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A Hospital for the Care & Rehabilitation of Crippled Children

Jon Lawrence Moore

A HOSPITAL FOR THE CARE AND REHABILITATION OF CRIPPLED CHILDREN • MOORE

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A HOSPITAL FOR THE CARE & REHABILITATION OF CRIPPLED CHILDREN

By

Jon Lawrence Moore

Bachelor's Thesis

Presented to the Faculty of the Department of Architecture, University of New Mexico, in partial fulfillment of the requirements for the Degree of Bachelor of Architecture.

The University of New Mexico

May 27, 1969

THESIS COMMITTEE:

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Jon Lawrence Moore
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Architecture 491
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The Purpose of the Program

The purpose of this program will be to outline the requirements for a Crippled Childrens' Hospital so that the project architect can prepare schematic and preliminary drawings.

This program should not in any way limit the imagination of the architect as long as the specific functional and area requirements are met.

Jon Lawrence Moore

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I. STATEMENT OF THE PROBLEM

I. Statement of the Problem

This thesis will deal with a specialized hospital similar to that of a Pediatric Teaching Hospital in that it concerns the care and rehabilitation of crippled children and the education of future physicians and paramedical personnel.

The term "crippled" however is defined to include only those conditions of the bones and joints and related abnormalities which are associated with motor impairment.

The word "children" shall be referred to as anyone under 21 years' of age. This classification will be subdivided to infants ranging from the premature to two years' of age, children from 2 to 12 years' of age, and adolescents from approximately 12 to 18 years' of age. 21 will be considered the maximum age.

> The Pediatric Teaching Hospital should have physical autonomy, but adequate links with other specialties in the medical center, because:
>
> > Children's special needs and requirements differ significantly from those of adult patients;
> >
> > Pediatrics is a specialty defined exclusively by patient age; and it must meet all the health-care needs of this patient population.
> >
> > The dominant work relationships are necessary between pediatric sub-specialists rather than between pediatricians and specialists concerned primarily with adults; and
> >
> > Noise and lack of "adult order" are distressing to adult patients.[1]
>
> These requirements apply except where the available site for building precludes the possibility or

1. Problems of Pediatric Hospital Design. Research Project, HM00235 United States Public Health Service, June 1965, Page 14.

architectural identity, and where the needs of the community do not suggest a Children's Hospital.

Children's Teaching Hospitals should encourage referring physicians to take an active role in their patient care, teaching, and research, because:

> This provides an effective way of continuing the education of the physician engaged in private practice;
>
> The house staff of the Pediatric Teaching Hospital can learn the "art of practice" from the referring physician;
>
> A sense of continuity is provided for the parent and for the child as they move from home to the distant Teaching Hospital;
>
> It is necessary to bridge effectively the contrasting sub-cultures of the private and academic practice of medicine;
>
> The family pediatrician can provide important background information which may assist in rapid and accurate diagnosis of a complex clinical condition; and
>
> The referring pediatrician is in close touch with epidemiological data of interest to clinical investigators at the Teaching Hospital.[2]

The hospital theoretically would be sponsored by the State of New Mexico in close cooperation with the Crippled Children's Services' Division of the New Mexico Department of Public Welfare. It would also work in conjunction with a University Teaching Hospital while still retaining its autonomy.

Dr. Ray of Carrie Tingley Hospital expressed concern that a hospital of this nature remain autonomous. (Personal interview, October 20, 1968)

In this program it will be assumed that the hospital will be opened independently as opposed to a division of the University

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2. Ibid., p. 12

Medical Center. For example, it might well have its separate Board of Directors appointed by the State who will delegate responsibility for movement. It will be designed for a completely independent administration. However, if in the future it should be clearly advantageous for the University to assume administrative activities, the final scheme should be flexible enough to accommodate the necessary changes.

The autonomy of this project should not reduce the possibilities of sharing facilities such as specialized radiology services and perhaps even the utilities of the medical complex.

Theoretically hospitals would operate within this complex sharing redundant facilities, thereby increasing the efficiency and specialization of the various units.

II. RESEARCH OF THE PROBLEM

II. Research of the Problem

Importance of the Teaching Hospital

Pediatric Teaching Hospitals do not generally give direct medical care to a large number of children, but they do provide services that significantly influence the form and quality of health care available to all children. This influence stems from several activities conducted predominantly within these complex organizations.

First, they provide highly specialized diagnostic and treatment services for children suffering from serious and obscure illnesses. Secondly, their clinical professors write the authoritative reference books and texbooks used by all pediatricians. Thirdly, their staffs train the majority of pediatricians who are educated in this country; and fourthly, their research teams create new types of medical therapy directed toward the prevention, cure, and rehabilitation of many disease states.

General Information

Admission Policy

Age: Patients must not have reached their 21st birthday. Those close to 21 will be admitted only if, in the judgment of the Chief Surgeon, significant improvement can be obtained before the 21st birthday. All patients must be discharged by their 21st birthday.

Residence: Patients must be the children of parents or

a guardian who have a residence within the State of New Mexico.

Medical Condition: Patients qualify for admission medically if, in the judgment of the Chief Surgeon, they are or have been afflicted with bone and/or joint conditions which fall within the province of orthopedic surgery or related disciplines. Their condition must, on physical examination, be such as, in the judgment of the Chief Surgeon, can be corrected or at least result in an improved capability for carrying on the activities of daily living.

Financial Arrangements: Parents of patients who obtain sponsorship of the New Mexico Crippled Children's Services, (a division of the New Mexico Department of Public Welfare) will be responsible for payment for services in relation to their ability to pay, as agreed upon in the CCS Family Financial Report. (CCS Form 504) Parents of all other patients will be responsible for payment of the full cost of care.

Admission Arrangements: Admission may be made in two ways:

1. CCS Referral: Parents may apply at the County Office of the Department of Public Welfare for CCS sponsorship of their child. Such application may be made on the basis of referral from a physician, hospital, clinic, Public Health or School Nurse, voluntary and official Health or Child Care Agency, or by personal request of the parent for orthopedic services. After evaluation of the application

by the State Office of the CCS, an appointment may be arranged for the child. Notification of the time and date of appointment will be made by CCS. If, after physical examination, admission to the hospital is judged necessary by the Chief Surgeon, a time and date will be set. The hospital will notify parents and the Crippled Children's Services Division, in writing, of the scheduled admission, as a result of a child being examined at one of the CCS District Orthopedic Clinics held in cities throughout the state.

2. Local Physician Referral: If the child's local doctor believes that care is indicated he may contact the Chief Surgeon to arrange for a clinic visit and/or admission. If the child meets the medical, age and residence criteria for admission, the Chief Surgeon may approve admission and indicate to the local doctor a time and date for the child. Under these conditions parents should make immediate application for Crippled Children's Services sponsorship at their County Office of the Department of Public Welfare, and explain what arrangements have been made. Contact with CCS is not necessary if the parent has already obtained CCS sponsorship, or if they wish to pay the full cost of care at the hospital.

The Care

All medical care at the hospital is the responsibility of the Chief Surgeon, a qualified orthopedist with a diploma from the American Board of Orthopedic Surgery.

Consultants in Pediatrics, Neurology, Pathology, and residents in orthopedics augment the medical staff. The hospital is approved for residency training in orthopedics by the American Medical Association.

Medical Service: Medical care provided at the hospital includes in-patient and out-patient services. In-patient treatment includes surgery, cast work, and physical therapy. When necessary, prostheses, braces, and/or corrective footwear are prescribed for the child. Rehabilitative physical therapy is often prescribed. Continuation of physical therapy in the home is made possible by a program of parent instruction. Out-patient services include clinics conducted weekly in the hospital and monthly at District Clinics, organized by CCS in cities throughout the state.

Hospital Services

Nursing Service: Nursing service, both in the wards and in the operating and recovery rooms is the focus of hospital care.

Diagnostic Services: X-ray and clinical laboratory facilities are provided to assist the medical staff in diagnosis of patient conditions and evaluation of their progress. Registered personnel staff these facilities.

Physical Therapy: Physical therapy is a major service in treating and restoring limbs to their fullest possible

usefulness. A registered physical therapist is in charge.

Brace Shop: Braces and artificial limbs are manufactured in the hospital brace shop and scientifically fitted to the child. A certified prosthetist and orthotist heads this department.

Other Services

School: As their condition permits, children of school age attend the public school conducted at the hospital through the cooperation of the New Mexico School System. Students thus lose very little schooltime, even though their hospital stay may last for months.

Recreation: A planned recreation program at the hospital eases the adjustment to hospital "life" and allows for needed play activity in those who are up and about. In addition to games, music, movies, and TV, holiday and birthday parties and special entertainment frequently brighten the time.

Who May Receive Care

Any child of a New Mexico family suffering from an orthopedic crippling condition may be eligible for care. The Crippled Children's Services Program is one which provides for assistance to families from a wide range of income levels. The reason for this is the fact that care for a crippled child often requires a number of lengthy periods of hospitalization and thus can be very costly. Such an expense can deplete the resources of a family in the

average, or even above average, income bracket; thus assistance for these families has been included under the Crippled Children's Services Program. Families that need all or any portion of the sponsorship under CCS auspices should make application for CCS sponsorship. Families that do not need assistance may apply for admission to the hospital on referral, under the private full-pay patient category.

History

Children's Teaching Hospitals

The history of hospitals in Western Europe and the United States indicated that most of these institutions were developed to serve highly specific populations suffering from certain ailments.[1] Hospitals devoted exclusively to the care of sick children evolved from the early orphanages and foundling homes. They have been known in England since 1852, when Charles West opened his "Hospital for Sick Children."[2] There have been similar establishments in the United States since the Children's Hospital of Philadelphia was opened in 1855. The Boston Floating Hospital was founded in 1896. Similar institutions have been established in a continuing pattern to the present decade.[3]

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1. Rosen, G. "The Hospital: Historical Sociology of a Community Institution," In Freidson, E. (ed): The Hospital in Modern Society: Eleven Studies of the Hospital Today. New York, Free Press, 1963, pp. 1-36.

2. Nuffield Foundation. Children in Hospital: Studies in Planning. London, Oxford University Press, 1963, p. 1.

3. Based on data from "Hospitals Guide Issue 1964." Chicago, J. Amer. Hosp. Assn. 1964.

In many cities of the United States the Children's Hospital has been geographically isolated from other hospitals and medical school facilities. Recently there has been emphasis upon relocating some of these older institutions so that they may become more closely integrated with University Medical Centers.

There are thirty-seven Children's Teaching Hospitals in the United States today, ranging in size from 28 beds to 400 beds.[4] These hospitals, typically located in major cities, usually have close affiliation with one or more medical schools. In terms of present trend they are staffed by between 12 and 40 academic physicians, representing a spectrum of sub-specialities within the field of Pediatrics.[5] They usually provide a considerable range of medical services, but the emphasis is upon diagnosis and treatment of difficult or problem cases. They form the most highly specialized, ultimate resource of health care for children.

Other Hospitals for Children

According to statistics of the American Hospital Association, there are 7,138 hospitals in the United States. Since the majority are general community hospitals, it is not surprising to find that children obtain various kinds of service within this larger hospital universe. In 1964, 5,159 community hospitals provided obstetrical service and new born nurseries. In addition, the typical community hospital provides care for children suffering from acute illness or in need of surgical services.

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4. Based upon data from Directory of Approved Interships and Residencies. Chicago, American Medical Association, 1964.

5. These figures were obtained in interviews during visits to other Pediatric Teaching Hospitals. The projected staffing for Boston Floating Hospital indicates an increase to approximate the larger figure.

Approved residency programs in pediatrics are established in 239 institutions.[6] These programs provide 2,210 training positions, The majority of the pediatricians receive their clinical experience in either Children's Teaching Hospitals or teaching hospitals with a strong degree of affiliation with a University Medical School.[7] Of approximately 440 teaching hospitals in the United States, only 37 are exclusively concerned with children, but a large number have pediatric residency programs.

From another perspective, 134, "Children's Hospitals" are included in the total of 7,138 hospitals. These 134 hospitals include 49 institutions for orthopedic cases, 21 for other specialties, and 50 for general medicine.

There are also special hospitals, institutes, and centers which care for children suffering from very specific disease conditions, as well as institutions specifically concerned with orthopedic problems,[8] tuberculosis, and extensive burn injury. Most general children's hospitals do not provide service for seriously disturbed psychiatric patients. In recent years we have seen considerable development of

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6. Based upon data from Directory of Approved Interships and Residencies. Chicago, American Medical Association, 1964.

7. There are 122 pediatric residency programs providing 564 positions in hospitals without medical school affiliation. However, there are 117 pediatric residence programs in hospitals with medical school affiliation which provide 1,646 positions. BFHNDP data, 1965, analyzed by Karen Dale using source 4.

8. Curtis, B. H. A Survey of Forty-Eight Children's Hospitals: Factors Shaping a Broader Concept of Children's Orthopedics, J. Bone Joint Surg. 44A: 398-415, 1962.

psychiatric out-patient clinics for children in the suburban communities, which provide a variety of psychiatric services not typically available at the nearby community hospital.

Other child-care institutions, such as orphanages, correctional institutions, schools for the mentally retarded, and schools for the handicapped, total about 1,900 with 85,000 children in residence.[9] Although these residential institutions are not referred to as hospitals, they represent organizations and environments with strong concern of meeting the health needs of children.

The Field of Pediatrics

Pediatrics is a unique specialty, exclusively concerned with the health problems of a population defined by age. In this respect it differs from most other specialties of medicine, surgery, and dentistry, which are organized by disease, parts of the anatomy, or by diagnostic and therapeutic technique. Although pediatrics as a major specialty traces its origin to Abraham Jacobi and the founding of the American Pediatric Society in 1882,[10] its more formal establishment in American medicine coincides with the creation of the American Academy of Pediatrics in 1930 and of the Specialty Board in 1933.

There is a paradox in the specialization of pediatrics. A pediatrician is assumed to be competent in coping with any form of illness in children. It must be realized, however, "that general pediatrics" is basically for patients under 15 or 16 and a field that

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9. Wallace, H. M. Health Services for Mothers and Children. Philadelphia, W. B. Saunders Company, 1962, p. 437.

10. Ross Conference on Pediatric Research. Careers in Pediatrics. Comumbus, Ross Laboratories, 1960, p. 13.

does not provide surgical, psychiatric, or dental care for children. The pattern is further complicated by the emergence of pediatric sub-specialties. Within recent years, pediatric allergy and pediatric cardiology have been established as formal sub-specialties, and a similar pattern has been projected for pediatric surgery and pediatric neurology. Psychiatry finds itself in an anomalous position of having created (in 1959) a sub-specialty known as "Child Psychiatry." There are some grounds for proposing that child psychiatry become a sub-specialty of pediatrics.

It is clear that the interests of pediatrics overlap those of obstetrics, preventive medicine, infectious disease, radiology, general practice, and several other specialties. Many of the well-recognized specialists in medicine have informally limited their practice to either adults or children, thus creating a host of overlapping professional jurisdictions. Such concerns relate particularly to an understanding of the activities within a teaching hospital, where problems of specialization and scientific research are intensified.

At the present time 6,000 board-certified pediatricians practice in the United States, plus an equal number of physicians who define their practice as pediatrics but do not hold formal certification.[11] Since the founding of the specialty board in pediatrics, 9,690 certificates have been issued.[12] Of the 1,342 pediatricians

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11. Peterson, P. Q., and Pennell, M. Y. Medical Specialists: Health Manpower Source Book No. 14. USPHS, Washington, G. P. O.

12. Directory of Approved Interships and Residencies, p. 314.

who held academic appointments at 85 medical schools in 1961, only 297 had full time academic appointments.[13] There has been a strong trend roward appointing more full-time professors and sub-specialists in pediatric teaching hospitals. Geographically, pediatricians concentrate in the metropolitan suburbs; few practice in the center of cities or in rural areas.[14]

It is important to recognize the significant sub-cultural differences between the private and the academic practice of pediatrics. The contrast in lifeways described by Anne Somers shows general characteristics which are in keeping with problems of pediatricians. Private practioners are concerned with a high-volume practice with significant emphasis on preventive pediatrics and routine conditions of illness. These physicians typically have long standing, continuing relationships with families in the community, and become the family pediatrician to each newborn infant. They operate within the context of a medical office building rather than a hospital. They receive fees for service rather than a salary from an institution. They have few, if any, assistants.

The academic pediatrician sees far fewer patients per day. He spends a great deal of time with students, discussing the complicated diagnostic problems of seriously ill children. He is engaged in highly specialized research. His medical associates represent a spectrum of

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13. Medical Specialists: Health Manpower Source Book No. 14, p. 77. (11) Adapted for American Association of Pediatrics: Child Health Services and Pediatric Education. New York, Commonwealth Fund, 1949, p. 23.

14. Child Health Services, and Pediatric Education, p. 38 (13).

different disciplines. His income is derived largely from salary, and his rewards come from teaching, publication, consultation, and academic promotion.

Both groups of pediatricians find a common link in the teaching hospital, for in this environment the residents in pediatrics receive their training before going into private practice. The alumni of the institution often have continuing contact through referral of patients and participation in post-graduate education. The teaching hospitals train a significant fraction of the future generation of pediatricians. Within the teaching hospital different careers are shaped depending on whether the resident prefers private or academic practice. Some pediatric teaching hospitals specialize in training practitioners, others in training the next generation of professors and researchers. Some institutions, such as Johns Hopkins, have two separate residency programs which formally recognize the differing demands of the world of practice and university.

Pediatrics plays a significant role in general medical education comprising a significant fraction of medical school curriculum time, so that each person who is granted an M. D. Degree has acquired general information about the illness of children. This pattern of classroom instruction is reinforced by clinical training of third and fourth year medical students and by internship, so that knowledge of pediatrics has indirect but pervasive influence on the general knowledge and skill of physicians.

A series of very specific programs are offered for the training

of pediatricians.[15] A medical school graduate who wished to explore a specialization in pediatrics may serve his internship in a children's hospital. If he decides to stay within this field he moves to junior residency status, often within the same teaching facility. This is followed by a second year of residency, which should provide the necessary background to pass examinations for specialty boards. A third year of residency is now being considered. In recent years, residents who complete two years of specialization in pediatrics may move on to fellowship programs in cardiology or other sub-specialty fields, where they engage in research and enter more directly into academic circles.

Continuing education for the busy private practitioner of pediatrics usually takes the form of specialized courses at nearby teaching hospitals or community hospitals. With the rapid expansion of medical knowledge, these post-graduate programs have assumed increasing importance for all fields of medicine.

Scientific research is a major factor in shaping patterns of specialization in academic pediatrics and the results of this research have been to reduce infant mortality and to provide more effective treatment for a variety of illnesses. Successes in the control of Poliomyelitis and the surgical correction of congenital defects illustrate the importance of research to the entire field of medicine. In recent years federal support of these activities has provided a new institute, at the National Institutes of Health, and a number of General Clinical Research Centers for children. The membership of the Society for Pediatric Research has increased fivefold in the past decade and several

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15. Haggerty, H."J. Family Medicine: A teaching Program for Medical Students and Pediatric House Officers." J. Med. Education, 37: 531-579, 1962.

important pediatric journals publish the results of a considerable volume of research. The teaching hospitals lead in sponsoring and promoting medical research, the second greatest volume of activity being found in the pharmaceutical industry.[16]

Pediatrics influences the health care of all children in this society, but because of the relatively small number of pediatricians this influence is largely indirect. First, highly specialized diagnostic and treatment centers are provided in a number of universities, where seriously ill children and those suffering from complicated illnesses may be referred. Second, pediatrics is taught in all medical schools. Third, a continuing volume of pediatricians are trained for private practice each year. Fourth, pediatrics has made significant contributions to the discovery of new techniques of diagnosis, therapy, and prevention. Fifth, the numerous publications which are produced serve as basic reference for any physician faced with the illnesses of children. Some of these publications are written for a lay audience. One pediatrician who writes popular articles, Dr. Spock, has had a pervasive influence on family health practices. Sixth, the specialty sets standards for the administration of nurseries for newborns in over 5,000 general hospitals throughout the country,[17] and similar standards for professionals working in this field.

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16. Interagency Coordination in Drug Research and Regulations. Hearings before Sub-committee on Reorganization and International Organizations, Committee on Government Operations. U. S. Senate 87th Congress, 2nd Session. Washington, 1963, Part I, p. 301.

17. American Academy of Pediatrics. Standards and Recommendations for Hospital Care of Newborn Infants: Full term and Premature. Evanston, Amer. Acad. Pediatrics, 1961.

Carrie Tingley Hospital, Truth or Consequences, New Mexico

Carrie Tingley Hospital was built in 1936-37 and the first patient was admitted on August 25, 1937. Since then approximately 12,000 New Mexico children have been helped to fuller, more productive lives through treatment received at the hospital. The institution was a project of special interest to Clyde Tingley, Governor of New Mexico from January 1, 1935 to December 31, 1938, and is named after his wife, Carrie, who had a deep concern for crippled children. In the process of planning the hospital Governor Tingley discussed the project with President Franklin D. Roosevelt, himself a polio victim; and the hospital architect sought and received advice from the planners of the Warm Springs, Georgia Foundation where President Roosevelt received treatment.

The choice of Hot Springs, New Mexico was made due to the existence of hot mineral water available from underground springs in the area. The Hot Springs community cooperated by generously donating a large portion of the ground for the hospital.

III. HOSPITAL SYSTEMS

III. Hospital Systems

A. Patient Housing System

The Hospital Bedroom

The Pediatric Teaching Hospital cares for infants, children, and adolescents. Each group could contain younger or older patients depending on their emotional needs and maturity. Separation of sex is not important until the age of five and at the age of nine it is imperative.

In addition to classification by age, patient groupings may also include prolonged stay, intensive care, and family participation. Intensive care classification in an orthopedic hospital such as this would be comprised of only a small percentage of beds, for only post-operative children could be placed in this category. Beds for emergency and ambulatory patients may also be necessary.

Irrespective of the Blue Cross categories of private and semi-private rooms, the patient accommodations considered necessary are a single room, a double room, and a ward with no more than seven beds. The single accommodation should be available for the child who required isolation and for infants. The single room should not be equipped to accept more than one patient. However the single rooms should provide a place where a living-in-mother may rest.[1] A few single rooms may be needed for patients in a clinical research unit.

The double room is not considered necessary for infants, but is desirable for some older children. The double room is the only accommodation that should be used for family participation. In the clinical

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1. Children in Hospital, p. 89.

research unit the double rooms are recommended to provide companionship between children.

Infants require cubicles placed around a large open space. The ward for children was designed to hold seven beds but to have six bed positions. It was assumed that the six-bed unit would provide 60 percent of accommodations available for children in the range of 18 months to 9 years.

In the distribution of patient care unit, a module was erected and has a variety of accommodations, depending upon the age of patient, kind of care, and length of stay. Although better accommodations may be afforded by dissimilar units, a uniform size is apt to meet the requirements of long range flexibility.

