

DECLARATION

This Thesis is my original work and has not been presented for a degree in any other University.

NAME OF AUTHOR

Daniel Muthoka Mutiso

Daniel Muthoka Mutiso B. A. (Arch. St.)

This Thesis is submitted as part of the University Examination for the Degree of Master of Architecture.

Henry Wood

CHAIRMAN OF DEPARTMENT OF ARCHITECTURE
UNIVERSITY OF NAIROBI.

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M. Arch. thesis
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DANIEL M. MUTISO B. A. [Arch. St]
university of nairobi

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1. & 2. APPROACH TO THE
MUSEUM FROM AINSWORTH
ROAD



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

I wish particularly to thank the Director of Kenya Museums, Mr. Richard Leakey, his deputy and the staff of the Centre for Pre-history and Palaeontology; without whose co-operation it would have been very difficult to compile this thesis. Likewise, I would like to thank Messrs. Dalgliesh Marshall Architects and Planners, for their verbal and illustrated contribution. The thesis would have been difficult to complete without the unreserved help of Prof. H. Wood, Chairman Department of Architecture, University of Nairobi. Dick Stevens of Messrs. Mutiso Menenzes International and my tutor, K. Andersen, of the department of Architecture. Thanks are also due to my dear wife, Margaret, who helped both in collecting the material and compiling them. I should also express my great appreciation to Miss Leonida Mwenesi for her part in typing the manuscript. It would be unfair to finish without commending my class-mates for their lively and useful discussions.

01. introduction.

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- 3. MUSEUM EXHIBITION HALL
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4



