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D E D I C A T I O N

To my dear Parents, brothers and sisters who have always made me feel capable, and to Almighty God, whose mercies, unto me, are new every morning.

A C K N O W L E D G E M E N T

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— Also noted is Miss Patience Omadide who agreed to type the manuscrip on a pay of only 'SUYA' (meat balls)!

ABS TRACT

It is paradoxical that the eye as small as it is relative to the total body surface area, could actually make life unbearable if it is malfunctioning.

It is common knowledge that most Nigerians lack basic personal hygiene; this has promoted the spread of contagius diseases not least of them are those related to the eye. And for those who due to accident, neglect, poverty, suffer from eye problems, the least that can be done is to provide a service incorporating the best and most modern techniques, facilities, technology and experts to help remove or reduce the eye problems of this relatively large number of our population.

Not to talk of academicians who consume a high proportion of reading glasses and those suffering from such natural eye effects as "Short sight" or "long sight".

It is the intention of the eye centre to help alleviate the suffering of this people. In general, the goal of the centre is to try and deal with any defect of the eye that would reduce the chances of one enjoying good and proper vision.

List of Illustration

(a) Location of Kaduna in Nigeria

(b) Kaduna's Basic framework

(c) Kaduna's District Sewerage Proposals

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CHAPTER 1

A Brief History:

While disease is older than man himself, the begining of attempts to treat disease (medicine) is thought to be about 30,000 B.C. The earliest "doctors" were men of magic. Early men saw diseases as caused by some god or as something put upon a person by another. As such, some sort of "counter-magic" was seen as necessary to heal. In ancient Egypt, doctors (priests) received much respect from the people. These men lived close to royalty and enjoyed all the privileges of an elite. There were already specialists at this time; Each healer knew about only one disease, or diseases of one part of the Gody, or one type of treatment.

Hospitals appeared during the middle ages - but had nothing to do with disease, at first; they gradually became places where poor people were housed when they were injured or sick.

The real beginnings of modern scientific medicine did not come until the sixteenth and seventeenth centuries. In the 16th century, the xtian church began to relax its regulations about the dissection of dead bodies. This allowed medical men to learn much more about the human body and how it works.

The discovery of the early 19th century of anaesthesia" made possible surgery without pain.

Microbiologist, Louis Pasteur's work of the late 19th century, led to much greater understanding of infections and how they might be controlled.

A "Scientific" attitude has largely replaced religion and magic in much of todays medicine. Since 1918, near - medical schools have been started in Africa (Kampala, Dakar, Lagos ...) These schools began to offer a shortened physician's education oriented towards common local diseases.

PROBLEMS OF COST - A CASE AGAINST LARGE HOSPITALS:

Modern medical care costs money. Costs have soared in the last twenty years due to higher salaries for personnel, improved specialised services, and expensive hospital equipment - and the ever increasing cost of drugs.

There is a wide gap between what richer industrialised countries can and do afford oughly ₦50 - 230 per head per year on health services) and what poorer countries can manage (50k - ₦10/head/year). Of the 1½ million physicians in the world, only 300,000 are in the poorer countries of Asia, Africa and Latin America (containing about ¾'s of the world's people).

While a country like Britain has one doctor per 860 people, there is only one for each 5,000 in India, and only one for each 30,000 in Nigeria. In 1965, the world Health Organisation set as a minimum target one doctor for each 10,000 of the population a ratio yet to be reached

in Nigeria. (These figures, of course, refer to doctors practising Western - style medicine).

Though it is difficult for a poor country to afford a fully-equipped hospital and expensively-trained doctors for everyone, it is however, commendable for a country to establish one National specialist hospital for a major cause of distress like the eye.

In Nigeria, about 80% of the population live in rural areas. As such, the obvious need is for a system of low-cost health care which reaches the rural areas. It is possible to build about 200 health centres for the cost one new teaching hospital in a major city. This is naturally so because health centres do not have X-ray plants, operating theatres, etc. not to talk of specialised equipment. They are thus cheaper to establish and run.

If there is a heirarchy of health care system, the optimum can be achieved by adequate planning and treatment procedure. This means that the one case in a hundred which requires more specialist care can be referred by a rural health centre to a district hospital. A district hospital may in turn refer about one percent of its cases to a regional or national hospital.

Health Centre — District Hospital — National (Specialist) Hospital

In content, small eye clinics scattered randomly (usually private practice) in a small town could fill the place of the health centre, while the district hospital could be in the form of eye depts. in general hospitals located singly in each local government area of a state. And finally, if possible, the different specialised areas of medicare may have its National specialist hospital, but necessity and urgency will determine the order of priority of such specialist hospitals.

FUNDING: The matter of funding in order to ensure a smooth, continuous flow of services to the public, is a matter of governmental policy. But an example is noteworthy: Britain has (since the National Health service acts of 1948) provided care for their whole population out of tax revenue. Central Inland Revenue taxation is used for the upkeep of hospitals and family doctor services, while public health (preventive health) services are paid for by local taxation. Taken charges are made for certain services and equipment, but the system is, on the whole, free to all.

CHAPTER 2

GENERAL CONSIDERATIONS:

Synthesis of the Hospital:

Design phases: I – Prehim analysis, to estimate the basic needs to be covered & to assess the available resources (site, funds, people).

" " II – Synthesis i.e. the translatn of these abstract needs into concrete physical form.

" " III – Realisation – the long & tedious transformation from drawings into bldg.

" " IV – Evaluation – to asses the success of the first three stages, and to draw up experiences.

There are two approaches to synthesis. One is static, an addition of elements. The second is dynamic based or prelim considerations of functions, traffic routes , etc. which, related to each other, result in a design organically conceived.

The Elements of dynamic hospital synthesis:- Circulation is the fundamental element of synthesis in the dynamic approach. in a hospital, there are three types of circulation: Macroscopic (people, stretchers, large objects) Medium (in pneumatic tubes, on belts etc)., and microscopic (of liquids, gases. These can be either vertical or horizontal; usually, however, vertical circulation is more important, as it links major activities among them, and can easily be mechanised.

A second element of synthesis is activities. Contemporary hospital design no longer links activities to the concept of the "room": enclosed spaces are the result of functional considerations, & not vice versa. Activities are usually kinetic, so if we apply methods similar to city-planning measurements to determine their patterns of circulation, we can then draw a diag of these patterns, which should concide with the architectural layout to give us a correct hospital design.

PROPOSED STRUCTURAL SOLUTION: Becos of the contradictions inherent in the design of a hospital (on one hand special technical requirements such as aten 'ization, air-cond etc and on the other need for flexibility and future expansion), perhaps the best solution lies in the creation of a structural frame with large openings & spaces, on which prefab units (laboratories, operating theatres etc.) can be mounted & dismounted easily

MAN AND HIS HOSPITAL - A hospital houses two main groups of people, both living under conditions of strain: the patients & the medical staff. Thus the architects major considerations when designing, overriding ev. n considerations of efficiency, should be

(a) the confort of the patients and

(b) the good working conditions of the staff.

Moreover, the hospital in the modern city, becos of function & size, constitutes an important urban landmark as exterior form should therefore suggest its social role, rather than a forbidding institutional character.

THE ARCHITECT AND THE HOSPITAL - As the late RINO LEVI often said, a hospital should first and foremost be a good piece of architecture Therefore, if one had to choose btn a bad architect with experience in hospital design, and a good architect without such experience, the choice should definitely favour the latter.

On Planning medical teaching facility:-

Parenthetically, in any consideration of hospital planning, it should be manifest that the doctor is the pivotal factor in health services, that therefore provision for the doctor's education is an essential path of the planning of medical care - and that, consequently, the planning of medical teaching facilities is an essential part of medical facility planning.

*Find out what the real challenges are in the planning (design of hospitals. Find conditions under which human beings can work together at their best in the service of other human beings who need help.

The need for Health Service facilities:

Hospitals are instruments of imperfect & changing societies, no medical institution or system of institutions can be a perfectly effective and up-to-date response to all human needs. According to the defn. of HEALTH in the constitution of the lotto, the m re absence of disease & infirmity is notenough, what is called for is a state of

complete, physical, mental & social well-being.

The fffg. principles are basic to the happiness, harmonious relative & security of all peoples:

(1) Health is a state of complete physical, mental & social well-being & not merely the absence of disease or infirmity.

(2) The enjoyment of the highest attainable standards of health is one of the fundamental rights of every human being without districtn of race, religion, political belief, economic or social condition.

(3) The health of all peoples is fundamental to the attainment of peace & security & is dependent upon the fullest corperatn of individuals & states,

(4) The achievement of any state in the promotn & protectn of health is of value to all.

(5) Unequal development in different countries in the promotn of health & control of disease, especially communicable disease, is a danger to all.

(6) Healthy development of the child is of basic importance, the ability to live harmoniously in a changing total environment is essential to such development.

(7) The extension to all peoples of the benefits of medical, psychologica & related knowledge is essential to the fullest attainment of health.

(8) Informed opinion & active corperatn on the part of the public are of the utmost importance in the improvement of the health of the people.

(9) Governments, have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health & social measures.

On relationships: The involvement of the health services with the social & economic life of the community cannot be over-looked, and there must be some considerat_n - or at least awareness - of related environmental factors like housing, rutin_, opportunities for work & educat_n, and for a meaningful life.

Otherwise, investments in health may in the long run prove futile. A philanthropic founda_ - seeking to give people in different parts of the world a chance for a better life - once built prototype medical facilities & concentrated over combating diseases like hookworm & malaria that were blocking progress. It was found that, to the extent that the society & the economy as a whole were not simutaneously elevated, much of the effort was wasted.

On Length of Stay: within the same, or similar, social & medical environments, length of stay can be a useful indicator of the effectiveness of hospital care. Other things being equal, a shorter stay is desirable, & the *decrease in length of stay in recent years is, in itself, a medical achievement. Recuperat_n is accelerated when the patient is diagnosed & treated faster & encouraged to leave the bed & the hospital earlier, & the savings in expenditures benefit both the patient & the community.

*A pt. in favour of Kaduna as a site is that it is a place that has potential that can attract the specialists regd. to use the facilities properly.

NEED: CONSIDERATION IN TERMS OF UTILISATION.

At the state level, where the plans for the service areas were prepared, other factors were brought to bear, such as current utilizatn, socio-economic factors, age distributn, availability of doctors, available transport etc.