A separate observation center for each 10-bed unit (variations of ward, single, and double units) satisfies the need for a sense of place and provides a center for control and servicing. 10-bed units allow for shifts in characteristics of patient population, bed control, improved patient census, night coverage, and long range changes. A series of connected 10-bed units on one floor has the potential for increasing the efficiency of nursing care. The average units could require some changes in the existing organizations of nursing care within certain hospitals.

This small unit is the right size and scale for children and, if the connections are properly made, each unit will have its own sense of place. The small unit and linear connection satisfy the need for flexibility in patient care activity. This design concept can accept

changes brought about by new ideas and policies as well as by a shift in the number of types of patients being cared for. It will provide for nursing staff, staff organization, and coverage. It will also provide for relocation of beds resulting from changes in the policy of assigning beds to specialists. If all units are the same size changes in patient classification, degree of illness, or length of stay can easily be made.

A policy of unrestricted visiting hours is the wisest for a Pediatric Teaching Hospital. The importance of family visits to the well-being of the child has been determined.[2] Various accommodations must be provided for parents who visit, parents who stay with their children, and parents who give care to their children. Parents should participate no matter how old or young their child is. Visiting parents require places to rest and to be alone, whether their child is hospitalized or ambulatory. Sleeping accommodations for parents who stay with their children in the hospital can be provided either in the room with the child, in a hospital dormitory away from the patient care area, or in a motel-hotel facility in the medical center complex.

Parents who care for their child in the hospital should have a private room with bathing and toilet facilities for care of the child, family conversation, and sleep and relaxation.

B. The Therapy System

The block of functions comprising those things that are done to or for the patient in a diagnostic or theraputic sense may be called the therapy system. The in-patient is usually brought to the areas

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2. Problems of Pediatric Design p. 25.

where things are done, while the out-patient usually walks to them. Since all of them contribute to the recovery process, these functions may be called the therapy system.

All other activities in the hospital, while no less and no more important, function in support of housing and therapy. But because they occupy space and employ people, they must also operate mutually in support of each other.

Each staff physician specialist should be provided with one work place to include: offices, examining rooms, conference-teaching spaces, secretarial and waiting space, and specialty research space. This provides the specialist with his own identifiable and consolidated territory.

The physician can maintain more effective supervision of his multiple activities, the physical proximity of these spaces reduces the physician's travel time, and a work-group's needs can be serviced in one place.

Medical students can be taught the value of interplay between patient care, sub-specialty research, and continuing education, and patients can be seen in an office environment rather than in a clinic cubicle.

The physical contiguity of space allows for more flexibility for scheduling the patient's and the physician's time. Having all the equipment necessary for sub-specialty patient care and research located in one place eliminates duplication, and this can provide for short-range change needs of the physician and long-range expansion needs of the institution.

Laboratory

This area should encompass all necessary tests which must be performed on patients entering the hospital or which must be conducted during their stay in preparation for surgery, etc.

Radiology

This department as well as the clinical department should operate in conjunction with other units within the medical complex. Due to the nature of orthopedic treatment, however, a Crippled Children's Hospital must have all extensive radiology units in order to provide for the hospital's specialization. The X-ray technicians which work within the radiology department usually work 9:00 to 5:00, 5 days a week.

Surgical

Modern surgical techniques have been effectively reducing the amount of post-operative infection. To continue to keep infection at a minimum, the following directives should be observed:

1. The patient approaching the operating room should be separated from and should not go through clean work areas or corridors cluttered with surgical paraphernalia.

2. A common holding area should be established for the retention of patients until the operating room is ready to receive them; this holding area must be completely unrelated to post-anesthesia recovery areas.

3. Decentralized cleanup rooms and sub-utility rooms, with costly duplication equipment, are unnecessary and should be eliminated.

4. A central work area from which any needed article can be dispatched immediately to any operating room should be established, and access to this area should be limited to surgical personnel wearing clean scrub garments. Scrub areas might, when properly safeguarded against splatter, be incorporated in this work area.

5. Major access to the clean central work area should go through interchange areas in which personnel exchange outer garments previously worn on the street or elsewhere in the hospital for clean scrub suits.

6. All soiled materials leaving operating rooms should move by way of a soiled corridor and be taken to a clean-up room or alternately, directly to the control sterile supply department.

7. Dressing rooms should be provided near the entrance to the suites where ambulance outpatients may leave their clothing and put on clean washable or paper slippers, a hospital gown and preferably a clean washable robe.

8. A clerk's desk should be strategically located so that the clerk at all times controls all traffic coming to the units, particularly the traffic entering the clean control area.

9. Ventilation should be so designed as to protect the operating rooms and the clean control area from infiltration of unfiltered air. Recovery rooms would support the facility.[3]

Physical Therapy

This division encompasses all forms of physical therapy except play. It would consist of complete physical therapy area containing all necessary therapy mechanisms, hydro-therapy baths and swimming pool. A registered physical therapist would be in charge.

C. The Supply System

Because every activity requires things to work with there must be a system to supply a wide variety of merchandise. The problem function within this system is that of distribution. This function is complicated by farflung locations of the units that comprise the patient housing and therapy systems and also by patient needs that tolerate no delays.

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3. Huddenburg, Roy. Planning the Community Hospital, McGraw Hill, ed., 1967.

The supply system will begin with the general stores area, and arbitrarily it will include processing functions allied to nursing care and exclude processing functions related to housekeeping care. The central sterile supply department and pharmacy are included in the supply department, although laundry and kitchen are not. Linen movement is considered a part of the supply system because of its close relationship with patient care and therapeutic function.

Also classifed in this department would be a brace shop supplying braces and artificial limbs made by a certified prosthetist and orthotist.

Within the system all functions are allied and all but the pharmacy and brace shop are susceptible to a single control. The area of pharmacy remains under the undisputed control of the pharmacist from the point of receiving in the building to the point of which the nurse takes over. The brace shop is under the control of the prosthetist.

In an Orthopedic Teaching Hospital the pharmacy could probably be reduced to little more than receiving and distribution because of its conjunction with the larger medical control complex. Alcohol and narcotic storage must meet all federal regulations for storage and protection.

Appropriate centralization of services will reduce operating costs. First, such activities as medical records, accounting and business procedures, blood bank, and pharmaceuticals can be consolidated for the entire medical center, releasing space for other needs. Second, linen service, maintenance and cleaning, and infant formulas can be contracted for, as well as sterile supplies and food. With centralization of servicing the administrative staff will be free for other emphasis.

In most instances, deliveries should satisfy the requirements of a module or unit rather than to ship the same item to various points. There is no reason why every 10-bed unit, for instance, cannot receive its daily supply of linen, sterile supplies, and medications at one time. Food can be pre-cooked and packaged on a unit basis. Disposable and dissolvable may soon lessen the need to return goods which have been used or worked with.

D. The Housekeeping System

Patient and worker alike must have their domestic needs provided for while they are away from their homes. The functions that satisfy these needs are involved with cleanliness and feeding and may be considered the housekeeping system.

Facilities of this department are predicated on an exchange cart system, and it is anticipated that the housekeeping carts will be returned to a central depot (supply-issue room) at night. There will be a storeroom for housekeeping supplies and equipment and for clean reserve linen. Soiled linen will be delivered to the soiled linen holding room by cart. All of the soiled linen will be bagged. A large soiled linen room will be located near the receiving dock so that commercial laundry trucks can pick it up. A trash cart area for holding bagged refuse temporarily will be provided on the nursing units. The refuse will then be taken directly to the incinerator.

The office and supply issue should be comfort-cooled. Adequate ventilation must be provided for all janitors' closets and trash holding rooms.

Dietary facilities for this department are predicated on a centralized dietary system (preparation, distribution and dishwashing) with truck delivery between the branch and base hospitals. A therapeutic dietitian will be housed in this facility, as well as a modest nourishment preparation center. Bakery items are to be developed commercially or made at the central unit. The cafeteria, private dining room and serving line should be located adjacent to the nourishment kitchen. The soiled dish holding area to be so located as to eliminate cross traffic of serving line and bussing of soiled dishes and also located in close proximity to soiled patient dish return.

Mechanical systems are gas, voice-paging, and pneumatic tube. The department will be air-conditioned. Also categorized with this unit will be school facilities administered by the New Mexico School Board and Children's Play & Recreational Departments, consisting of other than physical therapy.

Play is a vital part of the care in a pediatric hospital, and often has its own budget director. "We find many reasons to support a formal play program with separate play spaces for in-patients and ambulatory patients."[4]

Play personnel can function more efficiently in a single play space than in several scattered throughout the hospital. Organized games, entertainment, and educational activities are easier to handle in a large single space. The large space is also appropriate for other group activities. Most important, however, is the fact that children

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4. Problems of Pediatric Design, p. 183.

who travel to a central area to participate in organized play feel that they are going somewhere. This impression is difficult to associate with small scattered rooms. A central play program can also become an important observational laboratory for educating parents and medical students.

Informal play space is needed within each patient care unit; outdoor play space is also desirable if it can be provided. The recreational areas for adolescent patients and for children should be separated. A small movie theater might also be included within this program.

E. Administrative System and Business Function

The administrative system and business function include those operations of the ultimate coordination and flow of hospital economy. Through its admitting function, this system controls the influx of patients and their disposition through the housing system. Through its purchasing function merchandise is acquired to feed the supply system.

The administration and special service departments are predicated on a centralized administration with the following:

An integrated Telephone and Information Department.

Main Lobby with private Waiting Rooms.

Public Toilets and Public Telephones.

A centralized Admitting Department which could serve as the waiting area.

Administrative and Nursing Offices to be located near the Lobby and Business Office.

A Business Office which could be located off the main traffic corridor.

A Personnel Office.

A Medical Records Department with the space based on a unit system of medical records with terminal digit filing and the capacity of maintaining within the department three years' current medical records. A centralized medical dictation system will be utilized.

Doctors' Coat Room and Toilet Room, located near the Medical Records Department and a Lounge-Medical Library in this area.

A Volunteers' Office, Lockers, and Lounge.

Facilities for on-call Sleeping Rooms for both men and women.

Administrative Conference Room.

Employees' Rest Rooms.

Chaplains' Office.

Janitors' Closets.

The communications systems required would be a telephone, a voice paging system, and a doctors' register system at the doctors' entrance. The addressograph system for insuring correct patient identification of records and requisitions is contemplated. All administrative areas to be air-conditioned (temperature and humidity controls).

A central part of the admission process is initiation of the medical record. The parent is interviewed by the clerk and a house officer. The interview is usually followed by a physical examination. After further delay the patient and parents are escorted to the patient-care floor where they will be received by the head nurse. The patient is taken to an assigned room, undressed, given hospital clothing, and put to bed. This essential steps of the administration process include (1) communication to establish a date and time of arrival at the

hospital; (2) transportation from home to hospital; (3) one or two reception and escort of activities within the hospital; (4) interview of parent and physical examination of child; and (5) establishment of the patient in bed.

With an understanding of essential stages, it is possible to explore a number of special arrangements. For example, the transportation and information handling aspects can be separated. By telephone, correspondence, or through reactivation of previously obtained information and various medical and administrative records it is possible to initiate a patient chart without subjecting the child to a lengthy delay while the parent is being interviewed. The physical examination can be conducted at the doctor's office near the child's home, in an examination room inside the front door of the hospital, in an office on the patient-care floor, or in the patient's bed.

Ambulatory patients should be scheduled with precision and should not wait in large groups. This statement holds applicable for several reasons.

1. Long waiting periods make children difficult to manage during examinations.

2. Scheduling permits better utilization of the physicians' time.

3. Truly effective utilization of scarce facilities and resources requires careful scheduling.

4. The parents' time is valuable and every effort should be made to reduce unnecessary delay.

5. Scheduling of ambulatory patients can better allow for the individual differences in work habits of staff.

6. The large waiting area requires elaborate control to reduce noise, confusion, and potential contagion.

7. Large waiting spaces typically fail to provide a positive and comfortable environment.

8. Small decentralized waiting areas are better able to serve functions.

F. Teaching System

The space requirements for the many kinds of teaching activity are as follows:

Private teaching space, where one person studies by himself, or where two can converse quietly.

Conference space where about a dozen gather for instruction or discussion.

Classrooms where 20 to 30 people meet for scheduled instruction.

A large auditorium where over 100 persons can attend lectures or special teaching conferences.

Space distributed throughout the patient-care area where rounds can stop.

More room around the patient beds to accommodate teaching rounds.

Sleeping accommodations for residents who are on call.

A branch of the Medical School Library, and

Space for the electronic equipment for reading devices.

It is important that students see not only the rare case, but also the general picture of health and disease in the hospital. An awareness of the reasons for some of the spatial continguities already discussed will help the designer to provide a hospital in which the medical student can view his patient as a whole child. By including

the family in consideration of the care of children, the student pediatrician will learn early in his career how to deal with, comfort, and soothe the parents he will meet when he goes into practice. Habits are formed early in the student's career; and if all of the facilities necessary to his study of pediatrics, including a branch of the medical school library, are clustered within the teaching hospital, habits of research will be encouraged.

It has been suggested that teaching rounds are obsolete. The trend is to bring selected patients to demonstration rooms located in the patient-care areas. This is desirable in that it provides students and teachers with a continuity difficult to maintain while they move through busy wards. It also introduces the use of instructional aids, television, and films which are impossible to supply at the bedside.

Disadvantages to this trend are, first, that the student is not required to form the habit of going diligently from bed to bed; secondly, he cannot be reminded of past lessons when he is unable to see other patients; thirdly, the nurse who may informally participate in rounds is present in a demonstration room only by invitation, and fourthly, the child must be taken from the bed and may be frightened by the group. Children enjoy the activity that rounds provide, and they need to be visited, not only by their parents, but also by physicians and students.

G. Research System

Research in a Pediatric Teaching Hospital takes several forms. In laboratory research patients are not involved, although clinical specimens may be used. In other research, animals are the subjects.

Care of the animals should not be the direct responsibility of the Pediatric Hospital, but should be provided centrally for the whole medical complex. Clinical research involves the participation of either ambulatory or in-patients. Field research includes contact and agreements with practicing physicians, health officials, or others, but for this relatively little space has to be provided within the hospital.

All of these activities except field research should be located within the Pediatric Teaching Hospital. Research is as much a means of teaching medical students as lectures or rounds. A strong program in field research is one way of drawing in practicing physicians and continuing their education. The need for longitudinal research might suggest stronger spatial relationships with adult medical research. However, the communication necessary to such studies can be provided through scheduled staff meetings. The needs of the student pediatrician and of the child demand that pediatric sub-specialties be close to one another rather than to adult medical specialties.

Each sub-specialist should control his own research space and his students, although he may share services and equipment. Research space within a Pediatric Hospital should, as mentioned earlier, be proximate to the ambulatory patient area and not to in-patient beds. The sub-specialists' modules of space should include their offices, examination rooms, conference and teaching rooms, secretarial office, and space for assistants and research. They may share a waiting space or each sub-specialist may have his own waiting area close to his

secretary. Work space modules should relate to other physicians rather than to beds or activities. This required contiguity is best accomplished horizontally. Each module should be a "harbor" of the circulation space.

The great demands for flexibility within each physician's work space can be satisfied through convertibility, disposability, and polyvalency. Offices, examination rooms, conference rooms, secretarial space, and waiting space are not apt to change in size or character, but additional space for research and for assistants and fellows will be required for the growing number of pediatric sub-specialists. This mixture of the stable and the unstable can be satisfied by a two-part structural arrangement with both short and long spans.

H. The Structural and Mechanical System

All hospital functions must be sheltered and protected against the elements. They require some degree of controlled environment. Their processes require power to be supplied in various forms. The functions that provide for these needs may be called the structural and mechanical systems. The major function of this system is the operation of the mechanical plant.

IV. SPACE REQUIREMENTS

ROOM SQUARE FOOTAGES - PATIENT HOUSING SYSTEM

Room	Total Sq. Ft. needed for 60 Beds
Nurses' Station	240
Head Nurse	120
Office	80
Pediatric-Utilities	200
Medication Room	64
Nurses' Lounge and Toilets	140
Soiled Utility Room	150
Clean Utility Room	180
Doctor Charting or Dictating	60
Treatment Room	120
Floor Kitchen	60
Conference Room	160
Linen Cart Alcove	108
Stretcher and Wheel Chair Storage	120
Janitors' Closet	72
Solarium and Waiting Room	200
Baths	80
Supply Storage	100
10-Single Rooms and Toilet	1,200
7-Two-Bed Rooms and Toilet	1,260
6-Six-Bed Rooms and Toilet	3,600
Total for 60 Beds	8,314
Total for 120 Beds	16,628
Circulation @ 40%	6,651
Gross Square Feet	23,279

THERAPY SYSTEM

Examining & Out Patient Clinic

Room	Total Sq. Ft. needed
4-Examining	600
Men's Toilets	30
Women's Toilets	30
Secretary	120
2-Consultation	240
Total Net Sq. Ft.	1,020
Circulation @ 15%	153
Total Gross	1,173

Laboratory

Room	Total Sq. Ft. needed
Clinical Lab Director's Office	100
Secretary & Clerical	100
Public Toilet, Women	30
Public Toilet, Men	30
Clinical Laboratory	600
Supply Closet	60
EKG	80
EEG Workroom	80
Tissue Laboratory	160
Total Net Sq. Ft.	1,240
Circulation @ 20%	248
Total Gross Square Feet	1,488

THERAPY SYSTEM - Contd.

Radiology

Room	Total Sq. Ft. needed
Radiologist's Office	140
Secretary & Clerical	120
Stretcher & Wheelchair	40
Conference, Classroom & Library	200
Waiting, Dressing Room & Toilet, Women	140
Waiting, Dressing Room & Toilet, Men	140
Darkroom	160
Light Room	80
2-Film Viewing) Current Film Storage)	200
Linen Storage	40
Portable Equipment Storage	40
Janitors	36
Supply Storage	80
Total Net Sq. Ft.	1,296
Circulation @ 35%	453
Total Gross Square Feet	1,749

THERAPY SYSTEM - Contd.

Surgical Operating Suite

Room	Total Sq. Ft. needed
Nurses' Station	80
On-Deck Waiting	240
Supervisor's Office	80
Doctor's Dictating	24
Doctors' Lounge, Lockers, Toilets, and Showers (M)	360
Nurses' Lounge, Lockers, Toilets, and Showers	160
Coffee Bar	60
Janitors	36
Stretcher Storage	48
Anesthesia Workroom	120
Anesthesia Storage (Gas)	40
Clean-Up Room	160
Instrument Storage	100
Un-sterile Storage	60
Equipment Storage	60
Sterile Storage	200
Cast Room	200
4-Orthopedic General Operating Rooms	1,600
Total New Sq. Ft.	3,628
Circulation @ 40%	1,451
Total Gross Square Feet	5,079

THERAPY SYSTEM - Contd.

Recovery Room

Room	Total Sq. Ft. needed
Recovery Room	800
Nursing Area	60
Clean Supply Area	80
Soiled Utility	80
Patient Toilet	20
Equipment Storage	80
Total Net Sq. Ft.	1,120
Circulation @ 40%	448
Total Gross Square Feet	1,568

Physical Therapy

Room	Total Sq. Ft. needed
Office	120
Exercise Room	600
Toilet	80
Examination	100
2-Therapy Baths	300
Hydrotherapy	1,000
Linen & Storage	200
Stretcher & Wheelchair Alcove	30
Occupational Therapy	400
Total Net Sq. Ft.	2,830
Circulation @ 20%	566
Total Gross Square Feet	3,396

SUPPLY SYSTEM

Storage

Room	Total Sq. Ft. needed
Office-Receiving Clerk)	100
Office-Storekeeper)	
Receiving Area	140
General Storage	2,250
Record Storage	750
Furniture Storage	360
Janitors' Closet	36
Civil Defense Storage	300
Wheelchair & Equipment Storage	200
Total Net Sq. Ft.	4,136
Circulation @ 20%	827
Total Gross Square Feet	4,963

Pharmacy

Room	Total Sq. Ft. needed
Dispensing	320
Storage	120
Alcohol Vault	40
Total Net Sq. Ft.	480
Circulation @ 15%	72
Total Gross Square Feet	552

Orthopedic Shop

Room	Total Sq. Ft. needed
Office	120
Examining Room	120
Shop	1,000
Toilet	30
Total Net Sq. Ft.	1,270
Circulation @ 20%	254
Total Gross Square Feet	1,524

HOUSEKEEPING SYSTEM

Housekeeping Area

Room	Total Sq. Ft. needed
Housekeeper's Office	120
Supply Issue Room	140
Linen Room	360
Soiled Linen	200
Trash Room	100
Total Net Sq. Ft.	920
Circulation @ 10%	92
Total Gross Square Feet	1,012

Employee Facilities

Room	Total Sq. Ft. needed
Female Professional Lounge) Female Professional Lockers) Female Professional Washroom)	500
Female Non-Professional Lounge) Female Non-Professional Lockers) Female Non-Professional Washroom)	500
Male Employees' Locker) Male Employees' Washroom)	200
Total Net Sq. Ft.	1,200
Circulation @ 10%	120
Total Gross Square Feet	1,320

HOUSEKEEPING SYSTEM - Contd.

Central Supply

Room	Total Sq. Ft. needed
Receiving Area) Clean-up or De-contamination)	160
Bulk Storage	120
Solution or Flask Water preparation	120
General Work Area (Make-up)	240
Supervisor's Office	80
Area for Sterilizers	80
Sterile Storage	375
Equipment Storage	260
Dispensing Area	80
Janitors	36
Surgical Linen	300
Total Net Sq. Ft.	1,851
Circulation @ 20%	370
Total Gross Square Feet	2,221

School & Play

Room	Total Sq. Ft. needed
Teaching Theater	500
2-Playrooms	1,200
Office	120
Total Net Sq. Ft.	1,820
Circulation 15%	273
Total Gross Square Feet	2,093

HOUSEKEEPING SYSTEM - Contd.