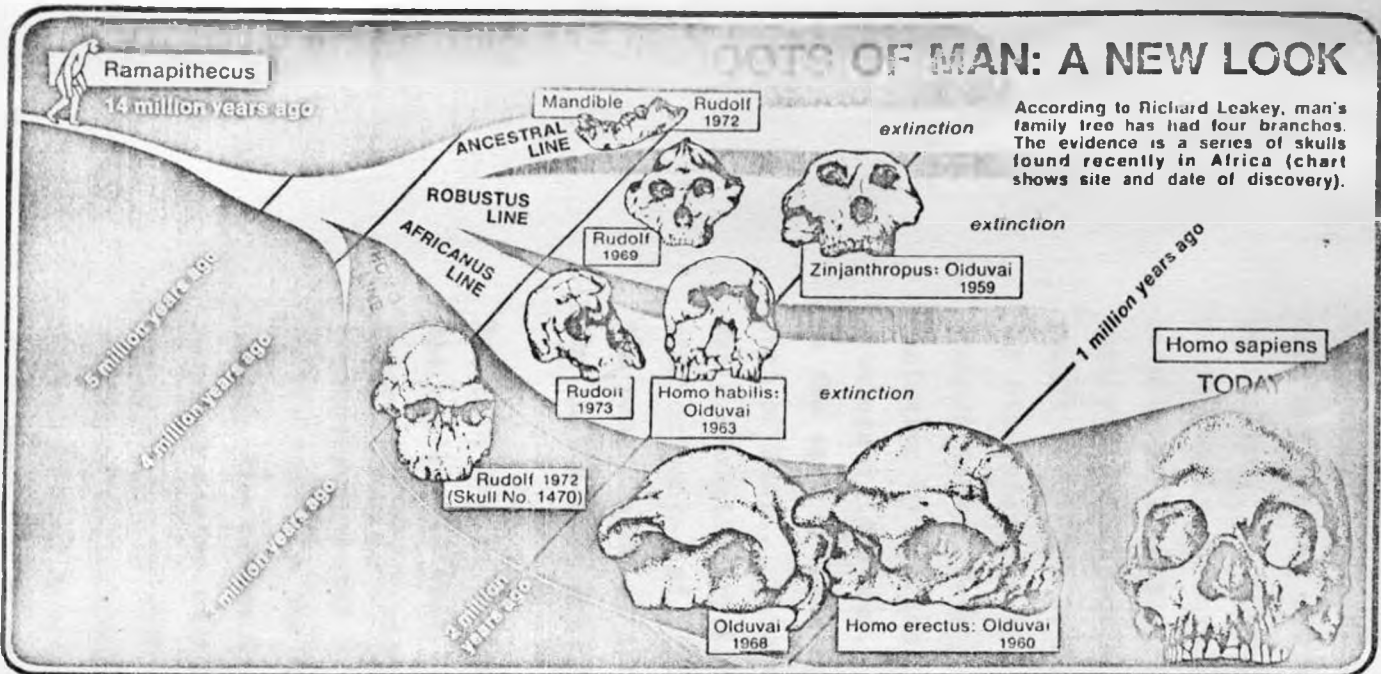
5



SEE CHART NEXT PAGE
AND PRE-HISTORIC MAP
AFTER PAGE 8.

The Leakey family is well known all over the world for their unceasing quest for the evolution of mankind. It is undoubtedly a family which has unsparingly committed the whole of their life to this course. As early as 1959, the senior Leakeys, Louis and his wife Mary, brought forward their first discovery in Olduvai Gorge in Tanzania, where they unearthed primitive stone tools and an almost complete skull, which to the world's astonishment were dated at one and three quarter million years old: a million years older than the celebrated homo erectus. This Leakey claimed was the missing link between the primitive four foot tall, ape-like known as ape-man, whose fossil remains had been discovered in South Africa in 1920's and the modern man.

Five years later, in 1963 as the anthropological world was still seriously questioning the validity of his previous discovery, Leakey came up with yet another more stunning discovery. This time his find also in the same place, was a skull that was very similar to that of modern man. Its teeth were the same size of that of modern man, while its braincase was far much bigger than that of Leakey's previous discovery which he had named: Zinjanthropus. This one, however, lacked the gorilla-like crest at the top of the head. He named this new discovery "Homo habilis", or handy man, and claimed that he was the true-ancestor of present day man.



Don Mackay

ROOTS OF MAN: A NEW LOOK.

He then claimed that the Zinjanthropus was an Australopithecus or ape-man, who had managed to coexist alongside the Homo habilis but was eventually doomed to extinction. He therefore concluded that man's family at this point had branched into two. Recently, in 1972 while the anthropological world was still in a tumult about Dr. L. S. Leakey's discoveries and his interpretations of them, his son Richard Leakey, was yet to cause another confusion by his discovery of the skull catalogued I470 man. This one he unearthed on the east of Lake Rudolf, in the northern part of Kenya. This new discovery pushed man's evolutionary history another one million years and even cast more doubt on the progression of the hominid line from the Australopithecus to the Homo Sapiens.

By 1962, Dr. L. S. Leakey had established the nucleus of what was to become the centre for Pre-history and Palaeontology, presently directed by his son Richard. By his death in the early years of this decade, the centre was a fully fledged research centre attached to the Nairobi's National Museum with a substantial amount of collections. The centre was formed to meet a crisis; the rapid growth of collections of fossils and artefacts resulting from intensified research at Olduvai Gorge in Tanzania and at Fort Ternan in Kenya.

Those are but a few of the major achievements of Dr. L. S. Leakey during his life time. Controversial as he may have been,,

no one doubts his contribution to the man's quest about his evolution. It is therefore, in recognition of his great works that the proposed institute will appropriately be named after his name THE LOUIS LEAKEY MEMORIAL INSTITUTE FOR AFRICAN PRE-HISTORY (IAP). Such a decision is a humble tribute to a person who was undoubtedly one of the greatest men of this century. The successful implementation of the architectural and socio-economic motives as well as continuation of quality research in various fields in which Dr. L. S. Leakey was such a pioneer, will be more meaningful as a living memory to the man who gave so much to the world, and at the same time make the IAP more viable to the society.

GENERAL.

Policy on Museums.