NEED vs DEMAND: It is argued that distributn (of beds) in response to demand is socially desirable becos it achieves the max use of the resources invested. On the other hand, distributn in response to estimates of need, as medically or socially conceived, is said to cause a certain amount of waste, becos society's investment is under-utilized in some areas - at least until the populatn catches up in terms of income, education, & other determinants of demand, and by that time the facilities may have become obsolete.

HOSPITALS: DESIGN FACTORS

The programming and design of hospitals requires a great deal of special knowledge.

Hospitals vary greatly in their organisation of staff heirarchies, administration, and their relation between OUTPATIENT and INPATIENT sectors, and in terms of their specialisation in certain areas of medicine.

The architect must concentrate on the elements of outer and inner circulation of staff, patients, visitors, and supply, on the administrative facilities and on the design of the nursing units.

Location - Easily reached by public transport, but away from traffic hosp. require a carefully chosen site as little affected by noise and atmos. pollutn as possible.

Size - teaching hospital - in determining size, consider

(a) intake area (b) statistically calculated needs (c) other hospitals in vicinity.

e.g. 300 bed hosp. average stay per patient = 14 days

365 days ÷ 14 = 26 admissions per bed per annum

300 x 26 = 7800 patients per annum

7800 ÷ 300 (holidays & sundays subtracted) = approx 26 admissions perday.

Division into wards:-

(a) Male/female (different floors)

(b) By age

(c) By class (i) general wards (national health)

(ii) Semiprivate - single/double brms. (iii) private - single rooms often with own bath & other conviniences.

(d) By Illness: Surgical/medical

Surgical (i) general surgical ward (ii) special x-ray (iii) Isolatn

Medical (i) general (ii) skin disease (iii) contagious disease.

*Proportn of sexes varies. max. differences in:

(a) Urinary diseases & abdominal disorders - approx.4 times morewomen

(b) casualties (Emergency) - approx. 4 times more men.

DOORS - all doors must be close - fitting width for transporting beds 1.20m. for halls, self-closing double swing doors 1.80m for service area according touse 1.0m. Plywood faced doors in steel frames with rubber insert in rebate are sound proof & silent in operation.

WINDOWS:- The smaller a window, the greater the glare, and the darker the appearance of the walls if window lintel is raised to ceiling, daylight penetrates deeper into rooms.

Planning of tropical Hospitals: severe heat, glare of sun, cooling winds, natural cross ventilatn, low humidity protectn from mosquitos, flies, ants.

No of beds per hospital relates to:

(a) incidence of tropical diseases in region

(b) shortage of qualified staff.

(c) local habits & customs

(d) limitatns of technical equipment for constructn, running & maintainin hospital.

Availability of untrained and part-qualified staff demands compact layout of rooms as unit, for ease of supervision.

OPERATINGS DEPT:

Operating section completely separated from wards, Each op. dept. should have " septic and aseptic theatres. Op. theatres within easy reach of ambulance driver closely related to central sterilizing plant & x-ray dept. Acident cases may require use of septic theatre. Situatn next to lifts & close to surgical ward. Seldom on top floor. Modern operating theatres have no skylights, often, no windows, are artificially lit & ventilated.

Anaesthesia Room: - with refrigerator for anaesthetics,/set anaesthezing apparatns, wash basins and space for stretcher and carriage (about 13.0m)

Scrub-up for surgeons & nurses (approx. 15m^2) separate from op. theatre, but with glazed observatn panel.

Operating theatre: (25 - 30m^2) - sterilizing rm.btn. I septic & aseptic theatre, each having I operating table. Clear rm. ht. 4 - 4.5m square or rectangular in plan. Lighting totally artificial.

Operating area completely cut off from wards

CSSD = Central surgical supply (dept?) - for lafger hosp. supplies operating & all other depts. with sterile material, dressing etc. often built - in sterilizers, steam OR gamma ray.

Safety precautns: Safeguard against static electricity from surgeous, staff & patients: insert brass rod into floor & earth all equipment & people. Against exploding goses in anaesthesia rms. & corridors.

X-RAY DEPT., Easy access for bed cases outpatients, surgical unit RM Size to allow bed/stretcher to be wheeled from any side to X-Ray table. For diagnostic equipment + waiting space allow 30-35m^2

— 2 - 3 changing cubicles

— 1 x 1.5m, per examination room.

— storage for X-Ray films.

Emergency/Casualty Dept. Separate drive with covered entrance connected with X-Ray dept., waiting rm., admission & bath (where patient receives hospital clothing).

Ancillary rms: Waiting rm. (large), record rm., hospital library, doctor's rms., examinatn & treatment rms. for group practices with plenty of changing cubicles. Rooms for mass radiography, possibly cinema & lecture rms.

Receptn. Patients admission, issue of hospital clothing. Admission of contagious suspects separate from other patients *Outpatients average 3 x No of inpatients per year.

LABORATORIES:- central lab. for chem., bacteriology, clinical pathology, serology etc.

— air-coned. to avoid temp. fluctuatns.

— for day-to-day routine work such as blood/urine analysis.

Strilizing dept. - Normally I sterilizing plant/500 beds, size approx. 0.50 - 3.00m^3.

Necropsy & Histology dept.: - Storage of bodies & autopsy in rear of hospital, so that transport of bodies is unobserved by patients.

CHAPTER 3

C A S E S T U D I E S

A Guinness Eye Clinic, Kaduna (Case Study) (1980)

OUTPATIENTS

New Patients	Total Attendances
28,150	61,294
for 260 working days/yr.	
no of patients/day = $\frac{28,150}{260}$ ≈ 104 pts./day	Average no of attendances per patient = $\frac{61,294}{28,150}$ = 2 times

INPATIENTS

Total Admissions	Total discharges	Deaths
1441	1411	4

No of available beds = 55

Average length of stay = 13.5 days.

It can be concluded that because of lack of equipment and special facilities, the average length of stay is longer than necessary.

B Bristol Eye Hospital, Bristol, England.

No of hospital beds = 66

No of Inpatients treated/year = 2,500

"Day cases" per year = 1,200

No of Outpatients/year = 35,000

Accident/Emergency cases/year = 22,000

This hospital serves a population of something over 1 million people in and around the city of Bristol, and drawn from the neighbouring areas.

Total floor space of hospital: approx. 5,000 sq. m.

O.P.D. — 2 separate clinics with 4 doctors/clinic casualty department — 1 full-time casualty doctor.

The 66 beds are divided into 5 ward areas. Medical and nursing staff to run this service is as follow:-

7 Consultant ophthalmologists

8 Junior medical staff

2 equivalent staff working on sessional basis

Nursing Staff:- 11 senior staff at ward sister level and above, and

52 nurses.

2 opticians

7 full-time orthoptists

21 medical secretaries -

2 full-time staff in pharmacy.

1 medical social worker

9 portering staff.

Domestic Staff:- 2 senior staff

17 full time equivalent members

Catering: approx. 4 whole time equivalent staff.

It is hoped in future to re-provide the service in a new hospital of approx. 8,000 sq. metres floor space, though without serious increase in the staffing levels. The increase in space will be rather to enhance the working environment and allow patients to be seen in individual cubicles in the O.P.D., allowing for a level of privacy which is not currently possible.

THE WELL-BEING OF DESIGN QUALITY IN THE HEALTH-CARE WORLD.

"Nowhere is this blending of aesthetic conviction with an understanding of psychological and emotional factors more crucial than in the design of hospitals or related facilities." - arch. Record.

— great sensitivity to architectural issues, values & qualities that affect larger-scale health-care institutions. These includes:

— Need to establish clear patterns of circulation and, thus, of the orientation of the users of such complex facilities - and not least, these include more sensitivity to the nature, effects, and use of light, materials, and colour to enliver the human qualities of the environment.

An innovation affecting design of the nursing units separated patient and staff traffic.

There are 3 levels of scale of projects:

(a) The small ambulatory-care centre

(b) The medium scale general hospital

(c) Major university facilities. It is clear that the smaller the project, the higher the level of balance that was achieved btn. technical competence & design competence. As a project gets larger, site constraints become significantly greater in most situations - and the problems of scale, clarity of organisation, and the read - ability of the bldg. come into play.

FINISH: - floors covered with either vinyl asbestos tile or carpeting. Oak railings are provided throughout the circulation areas as a means of protecting the wall surfaces and to give patients a good, reassuring grip as they move about.

The same bldgs. in a barren place would not be quite so appealing - this matter of making the most out of a site, and putting some creativity into choosing a site in the first place is important

Increase planting on site to suit users from the south who are used to seeing a lot of trees, does people no harm. The trees can be put to good use on the site.

A medical center & regional health-care facility for both urban and rural populations - the second largest short-term, acute-care, voluntary non-profit hospital.

The architect has to come up with a very clear plan, obviously, to make sense out of such a mix (of activity points in an OPD), and to ensure easy patient traffic.

(for light & orientation)

The atrium (or courtyard) in turn, while providing orientation, is light and airy - a good place to wait for the several hours it often takes btn. tests.

The anxiety of groping around in labysinthrine corridors is eliminated. To achieve the degree of flexibility and expandability reqd., a modular planning system has been used. Each module has a flexible planning field, with service cores containing fixed mechanical and electrical services, plus room for future vertical circulation. Expansion will occur in increments of these modules, thus maintaining a sense of ordered growth. Moreover, the close juxtaposition of the modules expedite the delivery of services, especially when the treatment requires the resources of morethan one component. For example, radiology is just next to the emergency room; patients needing that form of evaluation are just seconds away from the equipment and personnel needed.

OPENINGS - The openings are expressive of internal functional variations. They should be. They occur where you really want windows.

CHALLENGE: - The challenge was to create an environment meeting strict functional and technical criteria for the specialised care areas, while also responding to the needs, emotional & otherwise, of the patients & visitors.

The Emergency Dept.: The entrance: canopy to shelter vehicles as they pull up, also provides a sheltered walkway from the parking lot.

VISITORS:- A lounge for visitors overlooks a garden court, thus helping alleviate tension.

An Example:- for a multilevel block type:

In-patient facilities are in the upper levels, Diagnotic facilities are in the middle zone, and the outpatient and public activities are on the G. Level.

CHILDREN - Explore the dynamics of geometry (an exploration that children, conciously or unconciously, pursue all the time).

GREENBELTS:- Will serve as visual and acoustical foils to incoming traffic and the roadways beyond.

LARGE-SCALE PROJECTS:- Architects know of course that as bldgs. get larger, the maintenance of human scale and of a sense of orientation within, becomes proportionately more difficult. But, it can be demonstrated that the various, complex, often - over-lapping heirarchies of circulation can be handled efficiently and, in both visual and human terms, affably.

