KADUNA VETERINARY HOSPITAL

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By

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D E D I C A T I O N

- to God, who gave me the strength and ability to complete this thesis

  and the rest of my family

- to my parents who struggled to train, discipline and support me financially up to this time of my life.

- to Comfort, the one I love, who has given me love and understanding during this hard time.

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

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I will like to mention the following people for the help they rendered to me during my research and data collection:

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(3) Mal. Malumfashi of the Ministry of Animal Resources, Kaduna.

(4) The Veterinary Health Suprintendent, Kaduna Veterinary Clinic.

(5) Dr. Diamon, Civil Engineering Department, Zaria.

I will like to thank friends and class mates who showed interest in the programme and gave me moral support throughout the period of this thesis. My gratitude also goes to Mr. J. O. Audu who typed and produced this document in the nice form it appears.

(GIDEON RIJO SHEKARI)

S Y N O P S I S

It is my intention, as author of this documentation, to prepare an architectural contribution in Animal Hospital Architecture in terms of space requirements and facilities It was, therefore, necessary to prepare a documentory study of existing data (most of which were collected verbally due to lack of written documents) on Animal Hospital architecture and Planning.

The problem is tackled by first of all undertaking a short study of the history of animal hospitals or clinics up to the present day in Nigeria. The case of Kaduna was taken and used for this particular thesis. The planning of the complex, siting, flow of traffic within and outside the complex was done. Then, various units were studied and standards were established. It will be found out that in this documentation that more of standardization done rather than talking of existing standards.

CONTENTS

I N T R O D U C T I O N

A veterinary hospital is an institution established to supply examination, diagnostic and prophylactic services and medical and surgical treatment to companion animals, and equipped to provide housing and nursing care for them during illness and/or convalescence.

In a veterinary hospital, there is the utilization of scientific equipments and function in collaboration with a team of trained veterinarians, veterinary technicians and non-professional staff to provide service to the patient and the environment in general.

Veterinary hospitals can be categorized as follows:

(1) Animal or veterinary hospital; one defined as above. Has an out-patient and in-patient services.

(2) Animal out-patient clinic; one with facilities established to supply examination, diagnostic, prophylactic and medical services to companion animals not requiring confinement or supervised care, and operating in conjunction with an animal hospital.

(3) Central hospital; one with all standards heirin.
An outpatient clinic affiliated with central hospital and shall comply with all standards applicable to the activity and purpose of such clinic.

Because of the harzards caused by companion animals in the environment like; rabies, tuberculoses and other deseases, and the low standard of our clinics and the neglect on the part of the government to cater for the situation, the wirter feels that it is a duty upon the Nigerian architects and veterinary medical personnel to collaborate and make a contribution to improve the situation. The architect should make research into veterinary hospital architecture in order to understand the functions and relations of the various elements of the complex so as to prepare an architectural contribution in the field of animal health facilities design.

Chapter 1

HISTORICAL BACKGROUND AND EXAMPLES OF ANIMAL HOSPITALS AND CLINICS

It is the intention of the author in this chapter to talk generally about veterinary hospitals and clinics in Nigeria and in other parts of the world.

1.1 VETERINARY CLINICS IN NIGERIA

Veterinary practice in its full sence has not been a common practice in Nigeria for many years until recently. In fact up till now what is mostly done is the prophylcatic services. That is to say a lot has been done on prevention of livestock generally. However, there veterinary clinics and dispensaries all over the Country which give some services to pets and companion animals like dogs, cats and horses. These services include minor surgery, which in most cases does not necessarily require anesthesia, and treatment to minor deseases.

The F culty of veterinary medicine in A.B.U., Zaria, Faculty of Animal Science University of Ibadan and University of Nigeria, Nsuka have clinics which provide services for both companion animals and livestocks. In fact, in Zaria they provide both examination and diagnostic services. Their prophylactic services is not in as large scale as the two mentioned above. However, it is organized by the Faculty such that a vehicle goes out to the surrounding villages particularly the Fulani camps for ambulatory (vaccine inoculation etc) This is usually done on apointment with the Faculty by the client."

1.2 EXAMPLES OF SOME CLINICS IN NIGERIA

- VOM INSTITUTE FOR RESEARCH CLINIC

This clinic provides services for both large and small animals. The problem here is that what is used as the clinic is conversion of a building which does not suit what can be termed as a veterinary clinic. Because of the nature of the situation here (fig.1) you find out that the circulation is very adequate. For this reason, the following are not possible:

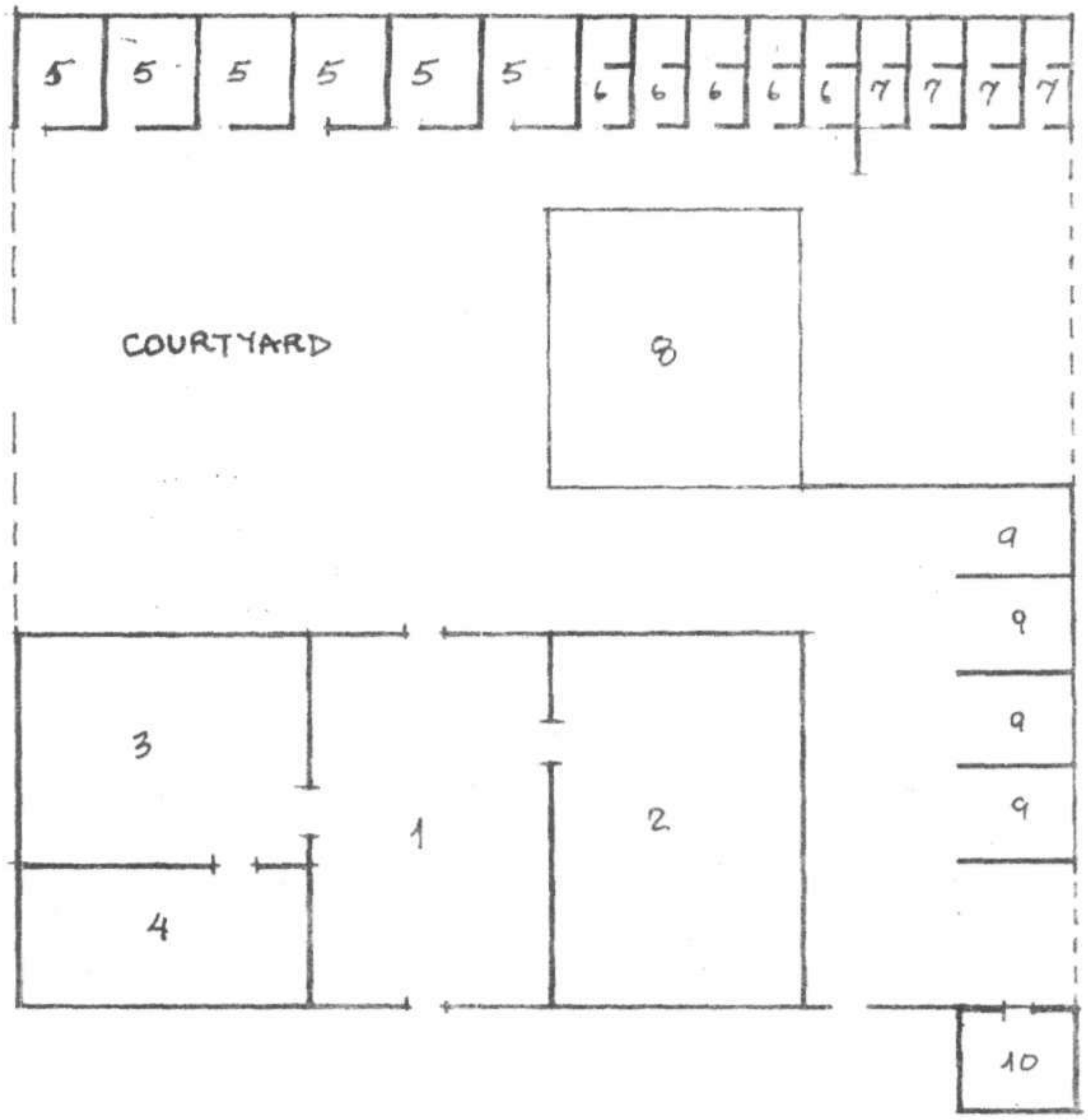
(1) the use of modern equipments for the clinic services

(2) no major operation can be carried out for large animals since it is done in the open in the courtyard.

(3) sanitation of the place cannot be properly kept.

- THE KADUNA CLINIC

The clinic in Kaduna is a small building which provides what they generally term animal health service; treatments of minor cases and control of diseases particularly livestocks.



1 OUT PATIENT.
2 OPERATION THEATRE & X-RAY ROOM.
3 VETERINARIANS' OFFICE.
4 DRUGS STORE.
5 LARGE ANIMAL SHEDS.
6 DOGS KARNNELS
7 RABIES INFECTED KARNNELS
8 HAY STORAGE.
9 LARGE ANIMAL SHEDS
10 MANURE.

FIG. 1 . VOM VETERINARY CLINIC.

The clinic operates by cases of minor treatments of small animals like cats, dogs and occasionally some large animals like horses and donkeys are brought to the clinic to be taken care of. But for most of the large animals, what they consider visitation is done by appointments. This visitation include poultry farms and individual that keep a poultry. All diagnosis is done some where.

This clinic has a lot of short comings:

(1) It only provides hospitalization for only animals with contengeous diseases like the rabies infected dogs.

(2) Both surgery and treatment are done in the same room.

(3) the location of this clinic is just in the town where there is heavy traffic and is not screened from the surrounding residential buildings near.

1.3 OTHER EXAMPLES

- CONEJO VALLEY VET. CLINIC

Figure 2 shows this clinic clearly. This is a small clinic which provides very convenient services for both the clinet and the staff working in it.