Dietary

Room	Total Sq. Ft. needed
Chief Dietitian	120
Therapeutic Dietition's Office	80
Supply & Receiving Area	100
Janitors' Closet	36
Personnel Toilet - Women	40
Personnel Toilet - Men	40
Refrigeration: Dairy, Meat, Fruit & Vegetables & Deep Freeze	200
Bulk Preparation	400
Finish Cooking, Nourishment Kitchen, & Special Diet Area	60
Tray Make-up	400
Pot & Pan Washing	80
Clean & Soiled Food Cart Parking	120
Day Storage	200
Dishwashing	300
Garbage Can Washing	100
Main Kitchen	240
Cafeteria Serving Line & Dining Room	1,350
2-Public Toilets	80
Private Dining & Conference Room	200
Total Net Sq. Ft.	4,486
Circulation @ 20%	897
Total Gross Square Feet	5,383

ADMINISTRATION AND BUSINESS FUNCTION

Room	Total Sq. Ft. needed
Main Lobby	640
2-Private Waiting Rooms	240
Public Toilets	120
Public Telephone	27
Information Dest & Telephone Switchboard	120
2-Admitting Offices	240
Administrator's Office	160
Administrator's Toilet	20
Assistant Administrator's Office	100
Administrative Secretary & Clerical	240
Purchasing Agent's Office	100
Personnel Director's Office	100
General Business Office	480
Credit Manager's Office	160
Office Machine Room	120
Medical Record Library Office	120
Medical Record Room	160
Medical Record Dictating Area & Medical Record Filing Area	160
Director Of Nursing Office	160
Nursing Supervisor's Office	120
Nursing Clerical & Secretary	120
Medical Staff Toilet & Lounge	160
Medical Staff Library	160
Administrative Conference	190
Personnel Toilets - Women	120
Personnel Toilets - Men	40
Janitors	36
Coffee & Gift Shop	500
Storage	100
Volunteers Workroom	160
Volunteers' Office	120
2-On-Call Sleeping	240
Total Net Sq. Ft.	5,573
Circulation @ 20%	1,114
Total Gross Square Feet	6,687

TEACHING SYSTEM

Room	Total Sq. Ft. needed
5-Private Classrooms	500
3-Conference Rooms	900
Auditorium	1,200
Total Net Sq. Ft.	2,800
Circulation @ 10%	280
Total Gross Square Feet	3,080

RESEARCH SYSTEM

Room	Total Sq. Ft. needed
Secretary	100
5-Doctors' Offices	600
Laboratory	600
Private Cubicles	500
Total Net Sq. Ft.	1,800
Circulation @ 20%	360
Total Gross Square Feet	2,160

MAINTENANCE AND MECHANICAL

Room	Total Sq. Ft. needed
Supervisor's Office	140
Maintenance Shops	200
Incinerator	325
Lawn & Garden Equipment	120
Mechanical Equipment:	
Air-conditioning essential areas	
Boiler Room	2,000
Storage, Toilet, Locker & Showers	120
Telephone Equipment	160
Transformer Vault	200
Electrical Switchboard	260
Total Net Sq. Ft.	3,525
Circulation @ 10%	352
Total Gross Square Feet	3,877

SUMMARY OF SPACE REQUIREMENTS

System	Total Net	Total Gross
Patient Housing	16,628	23,279
Therapy	27,762	37,732
Supply	5,886	7,039
Housekeeping	10,277	12,029
Administration	5,573	6,687
Teaching	2,800	3,080
Research	1,800	2,160
Mechanical	3,525	3,877
Total	74,251	95,883*
Parking 200 Cars @ 350 Sq. Ft. per Car		70,000
Grand Totals	74,251	165,883

*This Total Gross was arrived at assuming a 120 Bed Hospital (See Pediatric Hospital Development Graph)

V. REQUIREMENTS WITHIN A SPACE

The Implications of People Interacting

Much interaction in a hospital takes place in the circulation space. To provide the best possible spaces and interrelationships, the architect must be aware of the kinds of communication that exist. Meetings, even if called informal, are vital to the operation of the Pediatric Teaching Hospital. They occur frequently and center around issues, policies, work, or specific personnel. Observations indicate that a significant proportion of a full-time staff physician's time is spent in meetings, and that appropriate meeting places should be distributed throughout the hospital. These places may also provide for the formal communication of teaching hospitals, lectures, and seminars.

One instrument of formal communication is the medical record. Although laws regulating the period during which medical records must be kept usually specify five to seven years, in a Pediatric Teaching Hospital they will probably be kept longer, especially if studies in growth and development are an imporant part of pediatric research. Even if the record has been microfilmed, storage space can be a problem.

Formal communications including memoranda, are related to the number of divisions in the organizational structure. Greater emphasis on spatial definitions will reinforce formal communication patterns. It is necessary, then, to know the nature of communication in the hospital in order to provide appropriate architectural context. Building barriers, which increase formal communication, may interfere with good nursing care when emergency (and therefore unpredictable) decisions have to be made quickly. In a teaching hospital, the large number of

student doctors and nurses creates frequent need for "on the spot" decisions. Revans has pointed out similarities between decision needs in medical and in the mining industry (3C158). His studies showed that a greater number of mining accidents occurred when crucial decisions, such as the need for safety devices, had to be made in an office separated from the mine.

To plan space for physicians on the basis of their staff or academic rank may only impede their informal interaction and interfere with the medical students' training in patient care. Much of the communication at specific work sites is verbal, work-related, and not predictable. Work units should be provided with space which permits such essential communication. The groups usually communicate through one or two representatives whose interaction may either be scheduled or occur by chance meeting within the hospital. Chance interchange is essential to the functioning of the teaching hospital. It may be more important that layout provide proximity for informal contact than proximity of groups which can communicate at the formal level.[1]

Interaction between groups doing similar work can be helped by strategic location or functional contiguity, such as placing nursing units next to each other on the same floor. It is important that inpatient care groups be together rather than separated among the various medical specialties.

In light of the foregoing, certain traditional assumptions about the relationship of one department to another need to be studied

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1. Children in Hospital, p. 76.

critically. The proximity of radiology department to operating theater will be less important in the future because, first, transmission of the image by closed-circuit TV makes it possible to listen to a radiologist's interpretation within the operating room; secondly, recent developments in film processing provide, in equipment no larger than an attache case, a developed, dry film of archival quality in exactly one minute; and thirdly, overhead tubes link operating rooms electronically with the radiology department.

A warning must always be voiced about attempting to increase communication. It is important for workers to sense that they belong to a vital organization, but the individual's privacy must be considered. Privacy is a precious thing that can include quiet, contemplation, concentration, solitude, and withdrawal. "To serve the best interests of privacy two stresses, in particular, traffic and noise, must be treated as invaders."[2] Communication bombardment, or positioning people in such a way that they must constantly interact, can be as detrimental to the functioning of a hospital as erecting barriers. Those who need privacy will compensate for its lack by erecting other kinds of barriers (a hostile attitude, for example).

Noise requires careful analysis, since its absence alone does not insure privacy. As a matter of fact, recent developments of office layout in Germany suggest that noise can be used to gain privacy. Essentially this system, called Burolandschaft, produces arrangements that are irregular rather than rectangular. (It is not directly applicable to a hospital). The absence of partitions supposedly makes the space flexible and permits workers inside to view the exterior.

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2. Stein, G. Cited in Chermayeff, S., and Alexander, C. Community and Privacy. New York, Doubleday and Co., 1963, p. 54.

"One significant psychological aspect of the German system is the thinking that the kind of privacy provided by desks facing in different directions is analogous to the accoustical silence provided by the low and constant noise level of an air-conditioning system. When the noise is constant, there is so to speak, no noise. Similarly, when faces and movements are always visible, there is no distraction through singular action. The rule of Burolandschaft would be, then, that when everything is distracting, nothing is distracting. The idea is analogous to feeling alone in a bustling crowd."

Spatial distances, positions, and directions all can influence communication. Edward T. Hall[3] who, has contributed greatly to our understanding of proximic systems, indicates that proximic behavior is not language although it lacks none of the features of language. It tends to be regarded as iconic or a sign of an act, but is relative to the situation. "Cultural systems are organized in such a way that the basic components (structure points) can be controlled by all normal members of the group." Hall's definitions of "distance sets" - intimate, casual-personal, social-consultative, and public - are relevant to design. The proximic system of communication helps define the distances in each set. Children like to see their parents and to be seen by them.

The maximum intimate distance, set by Hall as 18 inches, has little bearing on design. From that point to approximately 48 inches is the casual-personal range. Forcing people to occupy spatial positions within this range (where visual contact is possible) may create problems, but in some cultures such distances are considered necessary for the

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3. Hall, E. T. The Silent Language, Garden city, Doubleday and Co. 1959.

transaction of business.[4]

Of most importance to the designer is the social-consultative distance set, which has two distinct phases - close phase: 4 to 7 feet, plus or minus 6 inches at each end; and - far phase: 7 to 12 feet, plus or minus 6 inches at each end. This range permits a voice level normal to Americans. In the close phase one can sharply see most of the face; in the far phase almost all of another human figure is within a reasonable visual angle. The close phase is usual for people who work together a great deal and for casual social gatherings. The far phase, at which business and social discourse is conducted, tends to inject formality and is preferred by Americans in their offices. This distance provides flexibility of involvement so that people can come and go without having to talk. An office receptionist can usually work comfortably if she is 10 feet or more away from visitors. If closer, she may feel that she should talk to those who are waiting.

Public distance is that beyond the "circle of involvement," or 12 feet. Because the voice must be raised to be heard at this distance, body stance and gestures, together with exaggerations in facial expression are more important for communication. Beyond 30 feet, details of facial expression are difficult to comprehend. Although these dimensions can relate to particular problems, such as the size of units for patients who must be under visual observation, the architect must consider them as design determinants throughout the hospital.

Richardson[5] alludes to the potentials of spatial positioning

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4. Hall, E. T., Our Silent Language: Ocultos Speak Louder than Words., American 14: 5-8, 1962.

5. Richardson, F. L. W. Talk, Work, and ActionIthaca, Soc. Applied Anthropology, Monograph No. 3, 1961, pp. 72-73.

for improving work situations, especially in his recommendations for control of contact avoidance and encouragement of contact sharing. He indicated that the simple operation of moving one desk 10 feet within an existing situation vastly improved interralationships among group members, hence promoting better production (D59, 3C18; 3C170). It should also be apparent that the shape of a conference room and its furniture, the placement of chairs and openings, the position of the room in the building, and its decor, directly affect the nature of the conference (3C171). Since 15 feet is the normal convergence distance of a gaze which rests the eyes (3C172), conference room design should be of adequate size or provide for this in other ways.

The Relationship to Other Spaces

Patient Housing System

Approximately 10 acute-care patients should be grouped around each observation station, because:

Children require more intimate supervision and more visual monitoring than do adults;

This size group encourages a sense of security and appropriate peer group interaction for the child in a strange environment;

The spatial distance between an observation center and the beds becomes too long with a larger number of patients;

This number of patients may easily be cared for by a nursing team;

At periods of low census a small unit can be closed more easily than a larger unit; and

The small number of patients allows the nurse to establish important relationships with her patients.

Only for adolescent patients where observation is less critical is this not applicable.

Room dimensions should be standardized to provide for a small number of different sized rooms, because:

Hospitals tend to be made up of a great number of rooms that do not differ significantly in size.

A single room of adequate dimensions can house a greater number of activities;

Interactional patterns in this culture tend to require similar-sized spaces;

It provides for a better opportunity to organize an orderly system of construction;

It provides for an opportunity to build a building which exhibits polyvalency in its whole and in its parts;

The detailed decision-making process can occur concurrently with the designing of the total building;

Room dimensions should not be standardized where the activity being housed really demands an accurate dimension;

Where the arrangements of the rooms would provide no spatial relief; and

Where the conditions of an existing structural system prohibit it.

Beds should be so placed that children can relate to the internal environment even more than the external environment, because:

The child is more interested in activity involving people than in a distant view;

Children in bed require something to hold their interest and compensate for their immobility;

Children tend to put emphasis on peer group interaction;

This kind of placement allows the patient to orient himself to an informal play area;

They should not relate to the internal environment;

Where the degree or type of illness requires intensive nursing care and/or privacy; and

When the age of the child is such that tactile communication is more important than visual communication.

Family participation care should be provided for in groups of five beds related to a private group space, because:

A group of more than five parents and their children creates problems of interaction and control;

This size permits mothers to give each other emotional support, to enjoy small group recreational activities, and to share babysitting responsibilities; and

This size can effectively moderate personality conflict and propagate a set of traditions associated with the use of family participation space; and

Potential conflicts about authority between mother and nurse can be significantly reduced if the mother has space which is clearly defined as hers.

All individuals need a place with which they can identify. In young children this need is strong enough to affect their ability to recover from illness rapidly. As shown, children need more interaction than adults; they need to be touched, to be seen, to hear, and to be heard.

Adults tend to interpret appropriate design for children chiefly in terms of decoration. The repetitious use of life-sized Walt Disney characters, lambs and flowers, or planes of pure bright color, may be only an unsatisfactory approach to the problem

Child-scale is more than just an investigation of dimensions. In fact, except that window sills closer to the floor allow the child to look out, and lower beds reduce the distance of a fall and are easier to get in and out of, few dimensions need to relate to the child. The height of steps can be reduced to 4 or 5 inches without making them uncomfortable for adults, but it must be remembered that adults have to function in a pediatric hospital and that children want to grow into a world of adult dimensions.

The child's architectural frame of reference, except in his play, is constantly and increasingly public-oriented.

He is well acquainted with his school environment, his parents' shopping environment, and his neighborhood, and is shaped by them. But in the hospital he has left the part of his environment that he needs most, his family and friends, and must instead relate to his peers. A child feels most comfortable in a small group, and a module of peers should not be larger than twelve. Six to eight would be ideal. For the Pediatric Teaching Hospital the size of the module can be related to the nature of the work load, serviceability, and ability to be controlled informally by one person although, as the Nuffield study points out, one nurse cannot be expected to handle a group alone.[6]

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6. Children in Hospital, p. 80-81

The Therapy System

Laboratory: This department would be located near the entrance for out-patients, and near surgical operating suites and radiology.

It should also be so located that it can be expanded at any time, such expansion not dependent upon other simultaneous building.

Radiology: The Radiology Department should be in close proximity to the surgical operating room. It must be designed in such a fashion that there is no extraneous traffic through the department.

The department should be so located that it can be expanded without other expansion.

Surgery: The Surgery Department should be located in close proximity to emergency and radiology. It should be integral with the recovery room.

Physical Therapy: The Physical Therapy should be in proximity to patient housing.

The Supply System

Medical and supporting services having no patient contact can be centralized outside the Pediatric Teaching Hospital, because:

Many services can be provided more economically on a medical center or city scale;

Individual hospital loads are small, sub-contractors can use industrial methods for reducing their overhead;

It is becoming increasingly difficult within the hospital to maintain quality control of services requiring unskilled labor;

It is important to concentrate services and spaces which have direct relationship to patient care; and

Concern with improving the secondary servicing functions takes administrative time away from improving primary functions of patient care.

Only when specific services are not available in emergencies or "off-hours" should medical services originate within the teaching hospital.

Do not provide mutually exclusive corridors for special kinds of movement, because:

The hospital corridor system usually satisfies functions other than passage;

Change rarely occurs in the corridor system but mode of service delivery may change;

The movement of people and the movement of goods are often related;

It is important to have alternative paths available for the use of all kinds of movement; and

Special spaces for special kinds of movement will inhibit growth and change.

Only where the corridor is a necessarily private and supposedly inaccessible space, as in a surgical suite, should this not hold applicable.

Servicing systems should remain a secondary design determinant and have no special spatial definition, because:

Spaces for groups at work represent the primary design determinant;

Special spatial definition will not allow for the maximum use-flexibility for the other spaces;

Many of the points to be serviced will be changed;

This kind of servicing system will allow for changes in the item size being delivered;

This allows for changes in the servicing system without extensive structural remodelling; and

This kind of delivery system allows for non-hospital-owned delivery systems to function within the hospital.

Only where standardized items in high volume are delivered to stable points of service over long periods of time, would this prove false.

Pharmacy

This department should be located contiguous to the central distribution center. No provision has been made for a separate out-patient dispensing or employee dispensing area, as we believe the volume

of this will be small and can be handled directly from the Pharmacy.

The Housekeeping System

Central Supply: Ideally, this department should be located with easy access to the surgical operating suite, the nursing units, and supply receiving entrance. The pharmacy, linen storage, food cart storage areas, and bulk storage areas should be adjacent to central distribution supply as it probably will be desirable to have these under joint supervision. Even if they are not under joint direction, all need direct access to the functional areas they are supporting.

Dietary: This department should be located in close proximity to the supply receiving entrance and the central distribution center.

School and Play

Provide spaces, groups of spaces, and areas capable of being adapted to different uses, because:

No precise method is available to predict all changes; and

This will permit changing the activity system without providing new sub-mains, servicing links, and fixed building equipment.

An approach of greater depth was observed at the new children's unit of Johns Hopkins University (3C184). There a play-education program is concerned with in-patients as well as out-patients. Even though the playtime for the latter group is short, the director feels it is necessary for his program to make contact. Of the several areas where out-patients may wait, one has a commercial merry-go-round; in another the play-education program provides just people interested in children. Their studies indicate that most children prefer the structured people-equipped program to the merry-go-round.

Administration System and Business Function

The lobby and administrative areas will be located near the grade level visitors' and ambulatory patients' entrance. The driveway should allow immediate access to the entrance. The lobby should be closely related to the visitors' elevators.

Provide for the reception of all patients in one general area.

An adequate and even workload justifies staffing by qualified medical personnel at all times.

The functions of emergency and dispensary care and admission to hospital, have similar patient examination needs and medical supply service needs.

A single center is provided for scheduling and coordinating various consultation and diagnostic procedures for a given ambulant patient.

The process of arrival and orientation is simplified for all patients and parents.

Only where the basic admission procedure is handled in the in-patient area, should this not apply.

Teaching and Research System

Senior pediatric residents and research fellows should occupy space close to the specific pediatric sub-specialties with which they are affiliated. Interns and junior residents should have office space close to the patient-care areas. The chief resident's office should be located near the office of the hospital's pediatrician-in-chief. Consistent with the need to present the student with a comprehensive education, we have assumed that the pediatrician-in-chief, although he may be a sub-specialist, should be a generalist at heart.

All patients should be available for teaching and research programs, because:

The educational and research missions of the teaching hospital require general patient participation in these major activities;

The former practice of providing free medical care for patients who served as teaching and research subjects is no longer valid;

Increased public support for medical education and medical research implies a greater degree of patient participation;

Teaching hospitals need as many good patient-teaching cases as are available; and

It is necessary for patients to participate in clinical research to obtain the latest results in medical research.

Only where such a degree of risk makes it impossible to obtain informed consent from the parent,

Where no benefit for the patients' health is anticipated from the research procedure, and

Where the patient's participation in a training exercise compromises his health status, rate of recovery, or right of privacy, should this not apply.

The Structural and Mechanical System

The structural system must be based on the needs of the hospital. The project's studies of appropriate structural systems dealt only with the problems of change, but a few things are important enough to mention.

The size of the spaces and modules developed for a hospital can dictate the size of its structural bays. The need for flexibility may dictate long spans with deep girders and beams. It has been suggested that the flat beam-and-slab system offers most advantages for hospitals. This system provides more columns than a system with longer spans, but the columns will be smaller in cross section. This system can also help to reduce the total volume of a building.

However, the structural system of the new general hospital in Greenwich, England, designed by Howard Goodman of the Ministry of Health, is a contradiction in part. The entire structure is to be precast and dry-erected rather than poured in place as the flat beams and slabs are. The floor-to-floor height is 16 feet as compared with the usual 12 feet for the flat beam and slab; the ceiling height in each is usually 9 feet. The bay size is uniform, 16 feet by 64 feet, the long dimension being almost 40 feet more than that recommended for the flat beam and slab. The major beam is of composite construction.

A uniform bay size may not be ideal in a hospital, but the Greenwich structure is interesting not only because of the long spans but because of a 70foot interspace between each ceiling and the floor above. The interspace houses the mechanical-service systems, thus eliminating the need of building around a profusion of relatively small vertical ducts. This separation of mechanical equipment from structural system appears economically sound and is practical because the structure has the longer life span.

In some recent buildings, nevertheless, mechanical and structural systems have been integrated and the results are visually exciting. The monumental quality of column-like service spaces is akin to that of the buttressing on a Gothic Cathedral. It may be that in our time the only way to get the effect of monumentality in a building is by making in-appropriate "elements" that are put together to resemble other things, i. e., mechanical-equipment ducts become huge columns. The amount of floor space taken up by mechanical equipment in relation to building cubage indicates that such elements should be designed for sections,

not for plans.[7] Kahn's design for the Salk Center at La Jolla, California, indicates his awareness of this problem as well as his dissatisfaction with the Richards Medical Towers at the University of Pennsylvania.

Mechanical-equipment systems, which in their upward trend of dollar and space consumption already account for more than one third of hospital costs, are important determinants of design. The necessary air-conditioning, plumbing, lighting - all present complex problems.

Complete environmental control, although feasible, is costly. Buildings with sealed windows keep out dust and avoid the high initial maintenance costs of movable sashes and screens, but many believe that a window should be capable of opening in an emergency and that the feeling of being sealed in is undesirable psychologically. If the occupants can relate to the outside through porches and balconies, or if the playrooms and lounges have doors or moving sashes, this objection may diminish. Observations indicate that in a controlled environment very few are given to pros and cons of hermetically sealing a building and its occupants.

A central air-conditioning system by which all of the used air cooled or heated, is discharged rather than re-circulated is the most desirable system in a hospital. It affords greater flexibility for the occupants than a unit air conditioner, which can operate only in an exterior room, and should be considered even though it is expensive to install and operate. If initial equipment costs must be reduced, a combination of central and unit air-conditioning is possible.

A reduction in heating costs may result from the suggestion of equipment engineers that artificial lighting should be able to heat a building. In that event, only an auxiliary system to maintain a constant

7. Banham, R. The Buttery-Hatch Aesthetic. Arch. Rev. 131:203-205, 1962.

temperature at night or during other periods when artificial light is not being used, plus equipment for cooling, would be needed.

Complex plumbing is required in any hospital for water service and the outlets for suction and piped oxygen. Some studies suggest that no hospital should be built without piped oxygen.[8] Others believe that an oxygen outlet is not needed for every adult bed. This recommendation is based on expense, and the study indicates that the installation cost may not be excessive in horizontal hospitals, since the greatest expense is incurred in bringing the leaders from the central reservoir. Infants and young children have special need for oxygen. It is our opinion that oxygen and suction should be provided for all infant beds, for all single and double rooms, for each bed in intensive-care units, and for every second bed in other group situations. These ratios will not be needed for adolescent accommodations.

A generous supply of electricity, both high and low voltage, should exist throughout the hospital. Each bed should have its own outlets. Every space or future space should be supplied with high and low voltage service; and because of the increased reliance on electronic equipment for care, research, and teaching, ways should exist to link the spaces. Outlets for closed-circuit television and computers should be provided for almost every space.

The problems of obselescence for mechanical movement apply to the building's other mechanical systems. Considerations must be given to the life of mechanical systems and parts, their replacement, probable changes, and disposable parts. The human attitude toward equipment

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8. Gautin, R. P. The Advantages are with piped oxygen, Med. Hosp. 83:122, 1954.

determines its life span. People care for new equipment but for several reasons, including availability of a later model, fashion pressures, or need for greater efficiency; they neglect it quickly.

The designer must be aware that the equipment load and many points of service will shift. He should be concerned with studying comparative efficiencies in mechanical systems that can save his client money.[9] Energy from burned waste, which is in almost predictable constant supply, would heat all of the hot water necessary for a hospital, especially with the increased use of disposable gowns and sheets.