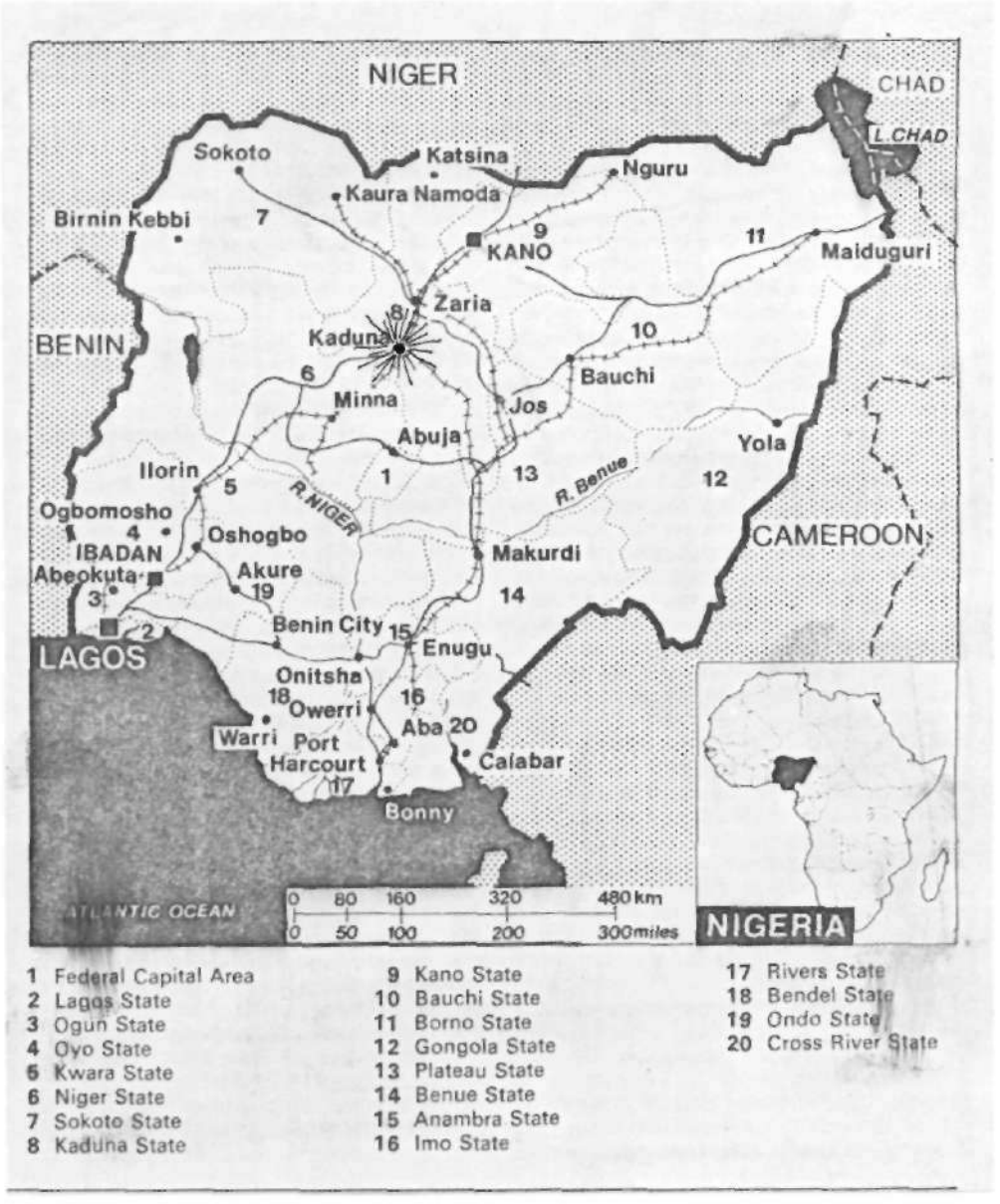
It can have a first-rate circulation clarification. The jury can appreciate how the heirarchies of scale - from one corridor to another "Cue" people as to destinations and directions.

CONTEXT:- Serious concern as to what bldg. does to its surroundings.

Noteworthy Elements:- handsome, inviting handling of structure as it reaches the ground.

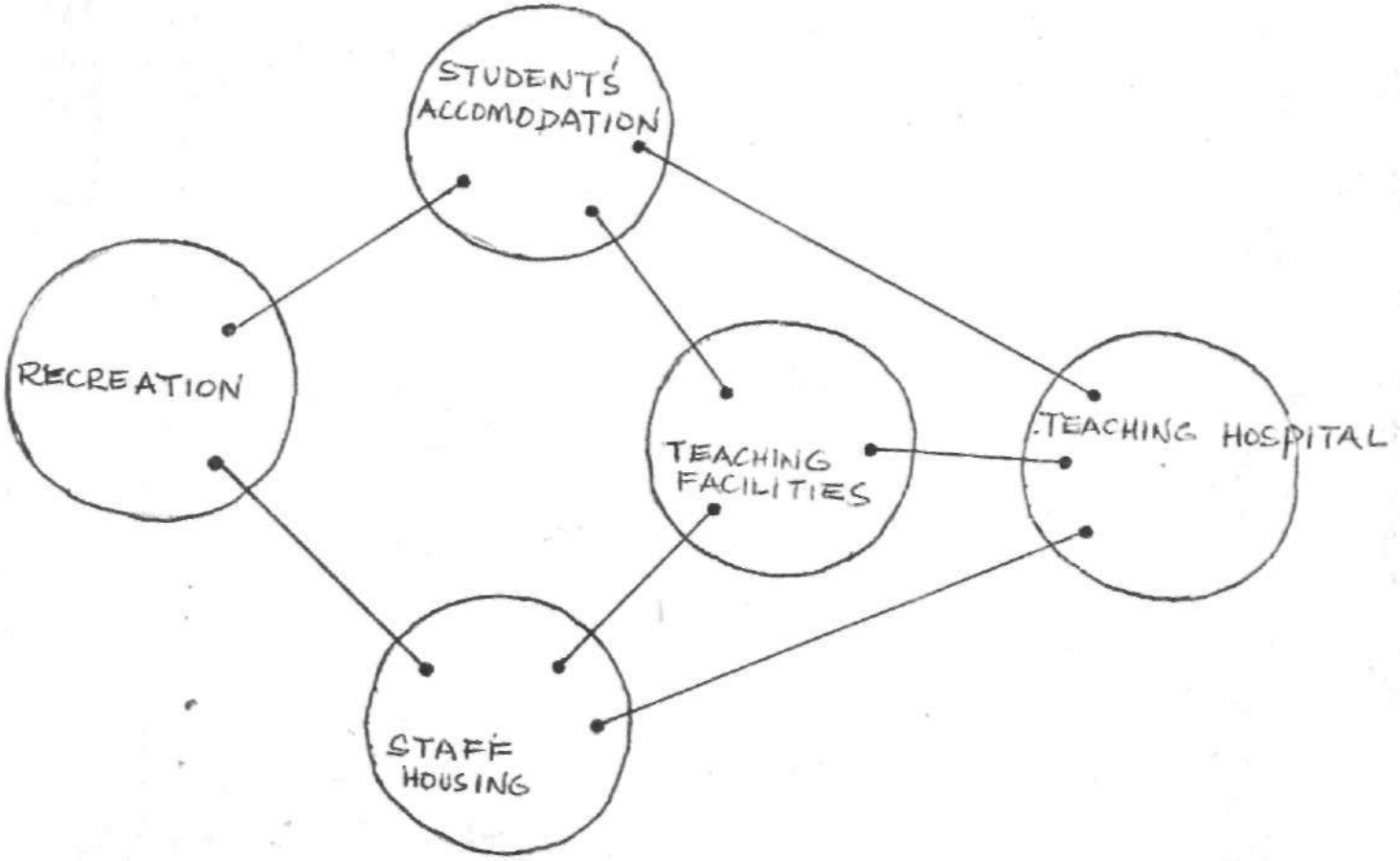
— clearly designated & unconfusing pts. of entry

— clearly designated patterns of circulation.



LOCATION OF KADUNA IN NIGERIA. [A]

RELATIONSHIPS AT THE NATIONAL EYE CENTRE [E]



CHAPTER 4

THE ROLE OF THE NATIONAL EYE CENTRE

The Centre will have a postgraduate teaching hospital in ophthalmology which will provide specialist services in the diagnosis and treatment of diseases of the eye, and will supply optical appliances. It will also have a postgraduate ophthalmic medical school for the training of ophthalmic consultants or eye specialists, and for ophthalmic research.