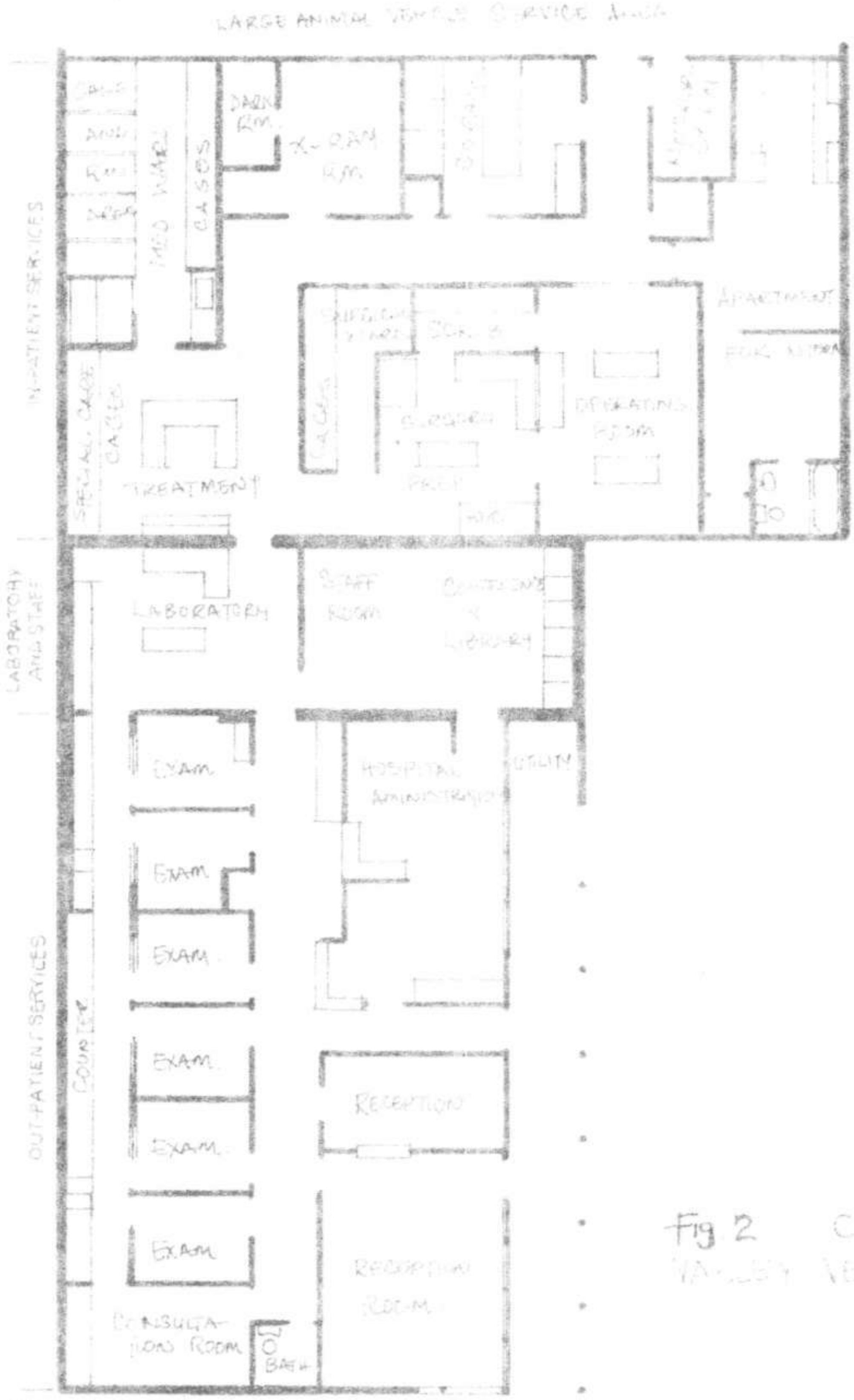


Fig. 2 CONC
VALLEY VET

There are five examination rooms and a consultation room to provide effective service to the clients. As can be seen in fig. 2, there is a large animal service area. This shows that large animals are taken care of outside the clinic. Services provided to these large aninals is done by appointments to the clinic.

This clinic is zoned into three zones; outpatient, laboratory and staff and the inpatient services. This can be said to contain the public zone (outpatient) and a private zone (inpatient), Besides the medical and surgical wards, there are areas for intensive care in the treatment room and a surgery recovery area.

Chapter 2

PLANNING A VETERINARY HOSPITAL

A veterinary hospital is an institution established to supply examination, diagnostic and prophylactic services and medical and surgical treatment to companion animals, and equipped to provide housing and nursing care for them during illness and convalescence.

The goal of a verterinary hospital is to promote individual or team work of the specialized professional staff so as to make the most productive and best use of time and talents. It is also as a duty for the hospital planner and designer to consider the safety and comfort of the patient for whom the hospital is planned for. The various units and pattern of circulation should be assembled in a way as to reduce the spread of infection and give good and effective nursing care. It should also be in a way as to give a convenient working condition for the staff.

I will like to discuss the subject under the following headings.

2.1 NUMBER OF ANIMALS TO BE CATERED FOR

A survey should be conducted on the number of animals in the community to determine the hospital requirements. This can be done in and around the community. The provision of a medical care facility depends solely on the number and types of animals in and around that area i.e. whether the animals found are companion animals or consummable ones, Some animals are used as pets some for sports, some for consumption and some for economic purposes.

Table 1 shows the categories animals in Kaduna:

TABLE 1

PETS	SPORTS	CONSUMPTION	ECONOMIC
DOGS	HORSES	CATTLE	DOGS
CATS		GOATS	DONKEYS
MONKEYS		SHEEP	BULL-OX
		CHICKENS	

TABLE 2

Table 2 below shows the types of animals and their number in and around Kaduna.

COMPANION ANIMALS AND ANIMALS FOR SPORTS		
HORSES	=	Over 3,000
DOGS	=	Over 20,000
CATS	No estimate byt	over 1,000 treated in 1975/76
LIVESTOCKS		
CATTLE	=	Over 10,000
GOATS	=	Over 10,000
SHEEP	=	Over 5,000
POULTRY	=	Over 500,000
OTHER ANIMALS:		
DONKEYS	=	Over 2,000
OTHERS	=	Over 2,000

2.2 HOSPITAL SIZE

In considering the size of a veterinary hospital one will have to the following points below into account:

- number of small animals in the area concerned
- number of large animals in the area concerned
- The frequency of animals treated in that need nursing care and the time they need this care; hospitalization.

These standards are generally accepted for the provision of hopitalization wards in an animal hospital:

- for small animals there is need for 10 cages area or karnells for every 1,000 - 1500 animals.
- for large animals there is need for 1 "Cell" for 1,000 - 1,500 animals
- for rabies infected dogs, you need at least 5 karnnels for every 10,000 dogs in the community.
- at the same time there is need to provide surgery recovery hospitalization and an area for intensive care.

  (the last point depends on the number of operations per day)

2.3 CIRCULATION:

It is necessary in a veterinary hospital planning to understand throughly the various hospital traffic movements. Any passage should involve crossing the path of as few people as possible, because passers-by are likely to obstruct movement of an animal.

Manual of standards for Animal Hospital

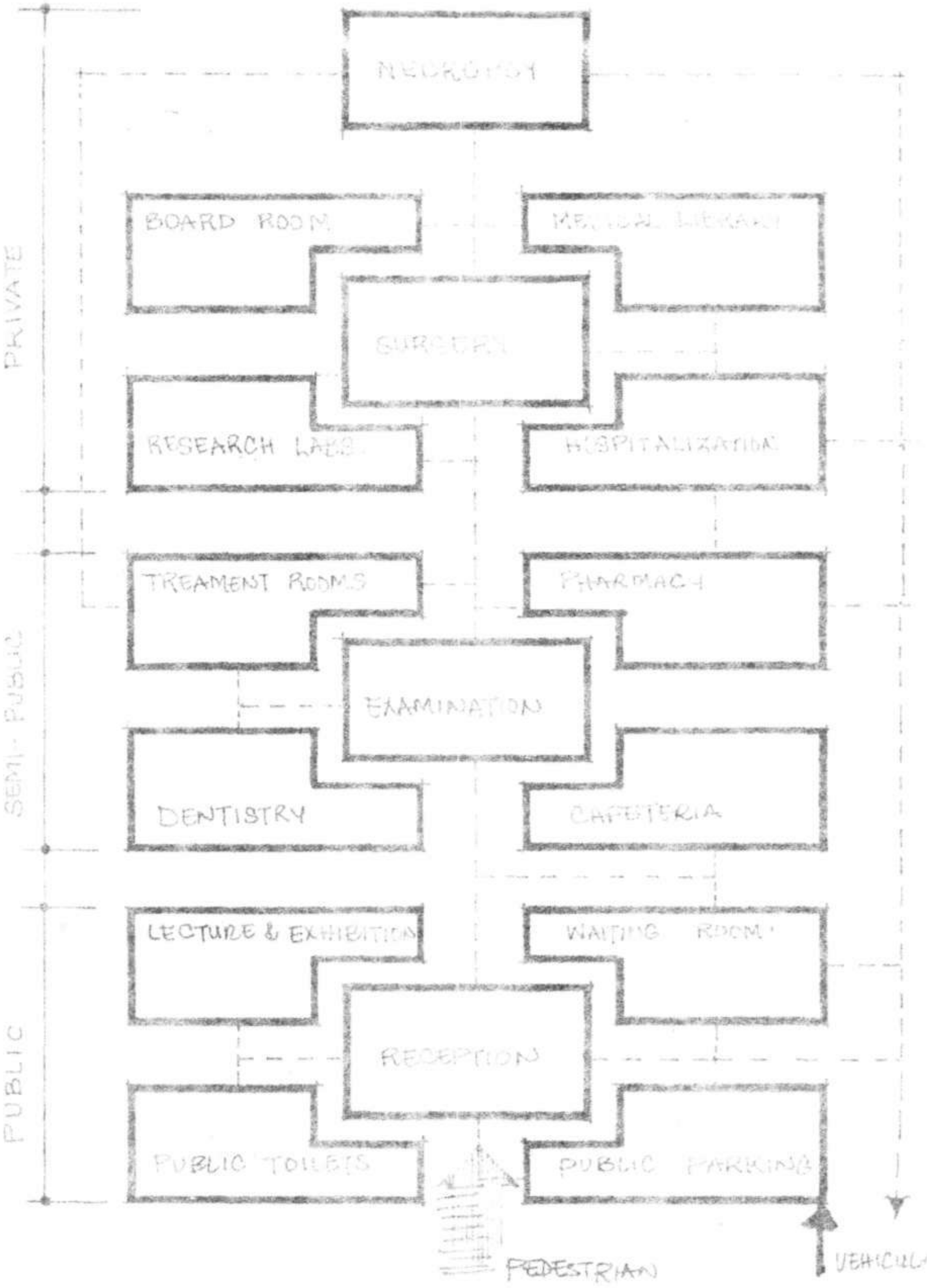


Fig 3 ZONING OF THE COMPLEX

> "Separate all departments, yet keep them all close together; separate types of traffice, yet save steps for everybody; that is all there is to hospital planning," 1

Traffic separations hould start from the outside before it gets with the building (figure 3).

Figure 3 shows different zones of the complex and the relationship of one unit to the other in terms of operation. Departmental flow chart should be studied to understand in detail the movement of staff, patient and services. In-patient traffic should be separated from outpatient traffic.

2.4 SITE SELECTION

In slecting a site for a veterinary hospital, one will have to consider the following points:

- the site should in an area which is almost the centre of the community.
- This area should be easily accessible to almost all the parts of the town.
- Although the site should be in the tonw, it should be seperated from residential area and noise.
- It should be an area where the sanitation of the area can be easily done.

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1. Emerson Goble "Hospital Planning Starts with Circulation Hospital, Clinics and Health Centre - p.2

Chapter 3

METHODS IN PATIENT CARE

The function of a veterinary hospital is to care for the sick and injured animals. Thus the understanding of the methods of tranfering this hospital care to the patient is of vital importance to the architect who takes the duty of planning medical facilities.

During the patient's stay in the hospital, it spends its time within the nursing care unit it is assigned to. It may make occasional visits to other diagnostic or therapeutic departments for certain investigations or therapy. It later returns to the nursing unit for further treatment.