The National Museum which comes under the jurisdiction of the Ministry of Natural Resources, provides research and educational facilities as well as a source of recreation. Talking about recreation, one should not forget the contribution of the Museums to the Tourism Industry which is the single highest foreign exchange earner to the Kenya government. Statistics available show that in 1973, a total of 241,810 persons visited the National Museum and its annex, the Snake Park here in Nairobi. During the last development plan 1970/1974, the Museum successfully started a training programme for technicians, both for Kenya and other countries. Schools and Colleges found the Museums a useful source of knowledge. As a result, the government has formulated a general policy for the Museums which it is hoped the government will eventually implement. The government recognizes the Museums as:-

- a) A provision of a national reference for collections incorporating biological, cultural and natural science materials.
- b) An identification reference centre for research programmes of the University and other Institutes.
- c) An extension of knowledge to the public by exhibitions and special programmes throughout the country.
- d) As the centre of initiation and participation in research that will advance knowledge in natural and cultural fields.
- e) Finally, for the preservation and conservation of cultural relics and prehistoric objects.

To further enhance these general policies, the government has carefully aimed at certain objectives during the current development plan period 1974/1978 viz:-

- a) To extend existing Museum facilities to provincial and/or district level.
- b) To provide nation-wide programmes to preserve and record traditional elements of national culture.
- c) To extend research facilities through the development of Institutions, research centres and local Museums for the advancement of knowledge in fields of natural, science, biology and culture:

The government then felt it was necessary to group the activities of Museums into five major programmes which then it would undertake to finance:-

1. The extension of the Museums.

The conservation of prehistoric sites and and historic monuments.

3. Science and technology.

4. African prehistory.

During the current development plan period, the government intends to spend as much as Kf834,000 on the project, which will include Kf117,000 on the conservation programme, Kf166,000 on extensions of the Museum facilities outside Nairobi, Kf250,000 for the establishment of science and Technology Museum in Nairobi and over Kf281,000 for the proposed Institute for African Prehistory in Nairobi.

National Museum Institutes:-

The National Museum over the last 45 years has acquired a large collection of great value to both national and international scientific investigators

from government departments, universities and other research oriented bodies.

Due to this international nature, international bodies have shown great interest and support to the Museums in general. Consequently, the need to establish Institutes within the Museum has received reasonable support to be able to materialize. The Institutes of which the IAP will be the second one are conceived as a means of extending both the facilities as well as the effectiveness of the Museums in Kenya.

The proposed Institute for African Prehistory is a renewal of the already existing and well established centre for Prehistory and Palaeontology which came into being in 1962 as mentioned previously. The IAP reflects, as mentioned before, part of a major plan to develop the National Museums as a major centre for educational and scientific research in East Africa.

The role of a Museum in a developing country is important and its policies for expansion must reflect the requirements of a country. Priorities are such that disease, poverty and illiteracy are first on the list. Therefore, expenditure of limited resources must be planned in accordance with national interests which will often differ from an international assessment of scientific research priority. But Kenya finds it necessary that it should not leave in isolation from the rest of the world in the field of Science: hence the deviation of these very valuable funds into this end.

The Museum trustees of Kenya have examined

all these quations and have formulated a policy together with the central government that will satisfy the national as well as international obligations. The success of the policy, relies upon an acceptance of Kenya's determination to retain a significant place within the global scientific communities, while at the same time meeting the obligation to take part in local educational and scientific research fields.

The growth of the National Museum and its activities has been tempered with by unavailability of local funds. The need for expansion in both physical and academic areas requires considerable resources which are seldom available except on the basis of international cooperation. As a result, Kenya has had to rely very much on international donors. The response has been very encouraging hence the implimantation of the IAP.

The Centre for Prehistory and Palaeontology

East Africa's prehistoric sites are well known all over the world. Sites like the Olduvai Gorge, the Omo and east of Lake Rudolf, have drawn attention from prehistorians all over the world interested in the quest about man's past history. Much credit goes to Dr. L. S. Leakey who in 1962 established the nuclues of what was to become the Centre for Prehistory and Palaeontology. This centre was to be attached to the National Museum in Nairobi, where it forms an integral part of the complex.