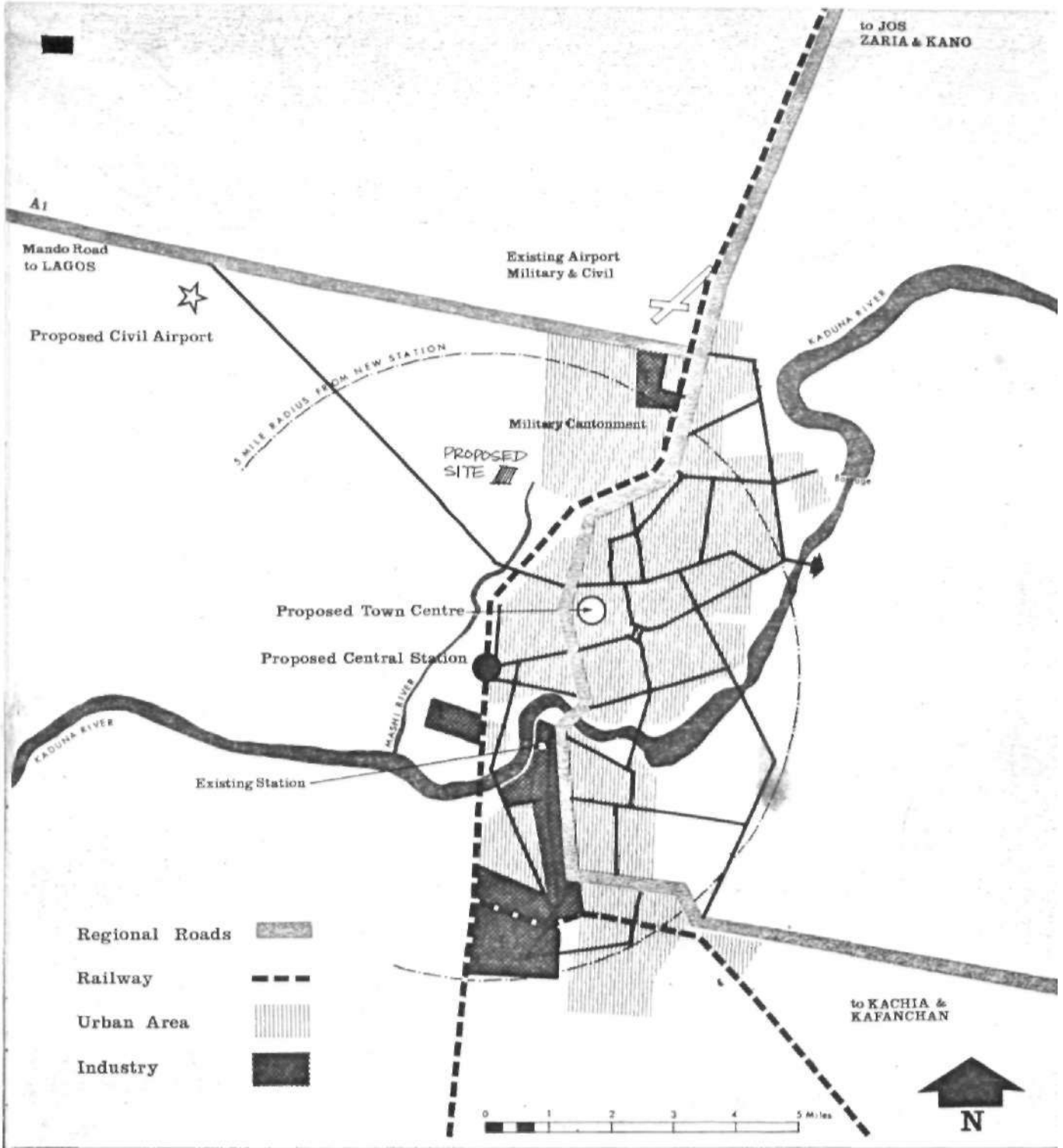
In order to fulfil these functions the centre has power to provide diagnostics, curative, promotive and rehabilitative ophthalmic services and ambulatory and domiciliary ophthalmic treatment employing the services of ophthalmologists and other medical practitioners.

It will also provide facilities for the training of ophthalmologists, ophthalmic and dispensing opticians, ophthalmic nurses, orthoptists, and ophthalmic technicians and health personnel in preventive ophthalmology. It will also develop new diagnostic and therapeutic ophthalmic instruments and appliances suitable for the practice of ophthalmology in Nigeria.

It will be a major participant in the establishment of eye hospitals or units in every state of the fedration, and will advise the federal or state governments on all matters relating to prevention of blindness.

Briefly, therefore, the Eye Centre seeks to provide:

(a) Postgraduate teaching hospital in ophthalmology for the diagnosis/treatment of eye diseases, and the supply of optical appliances.



Kaduna's Basic Framework

[B]

Kaduna's framework of regional roads resembles a pitch-fork. The shoulder of the fork forms the Capital's central lifeline, (Zaria Road and Ahmadu Bello Way) destined, as soon as the new bridges are built on the Niger and Benue Rivers, to become the main route from the far north to the deep South and East of Nigeria. Meanwhile the main road to Lagos (the handle of the fork) merely brushes the outskirts of Kaduna but does not penetrate its heart. The two eastern prongs, twenty miles apart, lead to Jos and Kachia. Between them flows the Kaduna river, the source of water for the flourishing textile industry.

Meanwhile the railway forks at right angles to the road fork. From Kaduna Junction its two prongs go south westwards and south eastwards to Lagos and Port Harcourt.

(b) Postgraduate ophthalmic medical school for the training of ophthalmic consultants and for research.

(c) Training facilities for:

- Ophthalmologists
- Ophthalmic/dispensing opticians
- Ophthalmic nurses
- Orthoptists
- Ophthalmic technicians
- Health personnel in preventive ophthalmology.

(d) Facilities for research in all aspects of ophthalmology: visual, clinical, experimental.

(e) Conferences/Seminars/Study Groups etc.

(g) Development of new diagnostic/therapeutic ophthalmic instruments and appliances.

(h) Establishment and administration of eye hospitals throughout the federation.

REASONS FOR LOCATING THE CENTRE IN KADUNA

Eyebrows may be raised as to why a National Eye Centre is sited not at the new federal capital, Abuja, but somewhere else. Kaduna has been chosen because statistics as shown in the appendix show that the incidence of eye diseases is highest in those areas of the country north of rivers Niger and Benue. Therefore, the greatest need of ophthalmic services and for clinical research in ophthalmic is in these

areas of which Kaduna appears to be a geographical centre. It is at the same time near the new federal capital.

Other reasons for siting the centre in Kaduna include the absence of major physical limitations or constraints for development at the north-west of Kaduna (the probable site). Easy accessibility to different parts of Nigeria is also ensured by the new expressways leading to Kaduna. (See map)
Furthermore, the present Kaduna Airport is one of the busiest in terms of domestic flights, and the new Kaduna Airport when completed this year, will be of the standard required for international flights.

The Kaduna Water Board has a massive expansion programme by the use of the (three million naira) Kungimi Dam. There is also available infrastructure such as electricity, good roads, telephone etc, in Kaduna. The following maps showing climatic situations in Kaduna, depict Kaduna as a suitable place to site the Eye Centre. It can be seen that there are no major rivers which may cause inundation or help the breeding of disease-carrying insects.

Health Services and Research Institutions IN KADUNA.



Kaduna is fortunate in having all its main medical services concentrated in the City Centre. The first group includes the maternity and child welfare clinic in Ibadan Street South which becomes part of the 53 acre Civic Centre focused on the Administrators office. Here also are grouped the workshops for the blind, the nurses' hostels, the extension clinics and Leprosy centre. There also is a site for a large school clinic and a medical practitioners' clinic. The dental clinic is in Ahmadu Bello Way north of Hospital Road.

The second group of metropolitan health services are the Regional hospital buildings, all situated in one large complex served from Tafawa Balewa Way, Golf Course Road and Independence Way. The location of the large Post and Telegraphs' transmitting station between the new general hospital and its site for extension poses the major problem of the removal of the transmitters to a less central site to facilitate a sound plan for future hospital development. The programme for rationalising the health services includes the transference of the Kabala isolation hospital to an infectious diseases ward in the General Hospital, the building of a cottage hospital in the populous Tudun Wada urban area, – and sites in all new neighbourhoods for general and maternity clinics and dispensaries grouped to economise staff.

The Capital's major research institute is the Federal Establishment of N.I.T.R. (Nigerian Institute for Trypanosomiasis Research) occupying the large triangular site in Shehu Lamina Avenue to the east of Tafawa Balewa Way.

Key

- Medical Institution
- Proposed Hospital
- Existing Clinic
- Proposed Clinic
- Medical or Government Training and Research Institution

N

0 ½ 1 2 3 miles

THE SITE

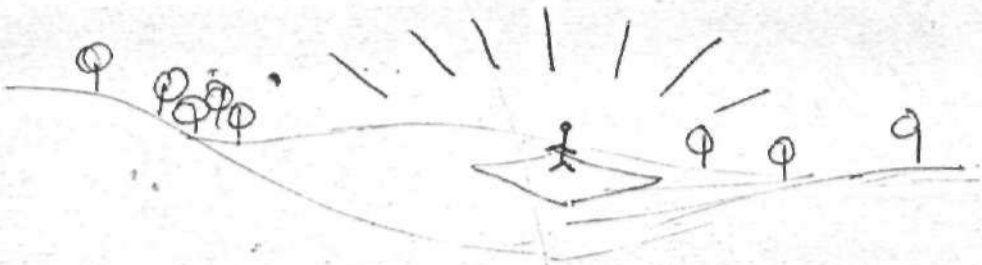
About 400 hectares of land situated between the rivers Gora and Mashi, to the NorthWest of Kaduna town is the site acquired by the Federal Government for the National Eye Centre. It is a relatively flat land with a maximum slope gradient of about 2.0%. Naturally, the river points form a valley and the ground gently slopes upwards again on the other side of the rivers.

To the East of the site is the spread of the Nigerian Defence Academy. To the north, about 5 Km away is the Kaduna Domestic Airport. A high voltage NEPA transmission line cuts diagonally across the site from the south-west corner. The confluence of the rivers Mashi and Gora links to the bigger river Kaduna to the south.

It is seen that the land is fairly flat and free from erosion and ravines and standing in the middle of the site, one can have a nice panoramic view on all sides beyond the rivers. Because solar orientation and the harsh, dusty wind that blow from the north-east for most part of the year, the north-eastern sector of the site invariably needs the greatest protection from exposure. This screening can be achieved through green belts. It is desired that there be very minimal change of levels in an Eye hospital, hence the site is cut into two grades or levels with just 60 cm. as the vertical height difference. These two levels are connected with a very gentle ramp (1 in 12) wherever they occur.

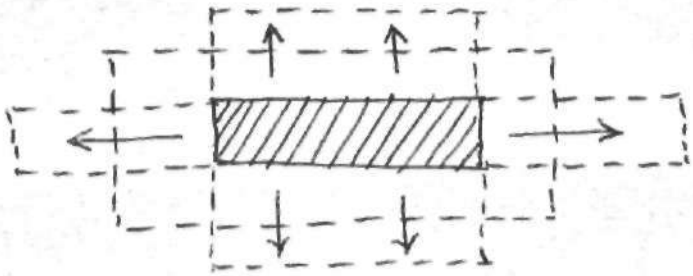
DESIGN CONSTRAINTS

— BARREN SITE — NO HUMAN SCALE

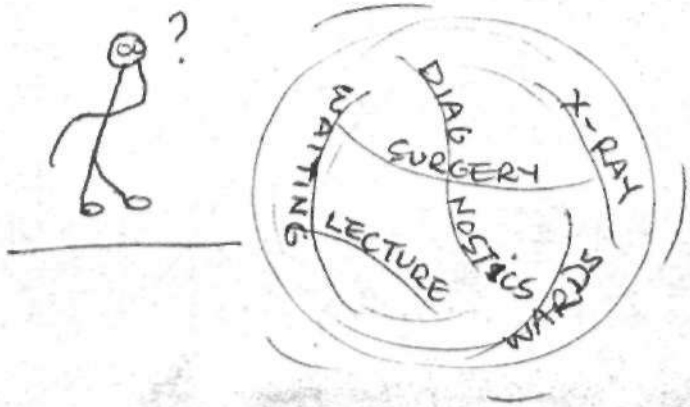


NO MAN-MADE STRUCTURES FOR 2-3km RADIUS.