In a veterinary hospital the methods of patient care is refered to a HOSPITALIZATION. Because of the nature of these animals in sizes, there is need for two types of hospitalization areas; small animals hospitalization and large animals hospitalization. The difference is in the space and height of the rooms.

The methods of care given to these animals differs (see fig. 3(a)

- Intensive care
- Intermediate care
- Home care
- Preventive care.

Having classified these patient into the above categories of care, let us now consider each of these elements and see how the architect can contribute to achieve the concepts objectives.

3.1 INTENSIVE CARE UNIT

This unit is meant for those patients who require skilled nursing care and continuous observation for whatever period of time necessary. The requirement of this unit include a highly trained staff (veterinarians), a nursing unit designed for maximum observability and the availability of all necessary life saving equipment and supplies that may be required at any one time.

In may opinion, as the author, I would suggest the location of this unit to be a separate nursing unit close to the surgical recovery room because of these obvious reasons:

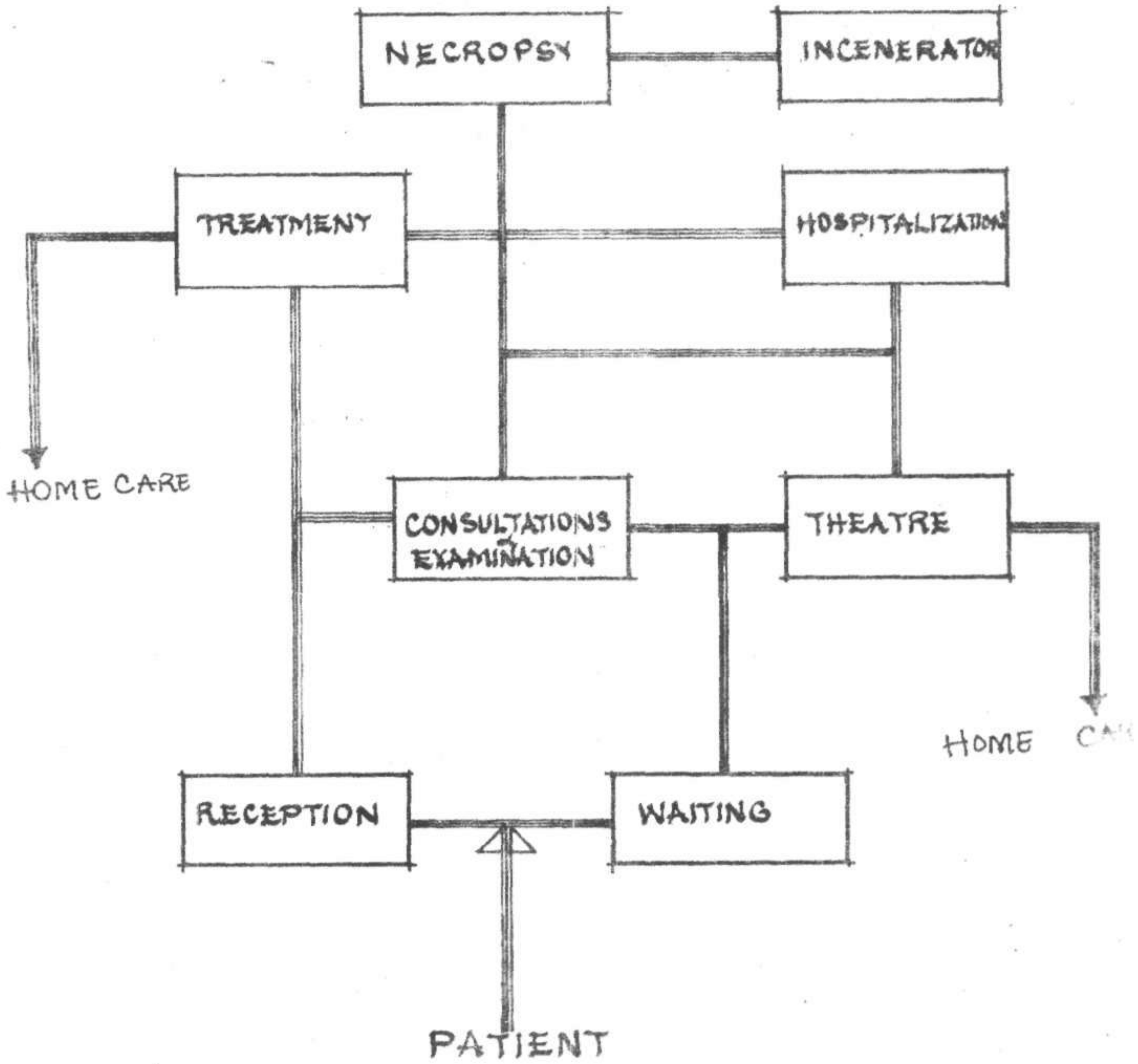


Fig. 3a : PATIENT MOVEMENT

- It will be easier to move patients from the post operative recovery room to the intensive care unit if required.
- Most of the emergency patients come into the nursing unit through surgery so location near emergency may not be necessary.

3.2 INTERMEDIATE CARE

These are usually patients which are either moved from intensive care nursing unit or directly from the admission office. They are beginning to recover and need less equipment and nursing care. They can be allowed as in the case of the large animals to roam about the hospital premisses to graise.

3.3 HOME CARE

Some animals can be taken home after treatment or a minor surgery by the client and brought back to the hospital for check ups, occasionally. The cat is a peculiar case where after an operation is taken home by the client and then brought later for hospitalization. This is because it doesnt adjust very easily to a new environment.

So as can be seen the there difficulty in examining an animal unlike the human being. The veterinarien makes use of what the client tells him gneerally.

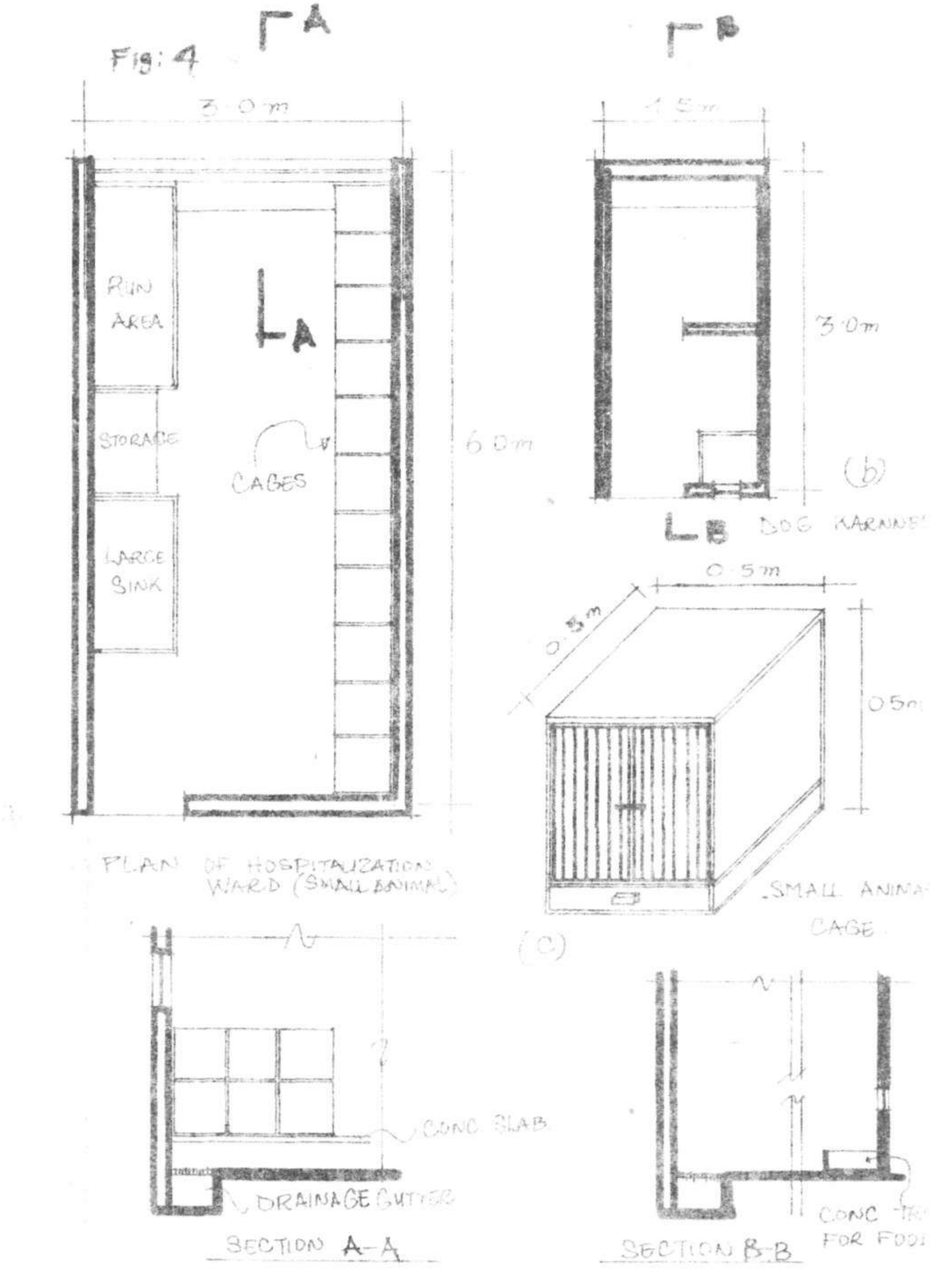
3.4 PREVENTIVE CARE

The patient in this category is kept for test to confirm whether it has got any disease that can be dangerous to the environment (man in particular) or to other animals like a Cow in other cattle with a foot and mouth disease. Any of these animals or patients when found with the disease, they are destroyed. For example, if it is confirmed the dog is rabies infected the only alternative is to kill it. This is because the cost of curing the disease out of the dog is not economical and could be dangerous if allowed into the society.

Nursing care is a broad spectrum of care for animals. It embraces techniques of assistance in diagnostic procedures, in pre-surgical, surgical and recovery procedures, as well as custodial care.

The hospital shall provide observation and care for each inpatient, using such methods and techniques as are indicated by current veterinary medicine practice. Supportive therapy shall include administration of fluids and blood medication if given by lay personnel, shall be under the direct supervison of aveterinarian.

Fig: 4


A
B
3·0m
1·5m
RUN AREA
STORAGE
CAGES
LARGE SINK
6·0m
3·0m
(b)
DOG KARNNE
0·5m
0·5m
0·5m
PLAN OF HOSPITALIZATION WARD (SMALL ANIMAL)
SMALL ANIMA
CAGE
(c)
CONC SLAB
DRAINAGE GUTTER
SECTION A-A
SECTION B-B
CONC
FOR FOO

3.5 SUGGESTION

1. Supervision of nursing care shall:

   (a) constantly check feeding procedures and disinfection of feeding and watering pans and equipment.