As mentioned earlier on before, this centre was formed to meet the rapid growth of collections of fossils and artefacts

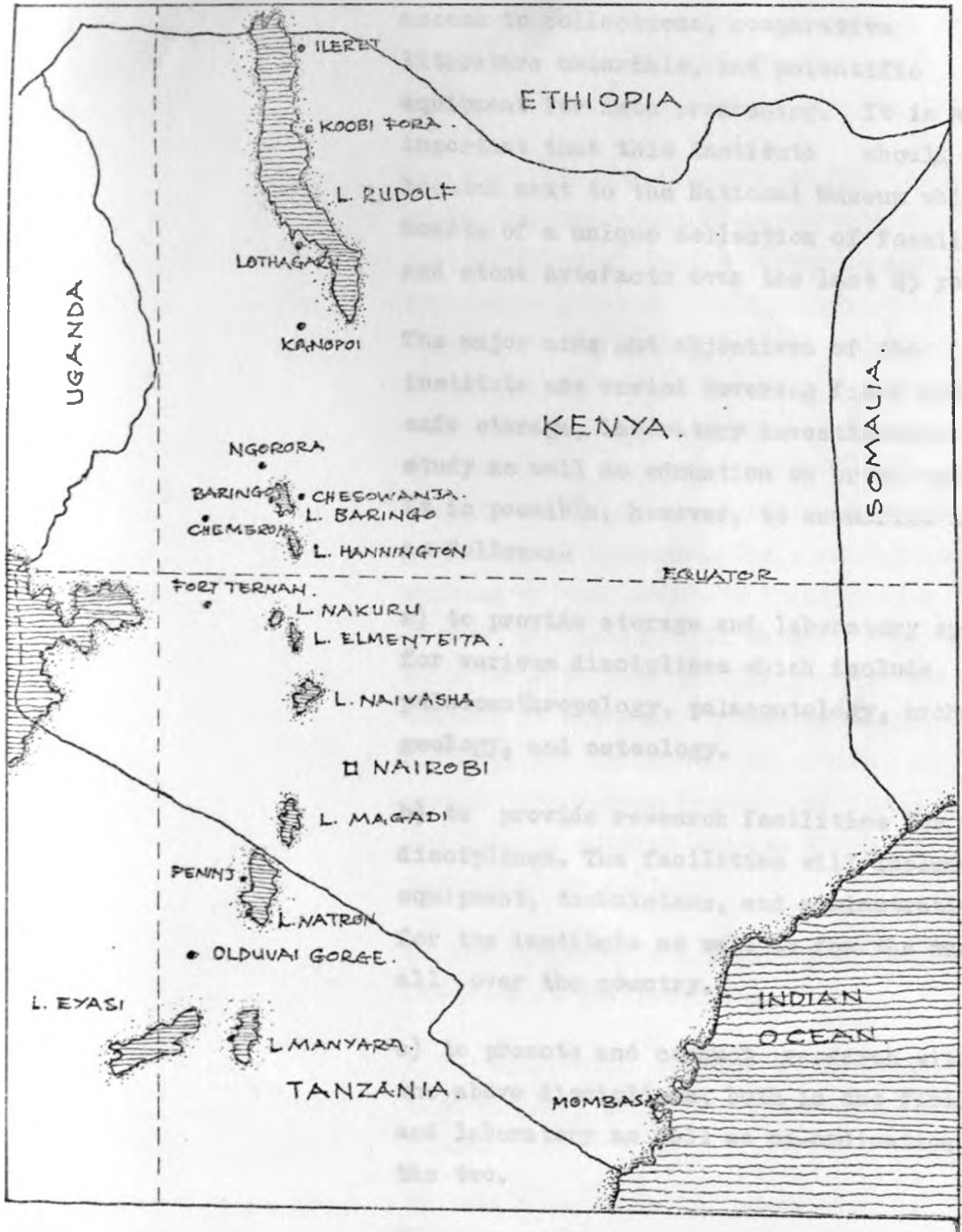
FOR PRE-HISTORIC SITES SEE
MAP OF KENYA NEXT PAGE.