— EXPANSION POSSIBILITIES.



— A CONGLOMERATION OF ACTIVITIES & FACILITIES



— CONFUSING TO USERS.

CHAPTER 5

AIMS AND OBJECTIVES

The aims and objectives of the design accrue from the site constraints which include micro-climatic considerations, expansion possibilities, and also the diverse hospital activities which form a confusing bundle that need to be carefully untangled and laid out such that the functional relationships are realised.

AIMS

(a) To achieve a human scale, relating man to hospital buildings and to the immediate surrounding.

(b) To provide avenues for future expansion (if any) in any or all departments.

(c) To establish a clear pattern of circulation; easy traffic for STAFF/PATIENT/SUPPLIES.

(d) Heat isolation from interior; also, dust, glare and insect need to be shielded from the interiors.

(e) To promote an atmosphere for cordial interactions between staff/students/patients/visitors.

OBJECTIVES

The means and methods of achieving the goals listed above are set as follows:

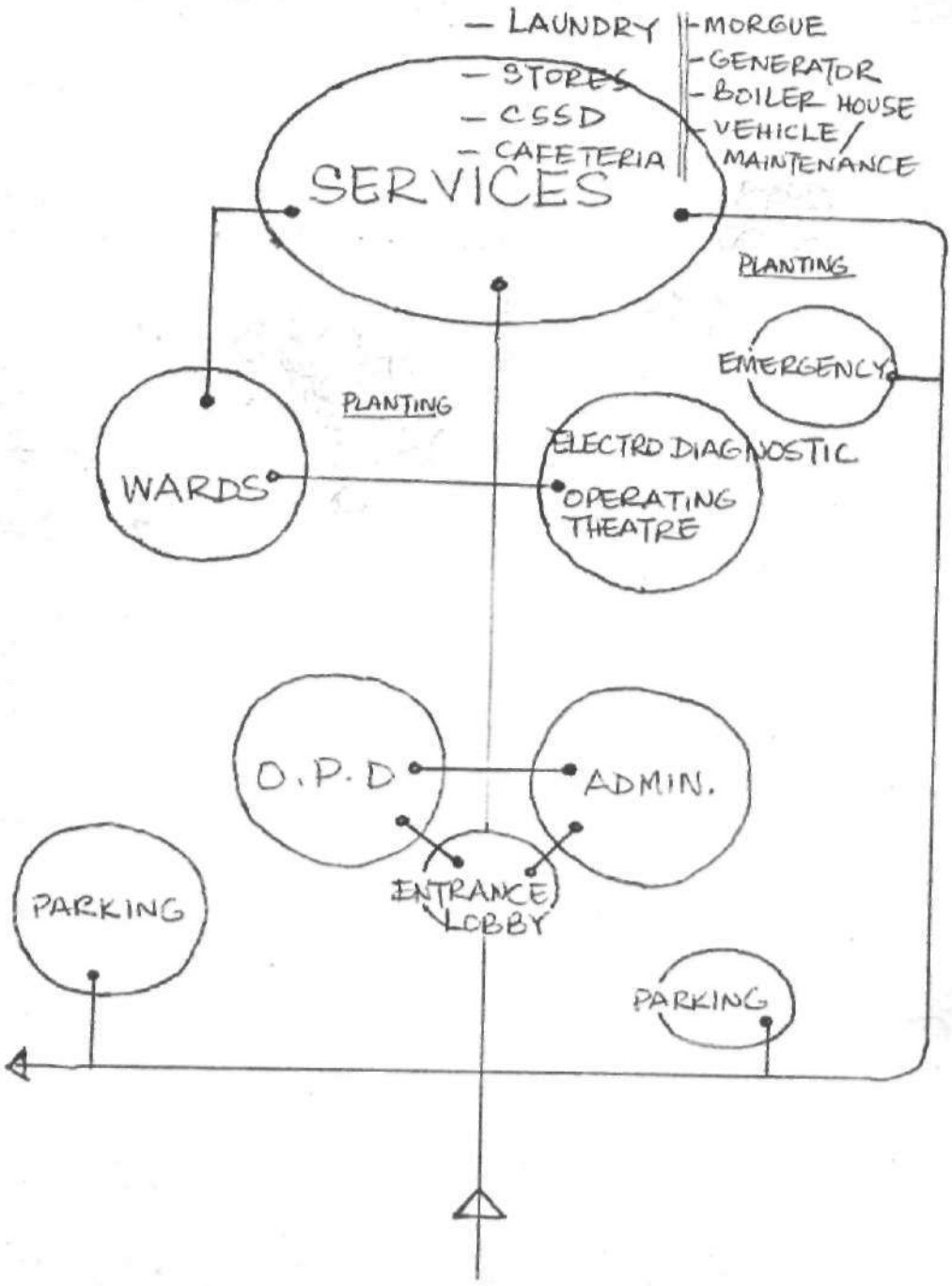
- Introduction of greenery; conforming building lines to the relatively flat terrain.

- Clarifying circulation from entry points to each department.
- Compact planning using courtyards.
- Effective sun-shielding devices; plantings; special door sealants to prevent dust and insects.

SOME AIDS TO GOOD HOSPITAL DESIGN:

These form additional things that were aimed for right from the planning stages:

- improved external traffic flow
- simplicity of direction
- provoking a desire to enter
- minimising depersonalisation
- ensuring receptivity and individual concern
- need for facilities to be brighter, more simplistic (using colour, drapes etc).
- more accessibility from external traffic
- homier atmosphere (pictures, plants, earthy surroundings).
- more open to nature (atriums, landscaping, external balconies).



FUNCTIONAL RELATIONSHIPS IN EYE TEACHING HOSPITAL. [F]

GENERAL QUESTIONS WHOSE ANSWERS DETERMINED THE DESIGN

- What is the normal procedure for treatment in the out patient department - from entrance through discharge?
- What relationships have the departments to each other?
- Which eye problems need inpatient care whether medical or surgical care?
- Working hours: Is shift operated? What are the working days and hours?
- How near should operating theatre be to the wards?
- What is the average length of stay in the wards?
- What is the average number of visits to the out patient department/ patient?
- Any available pictures of eye problems?
- What are the local names for some eye diseases in Nigeria?
- How are these diseases transmitted?
- What are the names of some of the major equipment used in the various departments?
- How are the spaces used?
- What is the estimated number of senipr/junior staff employed in a 300 bed hospital?
- Are there any special points for an architect to note in the design of an eye hospital?
- Any useful reference material in form of books, magazines or pictures available in terms of eye hospitals generally?

Some of these questions may appear irrelevant, but they happen to be the questions that came to the mind of thewriter that demanded solution. Maybe not all the questions have found their solution in the final design proposals; in fact, several more cropped up later on, even as the design process neared its end. However, the answers to these questions formed the basis on which the diverse important design decisions were made.

FUNCTIONAL CONSIDERATIONS

Waiting Areas:

Attempt to eliminate the humiliating effects of patients waiting in long lines for consultation; the waste of time and energy expended in small overcrowded waiting rooms can be considerably reduced by increasing their space and improving the physical surroundings of these important adjuncts to hospital service. This was achieved by introducing plenty of greenery, courtyards and fresh air wherever possible.

Teaching Spaces:

The clinical training of young doctors and nurses clearly will add to the demands of space within the hospital itself, since an added component of teaching and study space will be required in almost every unit of the hospital. These occur as seminar rooms, workshops, lecture rooms etc. in virtually all the departments.

Consulting Rooms:

The consulting room must be convinient to the waiting room, but not so convinient that consultations can be overheard. The big sizes of consulting rooms in the out patient department 7.5 x 7.5 m is to allow for the 6m viewing lanes and for changing rooms, examination couch, dark rooms and special portable equipment.

Rehabilitation:

The aim is to make life inside hospital as much like life outside as possible, to make work compulsory, to tie all work to training, to

pay patients fairly, and get every patient fit enough to become independent of hospital care. This occurs mostly with patients blind through cataract or other disease, but through surgery, have had their sight restored. Also, the therapeutic facilities in the ORTHOPTICS department enables the proper and correct use of eyes again after treatment.

SPECIAL FACTORS CONSIDERED

Electrodiagnostic Department

It is placed not too near the X-ray department due to electrical interference from the X-ray department. The department has special electrical and air conditioning requirements:

- all lighting is dimmable
- tungsten lighting instead of flourescent
- no overhead lighting in ultrasound room
- air conditioner temperatures and humidity critical and must be 24 hours reliable to prevent damage to expensive equipment. Those necessitates the absence of low-level windows, and the placement of an air-conditioning plant near to the department. The electicity generator which serves the whole hospital is placed far away due to noise, but is 24 hours reliable.

These special requirements also apply to the operating theatre suites.

~~of an air-conditioning plant near to the Department. The electricity generator which serves the whole hospital is placed far away due to noise, but is 24 — hr. reliable. These special requirements also apply to the operating theatre suites.~~

HANDRAILS :- All corridors, walkways and stairways have to aluminium hand rails to guide patient walks.

DOORS:- Lightweight spring closers are attached to doors where doors left open can be dangerous. Cupboards, drawers have sliding doors.

FLOORS:- Noisy, resonant floor surfaces preferred

DIFITS:- Where digits occur, they are embossed (raised) but not in braille, e.g. on toilet doors etc.

WALKWAYS:- There are covered walkways provided linking the wards to the operating theatre block, and also linking the O.P.D. and the Diagnostic block. These occur on two levels.

STRUCTURE: The construction is of concreate post and beam with grid deck as the roofing. Where possible, a module of 5m was used.

For floxibility and adaptation to use, most of the internal dividing walls are of moveable partitions. Flooring is terrazzo -finished, mostly.

Mechanical: The special ventilation and humidity requirements in the operating theatres and electrodiagnostic department has made it imperative for an airconditioning plant to be located close to these areas.