Four factors bear on planning and designing the hospital's much needed systems of mechanical equipment:

1. Analysis of the needs in terms of an operating system will effect real savings.

2. The systems must be accessible for maintenance and cleaning.

3. Each hospital activity (living, learning, etc.) will create its own demands and its own needs for control.

4. Constant change requires systems that are adaptable and easily replaced.

> "In themselves services (the mechanical systems) are very flexible and there are few restrictions on the manner in which pipes, ducts, and cables can be run, provided access is available to them. The major exception is that of soils and wastes which have very limited horizontal travel. This element more than any other will establish a grid of vertical distribution ducts and the degree of flexibility (possible)..."[10]

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9. Russell, L. S. A Computer Method to Determine the Optimum Mechanical System to Be Employed in a Building. Paper presented at first Boston Architectural Center Conference, December 1964, in Boston.

10. Mulcahy, S. Planning For Services, Architectural J. 132:15, 1960.

> "The influences of services on the issue of whether to build high or low can be summarized thus: though the horizontal runs occasioned by building low are more expensive, the fact that lifts can be dispersed will more than offset the difference. Apart from this, building low greatly reduces the space needed for vertical distribution of services and as, at the same time, it makes it easier to locate a new plant where it is wanted when functions change, it is generally considered preferable."[11]

Careful design can reduce construction costs, but more study should be given to design that will produce lower operating costs. The publications of operations research and management groups contains numerous examples. Some consultants have proposed ideas such as having a library give away inexpensive copies of books to avoid the high cost of returning books to the shelves. The potential exists for reducing costs through taking an unbiased look at the operation of a system and then attaching the key problem.

It is the designer's responsibility to request an unbiased analysis of his client's real needs and expressed desires, for in the end the designer must relate them to the building and to the operating funds. Kahn's clarification[12] states, essentially, that the budget for building bears no relation to economy of design and construction; economy means must always be considered, no matter what the budget. The designer is also responsible for seeking the most appropriate means to the desired end, and with hospital clients the desired end is too often just an up-to-date building with all the latest technical innovations. Our over-zealous faith in technology is evident in some recent predictions for hospitals of the future (3C210). Although technology has

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11. Ibid.

12. Kahn, L. I. Discussion Recorded in Kahn's Philadelphia Office. Perspecta No. 7, 1961, pp. 9-18. Architecture is the thoughtful making of Spaces. Perspecta No. 4, 1957, pp. 2-3.

saved many lives, we must be sure that devices recommended for a hospital take into consideration the sensitivity of the patient (3C211).

Standards of Construction

Facilities shall be available to the public, staff, and patients who may be physically handicapped. Minimum requirements except as noted in these standards shall be those set forth by USASI pub. No. A117.1-1961.[13]

Nursing Unit

Patient Rooms: Each patient room shall meet the following requirements:

Maximum room capacity: 4 patients.

Minimum room areas exclusive of toilet rooms, closets, lockers, wardrobes, or vestibules: 100 square feet in one-bed rooms and 80 square feet per bed in multi-bed rooms.

Multi-bed rooms shall be designed to permit no more than two beds, side by side parallel to the window wall.

Window: sill shall not be higher than 3'0" above the floor and shall be above grade.

Nurses' Calling Stations. (See Sec. 8-24H)

Lavatory. In single and two-bed rooms, the lavatory may be located in a private toilet room.

Locker or closet for each patient.

Cubicle curtains, or equivalent built-in devices, for privacy for each patient in multi-bed rooms.

No patient room shall be located more than 120'0" from the Nurses' Station, the clean workroom, and the soiled workroom.

Services Areas in Each Nursing Unit: The size of each service area will depend on the number and types of beds within the unit and include:

Nurses' Station. For nurses' charting, doctors' charting, communications, and storage for supplies and nurses' personal effects.

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13. General Standards of Construction & Equipment for Hospital & Medical facilities. U. S. Department of Health, Education, and Welfare. Silver Springs, Maryland, 1967.

Nurses' toilet room, convenient to the Nurses' Station.

Nurses' Office. Near Nurses' Station. (Office may serve more than one nursing unit).

Clean Linen Storage. Enclosed storage space. (May be a designated area within the clean workroom.)

Soiled workroom. Shall contain clinical sink, work counter,waste receptacle, and soiled linen receptacles.

Medicine Room. Adjacent to Nurses' Station; with sink, refrigerator, locked storage, and facilities for preparation and dispensing of medication. (May be a designated area within clean workroom if a self-contained cabinet is provided.)

Clean Workroom, for storage and assembly of supplies of nursing procedures; shall contain work counter and sink.

Nourishment station. Storage and sink for serving between-meal nourishments. (May serve more than one nursing unit.)

Equipment storage room. For storage of TV stands, inhalators, air matresses, walkers, and similar bulky equipment.

Patient baths. One shower stall or one bathtub for each 15 beds not individually served.

Stretcher and wheelchair parking area or alcove.

Janitors' closet. Storage of housekeeping supplies and equipment, floor receptor or service sink.

Patient Toilet Rooms: A toilet room shall be directoy accessible from each patient room without going through the general corridor. One toilet room may serve 2 patient rooms but not more than 4 beds. (The lavatory may be omitted from the toilet room if one is provided in each patient room.)

Isolation Room: Isolation room (s) for the particular use of those prone to infections as well as those suffering from infections shall be provided on the basis of one for each 30 beds or major fraction thereof, if the hospital does not have a separate contagious disease unit. Each isolation room shall have:

Only one patient per room.

Lavatory within patient room or toilet room.

View-window for nursing observation.

Separate toilet room with bath or shower.

An anteroom with adequate facilities to maintain aseptic conditions, including lavatory or sink. (One anteroom may serve several isolation rooms.)

Disturbed Patient Room: In the absence of a psychiatric unit, each hospital shall have a room which shall be designed in a manner to permit use as an ordinary patient room and which will also contain facilities to care for patients needing close supervision including facilities to prevent the patient's escape, suicide, or hiding. To minimize patient injury, the design of the room shall exclude sharp projections. An individual toilet room with lavatory shall be provided. The toilet room door shall be lockable only from the outside.

Pediatric Unit

If provided as a separate nursing unit, it shall contain:

Patient Rooms: Pediatric patient rooms shall conform to the same requirements as those for any patient room shown in Sec. 8-2A. In addition, an allowance of 40 square feet per bassinet must be provided in nurseries.

Service Areas: These areas shall conform to the requirements in Sec. 8-2B, and shall include:

Treatment room. Lavatory.

Dining, education, and playroom. Multi-use area for 50 percent of the patients.

Toilet room. For each sex, with minimum ratio of 1 water closet for each 8 beds, excluding bassinets.

Storage for clothes, toys, and equipment.

Out-Patient Suite

These facilities shall be located to prevent out-patients from traversing in-patient areas and shall include:

Well-marked and sheltered entry with nearby emergency parking and convenient access for ambulances.

Reception area with telephone, drinking fountain, and toilet rooms.

Admissions and Patients' Records area.

Examination and Treatment Room(s). Lavatory.

Emergency Room. Clinical sink. (See Secs. 8-20 and 8-24 for special requirements.)

Storage for sterile supplies.

Wheelchair and Stretcher Alcove.

Janitors' Closet. Floor receptor or service sink and storage for housekeeping supplies and equipment.

Radiology Suite

This suite shall contain:

Radiographic Room. (See Secs. 8-20 and 8-24 for special requirements.)

Film Processing Room.
Film Filing Room.
Toilet Room, adjoining Fluoroscopy Room.
Dressing area for ambulatory patients.
Holding area for stretcher patients.
Waiting space.
Office, with film viewing facilities.

Laboratory Suite

Facilities for the following services shall be provided: chemistry, bacteriology, serology, pathology, and hematology. They shall include:

Glasswashing and Sterilizing Facilities.
Recording and Filing Facilities.
Office.
Blood Storage Room. (May be located in an area other than the laboratory suite.)
Specimen Collection Room. This room shall be located near the laboratory and contain a water closet and lavatory.
Morgue and Autopsy Facilities. These facilities shall be provided within the hospital unless otherwise available.

Pharmacy or Drug Room

Dietary Department

Construction, equipment, and installation shall comply with or exceed the minimum standards set forth in the PHS Pub. 934. The department shall include the following facilities unless commercially prepared dietary service, meals, and/or disposables are to be used. If a commercial service will be used, dietary areas and equipment shall be designed to accommodate the requirements for sanitary storage, processing, and handling:

Food Preparation Center. Provide lavatory, but do not provide mirror.
Food Serving Facilities for patients and staff.

Dishwashing Room. Provide commercial-type dishwashing equipment and lavatory.
Potwashing Facilities.
Refrigerated Storage. Three-day supply.
Day Storage. Three-day supply.
Cart Cleaning Facilities.
Cart Storage Area.
Waste Disposal Facilities
Can washing Facilities.
Dining Facilities. Provide 15 square feet per person seated.
Dietitian's Office.
Janitors' Closet. Storage of housekeeping supplies and equipment, floor receptor or service sink.
Toilet Room. Conveniently accessible for dietary staff.

Administration Department

This department shall include:

Business Office.
Cashier's Station.
Information Center.
Administrator's Office
Admitting Office
Staff Lounge with Doctors' Coat Room
Medical Library
Lobby
Public and Staff Toilet Rooms
Director of Nurses' Office. (May be omitted in hospitals of less than 100 beds.)
Housekeeper's Office or Space. (Location optional and may be combined with clean linen room in hospitals of less than 100 beds.

Medical Records Unit

This unit shall include:

Active Record Storage Area
Record Review and Dictating Room
Work Area for sorting, recording and microfilming.
Inactive Record Storage Area. (May be omitted if microfilming is used.)

Central Medical and Surgical Supply Department

The following areas shall be separated from each other:

Receiving and Cleanup Room. Space for cleaning equipment and disposing or processing of unclean articles shall be provided.
Clean Workroom. This room shall be divided into work space, clean storage area, sterilizing facilities, and storage area for sterile supplies.
Un-sterile Supply Storage Area. (May be located in area other than this department.)

Laundry

The Laundry shall include:

Soiled Linen Room
Clean Linen and Mending Room
Linen Cart Storage
Lavatories, accesible from soiled, clean, and processing rooms.

Central Stores

General storage room(s) shall have a total area of not less than 20 square feet per bed and shall be concentrated in one area.

Employees' Facilities

These facilities shall include:

Nurses' Locker Room. This room shall have lockers, rest space, and separate toilet room.
Female Help Locker Room. This room shall have rest space, lockers, and separate toilet room.
Male Help Locker Room. This room shall have lockers and separate toilet room.

Engineering Service and Equipment Areas

The following shall be provided:

Boiler Room
Engineer's Office
Mechanical and Electrical Equipment Room(s)
Maintenance Shop(s). At lease one room shall be provided.
Storage Room for Building Maintenance Supplies
Storage Room for Housekeeping Equipment. (Need not be provided if space is available in janitors' closet elsewhere.

Toilet and Shower Rooms
Refuse Room for trash storage. Shall be located convenient to service entrance. (See Sec. 8-20A9d.)
Incinerator Space. The incinerator shall be in a separate room, or in a designated area within the boiler room, or outdoors. (See Sec. 8-23B.)
Yard Equipment Storage Room for yard maintenance equipment and supplies.

Physical Equipment

Because of the extensiveness of a hospital physical equipment list, it will not be included in this program. The architect will refer to Hospital Equipment Planning Guide of the U. S. Department of Health, Education and Welfare.

VI. DIAGRAM OF RELATIONSHIPS

Elements of the People-Machine Work/System

Examples of graphic method used in analysis of hospital work sub-systems. Upper grid shows four degrees of involvement by persons or machines in specific activities. Lower grid does the same in the area of contacts between persons and machines.

PM/WS ACTIVITIES INVOLVEMENT

ACTIVITIES \ PEOPLE AND MACHINES	DOCTOR	PATIENT	PAPER	NURSE	TECHNICIAN	BED	PARENT	STUDENT	SECRETARY	ELECTRIC MACHINE	DEPARTMENT
INTERVIEWING											
TYPING											
OBSERVING											
CONSULTING											
ROUNDS											
REPAIRING											

PM/WS PEOPLE MACHINE FIELD CONTACT

MACHINES \ PEOPLE	DOCTOR	NURSE	TECHNICIAN	SECRETARY	STUDENT	PATIENT	PARENT
DEPARTMENT							
ELECTRIC MACHINE							
BED							
PAPER							

KEY

DIRECT

PARTIAL

INDIRECT

NONE

Establishment of Children's Hospitals in U. S., 1865-1964

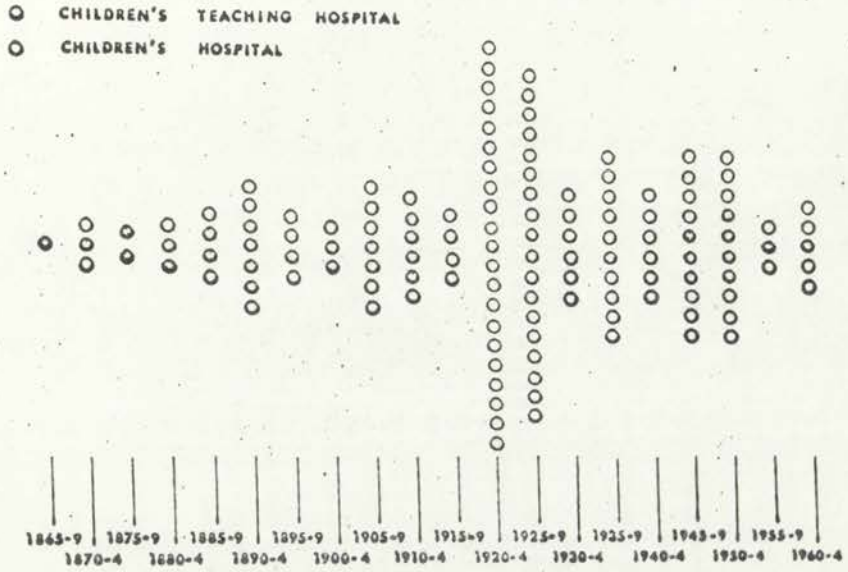
Pattern of present Children's Hospitals in the United States, showing dates of establishment.

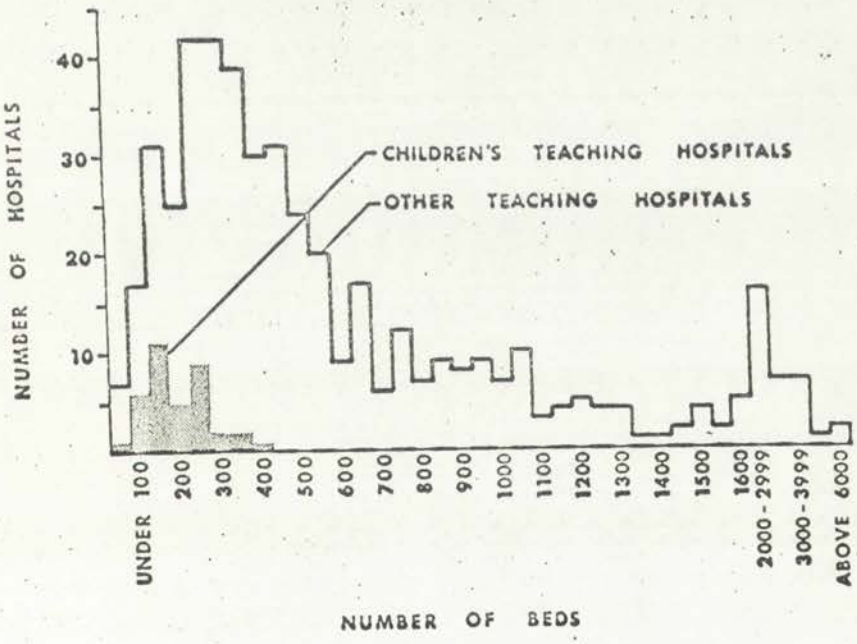
Data derived from Hospitals Guide Issue, 1964. Published in J. Amer. Hosp. Assn., Nov. 1964.

Distribution of U. S. Teaching Hospitals by Bed Capacity

Children's Teaching Hospitals (shown separately) typically have a smaller number of beds than other teaching hospitals.

Data derived from Directory of Approved Internships and Residencies. Published by American Medical Association, 1964.


CHILDREN'S TEACHING HOSPITAL
CHILDREN'S HOSPITAL
1865-9
1870-4
1875-9
1880-4
1885-9
1890-4
1895-9
1900-4
1905-9
1910-4
1915-9
1920-4
1925-9
1930-4
1935-9
1940-4
1945-9
1950-4
1955-9
1960-4


NUMBER OF HOSPITALS
40
30
20
10
CHILDREN'S TEACHING HOSPITALS
OTHER TEACHING HOSPITALS
UNDER 100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
2000-2999
3000-3999
ABOVE 6000
NUMBER OF BEDS

The Hospital Universe in the U. S., 1964

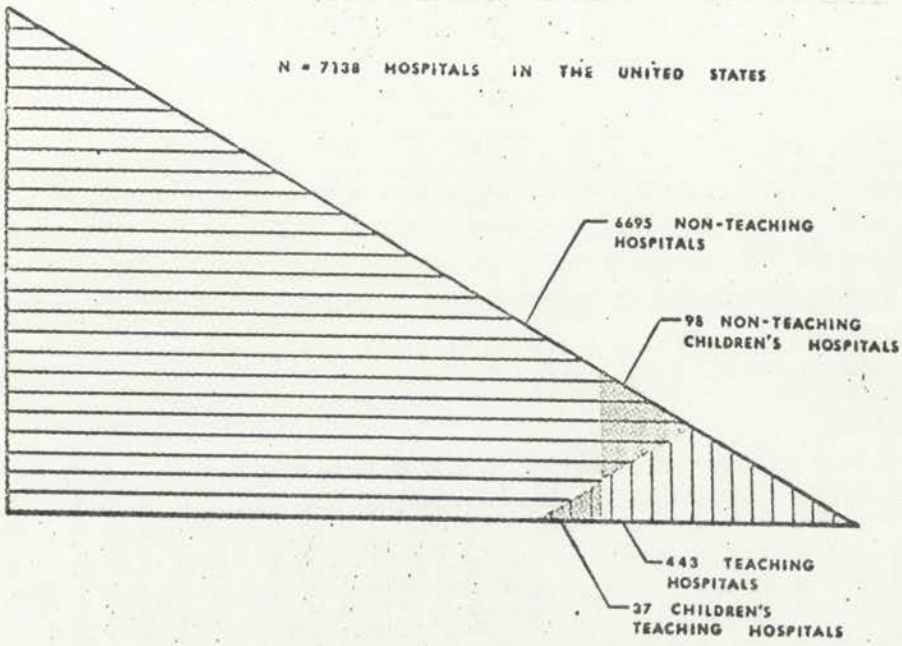
Diagram shows proportion of various types of hospitals to the total hospital universe of 7,138.

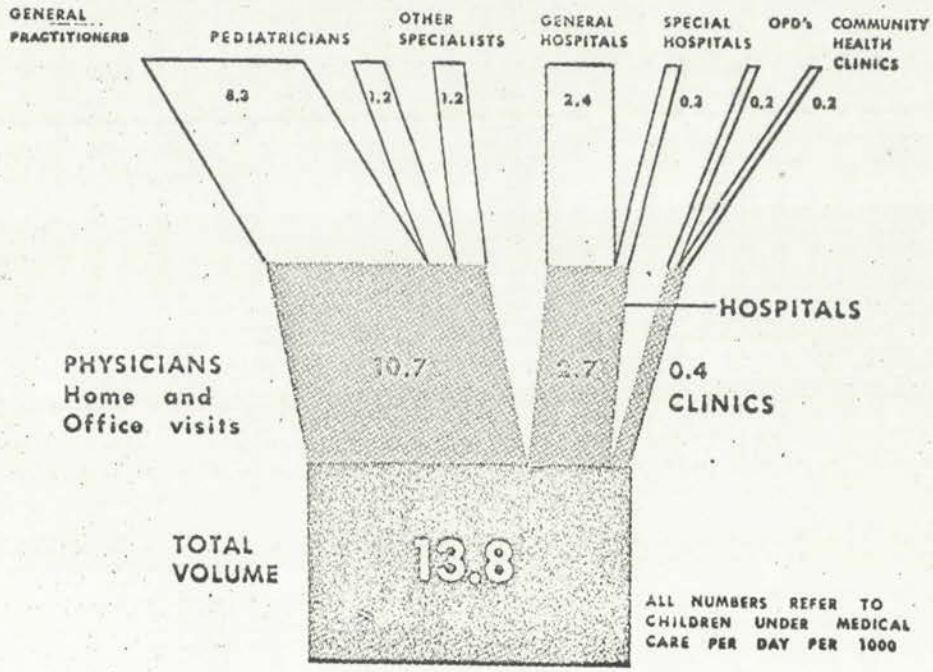
Data derived from Hospitals Guide Issue, 1964. Published in J. Amer. Hosp. Assn., Nov. 1964.

Total Volume of Medical Care Given Children in 1949

The numbers used to express volume of care refer to children under medical care per day per 1,000.

Adapted from report of American Academy of Pediatrics, Child Health Services and Pediatric Education. New York, Commonwealth Fund, 1949, p. 23.