   (b) constant review laundry practices

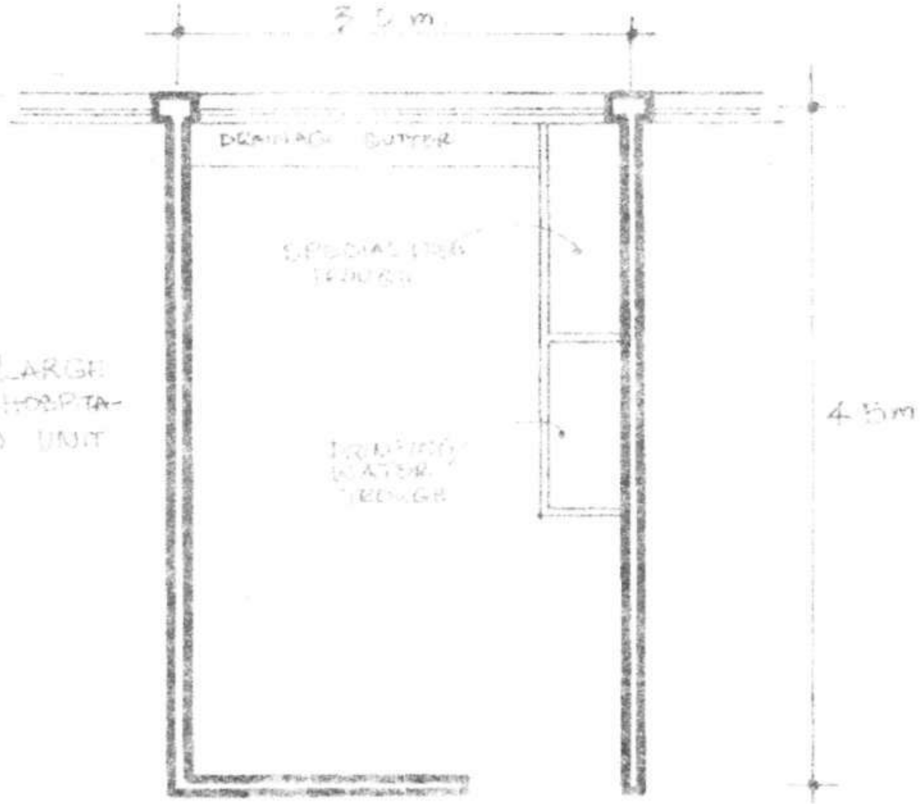
   (c) constantly check the handling and disposal of all waste materials and disinfection of all compartments and runs.

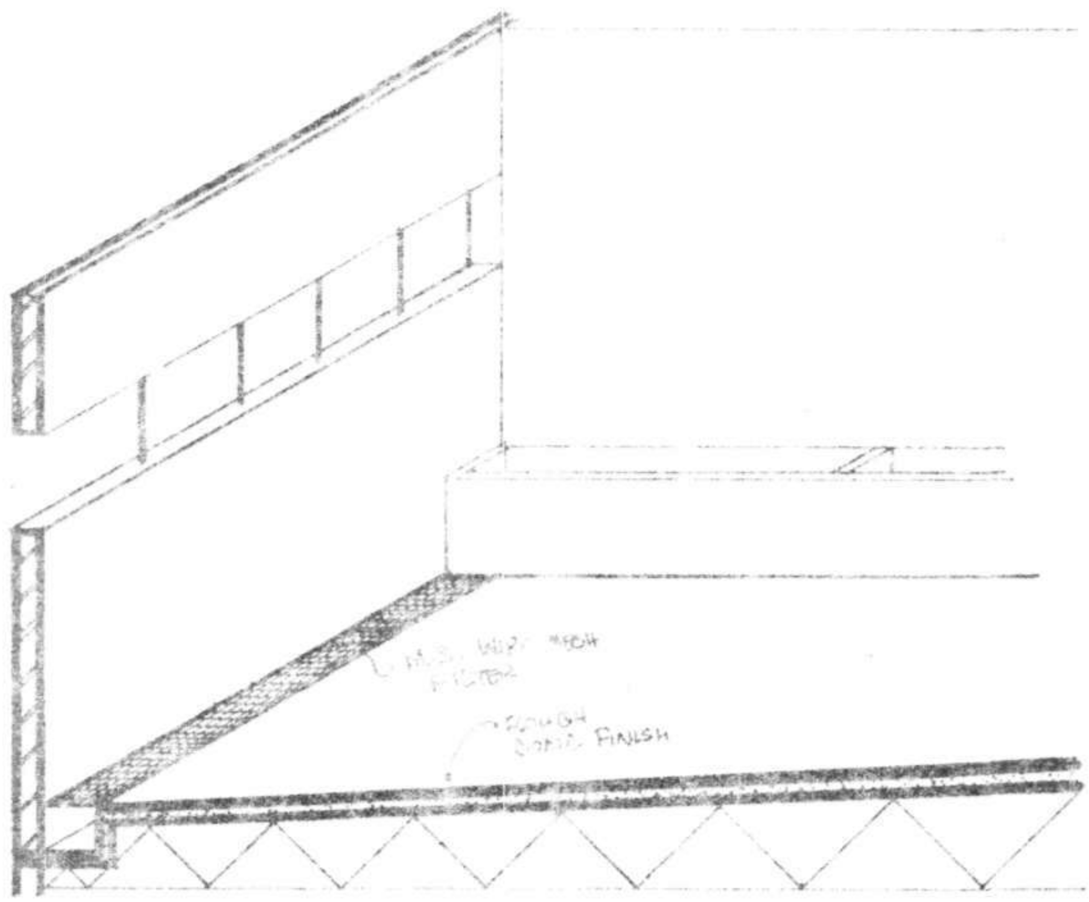
2. The bedding of patients is of utmost importance Neat cages in the case of small animals should be provided.

It is suggested that an oxygen care unit, incubators and basic monitoring equipment be available. The ward room should not contain more than 25 compartments and each animal should occupy a separate compartment. Adequate exercise areas shall be provided in all relationship to the normal case load.

Fig. 4 are examples of small animals hospitalization wards. In fig. 4(a) is an example of a ward room where 22 nursing care cages are kept. The cages are arranged in a way where by the animals don't see each other. This prevent them from being

Fig. 5 LARGE ANIMAL HOSPITALIZATION UNIT





restless since most of them might not be used to one another. There is adequate light and ventialtion in the ward room.

For better supervision it is recommended that the ward room be rectangular rather than square or circular. As can be seen from fig.4(a) a minimum of 3.0mx4.5m is required.

Fig.5 is an example of alarge animal compartment. It has a minimum of 3.0mx3.0m for the animal to move freely and for case in cleaning and disinfecting of the compartment.

In both cases the floors are finished with rough concrete in the case of the large animals compartments and granoluthic finish in the small animals ward room.

Chapter 4

SMALL ANIMAL UNIT

The author will like to discuss this part in terms of large animals and small animals. Both the two units have certain things they share; records, laboratories, pharmacy and necropsy room and inceinerator and the medical library.

I will discuss this, step by step as follows:

4.1 RECEPTION AND RECORDS

Medical records are an important tool in the practice of veterinary medicine . They serve as a basis for planning patient care and as a means of communication between members of the hospital staff. They furnish documentary evidence of the patients illness, care and treatment. They also serve as a basis for review, study and evaluation of medical care rendered by the hospital.

The medical record normally contains:

+ Patient's indenfication
+ Complaint given by client
+ Presnt illness
+ Vaccination record
+ History

+ Physical examination findings
+ Provisional diagnos
+ etc.

It is suggested that the medical record should be the responsibility of the hospital authority to safeguard and make sure of its safety. This will safeguard the patient and clients information against loss, tampering or use by unauthorized persons.

The location of the reception and records rooms should be as close as possible to the main entrance.

4.2 EXAINATION AND CONSULTANCY

These are rooms which are found immediately after the reception and waiting areas. They should be directly after the waiting area. It is the centre around which all other activities of the hospital revolve. It is the centre for outpatient care and admission for hospital treatment. It is the point which history taking, physical examination, inoculation, minor therapy, prophylaxis, ophthalmic examination etc. occurs.

Location and design of such facilities are critical and should consider traffic safety and operational ease for the professional staff insofar as equipment and space are concerned .

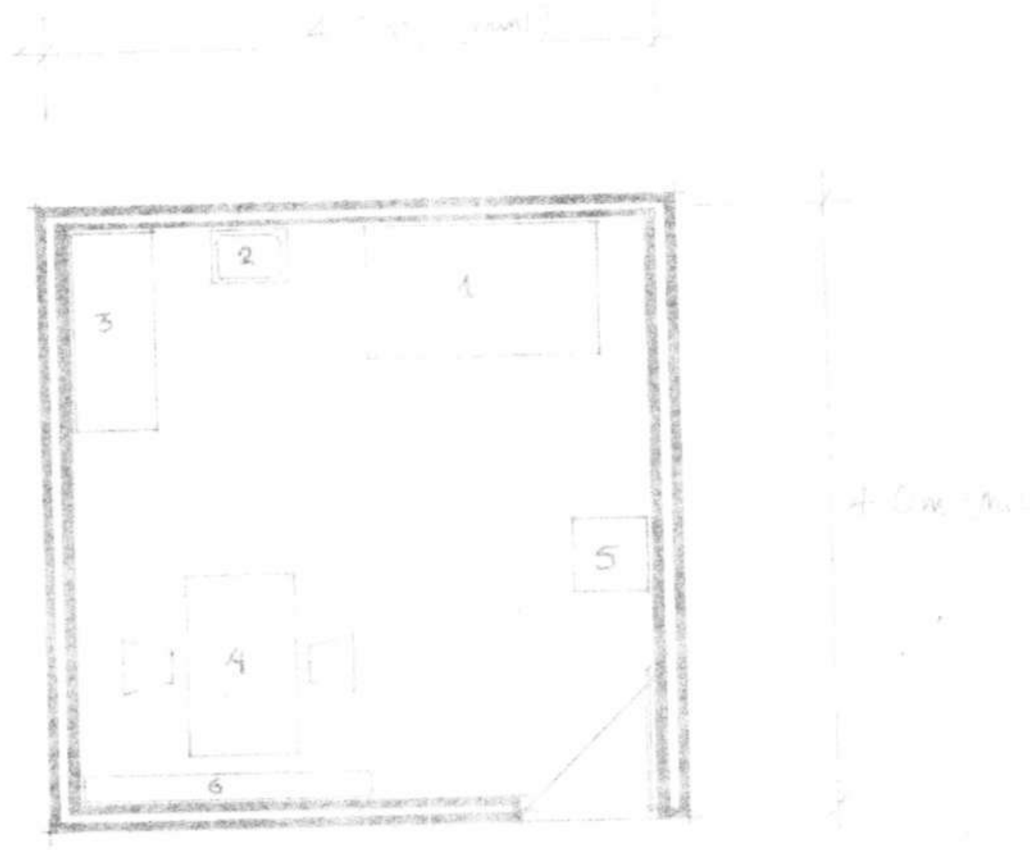


FIG 6. SMALL ANIMAL EXAMINATION & CONSULTATION R[illegible]

1 EXAMINATION TABL[illegible]
2 WASH HAND BA[illegible]
3 STORAGE FOR INSTR[illegible]
4 CONSULTANT'S SEA[illegible]
5 ANIMAL CAGE
6 BOOK SHELF

The equipment used in an examination room are not such that they affect the normal structure of a building. Some of these equipment are the basic ones like a stethoscope, otoscope etc equipment necessary for safe handling of medical patients, as well as other instruments for minor therapy, inocculation and immunization.

