna F. Cooper, Margaret Gillam and Dr. Henry Kaplan, all of whom carefully reviewed and criticized plans at various phases.