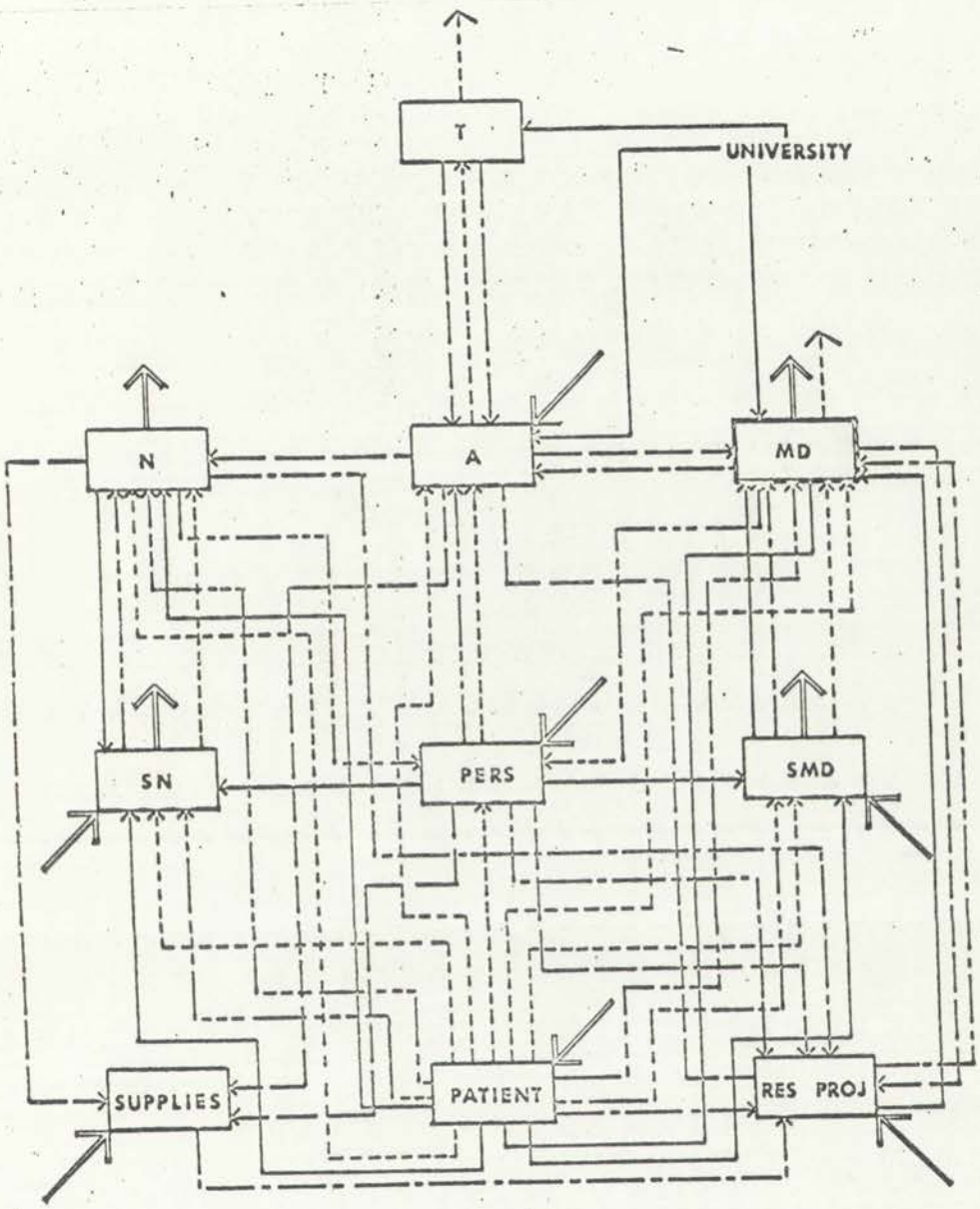

N = 7138 HOSPITALS IN THE UNITED STATES
6695 NON-TEACHING HOSPITALS
98 NON-TEACHING CHILDREN'S HOSPITALS
443 TEACHING HOSPITALS
37 CHILDREN'S TEACHING HOSPITALS


GENERAL PRACTITIONERS
PEDIATRICIANS
OTHER SPECIALISTS
GENERAL HOSPITALS
SPECIAL HOSPITALS
OPD's
COMMUNITY HEALTH CLINICS
8.3
1.2
1.2
2.4
0.3
0.2
0.2
HOSPITALS
PHYSICIANS Home and Office visits
10.7
2.7
0.4 CLINICS
TOTAL VOLUME
13.8
ALL NUMBERS REFER TO CHILDREN UNDER MEDICAL CARE PER DAY PER 1000

Multiple Responsibilities in the Teaching Hospital

This chart of hospital organization shows the overlapping authority and responsibility associated with the work of key personnel.

T	Trustee
N	Nurse
A	Administrator
MD	Physician
SN	Student Nurse
Pers.	Personnel
SMD	Student Physician
Res. Proj.	Research Project



HIERARCHIES - RESPONSIBILITIES - SIMULTANEITY

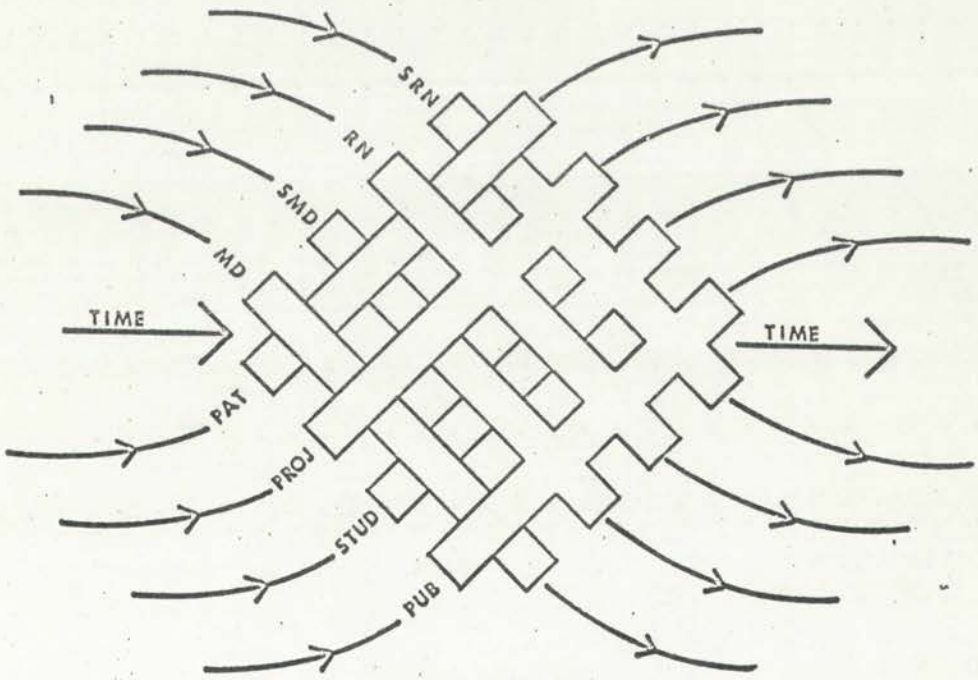
- - - - - - legal responsibility for patient
——— teaching responsibilities
—·—·— research responsibility
——— financial authority
— — — responsibility for med. rec.
⇒ advancement

Differing Responsibilities for the Multiple Missions

The primary missions of patient care, medical research, clinical training, and public leadership involve the physician, student physician, nurse, and student nurse. In this drawing the role of each group is shown at the intersections. Changes in activity and personnel occur from time to time.

SRN	Student nurse
RN	Registered nurse
SMD	Student physician
MD	Academic physician
Pat	Patient
Proj	Research project
Stud	Student
Pub	Public

WORK FLOW



4 FOLD MISSION

Referral of Patients

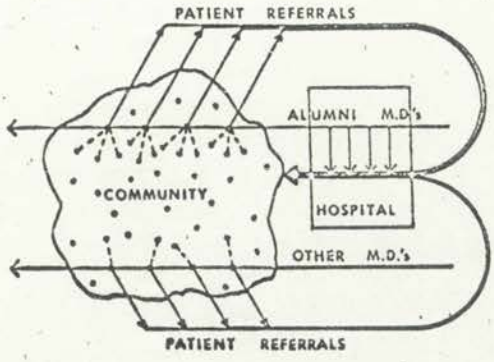
Private physician referral is shown at the left. This pattern of referral requires a special form of staff privilege and strong alumni associations.

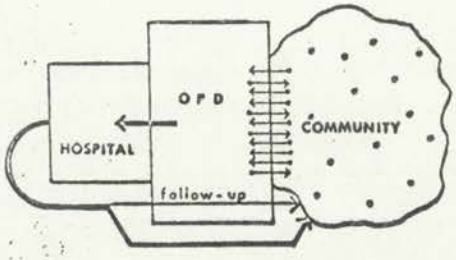
The drawing at the right shows out-patient department referral. This pattern of referral requires close proximity to a large population which is unable to obtain adequate coverage from private physicians.

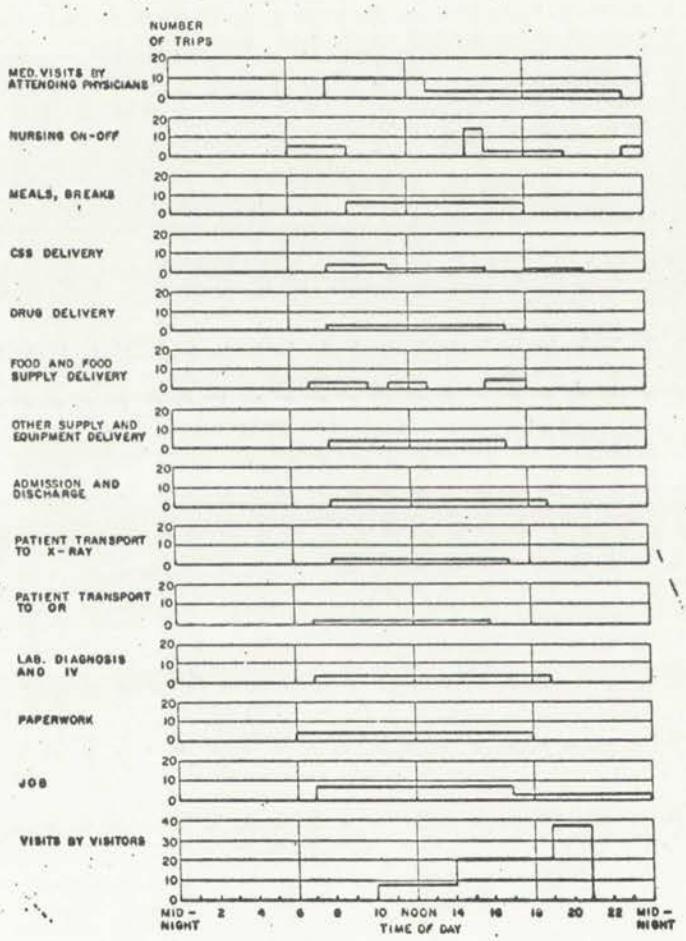
Time Cycles in a Patient-Care Area

Patterns of work, traffic, and interation show definitive cycles throughout the day.

Taken from Souder, J. J., et al. Planning for Hospitals. Chicago, R. R. Donnelley and Sons, 1964.


PATIENT REFERRALS
ALUMNI M.D.'s
COMMUNITY
HOSPITAL
OTHER M.D.'s
PATIENT REFERRALS


OPD
HOSPITAL
COMMUNITY
follow-up


NUMBER OF TRIPS
MED. VISITS BY ATTENDING PHYSICIANS
NURSING ON-OFF
MEALS, BREAKS
CSS DELIVERY
DRUG DELIVERY
FOOD AND FOOD SUPPLY DELIVERY
OTHER SUPPLY AND EQUIPMENT DELIVERY
ADMISSION AND DISCHARGE
PATIENT TRANSPORT TO X-RAY
PATIENT TRANSPORT TO OR
LAB. DIAGNOSIS AND IV
PAPERWORK
JOB
VISITS BY VISITORS
MID-NIGHT
NOON
MID-NIGHT
TIME OF DAY

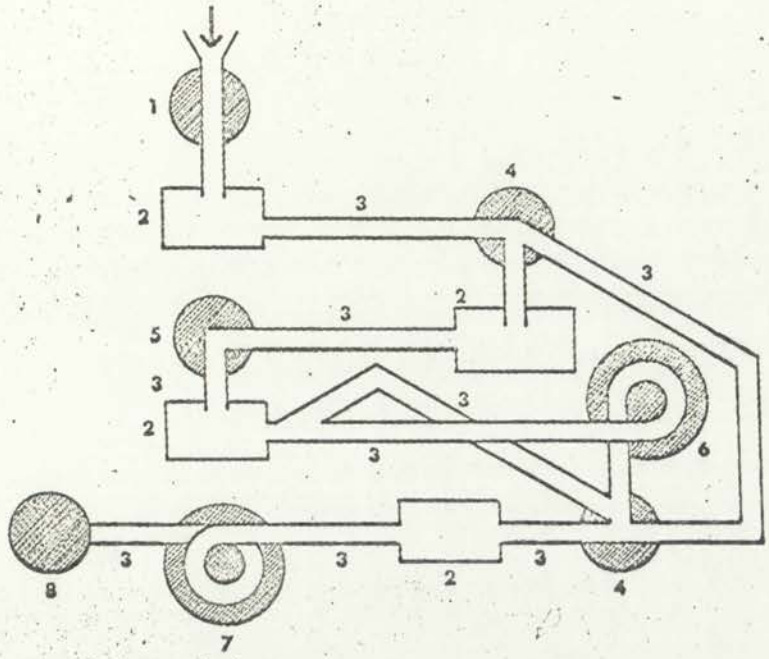
TIME CYCLES

Stages of the Admission Process

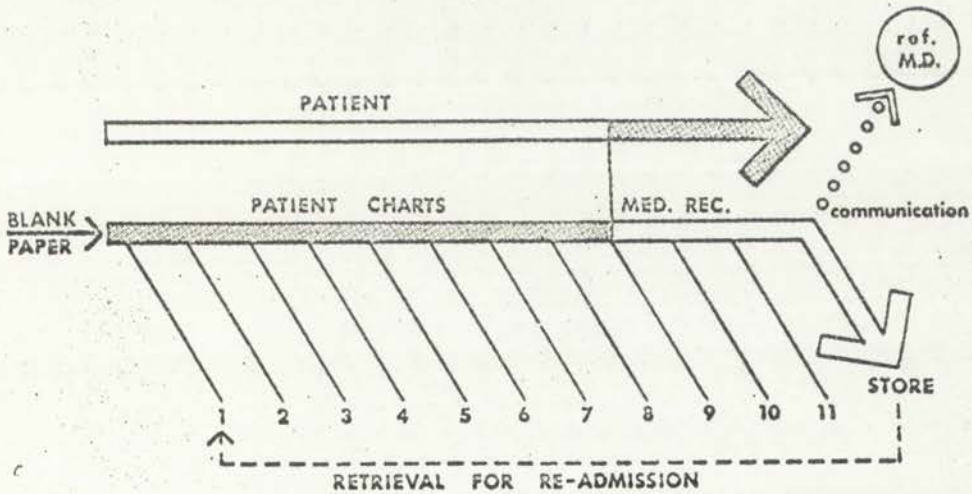
1. Scheduling Admission
2. Waiting
3. Movement
4. Reception
5. Interview
6. Physical Examination
7. Changing Clothes

Formation of the Medical Record

1. Admission Interview
2. Medical History
3. Physical Examination Report
4. Doctors' Orders
5. Nurses' Notes and Vital Signs
6. Diagnostic Reports
7. Medication orders
8. Charge Slips
9. Dictated Discharge Summary
10. Transcribed Discharge Summary
11. Statistical Abstract



ADMISSION FLOW

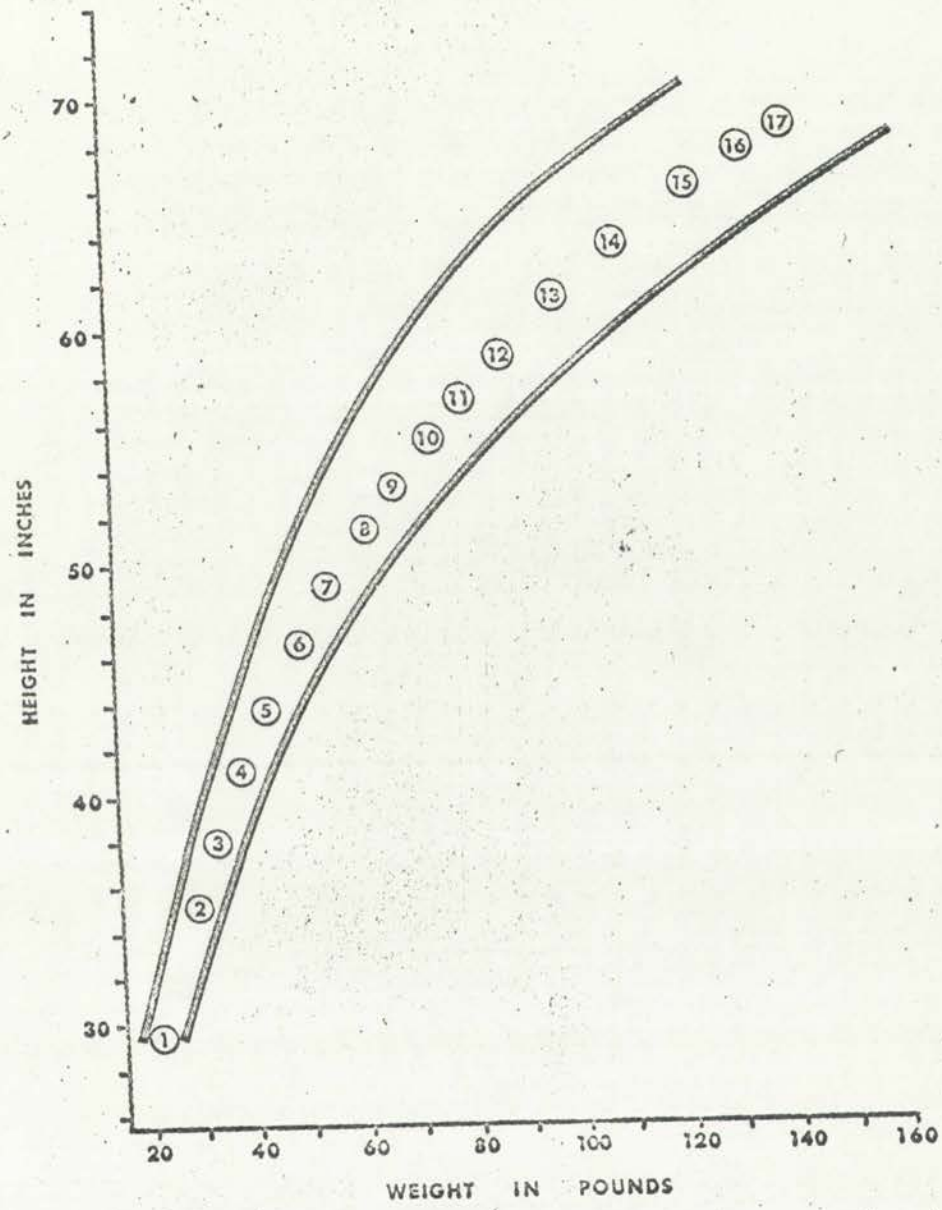


PAPER SHADOW

Physical Growth of a Boy

Chart shows weight and height from 1 to 17 years' of age. The circled numbers represent age.

Taken from Hathaway, M. Heights and Weights of Children and Youth in the United States. Home Economics Research Report No. 2., Washington, GPO, 1957, p. 65.



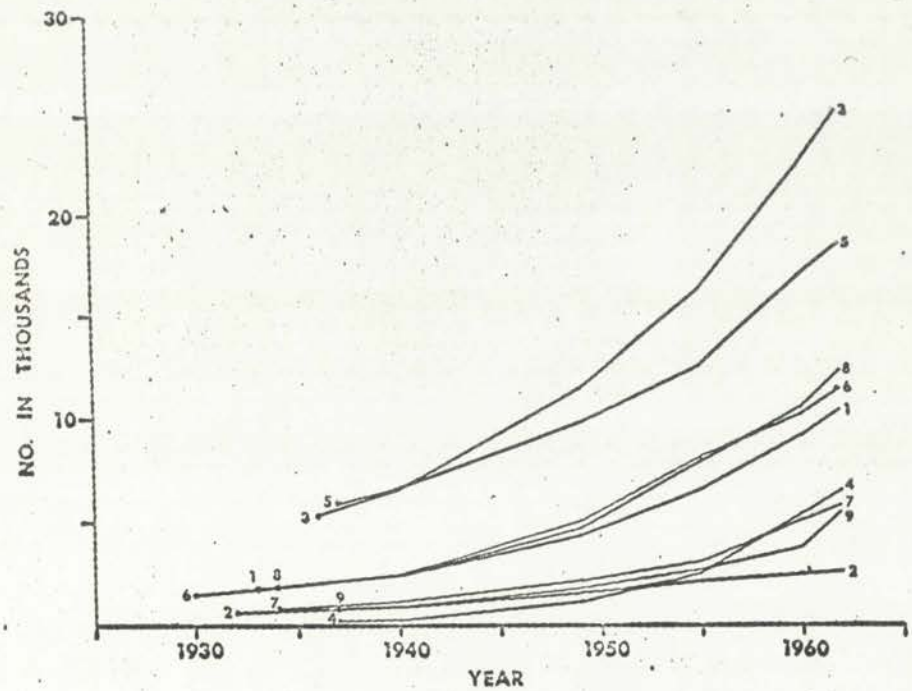
GROWTH CHART

Growth of Selected Specialties

The newly emergent patterns in pediatrics are consistent with the general growth in specialties. Numerals refer to specific specialties:

1 Pediatrics
2 Dermatology
3 Internal medicine
4 Anesthesiology
5 General surgery
6 Obstetrics and gynecology
7 Orthopedic surgery
8 Psychiatry and neurology
9 Pathology

Taken from Peterson, P.Q., and Pennell, M.Y. Medical Specialists. Health Manpower Source Book No. 14. Washington, GPO, 1962.



SPECIALTY - GROWTH

Nursing Spans of Control and Spatial Arrangement

With one head staff nurse (HSN) for each 10-bed unit, a variety of supervision patterns is possible. The upper diagram shows three possible spans of control for several medical head nurses (MHN). The need for flexibility in unit allocation suggests a linear or one-floor arrangement.

The three lower diagrams show three different spatial arrangements for the 10-bed cluster: a continuous ramp, an undifferentiated circulation grid, and a grid which differentiates circulation systems.

The Physician's Activity and Work Space

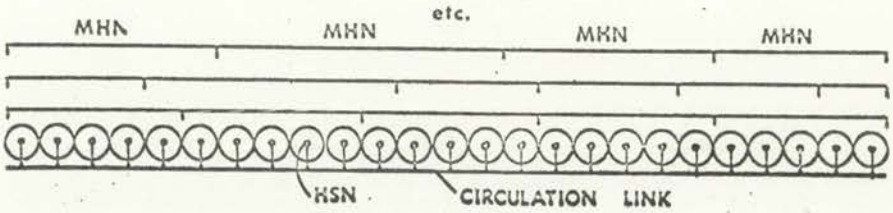
If activities are in one place, the academic physician can save valuable time. When several physicians work on the same floor, they can communicate easily and can share certain space and equipment.

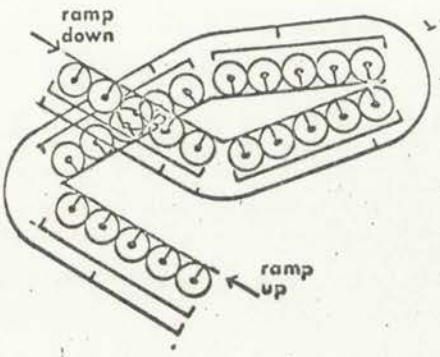
Diagram on the left shows a proposed spatial arrangement for physicians' offices and research areas on the same floor. Note variation in combinations of small rooms associated with four academic physicians.

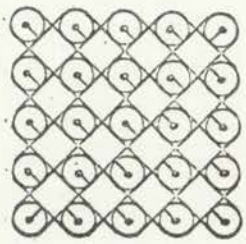
F	Research Fellows
R (large)	Research Laboratory
Sup	Supporting Services
W	Waiting Room
E	Examining Room
R (small)	Resident's Office
S	Secretary
O	Office of Senior Physician
C	Conference Room
PWS	Physicians' Work Space

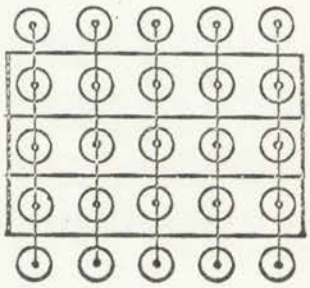
Diagram at right shows important work relationships centering around academic physicians as they see ambulatory patients, teach student physicians, conduct research, and control clinical information on their patients. L indicates Library.