It is recommended that there should be at least one more exaination room than veterinarians usually on duty. In every examination room there must be enough room for the doctor, assistant, patient and client. So the minimum space required for an examination room should be at least 4mx4m (see fig.6)

4.3 PHARMACY AND RADIOGRAPHIC UNITS

The pharmacy is an important supportive service. Its physical location should be considered from the view-point of use by all staff. It is usggested that it should be between the small animals unit and the large animals unit. This reduces necessary long walk from the either the large animal or small animal clinics to the pharmacy unit.

The hospital shall have diagnostic radiographic equipment in order to comply with the standard expected of an animal hospital. This is an entirely separate area from the operating room radiogrphic equipment.

The radiographic department consists mainly of an X-ray room and a dark room for devsloping and storing of radiographic films. Minimum area required:

(1) X-ray room 6m x 6m

(2) Dark room 3m x 6m

4.4 MAJOR SURGICAL UNIT

Major surgery include; abdominal surgery, thoracic surgery, or-thopedics surgery and urogenital surgery.

The surgical unit consists of:

(1) Surgery preparation room

(2) Scrub room

(3) Operating room.

SURGERY PREPARATION ROOM:

This room is suppose to be where the animal is prepared for surgery; anesthetia, shaving and any other thing necessary before surgery. This is where the surgical records are kept.

The size of the room should be at least $4.5x4.5m^2$

SCRUB ROOM:

This should be a room of adequate size to permit the installation and operation of any standard type knee, elbow or foot-operated deep scrub simulteneously is recommended.

This room should be convenient to the surgical suite, but entirely separate from the operating room.

Equipment required

- hot and cold water taps
- deep sink of impervious material
- foot-operated soap dispenser
- adequate counter space
- storage space.

OPERATING ROOM

The operating room should have the following characteristics:

- Location: can be anywhere in the hospital provided it is convenient to the recovery room, preparation room, and out of heavy traffic areas.
- Should be a single purpose room
- All personnel entering the operating room should be garbed with clean hospital clothes or sterile garments All personnel should wear masks and preferably surgical cover boots.
- The doors should not be placed in a manner which could creat drafts. Positive pressure of the atmosphere in the operating room would minimize the incidence of

contamination from other rooms. (see fig.7)

Fig. 7 is an example of a surgical module with all the necessary arrangement of equipments and storage facilities.

The size of the operating room for small animals should be at least 6m x 6m.

FLOOR

Impervious material with no seams and easily cleansed e.g. terrazzo sealed, cement sealed, vitroglaze.

WALLS: Impervious material with no seams and easily cleansed.

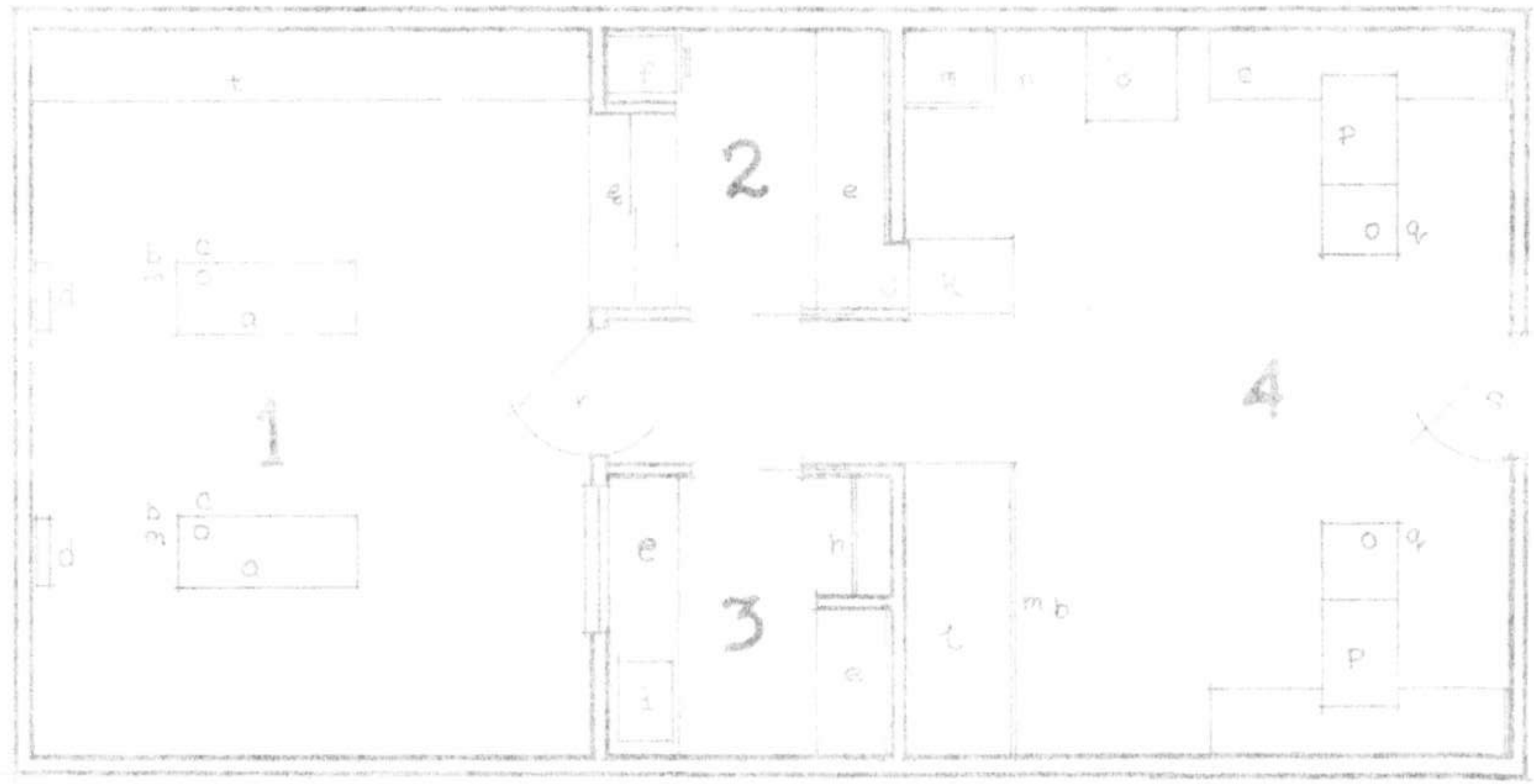
CEILING: Washable plaster or cement.

DOORS: Well-fitted; draft-free; should be wide enough to permit mobile table to enter and high enough to permit large equipment to pass. There should be only one door into the surgical suite (see fig.7). In addition, all electrical outlets should be at least 1.5m above floor level.

In fig. 7 the type of equipments to be used and that arrangements are shown.

Fig. 7

SURGICAL MODULE



KEY TO FIGURE 7

1. SURGERY
2. PACK ROOM
3. SCRUB ROOM
4. PREPARATION

(a) surgery table
(b) oxygen outlet in ceiling
(c) I.V. Hook in ceiling
(d) X-ray viewer
(e) storage cabinet
(f) autoclave
(g) sliding glass doors
(h) closed
(i) scrub sink
(j) instrument pass through
(k) cart
(l) Recovery & Intensive care
(m) laundry tub
(n) washer
(o) dryer
(p) sink
(q) clipper outlet in ceiling
(r) door w/hall glass
(s) door / w/viewing window
(t) storage cabinet sterile packs

Chapter 5

LARGE ANIMALS UNIT

The services in the large animals unit is different in that the cases here are treated on appointment basis. The client reports the case to the hospital and he is given an appointment of the treatment of the case. Some of these patients are treated at home and some have to be brought to the clinic.

In cases where by the patient will have to brought to the hospital for treatment or a major operation, a duty truck is sent to bring the animal to the hospital. In other cases, when the number is too much, the treatment is done out of the hospital for convenient sake. The veterinarian and a number of hospital staff go to the client.

Where an animal has to be brought to the hospital it is usually carried to the examination and consultation room for the large animals. Because of the difference in size of the animals the head room of the large animals unit has to be larger than that of the small animals. This s usually about twice that of the small animals unit. The size of the treatment area should be at least 10m x 10m.

5.1 TREATMENT AND CONSULTANCY

This is where all the major and minor treatments are carried out for animals that are brought to the hospital. The animal is examined here too.

The size of the room should at least 10 x 10m^2. This is because space is needed for horses and cattle rings (see fig. 8(a). These are fixed permanently to the wall at a height of at least 1.0m above the floor level.

This room should have a floor finished with rough concrete and should be easily cleaned and disinfected.

The location of this room should be between the surgery room and the hospitalization wards. There should be easy contact between this room and the X-ray room pharmacy and clinical pathology laboratories.

It is in this room that all the preparation for any major operation takes place.

5.2 OPERATING ROOM

This is where all major operation for large animals take place. The height and floor area of this room is the same with the examination and treatment room (10mx10mx5m) min.

FIG 8a ANIMALS RING AND PENS

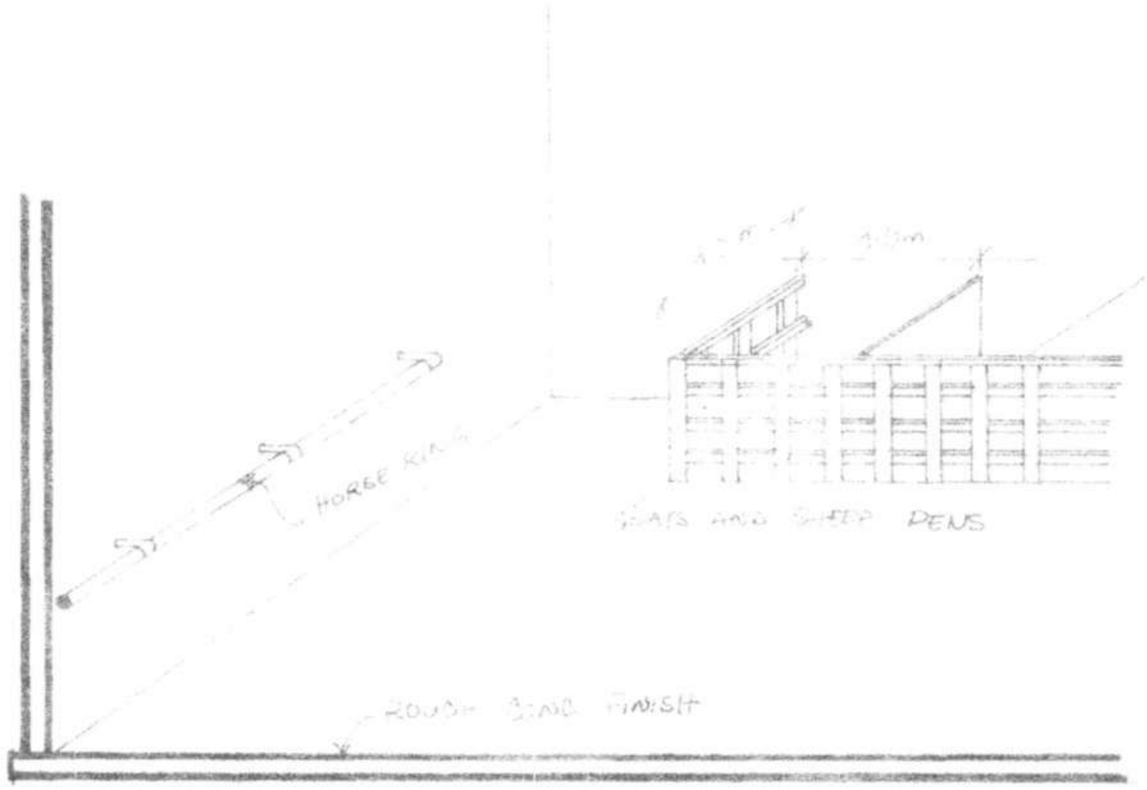


FIG 8b AXONOMETRIC OF FIG 7a.