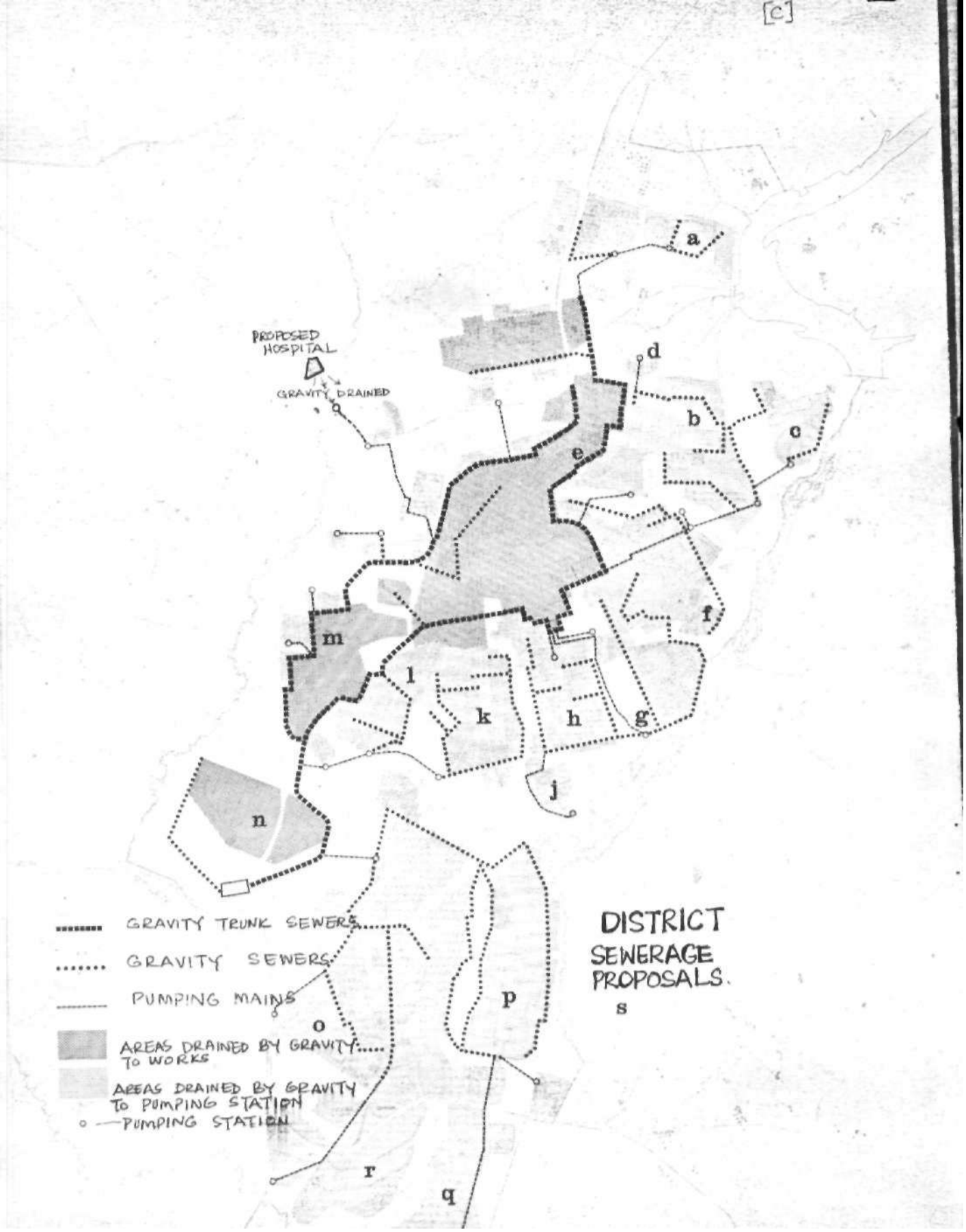
Air-conditioning units are used freely in other areas such as the consultation rooms (O.P.D.) and the administration department.

Hospital Lifts are introduced in the surgical wards (4 No) Also, the operating theatre (1st floor) is reached by a lift from the ground floor.

Ventilation:- Generally, the problem in this hot/dry climate is one of heat isolation. Hence, compactness and introduction of courtyards and plantings will effect the desired coolness in the interiors. Adequate ventilation of buildings is better achieved when the buildings are low-lying, so for this purpose, the highest level in the hospital is only two floors high. This is about 9.5 metres from G. floor slab to parapet top.

Sunshading/Lighting:

Sunshading Element employed mostly is horizontal LUXALON shields. This prevents the glazed areas from getting direct sunlight which invariably transmits heat into the interiors.


PROPOSED HOSPITAL
GRAVITY DRAINED
a
b
c
d
e
f
g
h
j
k
l
m
n
o
p
q
r
s
GRAVITY TRUNK SEWERS
GRAVITY SEWERS
PUMPING MAINS
AREAS DRAINED BY GRAVITY TO WORKS
AREAS DRAINED BY GRAVITY TO PUMPING STATION
PUMPING STATION
DISTRICT SEWERAGE PROPOSALS.

In areas other than the electrodiagnostic and operating theatre departments, the lighting is controlled generally by use of tinted glass and drapes.

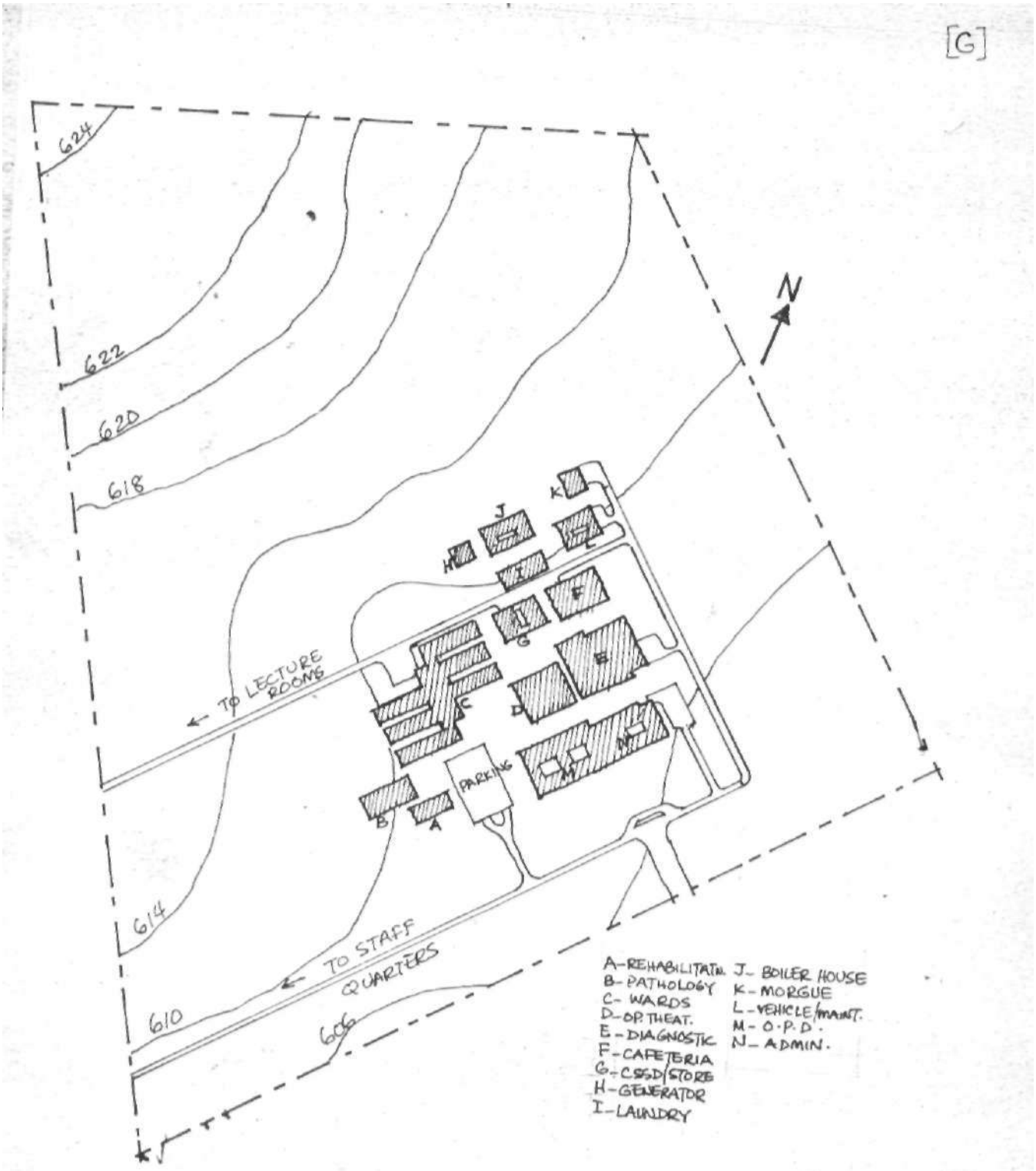
Sewage:- It is envisaged that drainage is by the gravity drainage system, from the property lines of the Eye centre. Drain connections are thus carried to the nearest pumping station which (according to the District sewerage Proposals) is situated just after River Mashi to the South-East. From there, pumping mains will carry sewage directly to the gravity Trunk Sewers.

Expansion/Future:

Being a centre from where activities will diverge to the different parts of the federation, the hospital is not envisaged to require more than 50% expansion. This is to be more expected, since, being a teaching hospital, the patients and equipment serve teaching purposes which will continue to serve the optimum student population.

Because health care will improve, it is consequential to having fewer people requiring specialist medical attention. This will therefore fix the no of hospital bed and outpatient facilities. Thus it is evident that expansion is a factor relating only to student population.

[G]



SITE PLAN PROPOSAL SCALE 1:5000

SPACE DETERMINANTS.

In a 300 - bed hospital, assuming

150 beds surgical, and

150 bed medical.

No of operating theatres to serve 150 beds:

No of operations = $\frac{150 \times 85\% \text{ occupancy} \times 365 \text{ days}}{10 \text{ days average stay}}$

= 4654 ops./year.

No of operating rooms:

$\frac{4654}{286 \text{ days} \times 4 \text{ ops./room/day}}$ 4 Operating theatres

This is assuming 5½ workdays per week and, assuming each operation takes roughly 2 hours.,

and 7 a.m. - 3 p.m. work time.

No OF OUTPATIENT CLINICS

If 30 patients come from each of the 19 states this gives 570 patients referred/day.

If a consultant takes 15 mins. with each patient, then, per day, a doctor will see about 32 patients (for 8 working hours/day).

To take care of 570 patients/day,

$= \frac{570}{32}$ = 18 doctors.