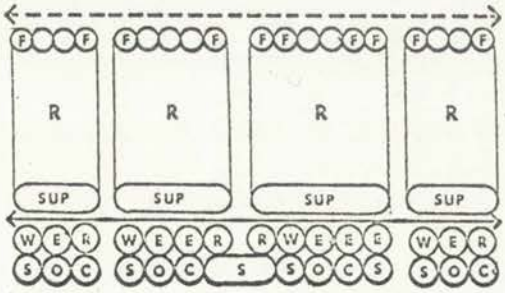
SUPERVISION

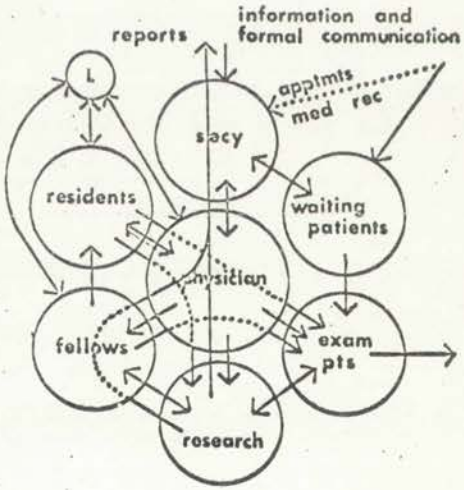








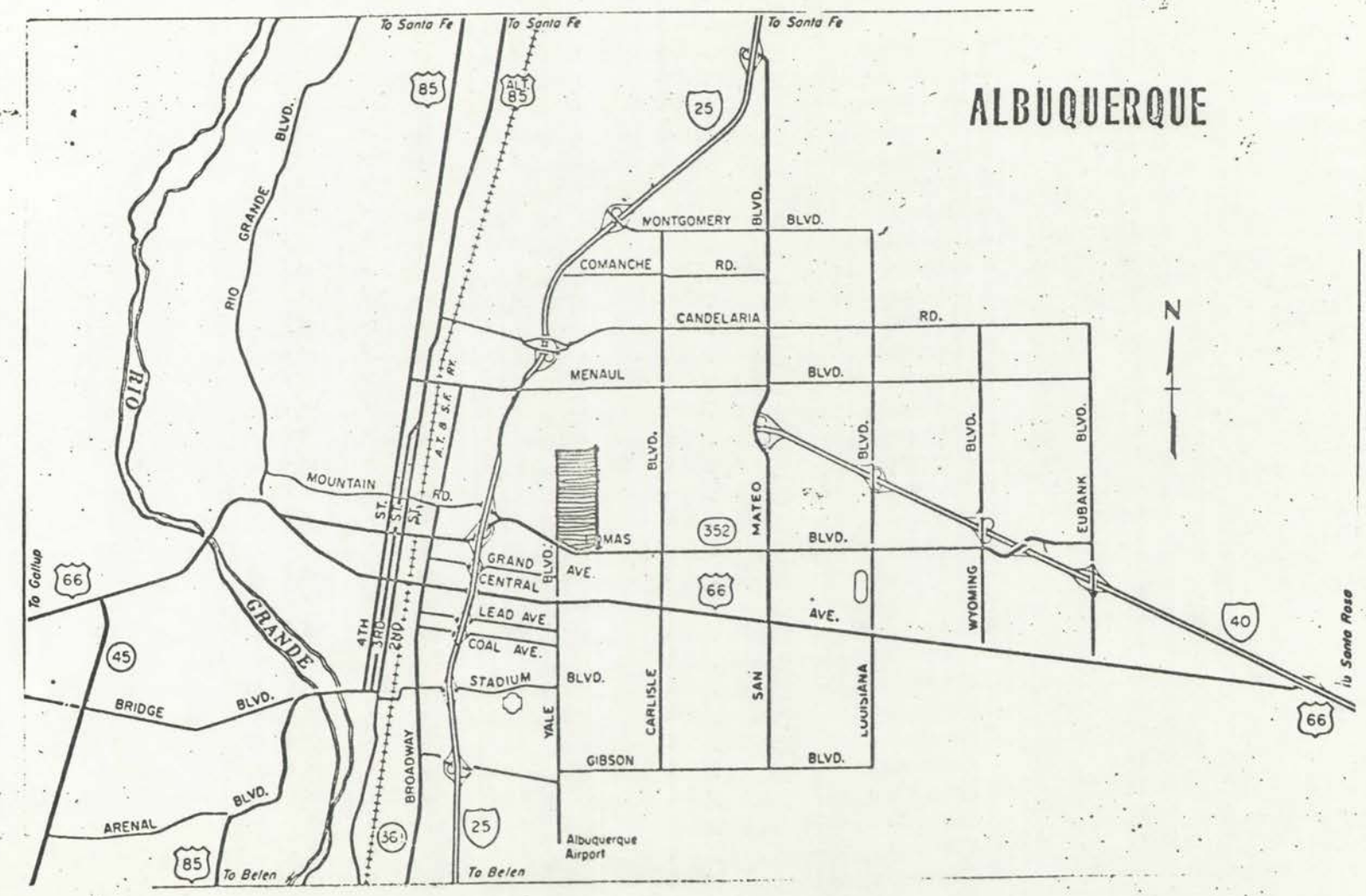


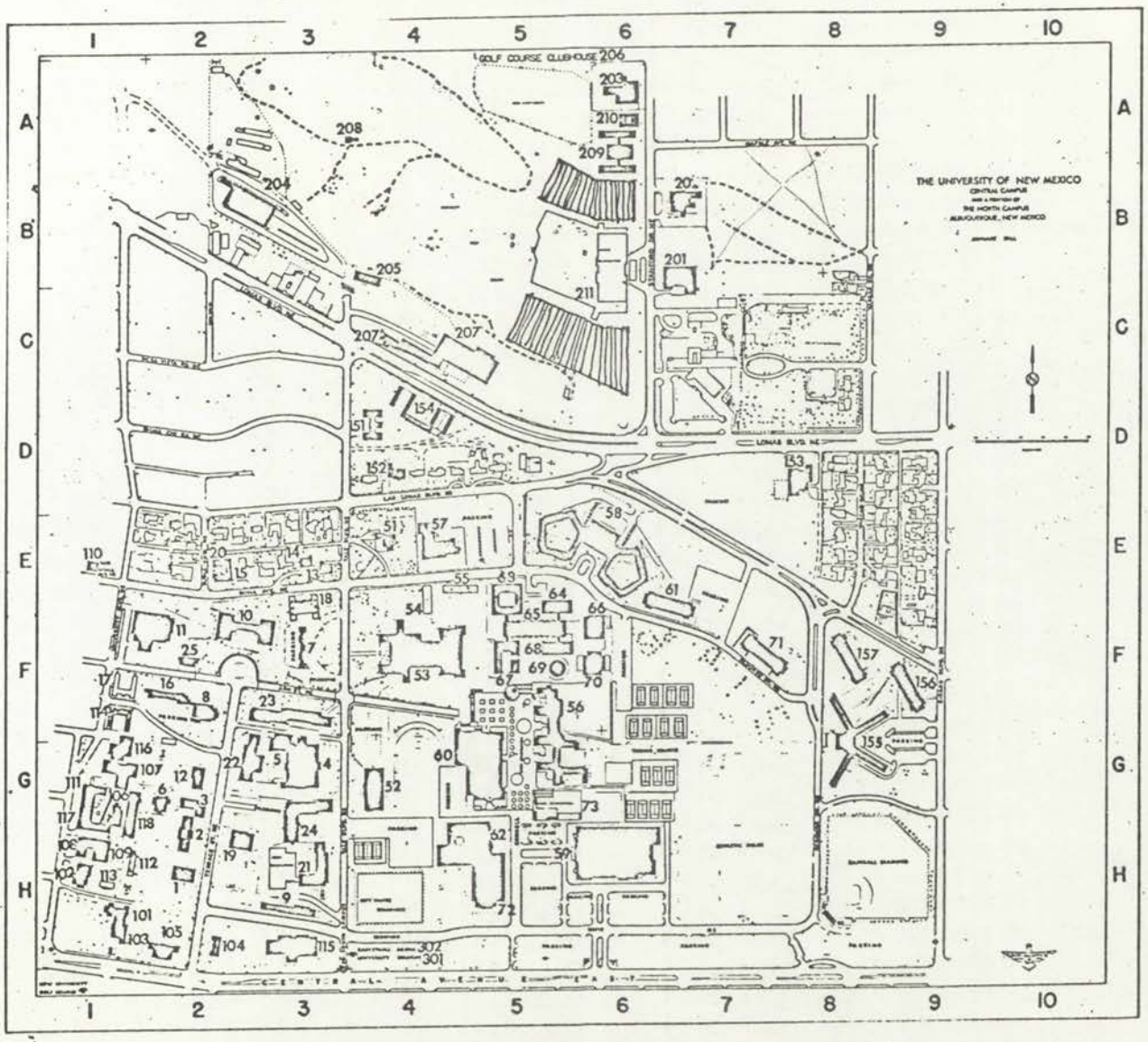


PWS

VII. SITE PLAN INFORMATION

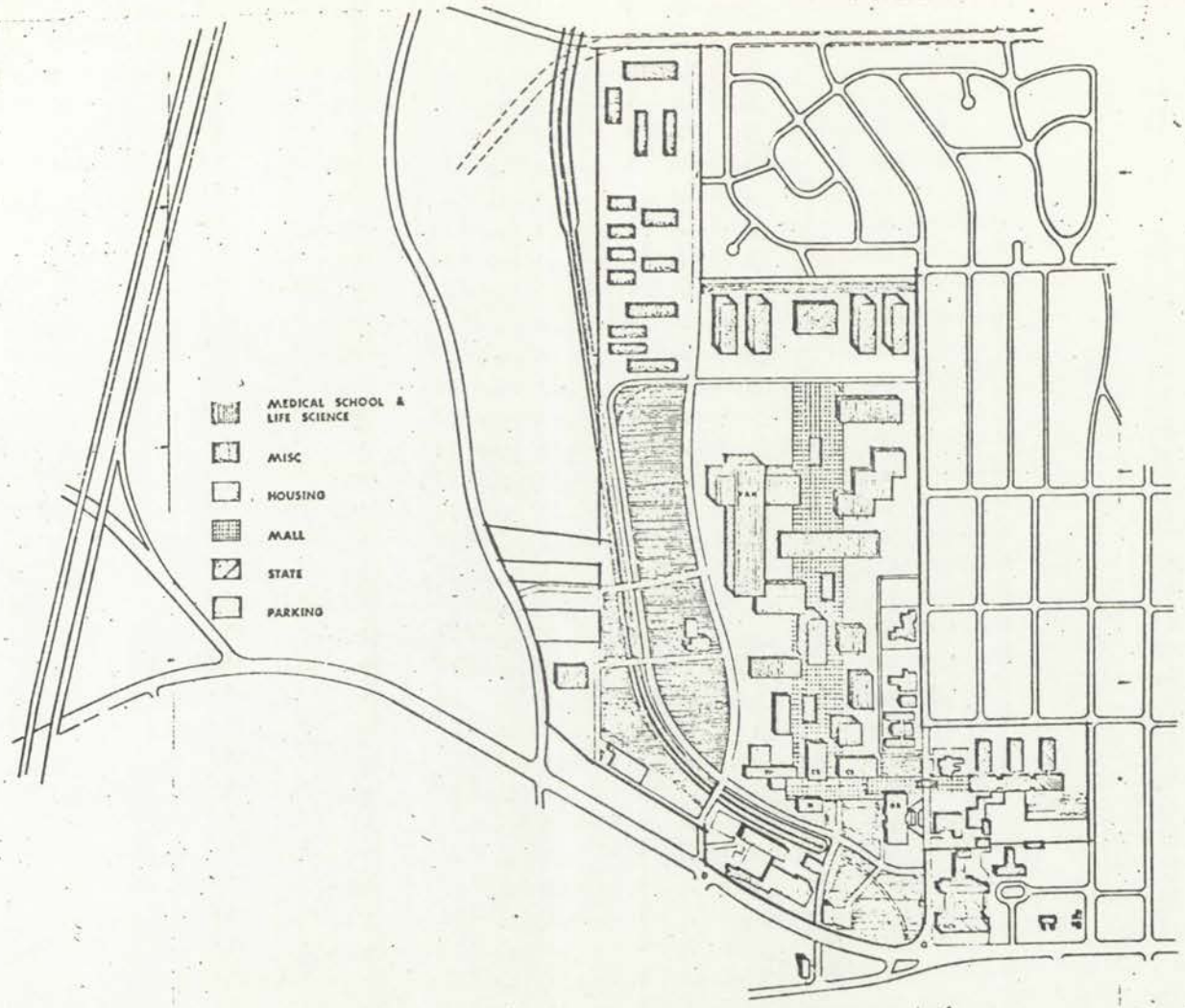
The North Campus of the University of New Mexico was chosen for the site because of the possibility of a future medical center being located in this area. The University of New Mexico Medical School already has some foundations established in this location and development of a complete site seems quite apparent.


ALBUQUERQUE
To Santa Fe
To Santa Fe
To Santa Fe
85
ALT. 85
25
RIO GRANDE BLVD.
RIO GRANDE
MONTGOMERY BLVD.
COMANCHE RD.
CANDELARIA RD.
MENAUL BLVD.
MOUNTAIN RD.
A.T. & S.F. RY.
4TH ST.
3RD ST.
2ND ST.
BROADWAY
GRAND AVE.
CENTRAL BLVD.
LEAD AVE
COAL AVE.
STADIUM BLVD.
YALE BLVD.
GIBSON BLVD.
CARLISLE BLVD.
MATEO BLVD.
SAN MAS
LOUISIANA BLVD.
WYOMING BLVD.
EUBANK BLVD.
AVE.
352
66
40
To Gallup
45
BRIDGE BLVD.
ARENAL BLVD.
361
To Belen
To Belen
Albuquerque Airport
To Santa Rosa
N



Legend of Buildings

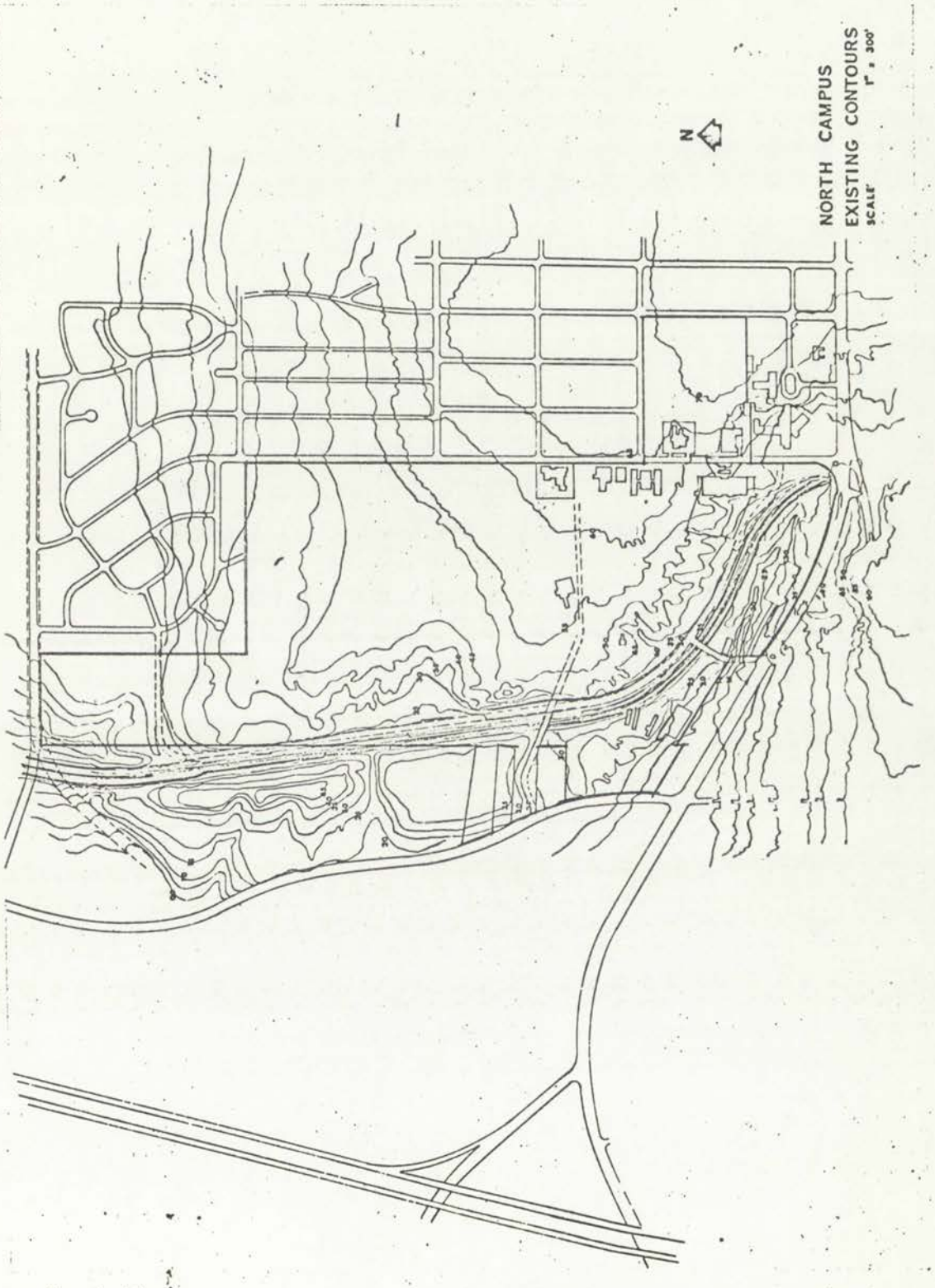
Administration Building (10)	E-2
Alumni Memorial Chapel (25)	F-2
Alvarado Hall (Men's Dormitory) (157)	F-6
Anthropology Building (11)	F-2
Apartments for Married Students (134)	D-4
Architecture Building (3)	G-2
Art Building (105)	H-2
Art Department Crafts Annex (2)	G-2
Art Education Building (68)	F-5
B-1 (17)	F-1
B-2 (114)	F-1
Bandelier Hall (Departmental Offices) (16)	F-2
Basketball Arena (302)	South Campus
Biology Building (21)	H-3
Bureau of Business Research Building (13)	E-3
Business Administration Annex (14)	E-3
Carlisle Gymnasium (4)	G-3
Chemical Engineering Building (111)	G-1
Chemistry Building (Clark Hall) (22)	G-3
Civil Engineering Building (117)	G-1
Civil Engineering Research Laboratory (106)	G-1
Concert Hall (72)	H-5
Coronado Hall (Men's Dormitory) (155)	G-8
Drama Building (102)	H-1
Education Administration Building (65)	F-5
Education Classroom Building (67)	F-5
Education Office Building (63)	F-5
Electrical Engineering Building (118)	G-1
Engineering Annex (1)	H-2
Fine Arts Center (62)	H-4
Geology Building (24)	G-3
Golf Course Club House (206)	A-5
H-1 (112)	H-1
H-2 (113)	H-1
Heating Plant (115)	G-1
Hodgin Hall (Peace Corps Training Center) (103)	H-1
Hokona Hall (Women's Dormitory) (158)	E-6
Home Economics Building (66)	F-6
Home Management House (110)	E-1
Industrial Arts Building (64)	F-5
Johnson Gymnasium (59)	H-6
Jonson Art Gallery (132)	D-4
Journalism Building (115)	H-3
Kiva (69)	F-5
KNME-TV Building (15)	E-2
Law Building (Stanton Hall) (57)	E-4
Lecture Hall (6)	G-2
Library, Zimmerman (53)	F-4
Manzanita Center (Educational Laboratory) (70)	F-6
Marron Hall (Departmental Offices) (9)	H-3
Mechanical Engineering Building (107)	G-1
Mechanical Engineering Shops (108)	H-1
Medicine, School of	
Basic Medical Science Building (211)	B-6
Clinical Psychiatry Building (210)	A-6
Library of the Medical Sciences (201)	C-7
Medical Science Interim Facilities (209)	A-6
Medical Science Departmental Building (202)	B-7
Mesa Vista Hall (Men's Dormitory and Departmental Offices) (56)	F-5
Meteorites Building (207A)	C-4
Mitchell Hall (Classrooms) (23)	F-3
New Mexico Behavioral Center (203)	A-6
New Mexico Union (60)	G-5
Nuclear Engineering Laboratory (109)	H-1
Observatory (208)	A-3
Ortega Hall (Men's Dormitory) (156)	F-9
Ortega Hall (Modern and Classical Languages) (8)	F-2
Pharmacy Building (19)	G-2
Physics Astronomy Building (207)	C-4
President's Home (31)	E-4
Research Center (153)	D-8
Rifle Range (205)	B-3
Santa Ana Hall (Women's Dormitory) (71)	F-7
Santa Clara Hall (Women's Dormitory) (61)	F-6
Sara Reynolds Hall (104)	H-3
Service Building (204)	B-2
Speech Building (70)	E-2
Stadium Building (52)	G-4
State Public Health Laboratory (12)	G-2
Student Health Service (151)	D-4
Student Health Center (73)	G-6
Testing Center (3)	G-3
T-10 (54)	E-4
T-17 (53)	E-4
University Stadium (301)	South Campus
University Theatre (Rodey Hall) (101)	H-1
Y-1 (18)	E-3
Yatoke Hall (Business Administration) (7)	F-3