It is recommended that there should be at least two recovery rooms. The recovery room has to be specially made. Fig. 9 shows the plan and section through one of such recovery rooms. The room should be designed so that the operating trolley can move into it and fit conveniently. Both the wall and floor of this recovery room should be finished with soft material. This is because when the animal recovers from convalescence becomes restless and without this finish it can injure itself.

The size of the recovery room should be at least 3.0mx3.0m to allow space for movement after recovery from convalascence by the animal.

5.3 EQUIPMENTS

Because of the weight and strength of some of these animals for example the horse, some special equipments are necessary in this large animals unit.

- THE CRANE OR PULLEY. This is used to lift large animals for treatment like "foot rot". The animal has to be lifted up. In fact, they use the pulley for examination purposes too.

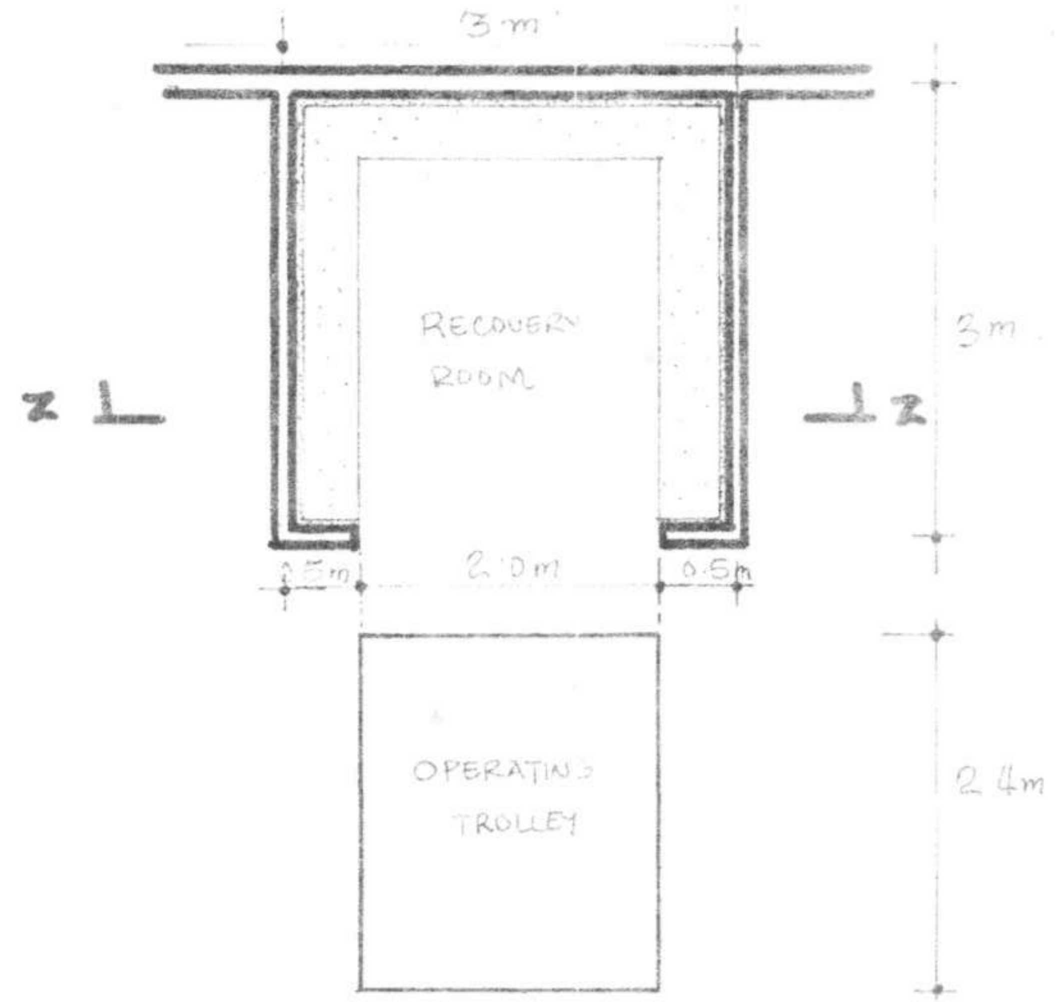
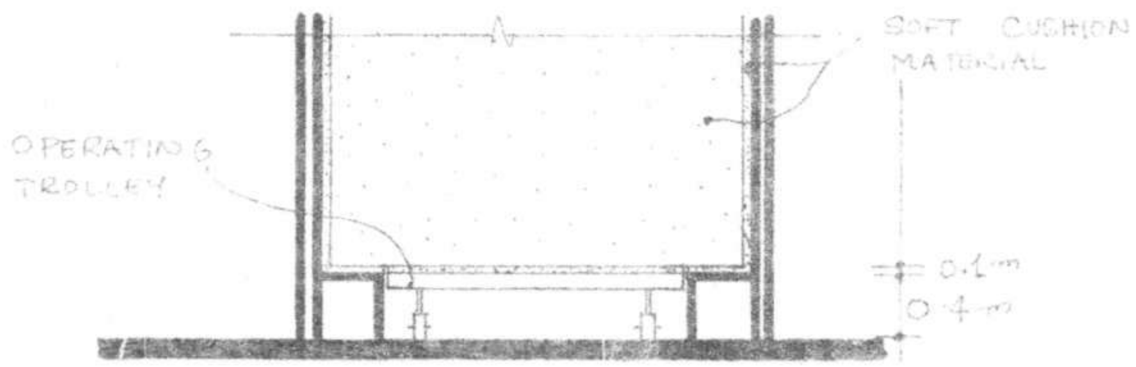


FIG. 9 PLAN OF LARGE ANIMALS RECOVERY ROOM AND OPERATING TROLLEY.



SECTION Z-Z

At least 4m - 5m is required as a head room height for the use of this equipment.

* OPERATING TROLLEY

This is a flat table-like and moveable equipment used for major surgical operations. The height of this equipment can be adjusted. The height varies from 0.4m to 1.2m. The height is adjusted to 1.2m when an operation is to be performed on the animal. After the operation, it is adjusted to 0.4m so as to be able to fit into the recovery room (see section 2-2 of fig. 9).

* TREATMENT "PEG"

This is a fixed steel or timber made structure. The animal is moved inbetween the "peg" so that it can remain there without any movement until the treatment is completed. It is recommended that two of these "pegs" be available in the treatment and examination room.

5.4 HOSPITALIZATION WARDS

This is a place where the animals are kept for nursing care. Each of these wards is to be designed with space enough to allow the naimal fell free during the nursing care period. It is adviseable to allow each animal to a compartment to avoid possibilities of fight during this period.

It is recommended that the floor of this compartments be finished with rough concrete and to be easily cleaned and disinfected when another animal is to be brought in for nursing care.

The compartments should be at least 3.0m x 3.0m.

Chapter 6

CLINICAL RESEARCH LABORATORIES

It is the intention of the author to make provision for laboratories in the hospital which will be used for research and diagnosis. These laboratories will also be used for prevention purposes. So the laboratories will be used as part of the hospital and also as a means of tackling the problems of diseases of livestocks in and around Kaduna.

Veterinary clinical research laboratories comprises of the follwoing:

- Bllod Analysis Laboratory
- Urine Analysis laboratory
- Cultures and anitbiotic sensitivity tests laboratory
- Histopathological examinations laboratory
- Autopsies.

6.1 PLANNING THE FACILITIES

Many papers in recent years have discussed ways in which veterinarians can improve their laboratory programs. There is a significant difference between planning a laboratory for a new building and renovation of an area for use as a laboratory in an established practice. With renovation there is usually a limited amount of space available, and the location of available space may be poor relative to other important hospital functions. Since it would be impossible to establish a renovation plan to fit all the "unseen" practices, the author will be limited to new construction.

It is neither possible nor desirable for laboratory activity to be completely standardised in the veterinary profession, but regardless of its size and geographical location every hospital can work toward a goal of providing a good in-office service. It is improper to have any test outside the hospital premisses since this will obstruct the smooth operation of the hospital.

6.2 COUNTERS, CABINETS AND UTLITIES

Adequate wall space is of utmost importance, and estimates should be made for total bench needs as well as an allowance for free standing equipment. A study of bench top utlization will reveal that four major dimensions must be considered.

Space must be provided for:

(1) full-depth equipment (sinks, drain boards)

(2) front-half equipment (colorimeters cells counters)

(3) back-half equipment (water baths, incubators)

(4) manual procedures.

COUNTERS

Should provide adequate space for proper positioning of all major equipment. The counters should be as clear as possible, and seldom used items can be kept in cabinets space over and under the ideal counter height is about 7-10cm lower than the elbow. However, in general planning the stand-up counter height should be about 1.0m, and one 2m-2.5m section should be sit-down height (70cm to 90cm) with knee space for microscope work. A 10cm toe space should be providedunder all bottom cabinets. The counter dept should be at least 50cm and not more than 60cm. Anything more than 60cm encourages the use of the back part of the counter for storage which makes it difficult to keep clean.

CABINETS

solid cabinets door are esthetically preferred to glass doors or open shelves, since reagent cartons and bottles are so susceptible to staining and light can cause decomposition of chemical reagents. A common mistake is to make wall cabinets too deep. Anything more than 15cm ecourages unnecessary dead storage, and the excessive overhang interferes with counter activities. All cabinets should have slots or holes for ventialtion to allow for exhaust of chemical fumes.