However, in reality, several of the southern states can never refer up to 20 patients per day. This invariably reduces the total No of consultants needed in the O.P.D. Hence, it is safely assumed that 16 doctors will man 16 clinics; separated thus:

8 ordinary clinics

8 special clinics.

ACCOMODATION SCHEDULE: (BY DEPARTMENTS)

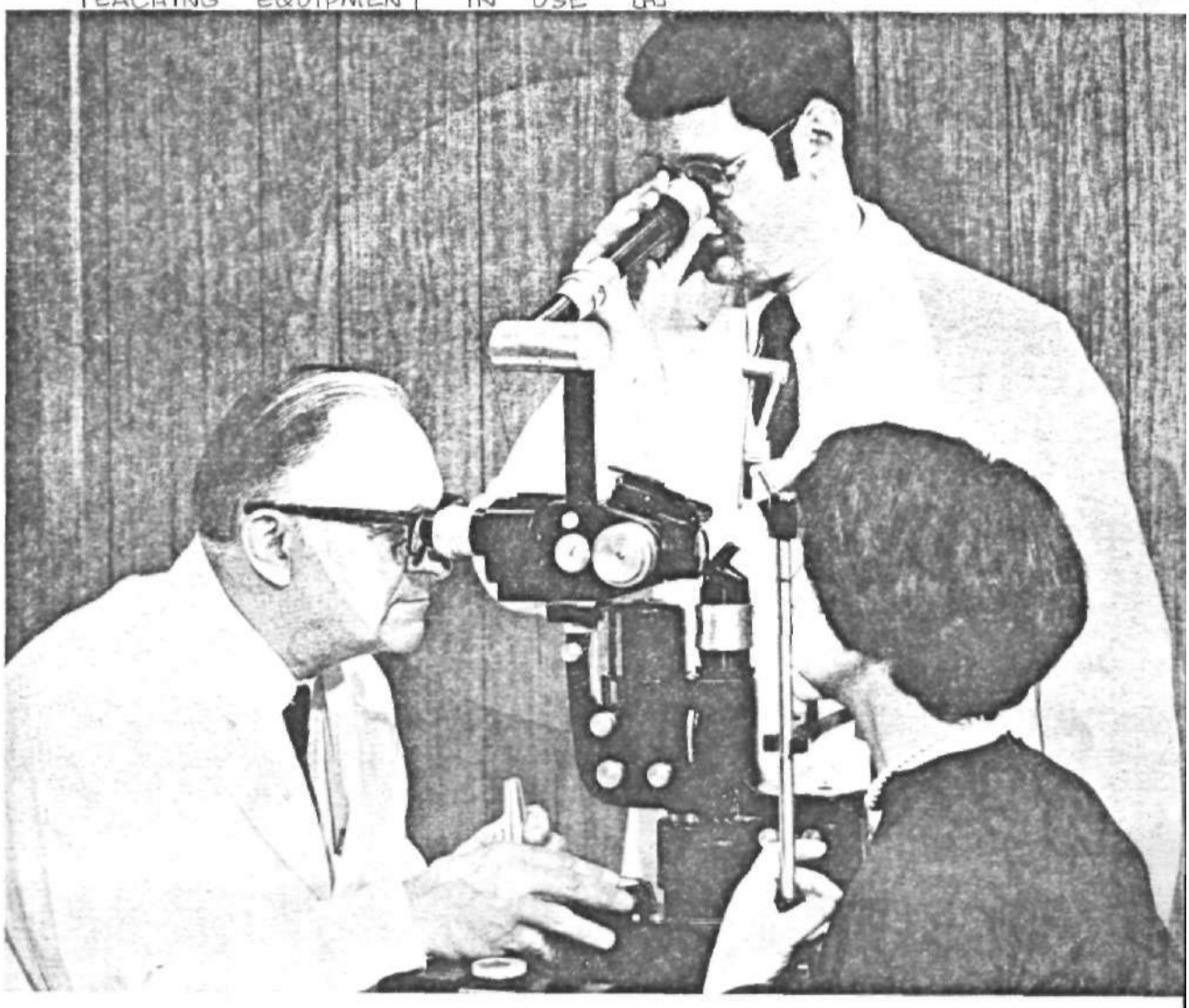
	Department	Area (M^2)	Total Area/Department
A	OUTPATIENT (O.P.D.)		3890.0
	- Waiting areas	1800.0	
	- Consultation/Treatment	1500.0	
	- Lobby	150.00	
	- Public lecture rms.(2no)	150.00	
	- Doctor's common rm.(2no)	90.0	
	- Snacks/magazines	100.0	
B	REHABILITATION		
	- Craft training - Workshops - Offices - Waiting/Toilets		200.0
C	PATHOLOGY		
	- Harmatology - Chemical Pathology		795.0
	- Microbiology - Histopathology - Blood Bank	400.0	
	- General laboratory	270.0	
	- Toilet/waiting area	125.0	

	Department	Area (M^2)	Total Area/Department
D	PHARMACY		
	- Issue/Waiting - Day Store - Cold Store - Receiving/Unpacking - Chief Pharmacist - Prepacked Storage - Mixing		450.0
E	OPHTHALMIC WARD		7,075.0
	- (Surgical) 25 bed/ward. 12 such units.	6375.0	
	- Lobbies, toilets, waiting	500.0	
F	SURGICAL DEPARTMENT.		
	- Operating theatres (4 no)	400.0	1,600.0
	- Recovery room - Seminar - Holding - Staff Changing - Laboratory - Anaesthetics	1,200.0	

	Department	Area (M^2)	Total Area/Department
G	ORTHOPTIC DEPARTMENT		1,400.0
	- Seminar - Examination - Toilets & Reception	1,400.0	
H	X-RAY		
	- Seminar - Radiologist	180.0	600.0
	- Archieves	150.0	
	- X-ray rooms (2 no)	150.0	
	- Toilet & waiting Area	113.0	
I	ACCIDENT & EMERGENCY		744.0
	- Day ward (10 bed) - Waiting Reception - Theatre - Resuscitation - Examination/consult. - Toilets.		
J	ELECTRO DIAGNOSTIC		625.0
	- Electro Retinography - " Oculography - Ultra Sound		

	Department	Area (M^2)	Total Area/Department
	- Future Holography - " Computer - Visual Evoked Potential - Laser room - Waiting & Toilets	625.0	
K	FLOURESCEIN ANGIOGRAPHY		550.0
	- Camera Rooms - Dark Rooms - Seminar Rooms - Film Archieves - Toilet & Waiting	550.0	
L	REFRACTION		625.0
	- Workshops - Official Repairs - Refraction (10 no Eye lanes) - Consultation/Seminars - Toilets/Waiting	187.5	
M	CONTACT LENSES		562.5
	- Examination & Fitting - Records - Offices - Laboratory	160.0	

	Department	Area (M^2)	Total Area/Department
	- Workshop - Seminar/Lecture Room - Toilets & Waiting	400.0	
N	MEDICAL STORES	440.0	440.0
O	CENTRAL STERILE SUPPLY (C.S.S.D.)	313.0	313.0
P	ADMINISTRATION - Conference - Board Room - 8 big Office Spaces - 4 small Office Spaces		1,325.0
Q	CAFETERIA - Dining - Kitchen	840.0 600.0	1,440.0
R	LAUNDRY	500.0	500.0
S	MORTUARY	250.0	250.0
T	BOILER HOUSE	700.0	700.0
U	VEHICLE & MAINTENANCE WORKSHOP	750.0	750.0
V	STANDBY GENERATOR	120.0	120.0

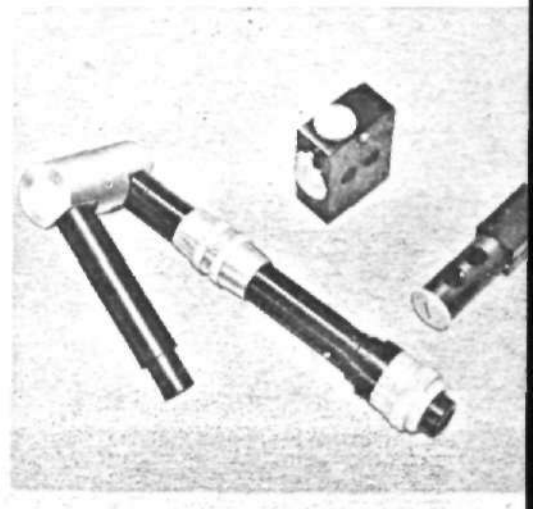


Infinite Positioning Dual Viewing Attachment

The double-joint design with horizontal rotation provides for universal movement of the Dual Viewing Attachment. While you traverse the eye, the student or associate can easily accommodate your movements... conveniently, and *without disturbing the examination.*

His view is identical to yours... greatly enhancing teaching and consulting communication. Regardless of his relative position, the second observer can obtain and retain an erect image simply by adjusting a rotatable sleeve on the viewing tube.

A unique, movable, beam-splitting cartridge and adapter block allow the Dual Viewing Attachment to be permanently mounted without interfering with normal viewing through the slit lamp. Simply sliding the beam splitter into position allows you to share your view with an associate. While the adapter block and cartridge remain permanently mounted, the observation tube portion may be easily removed and stored, if desired, to facilitate mechanical movement of the slit lamp.



CHAPTER 6

WORD DEFINITIONS

Ophthalmology:- the scientific study of the structure, functions and affections of the eye.

Ambulatory:- movable, unfixed in abode, shifting, temporary mutable.

Clinical:- Medicine or surgeny as taught at the bedside.

Domiciliary:- The place where one has his permanent residence, to which, if absent, he has the intention of returning.

Inundation:- an overflow of water; flooding

Therapeutic:- That branch of medicine concerned with the remedial treatment of disease.

Electro Oculography (EOG):- A method of recording eye position and eye movements by using electrodes placed on the skin adjacent to the lateral canthi to detect a standing potential difference between the front and the back of the Eyeball.

Canthi(pl.):- cantus (singular) - corner of the Eye

Electro Retinography (ERG) - The recording and study of the retinal action currents.

Flourescein Angiography:- radiography of vessels after the injection of a radiopaque material or, description of the blood vessels or lymphatics.

Flourescein:- An orange-red crystalline powder that yields a bright-green flourescence in solution.

Orthoptic:- The study and treatment of defective binocular vision; of defects in the action of the ocular muscles, or of faulty visual habits.

Histopathology:- (Pathologic histology)- the science or study dealing with the cytologic and histologic structure of abnormal diseased tissue.