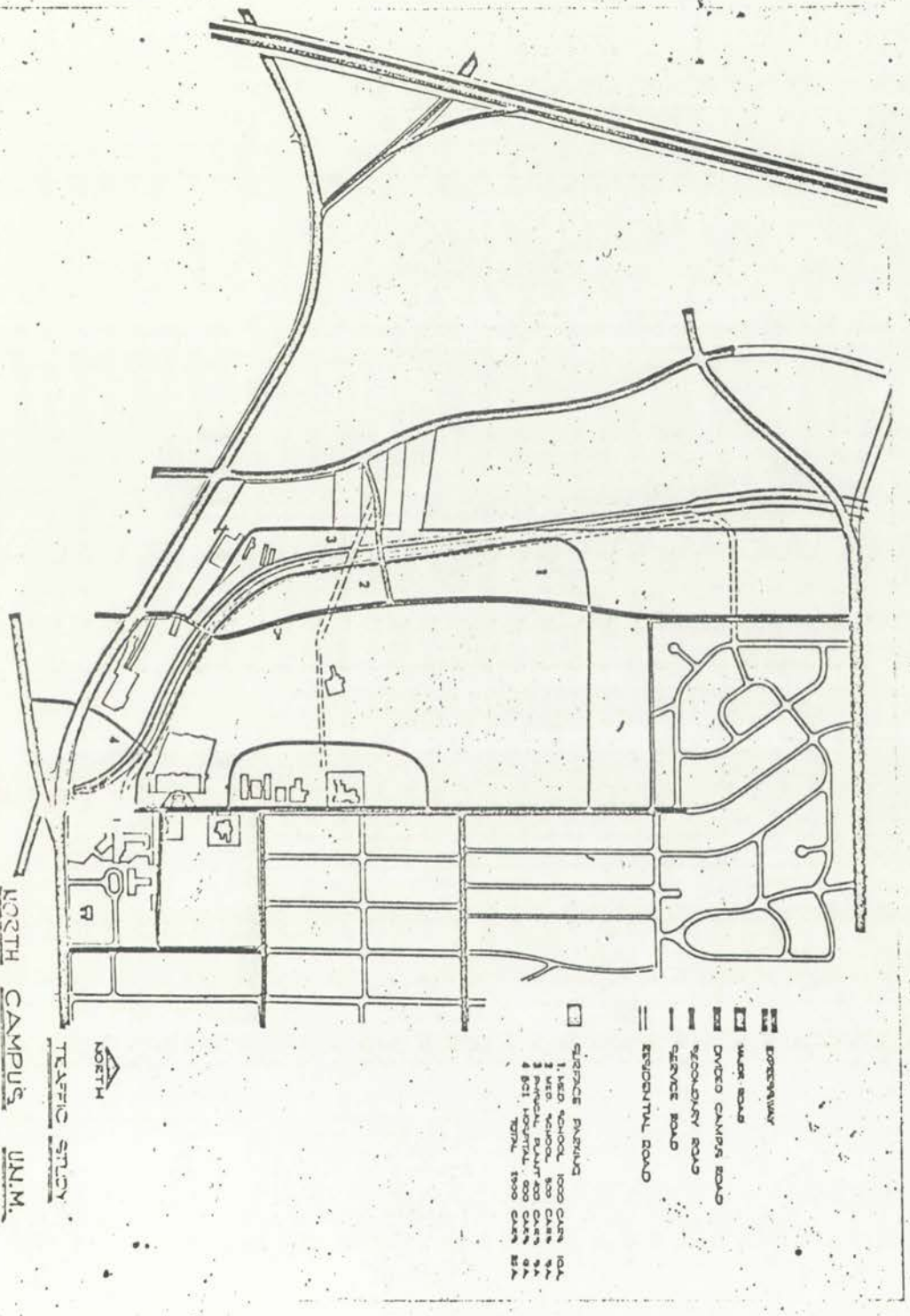


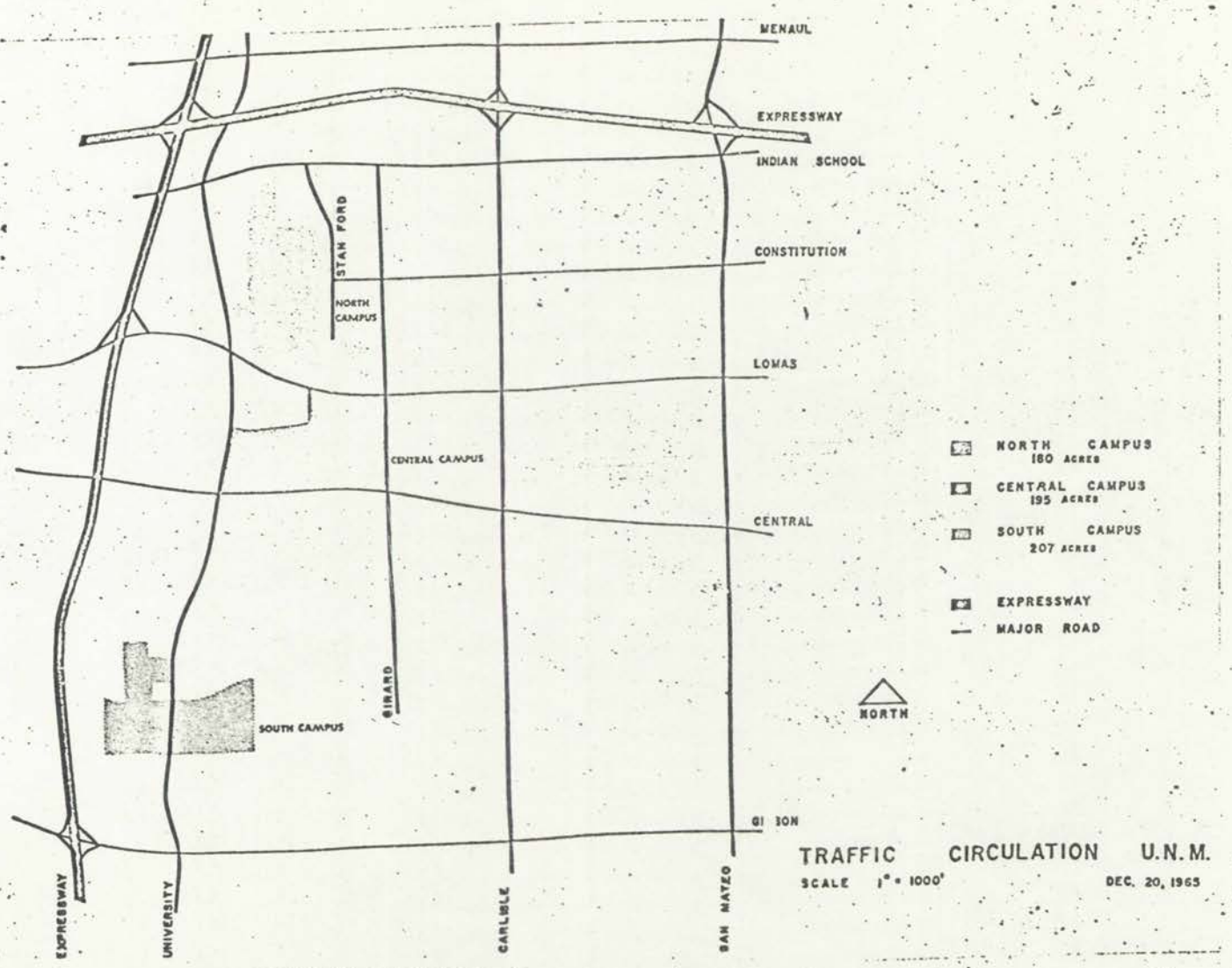
MASTER CONCEPT PLAN

NORTH CAMPUS ··· UNM

SCALE 1" = 300' DEC. 28 1963


NORTH CAMPUS
EXISTING CONTOURS
SCALE 1" = 300'
N

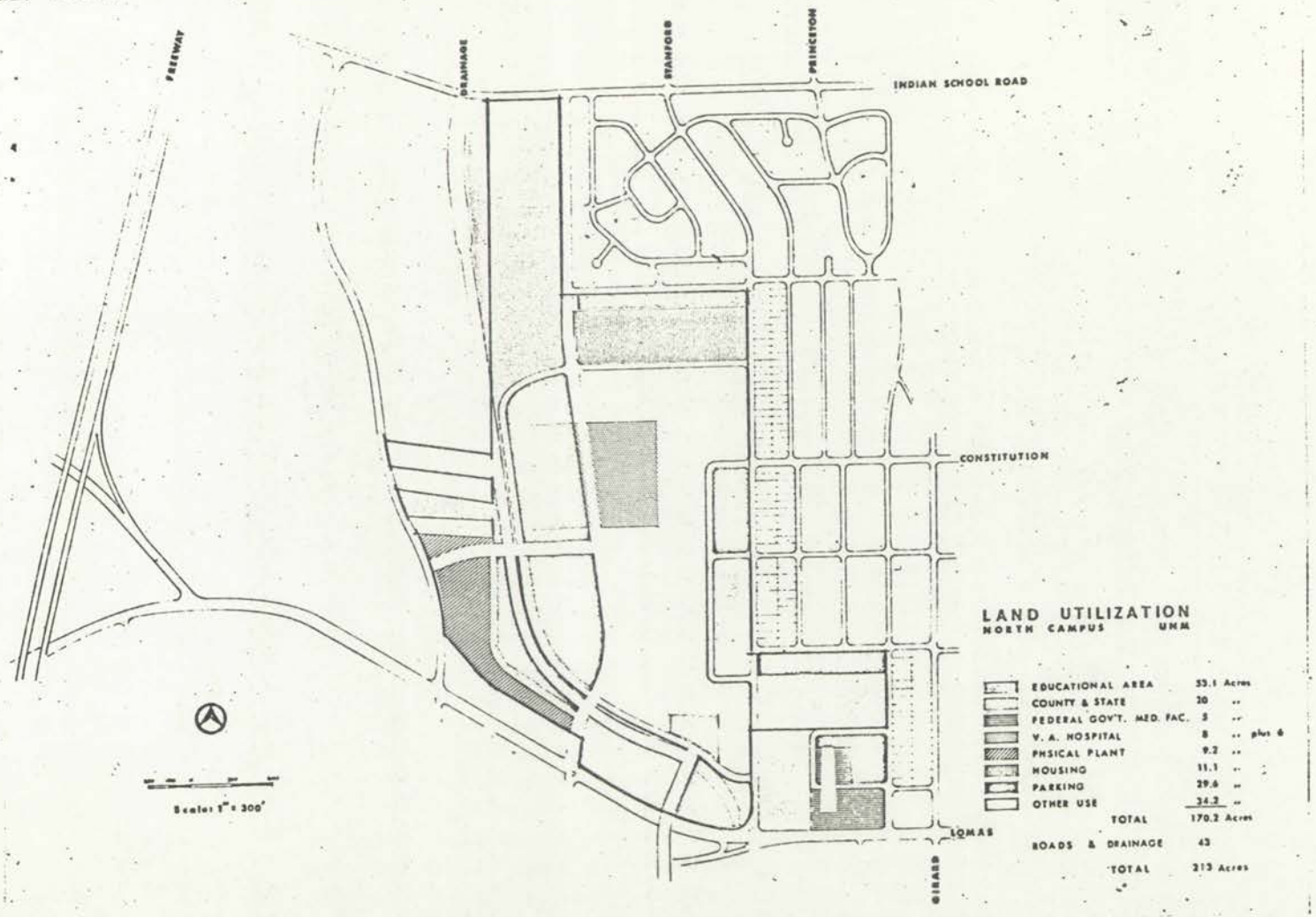

NORTH CAMPUS
U.N.M.
TRAFFIC STUDY
NORTH
SERVICE PARKING
1. MED. SCHOOL 1000 CARS
2. MED. SCHOOL 500 CARS
3. PHYSICAL PLANT 400 CARS
4. BOI. HOSPITAL 800 CARS
TOTAL 1900 CARS
EXPRESSWAY
MAJOR ROAD
DIVIDED CAMPUS ROAD
SECONDARY ROAD
SERVICE ROAD
PERIPHERAL ROAD

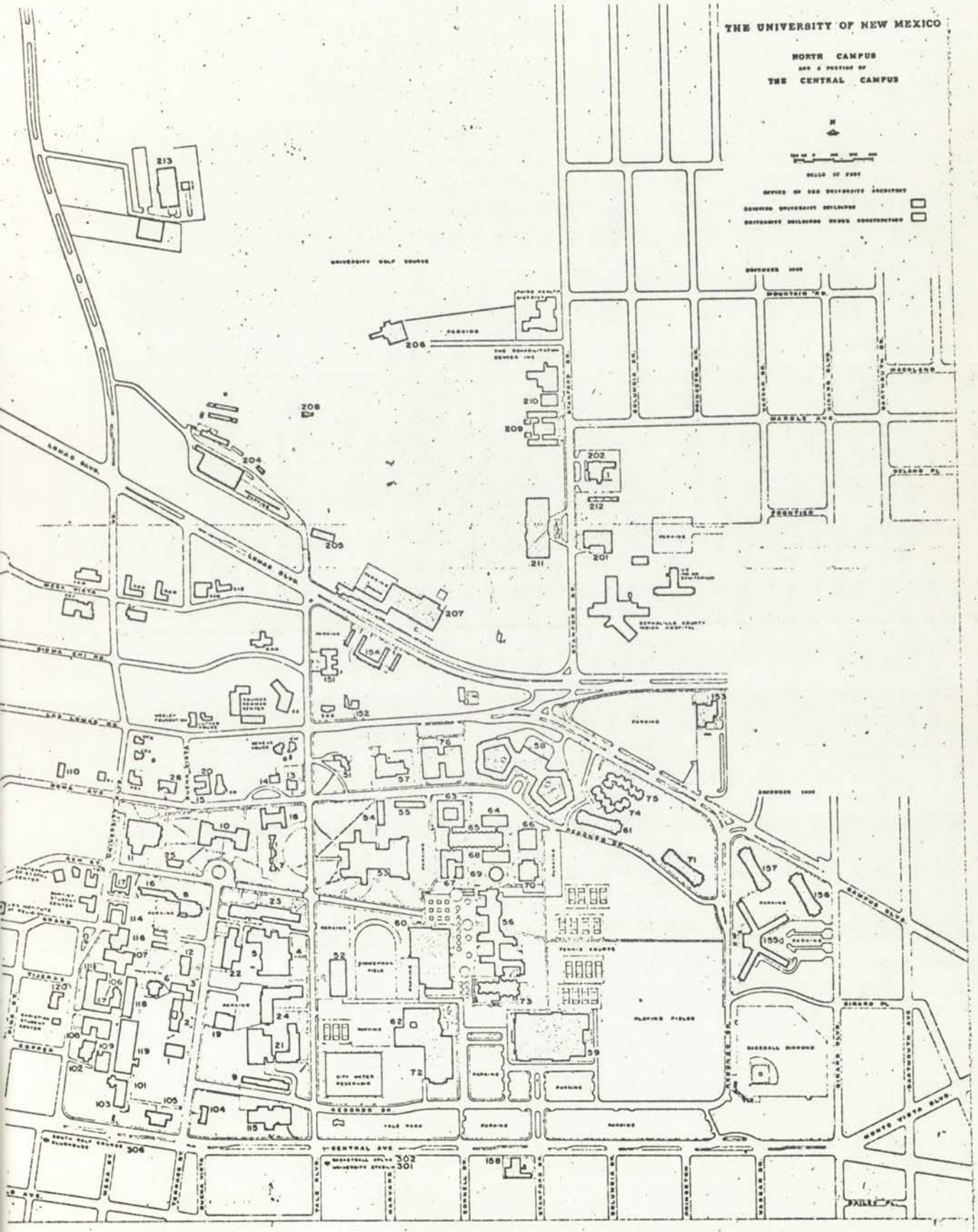


TRAFFIC CIRCULATION U.N.M.

SCALE 1" = 1000'

DEC. 20, 1965


FREEWAY
DRAINAGE
STANFORD
PRINCETON
INDIAN SCHOOL ROAD
CONSTITUTION
LOMAS
GIRARD
Scale: 1" = 300'
LAND UTILIZATION
NORTH CAMPUS UNM
EDUCATIONAL AREA 53.1 Acres
COUNTY & STATE 20 "
FEDERAL GOV'T. MED. FAC. 5 "
V. A. HOSPITAL 8 " plus 6
PHSICAL PLANT 9.2 "
HOUSING 11.1 "
PARKING 29.6 "
OTHER USE 34.3 "
TOTAL 170.2 Acres
ROADS & DRAINAGE 43
TOTAL 213 Acres

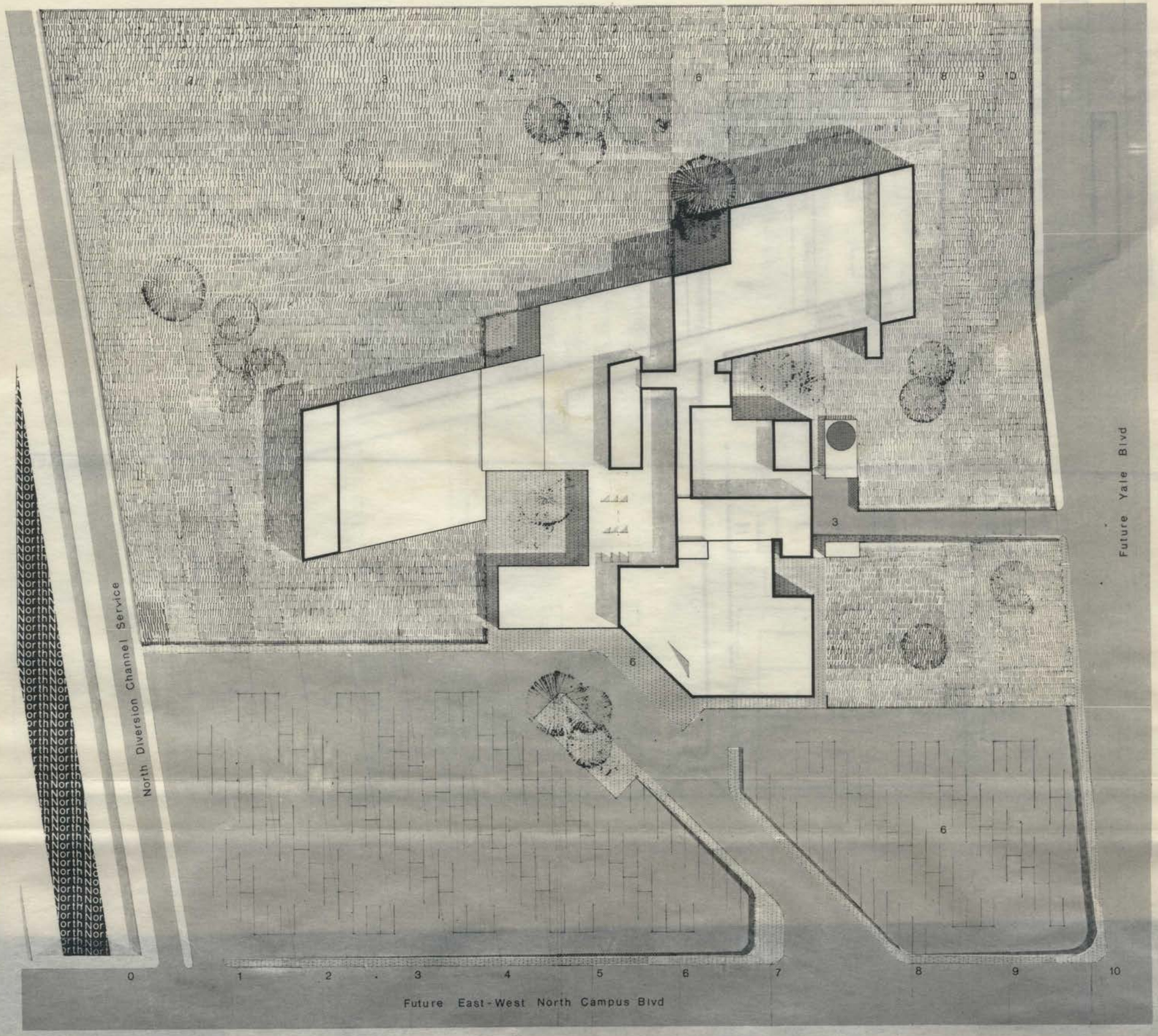

THE UNIVERSITY OF NEW MEXICO
NORTH CAMPUS
AND A PORTION OF
THE CENTRAL CAMPUS
LOMAS BLVD.
CENTRAL AVE
REDONDO DR.
MARBLE AVE
MONTE VISTA BLVD
CAMPUS BLVD.
PLAYING FIELDS
BASEBALL DIAMOND
TENNIS COURTS
PARKING

VIII. CRITICAL PATH OF TIME ORGANIZATION

CRITICAL PATH

DESIGN	PRESENTATION	WORK
50 hrs.	20 hrs.	SITE
150 hrs.	050 hrs.	STRUCTURE
	20	FLOOR PLANS
	10	MECH & STRUCT.
	20	SECTIONS
	10	ELEVATIONS
	5	SITE PLAN
	30	PERSPECTIVES
	20	MODEL
	5	PHOTOGRAPHS
	30	GRAPHICS
	10	TECHNIQUE
200 hrs.	150 hrs.	
50 hrs.	40 hrs.	TOLERANCE
250 hrs.	230 hrs.	TOTAL

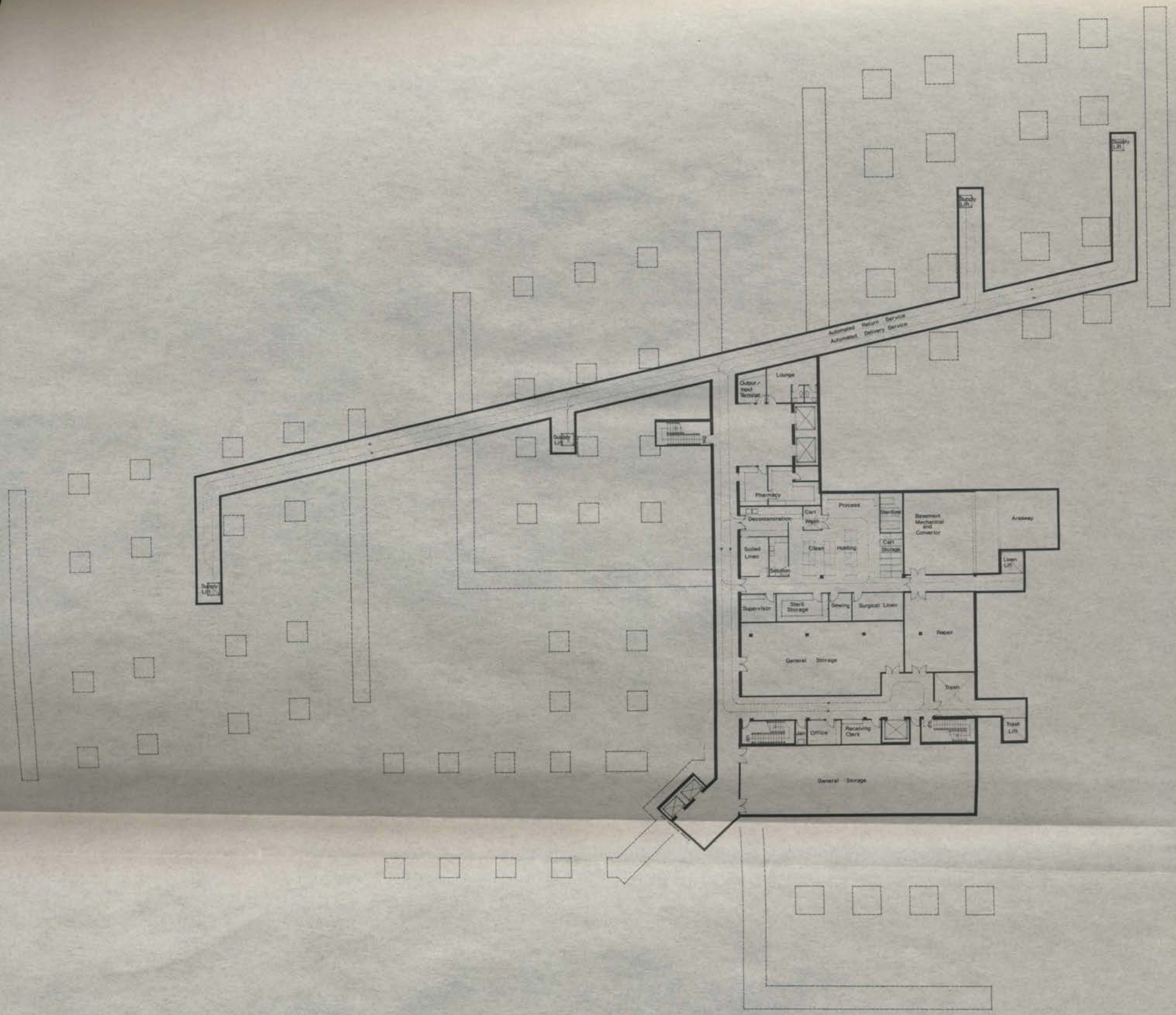
DATE	WEEK.	SCHEDULE	WK/HRS.	FUNCTION
FEB 6.	1		20	STUDY SITE
FEB 10	2		20	
FEB 17	3		20	BEGIN
FEB 24	4		20	BLDG DESIGN
MARCH 3	5		20	
MARCH 10	6		20	
MARCH 17	7		30	
MARCH 24	8		30	FINISH DESIGN
MARCH 31	9	SPRING RECESS	60	REVIEW
APRIL 7	10	APRIL 2 – 10	30	PRESENTATION
APRIL 14	11		30	
APRIL 21	12		30	
APRIL 28	13		60	
MAY 5	14		40	
MAY 12	15		50	SUBMIT
MAY 19	16	FRES. MAY 19		MAY 19
MAY 26	17	FINAL EXAMS		
JUNE 2	18	SEM. END		