Because of the dnager of staining and chipping, porcelain sinks are not as good as stainless stell. A good double kitchen-type sinks is preferred so that staining processes, etc, can be done over one compartment of the sink without inhibiting work on fecals and other laboratory routines. A standard kitchen disposal is highly recommended so that faces and other odor-generating materials can be rapidly removed from the laboratory area. For this reason, an exhaust fan should be placed over the sink area. Standard kitchen hoods are quite adequate for this purpose.

6.3 FLOORS AND ELECTRICAL NEEDS

The flooring selected for general use in the hospital will in most instances be used in the laboratories. Several studies have suggested carlon sheet vinyl is the best for general hospital use when all factors considered several types of Amstong coverings are available, but the most cmmon are regular carlon, solarian (nowax) and corlon Brigantine. The Brigantine requires waxing but is more durable and is considered to be the best product for commercial use. Any covering which contains asphalt is indesirable because of its high susceptibility to common laboratory solvents. Ceramic tiles is also undesirable because the grouting is so easily stained.

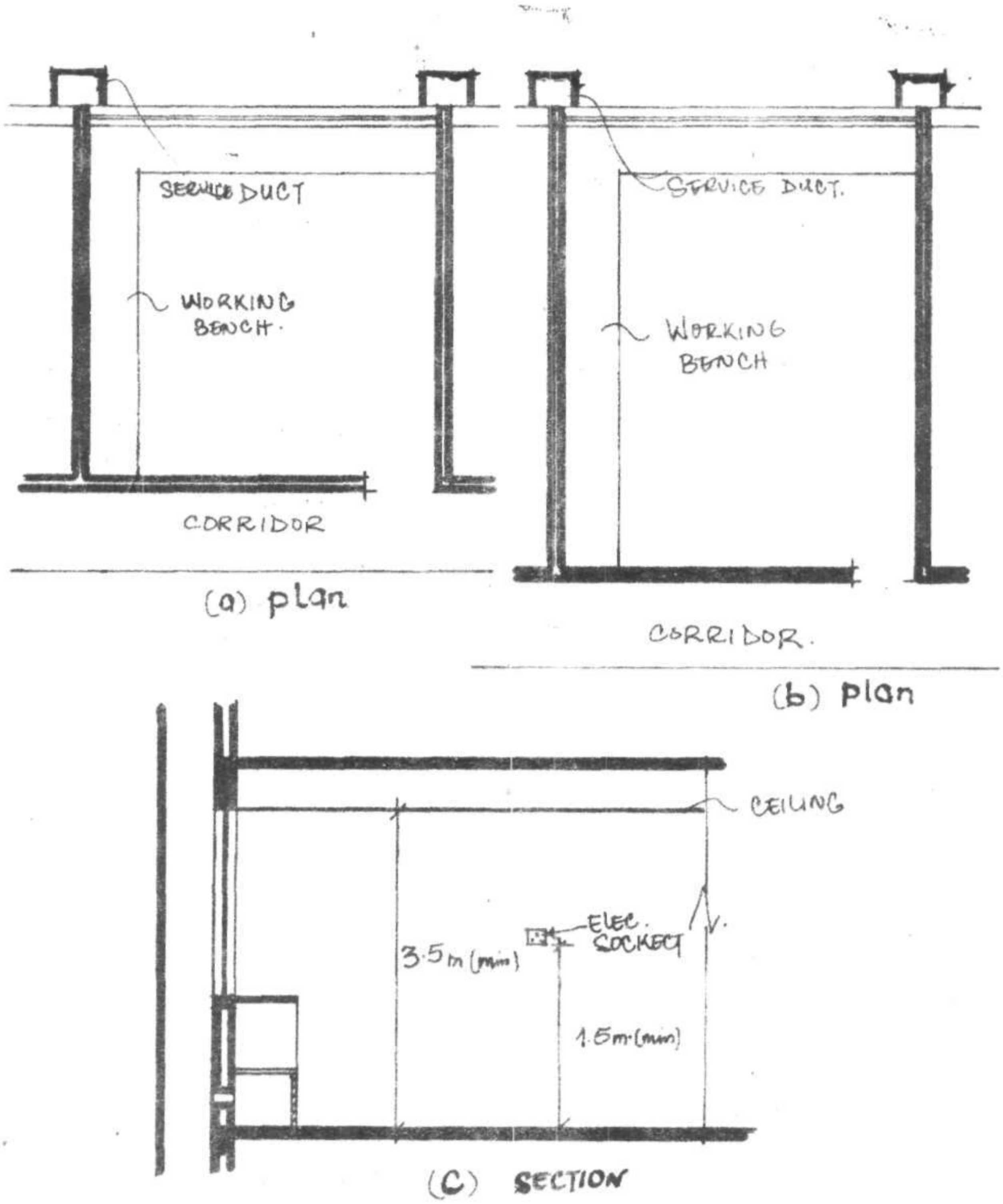


Fig. 10 SHAPES OF RESEARCH LABS. UNITS

Special consideration should be given to electrical needs in the laboratory are : To increase wall space the use of windows should be avoided. This, then, results in a need for better than average ceiling lighting. At least 90 humens per sq. ft. should be appropriately placed over major work areas.

6.4 RESEARCH ANIMALS

The small animals are kept in the laboratories in cages (and could remain in the lab.) while the large animals can have a different building for themselves.

Their compartments are similarly designed as those of the large animals for nursing care. It is recommended that each one of these animals occupy a compartment of its own.

6.5 SHAPE OF LABORATORY

It is recommended that the shape of a laboratory be more of a rectangle than a square (fig.10). This is because the rectangle provides more working space and still use the central space (see fig.10).

Chapter 7

NECROPSY BUILDING

This is a building where post-mortem is performed for dead animals. It is the intension of the authro that this building will be used for research. This is a necessary part of the hospital because it is the building that takes care of carcases of the dead animals.

The building comprises of the following sections:

- Carcass preparation room
- Cold room
- Rumen Room
- Necropsy Area
- Offices and Dark room
- Store
- Microscope Room
- Changing Rooms
- Incinerator

7.1 CARCASS RECEPTION AND PREPARATION ROOM

This is where the carcass of any dead animal is received and registered. This room should be immediately at the entrance of the building. The location of the room should be as close as possible to the cold room and the rumen room.

It should also be accessible to the necropsy area.

This room has a minimum height of 4.5m and a minimum area of $5.0x5.0m^2$. The door leading to this room should be at least 3.0m high and should be wide enough for people to carry a large animal carcass conveniently. It is recommended that this door should be at least 2.5m wide.

7.2 COLDROOM AND RUMEN ROOM

The cold room is where the dead animals carcass is kept awaiting necropsy. This room is suppose to be directly connected to the carcass reception room and necropsy area. It should have a minimum floor area of 4mx5m.

The rumen room is where the carcass stomach is opened to remove the remins of the feed in the animal before deing. It should have a minimum area of 3mx6m. It should be as close as possible to the carcass reception and the incinerator.

7.3 NECROPSY AREA

This is where the carcass is examined. It is recommended that it should be spacious and have ample amount of light in it. This area should be properly drained to avoid smell and untidiness since a lot of water is being used here. It is intended that necropsy of both large and small animals will be done in this building. It is then required that there should be four fixed tables with drainage taps for the work.

It is then recommended that this area be as near as possible to a changing room for the personnel and to be of minimum floor area of 9.0mx12.0m. The windows to this area should be fly-proof to avoid spread of any form of disease to the environment. It should have a minimum height of 4.0m.

7.4 INCINERATOR

After the post-mortem or necropsy the carcass is not just thrown away to the environment for the fear that some animals might even go and eat the carcass which could be dangerous So usually what is done is that the carcass is burnt in what is called an incinerator.

"Types of incinerators:

(1) Fire-wood incinerator. Economical but the smoke could pollute the environment.

(2) Gas incineraor; Relatively economical and apreciable. No smoke pollution to the environment.

(3) Electric incinerator; best, but uneconomical.

In this case, I intend to use a gas incinerator. This is usually in different sizes. So when there is the need, one places order for a particular type from the manufactures, However, space should be allowed for it.

The inside wall of the necrapsy area should be covered with white marble tile from floor to a height of 1.5m.

The floor for the necropsy area, carcass reception and vumen room should be covered with terazzo and built in such a way as to facilitate drainage.

After the rumen is removed from the carcass, it is examined and when satisfied to be harmless it is taken to the manure collection pit.

7.5 STAFF FACILITIES

Because of the mess involve in the necropsy work, there should be provision for a cleaning room. For this reason, changing rooms should be provided with showers for the personnel that work here. They should also be an office or offices according to the number of personnel to write autoposy and post mortem report.

Chapter 8

OTHER FACILITIES

Besodes all these units discussed there are other facilities that are necessary for a smooth running of the hospital. These facilities include:

- Administration
- Lecture theatre and exhibition
- Medical Library
- Workshop
- Staff rest room
- Board Room

8.1 ADMINISTRATION

The running of the hospital is head by the director of the hospital who is himself a veterinarian by profession. The accounts of the hospital expenditure is supervised by the director. All programmes of the running of the hospital is planned by him.

Besides the director; there are other staff who are not necessarily veterinarians by profession. These category of staff include the following:

- Executive Officer Accounts
- Typists Cleaners and labourers.
- Receptionists and Telephone Operatress

of keeping animals well. This also meant to show the general public the dangers of leaving pets without any proper care. Diseases like rabies and tuberculoses are spread by dogs and monkeys. Animals are part of the society and could be very valuable to man if they are kept well.

Some of these animals are used as companions, some are used for consumption, some are kept for economic reasons, while some are kept for protection. The animal just like a human being needs proper care to be of use to man.

It is intended that the public will be enlightened through:

- Lectures
- Film shows
- Photographs in the exhibition halls(s)
- And some of these animals kept for the public to see.

The lecture theatre to can be used for conferences by veterinary professional from time to time.

The lecture theatre is suppose to take about 100-120 people. The exhibition rooms(s) will have both photographs artificial and life exhbits.

Where the life exhibits are kept, it should be located in such a way that the smell does not disturb the public when a lecture or a film show is going on in the lecture theatre.

Because of this need, there is, therefore, a need for offices and space for adequate work by these staff. There should be provision for:

- A receptionist office which is to be at the main entrance of the complex
- A records office where all the history of cases treated and records of autoposy reports are kept.
- A general office for typists and clerks for general duties .
- An office for the E. O. Accounts.
- An office for the director of the hospital.

Space requirements for these offices are as follows:

- Director $6x6m^2$ min.
- Asst. to Director $3x6m^2$ "
- E. O. Accounts $6x6m^2$ "
- Each typist and clerk minimum of $4.70m^2$ is recommended for each person.
- Reception and Records; it is recommended not to be less than $6x6m^2$.

8.2 LECTURE THEATRE AND EXHIBITION

It is the intention of the author to enlightened the public on how to keep animals in the best way and the advantages

The location of this public enlightment" area should be directly to the public entrance.

8.3 MEDICAL LIBRARY

This room is suppose to be a place where medical reference books and journals are kept for the use of the professional staff.

The location of this room should be away from heavy trafic and public area as much as possible. It is also recommended to be easily accessible by these professional even after normal duty hours.