Ultra sound:- (ultra sound scanner) - instrument that provides cross-sectional pictures of the eye and the structures around and behind the eye itself by beaming pulses of sound into the eye area at the rate of millions/sec. An electronic machine converts the sound echoes into light signals, and this gives a black and white picture on a television - like screen.

SOME COMMON EYE DISEASES

(1) GLAUCOMA:- An increased pressure within the eyeball because drainage of fluid is impeded and pressure builds up, thus inhibiting the blood supply. This leads also to damage to nerve cells.

— 10% of the american population have it.

— Causes 13.5% of all blindness

— rarely appears before the age of 35 years.

Symptoms: redness of eye, clondy vision, severe eye pain, nausea and headache.

Treatment: Medical - Eyedrops

Surgical - Iridectory operation.

(yana Hausa)

(2) CATARACT:- Opaque spots that form on the lens and spread throughout the lens over a period of time; cataracts keep light rays from getting through to the retina. Cataracts are usually de-generative but can be congenital or they may be linked with infection inside the eye, diabetes, penetration of the eye by an object.

Symptoms: blurring dimming vision

Treatment: Only treatment known for cataract is surgery; to remove the lens of the eye - which is then replaced by glasses.

(3) CONJUNCTIVITIS: (Pink Eye) - May be caused by allergy or contact with pollen, dust, bacteria etc. - producing itching and redness of the eye. e.g. CHRONIC CATARRHAL CONJUNCTIVITIS Popularly known as "APOLLO".

Treatment:- is usually by antibiotics.

(4) ONCHOCERCIASIS:- (River blindness)

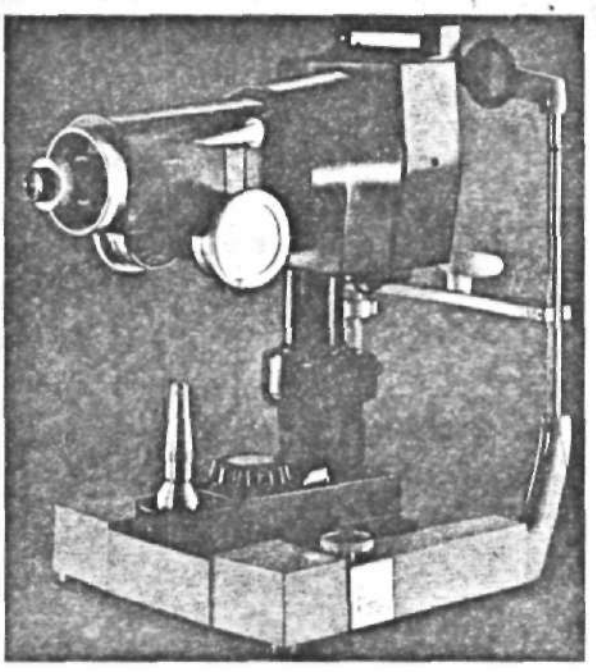
— 20 million people are affected in the world

— 4 - 10% of the cases are blinded

— insect vector (black fly in riverine areas)

(5) TRACHOMA: About 600 million people affected in the world, and is the world's major cause of blindness. It is a water - washed infection, affecting the skin and eyes.

the AO·CLC Instrument

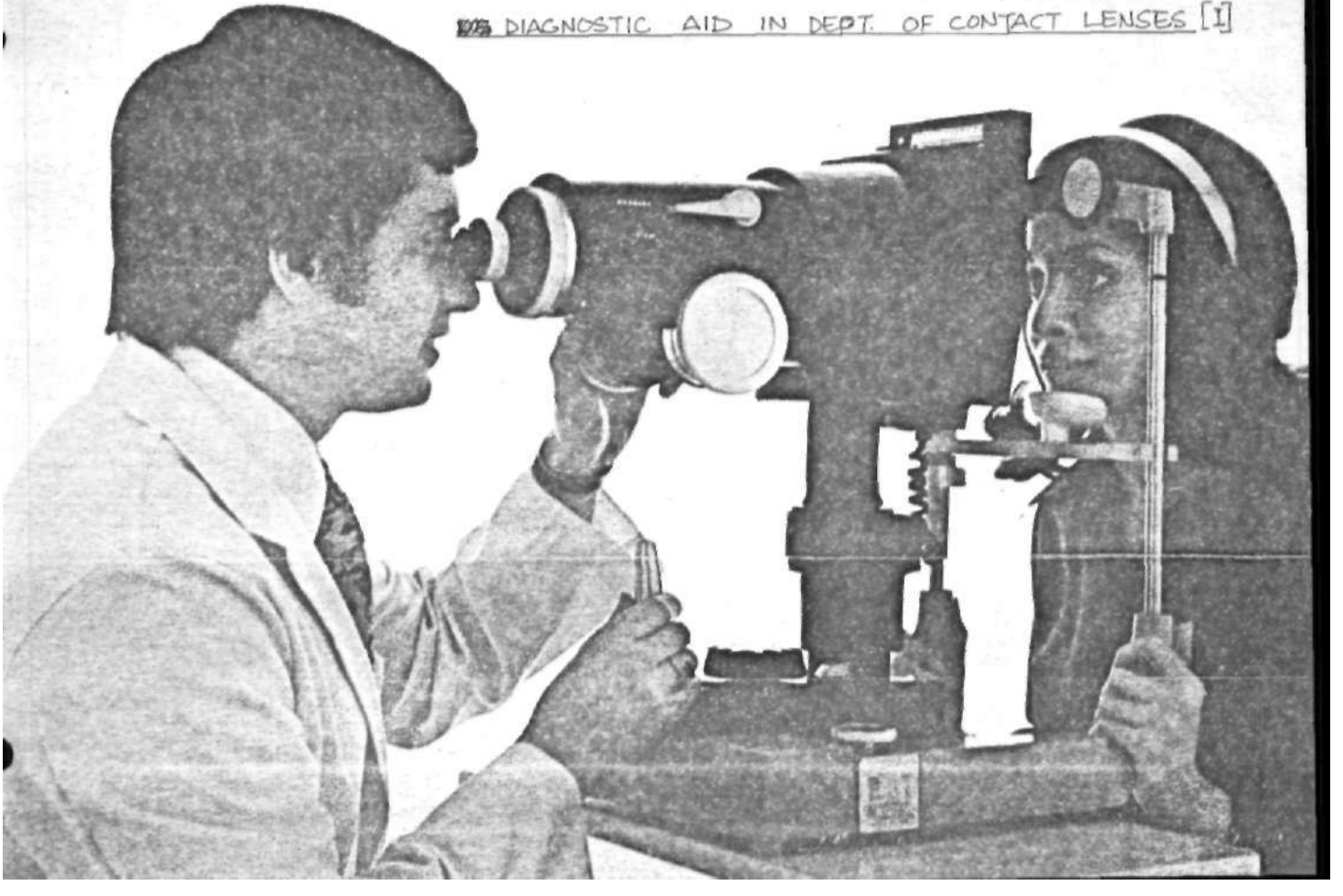


to measure and examine the anterior surface o the eye and contact lenses easily, conveniently and accurately. Never before has one instrument offered such a variety of distinct advantages to the eye care practitioner. It not only functions as a diagnostic aid in determining the exact corneal radii, amount of corneal astigmatism and its axis but is also used for examining, measuring, and fitting contact lenses.

The CLC is truly a one position instrument using the coincidence method of focusing. It is rotated only until the major axis is located. At this point the curvature in both the primary and secondary meridians can be measured.

In measuring corneal curvature, readings are taken directly from the instrument both in millimeters and diopters.

DIAGNOSTIC AID IN DEPT. OF CONTACT LENSES [I]



APPENDIX 1

MAJOR CAUSES OF MORBIDITY FROM NOTIFIABLE EYE DISEASE IN NIGERIA, BETWEEN 1975-1979

DISEASE	1975	1976	1977	1978	1979	75 - 79 TOTAL	ANNUAL NO	AVERAGE 100,000 PER POP.
ONCHOCERCIASIS (RIVER BUNDNESS)	18380	9243	7075	8343	10,287	53,328	10666	12.9
TRACHOMA	6755	11551	6779	9484	3110	37,678	7536	9.1
OPTHALMIA NEUTORUM	5493	4609	3446	3713	6770	24,031	4806	5.8

APPENDIX 2

HOSPITAL MORBIDITY AND MORTALITY OF EYE DISEASE IN NIGERIA FOR YR. 1976.

	INPATIENTS			DEATHS			OUTPATIENTS		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
INFLAMMATORY DISEASES OF EYE	528	484	1012	4	3	7	23396	21934	45330
CATARACT	660	479	1139	1	1	2	3166	2800	5966
GLAUCOMA	188	140	328	1	-	1	8918	7165	16083

APPENDIX 3

REPORTED CASES AND DEATHS FROM NOTIFIABLE EYE DISEASES BY STATE. - YEAR 1979.

	OPTHALMIA NEMATORUM		TRACHOMA		ONCHOCERCIASIS	
STATE	CASES	DEATHS	CASES	DEATHS	CASES	DEATHS
ANAMBRA	84	-	4	-	187	-
BAUCHI	2	-	61	-	-	-
BENDEL	286	-	26	-	46	-
BENUE	797	-	93	-	3535	-
BORNO	729	5	65	-	2710	-
CROSS RIVER	257	-	6	-	-	-
GONGOLA	580	-	720	-	1015	-
IMO	134	-	55	-	511	-
KADUNA	2275	-	597	-	71	-
KANO	261	-	1077	-	58	-
KWARA	641	-	137	-	497	-
LAGOS	313	-	-	-	-	-
NIGER	66	-	25	-	98	-
OGUN	✱	✱	-	-	-	-
ONDO	37	-	25	-	16	-
OYO	13	-	5	-	1	-
PLATEAU	235	-	5	-	1538	-
RIVERS	160	-	9	-	4	-
SOKOTO	✱	-	5	-	-	-

B I B L I O G R A P H Y

Chapter One:

- Disease and world Health by Nance Lui Fyson

- Hospital Architecture and Beyond by Isadoro Rosenfield.

Chapter Two:

- Hospital planning Handbook by Rex Whitaker Allen

- Architect's Data by Nenfert

Chapter Three:

- Architectural Record No 5 - October, 1979

Chapter Four:

- New Nigerian Newspapers, December 24, 1980

Chapter Five:

- A survey plan of Kaduna by Max Lock & Partners

Chapter Six:

- Appendices - Statistics supplied by the Federal Ministry of Health, Lagos.