A Hospital and Research Center for the Care and Rehabilitation of Crippled Children

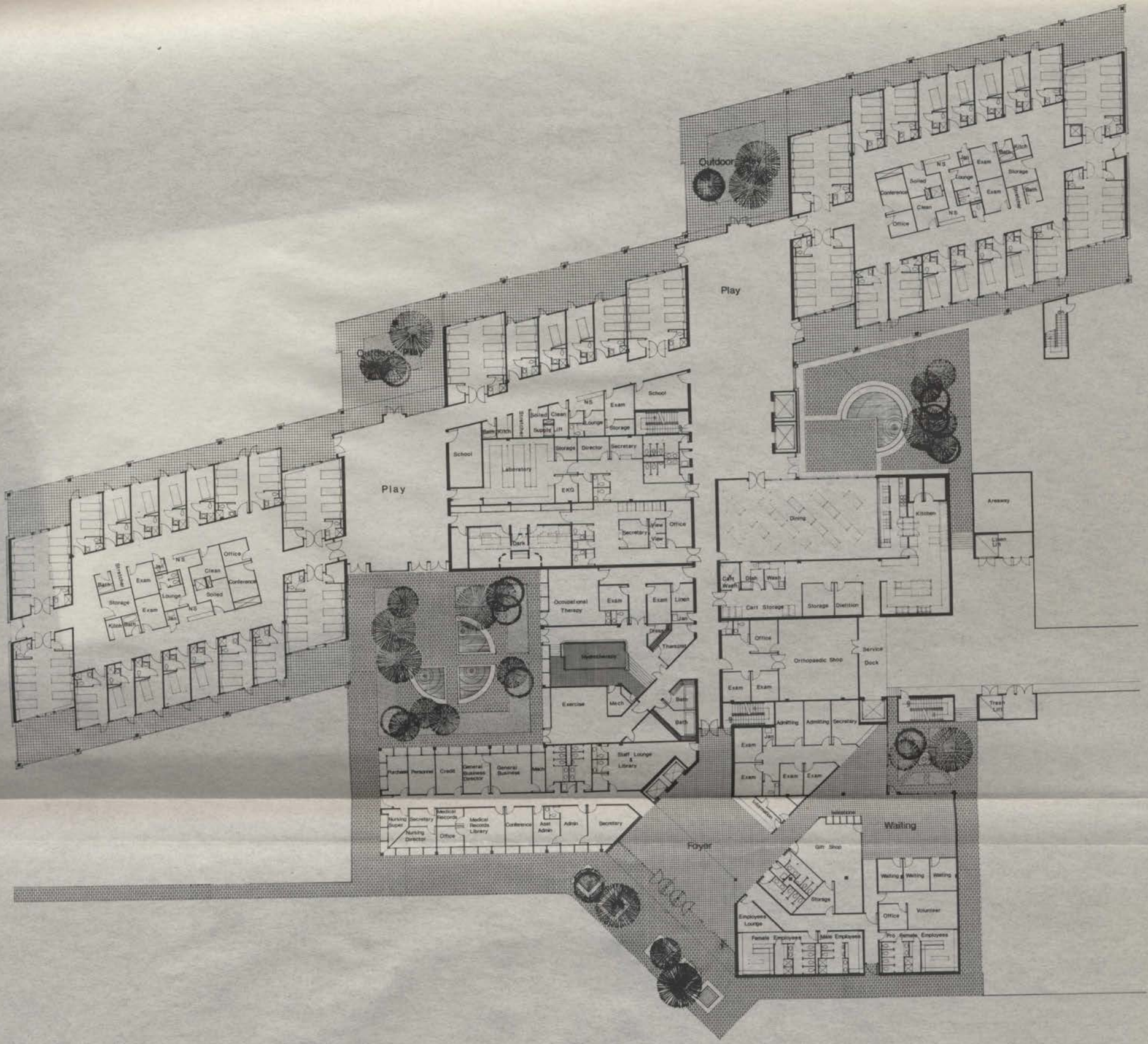
Jon Lawrence Moore

Site 0 50



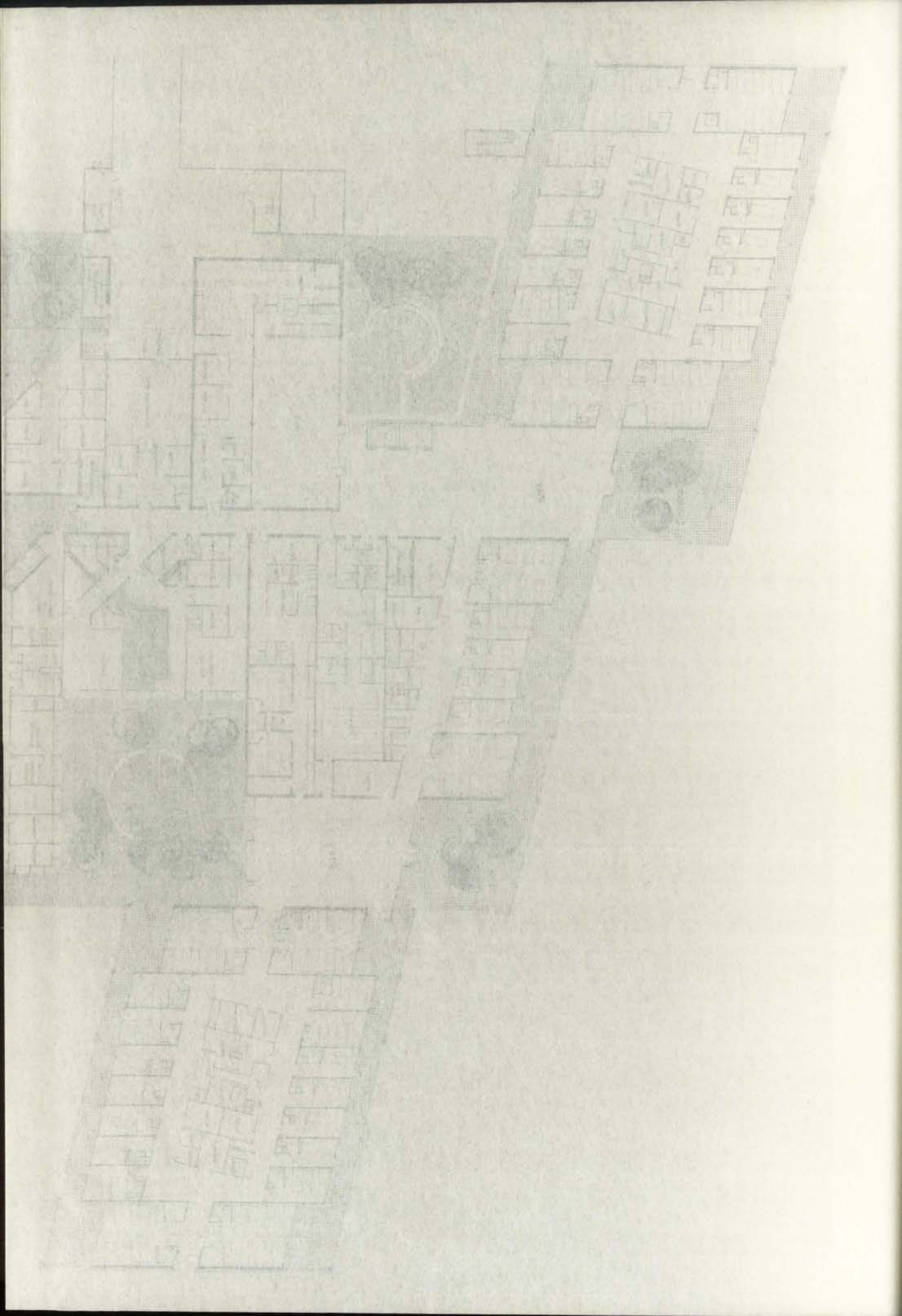
Basement

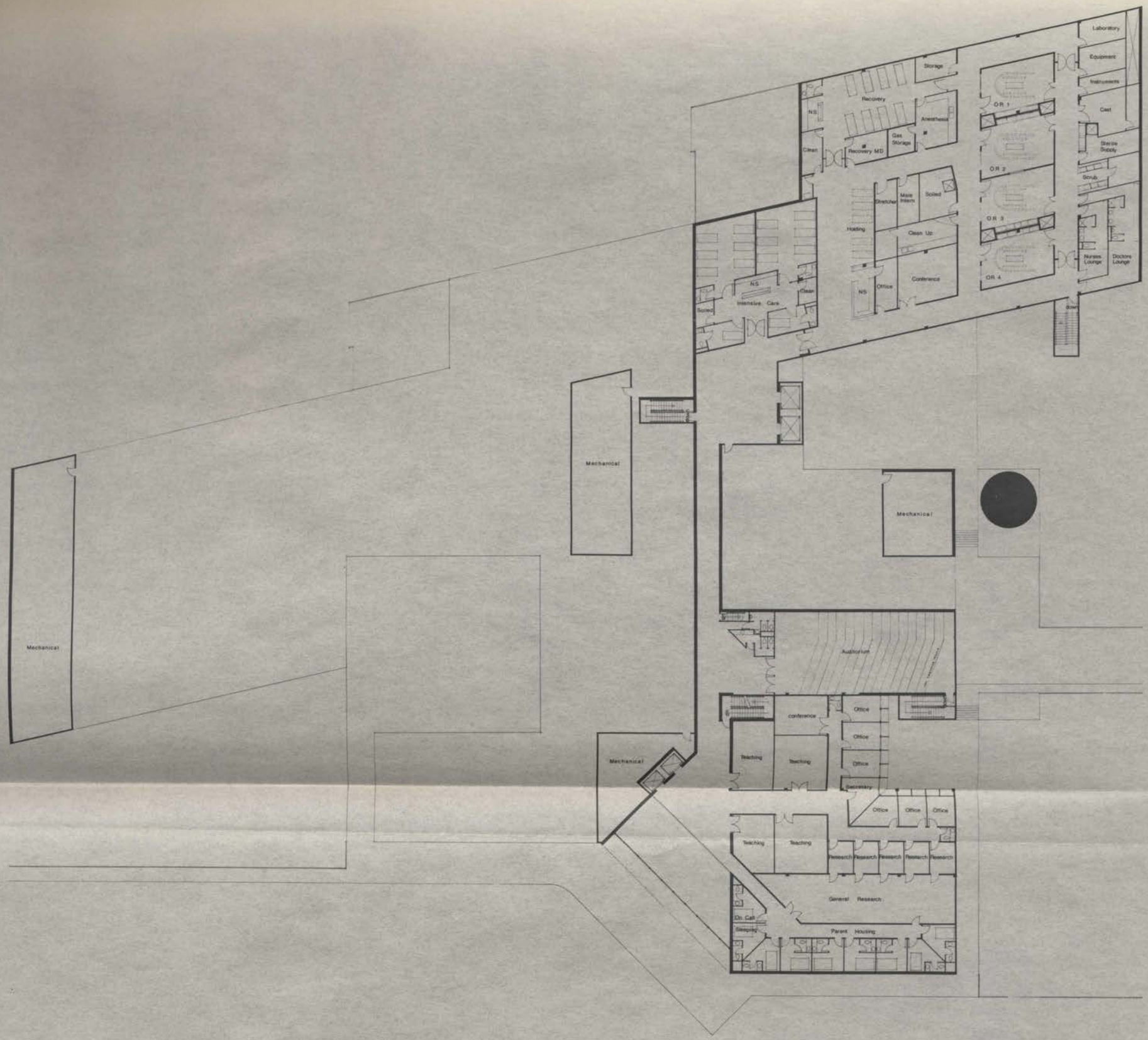
0 20 40



Level One

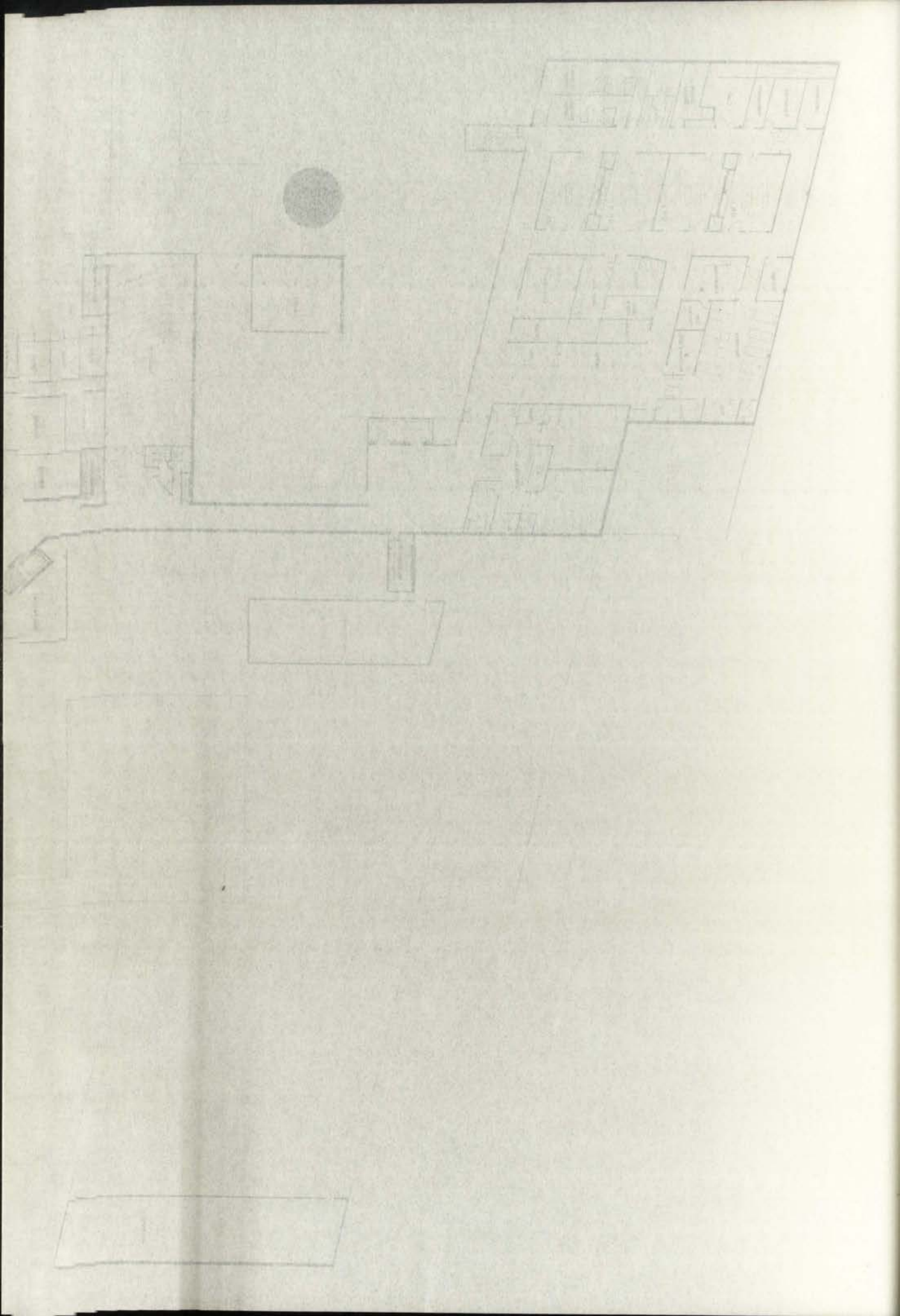
0 20 40

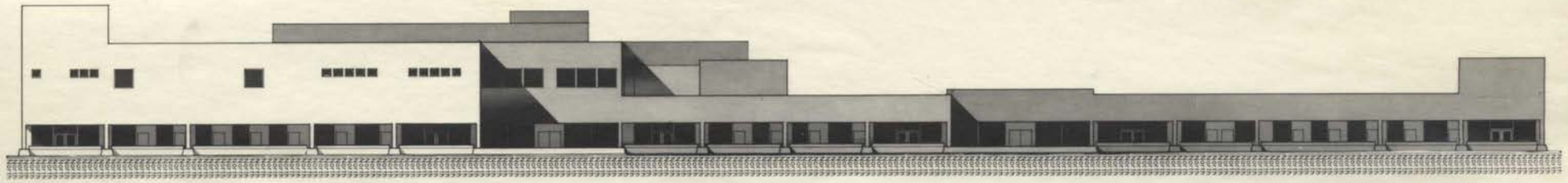


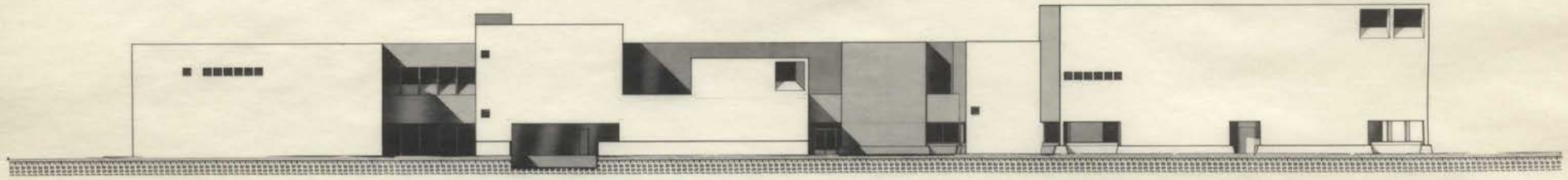


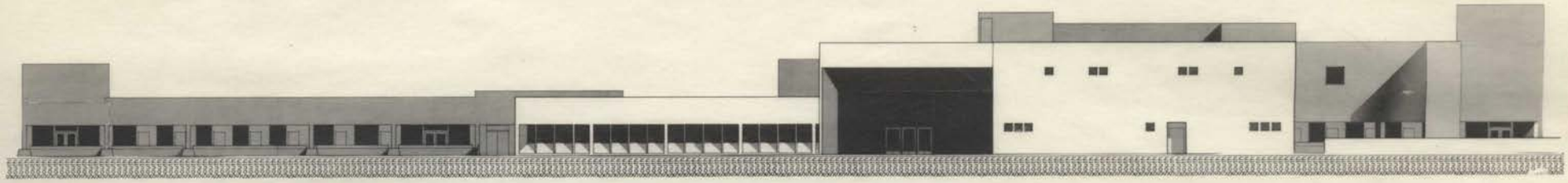
Level Two

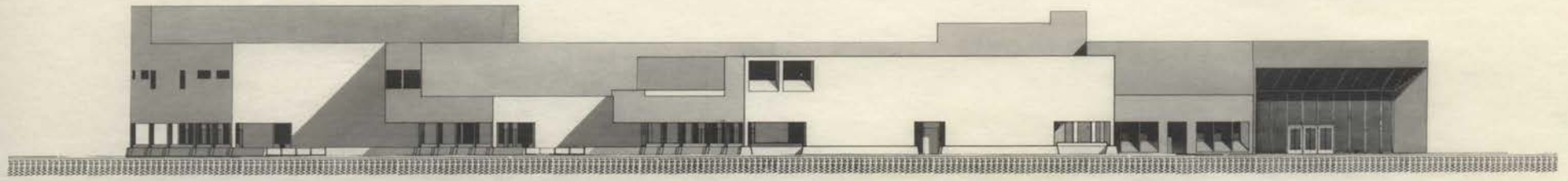
0 20 40

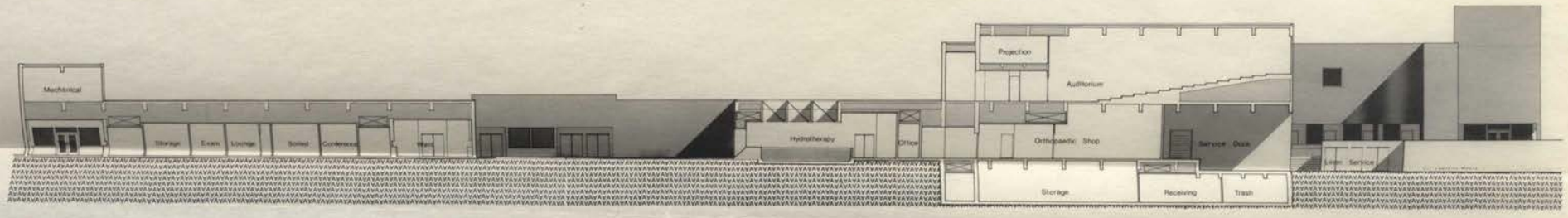


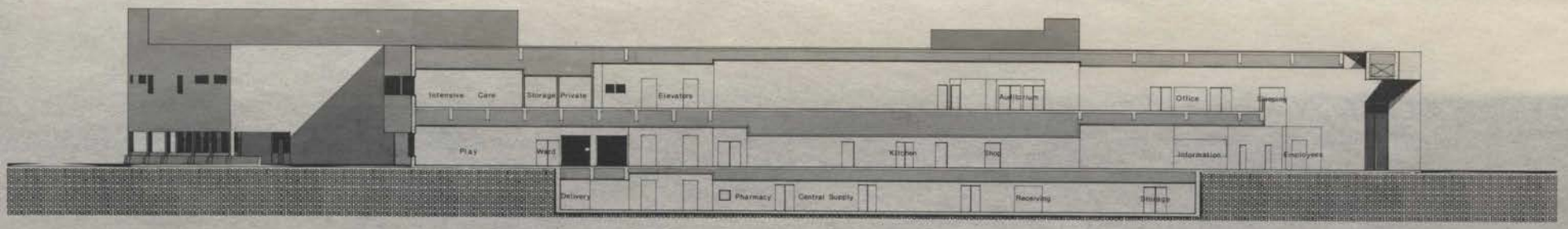












Elevations
Sections