8.4 WORKSHOP

There's need for a workshop for the mentainance of instruments and equipments used in the hospital.

The workshop staff are responsible for:

1. Regular cleaning of screens and filters in heating ventilating and air conditioning systems.
2. An annual check of fire extinguishers.
3. Frequent inspection of X-ray equipment, as well as anesthetic equipments.

8.5 STAFF REST ROOM

The staff require a place to make their work more comfortable This rest room should provide them with at least snacks to avoid unnecessary movements away from duty to other parts of the town. This will increase productivity of work in the hospital.

Chapter 9

SANITATION

The most important thing to consider is how to keep the hospital clean and also to keep away smell from the environment. The animals are quite different from the human beings in that they don't use toilets. A means will have to be employed to clean where they are kept. The chemicals used in the laboratories should not just be allowed into the environment like that since this will cause water pollution.

9.1 CLEANING OF HOSPITALIZATION WARDS

The hospitalization wards have to be cleaned constantly and disinfected. The small animals have what is called A RUN in the wards that is used to allow them ease themselves. Usually the animal is brought out of the cago and allow for sometimes outside since no animal will fell comfortable to lie or sleep in a messy compartment. After the animal eases itself the place is cleaned and disinfected.

In the case of the large animals, the soil is collected with the unwanted feed and taken to the manure pit and then the compartment washed and disinfected after the particular animal is discharged or is no more occupying the compartment.

In both cases when the wards are washed, it is recommended that the water should drained and treated and made harmless before it is allowed into the environment.

The floors of these wards should be finished with terrazzo or rough concrete as the case will be for the large animals wards.

The method of cleaning and collection of the soiled wil be manual by the hospital attendants.

9.2 MANURE PIT

This is a pit where all the soil is collected and turned manure and used as locally made fertiliser. The amnure is collected when ready and distributed to farmlands on the out-skirt of the town. The pit should be protected so that the smell is not carried round the environment.

9.3 LABORATORIES AND TREATMENT ROOMS

All the water and ehemicals washed from this areas will be drained through pipes to the water treatment area. This is to avoid pollution of the environment.

Sanitation in an animal hospital is so important that the case of treating the water drained should be left for the sewage and water treatment engineers. The animals themselves have an odour which could be very displeasing in the environment.

It is, therefore, recommended that there should be proper screening of the hospital from residential areas to avoid air pollution.

All water used for washing and cleaning and part of the hospital should be drained in pipes rather just use an open gutter drainage system. This is to avoid any spread of disease by flies and to avoid air pollution by the smell. All water used to wash chemicals will be drained in pipes and treated before it allowed into the environment.

Chapter 10

REQUIREMENTS AND SCHEDULE OF ACCOMMODATION (GROUND FLOOR)

10.1 RECEPTION AND RECORDS ROOM

There will be a reception and any information about the hospital. The medical records shall contain all information pertaining to the patient with sufficient information to justify the diagnosis and warrant treatment.

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM (m2)	TOTAL AREA (M^2)
Entrance Hall	1	84.0	84.0
Reception	1	18.8	18.8
Records	1	32.2	32.2
Toilets	6	1.5	9.0
			144.0

10.2 ADMINISTRATION

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM (m^2)	TOTAL AREA (m^2)
Gen Office	1	63.0	63.0
E.O. Accounts	1	42.0	42.0
Utility	1	21.0	21.0
Toilets	6	1.5	9.0
Director	1	36	36.0
Asst. Director	1	18	18.0
			189.0

10.3 THERAPY AND DIAGNOSIS

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOMS M^2	TOTAL ARE M2
Waiting Room	2	31.5	63.0
Examination	4	14.0	56.0
Treatment Room	1	63.0	63.0
Changing Rooms	2	42.0	84.0
X-ray Room	1	63.0	63.0
Dentistry Room	1	63.0	63.0
Pharmacy	1	81.0	81.0
			473.0

10.4 SMALL ANIMAL SURGERY AND WARDS

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM M2	TOTAL AREA M2
Surg. Prep.	1	81.0	81.0
Scrub Room	1	6.25	6.25
Pack Room	1	6.25	6.25
Theatre	1	42.0	42.0
Wards	5	21.0	105.0
Kannels	6	3.6	21.6
Toilets	6	1.5	9.0
			271.1

10.5 LARGE ANIMAL UNITS

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM m2	TOTAL AREA m2
Exam. & Treat	1	180	180.0
Operat. Theatre	1	172	172.0
Surgery Recovery	2	9	18.0
Animal Compartment	26	13.5	351.0
Toilets & Shower	2	4.5	9.0
Animal Drive-in	2	30.0	60.0
			780.0

10.6 NECROPSY BUILDING

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM m2	TOTAL AREA m2
Carcass Reception	1	96.0	96.0
Necropsy Area	1	192.0	192.0
Cold Room	1	36.0	36.0
Rumen Room	1	24.0	24.0
Incineration	1	6.0	6.0
Microscope Room	1	24.0	24.0
Offices	2	12.0	24.0
Store	1	15.0	15.0
Changing Room	2	22.5	45.0
			462.0

10.7 LECTURE THEATRE AND EXHIBITION HUTS

ROOM DESIGNATION	NUMBER OF ROOMS	m2 SIZE OF EACH ROOM	m2 TOTAL AREA
Projection Room	1	24.0	24.0
Lecture Area	1	348.0	348.0
Exhibition huts	3	103.2	309.6
			681.6

10.8 WORKSHOP, CAFETERIA AND TRUCKS SHED

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM m2	TOTAL AREA m2
Workshop	1	81.0	81.0
Trucks Shed	1	216.0	216.0
Kitchen	1	72.0	72.0
Servery	1	72.0	72.0
Dinning Area	1	144.0	144.0
			585.0

FIRST FLOOR

10.9 RESEARCH LABORATORIES, LIBRARY AND BOARD ROOM

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OR EACH ROOM m2	TOTAL AREA m2
Board Room	1	81.0	81.0
Medical Library	1	180.0	180.0
Stores	3	-	258.0
Toilets	12	1.5	18.0
Laboratories	-	-	749.0
			1,286.0

SECOND FLOOR

10.10 RESEARCH LABORATORIES

ROOM DESIGNATION	NUMBER OF ROOMS	SIZE OF EACH ROOM m2	TOTAL AREA m2
Stores	3	-	258.0
Toilets	12	1.5	18.0
Laboratories	-	-	749.0
			1,025.0

Total Area $5900m^2$

Add 20% of the area for circulation:

$= (5900 + 1200)\ m^2$

$= 7,100\ m^2$

Chapter 11

DESIGN CONCEPT

11.1 SITE SELECTION AND PLANNING

The site chosen is along constitution and Maiduguri roads just by the Methodist Church and not far from the Ahmadu Bello Stadium. This site has the advantage of being in the centre of the town. It is situated near Constitution road which is one of the main streets in the town and also connects the site with parts of the town where companion animals are common; the G.R.A. and Kaduna South. It is also right in the town.

Within the complex itself, the departments have been planned to allow a smooth flow of both pedestrian and vehicular traffic and also to allow for a smooth operation within the complex. This has been achieve by dividing the complex into 6 basic zones as follows:

1. Administration
2. Patient care zone
3. Diagnostic and therapeutic area
   (small Animals)
4. Diagnostic and therapeutic area
   (Large Animals)

(5) Out-patient and public area

(6) Research.

Adminstration, and public area is right on the approach to the complex. All encuires and appointments are done on reaching the building without necessarily interferring with the busy staff on duty.

Just between the patient care zone and the"public zone" are the therapeutic and diagnostic zone. This zone is termed the semi public zone. This is because the client takes the patient for examination and at times up to the treatment area.

The surgical operation theatre, wards and the research laboratories are termed the private zones.

The services road drives right round the build to the manure collection point and the necropsy building. This road is used as service road and the vehicular road for the public to the parking lot. The same road is tapped to the large animals unit and the loading bay.

11.2 THE COMPLEX

The planning of the complex was restricted because of:

1. shape of the site
2. different head rooms and space requirements
3. the struggle to avoid air pollution from the nursing units into the complex and the surrounding area.
4. the fact that most of the units have to be on the ground floor.

It is the intention of the author to create a hospital building which will:

(1) provide effective services to the public

(2) provide a comfortable work area for the staff

(3) encourage and attract the public since the services of veterinary hospitals are not common in the Country.

Building used for therapy, diagnosis and patient care and administration were placed on the ground floor and then research laboratories, medical library and board room on the first and second floors.

PLAN SHAPE

Rectangles and squares with certral courtyards were found to be most effective. The courtyard conept was adopted so as to allow free movement of air into the rooms and at the same time let natural light penetrate the spaces. The court-yard also reflect the way building are designed generally around. The "Z" shape of the small animal unit is made purposely to seperate it from the inner courtyard so as to avoid air pollution of the complex thus an uncomfortable for the staff.

11.3 THE DESIGN

A GROUND FLOOR

The hospital is generally accessible through a main entrance which allows a person into the main reception hall of the complex. Other entrances are provided for services and emergency patients.

On the left side of the entrance hall is the reception counter where enquiries are made. Then on the right side is the administration. Just straight from the entrance into the hall and ahead is the out-patient unit for the small animals. Rooms for waiting, consultations, examinations and treatment are grouped together on one side. The pharmacy building since its use by both the large animals and small animals unit, its place inbetween these units for convenience.

Just ajacent to the administration building is the cafeteria and the large animals unit and the duty trucks shed. Between the cafeteria and the administration building is a loading bay and a staff entrance.

The necropsy building, large animals shed, and the manure pit are in the background.

The X-ray dental unit, workshop and the lecture theatre and exhibition "huts" are all placed on the ground floor.

B. FIRST FLLOR

The first floor is made up of research laboratories, stores, the medical library and the board room.

C. SECOND FLOOR

The second floor comprises of research laboratories and stores only.

11.4 STRUCTURE OF UNITS

The basic structure of the units is such that it can stand as any domestic building. There are no special eauipment for example equipment with high vibration, to require say special floors or supports.

However, the design of comple was done by separating building which have

(1) wider or spans = 7.5m without any intermediate support and

(2) greater headroom height.

For example, the large animal treatment area needs an area of at least 10mx10m while the small animal treatment area can have a span as small as 6m.

11.5 FLOOR FINISHES

- Reception, entrance Hall and corridors should be be ganolithic finish.

- All public rooms waiting rooms, cafeteria lecture theatre and also offices and small animal examination rooms should be finished with P.V.C. viniyl tiles.
- The laboratories; this should be finished with carlon brigantine.
- Large Animal ward, large animal treatment and examination room should be of hard rough concrete finish.

C O N C L U S I O N

Chapter 1 of this writing has enabled the researcher to understand the basic problems encountered in animal hospital planning. The functions and requirements, as regards space and location, of the hospital elements has been clearly understood. The researcher used this inconjuction with a community study of animal medical care requirements, to propose an animal hospital for Kaduna and its environs.

The thesis has resulted in an animal hospital capable of providing examination, diagnosis and prophylactic services.

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