resulting from intensified research at the Olduvai Gorge, and Fort Ternan in Kenya. Without the generous donations from several interested world organizations it would not have been possible to put it on the move. Collections began to grow and scientists began to visit Kenya more frequently to examine the collections of the centre, making it the focal point for world scientists and their activities as they carried their research both in the field at the centre. Due to the pressing demand for the centre, the modest facilities it offered were found to be inadequate and overcrowded making it apparent that the centre needed drastic expansion.

The Institute for African Prehistory(IAP)

The proposed Institute for African Prehistory will absorb the activities of the Centre for Prehistory and Palaeontology and its collections as well as adding a new dimension to the concept through the provision of a well planned adequate facilities . Perhaps it may be appropriate, at this point, to note that the last five years have shown alot of significant advance on man's knowledge about his past,however, much remains to be explored and co-ordinated.Multidisciplinary approach must be realized. This requires alot of advanced scientific techniques to provide the required data. The new institute to a certain extend will be able to meet some of the requirements by its programmes of research and education which will be tailored to meet international requirements.

The establishment therefore of physical



EAST AFRICA HOMID SITES

Facilities for varied inter-related disciplines in one place within one geographical zone, where the research undertaken will be useful to man's quest about his past, is a welcome idea. It is important therefore, that this institute will not be merely a store but also an access to collections, comparative literature materials, and scientific equipment for data processing. It is also important that this institute should be located next to the National Museum which boasts of a unique collection of fossils and stone artefacts over the last 45 years.

The major aims and objectives of the institute are varied covering field research, safe storage, laboratory investigation and study as well as education on broad terms. It is possible, however, to summarize them as follows:-

- a) to provide storage and laboratory space for various disciplines which include, palaeoanthropology, palaeontology, archeology, geology, and osteology.
- b) to provide research facilities for these disciplines. The facilities will include, equipment, technicians, and administration for the institute as well as for the museums all over the country.
- c) to promote and conduct research within the above disciplines, both in the field and laboratory as well as co-ordination of the two.
- d) to provide advanced research training for local as well as international scholars.
- e) to provide international co-ordination in research activities and dissemination

of knowledge through publications, lectures, symposia and conferences.

f) to foster human understanding through continued research into the origin and evolution of man.

g) and finally to contribute through its activities and the relationship with other bodies, to the growth of science in Africa.

The international character of the IAP will presuppose the close co-operation and participation of leading scientists. An impressive group of leading people has agreed to help launch the IAP and thereafter ensure its continuation through meetings and consultations with the IAP administration. The IAP must therefore adhere to the finest scientific discipline and international standards of research. The planning and running of the institute incorporates the concept of a scientific council comprising of experts in several disciplines. This council is expected to meet regularly although not frequently to advise and assist the Museum Trustees of Kenya and the IAP on several aspects which can be summarized as follows:-

- a) the initiation and followup of significant research at the institute.
- b) the nomination and support of postgraduates from Africa for further training in advanced study.
- c) the supervision of postgraduates studies.
- d) the identification of post-doctorial research personnel who might participate with the IAP as visiting research associates.

II

e) finally, periodic review and assessment of the IAP's programmes and their progress.

In recognition of the magnitude and importance of such a council role, it has been suggested that the council should appoint a small Research Co-ordinating Committee. This committee would meet at least once a year at the Institute to contribute to its programmes through correspondence and individual visits. The membership would be primarily of people involved in research at the Institute.

02. institute for african
pre-history

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ACTIVITIES AROUND THE
MUSEUM COMPLEX
6. GAME DEPARTMENT
KENYA GOVERNMENT
7. INSTITUTE OF AFRICAN
STUDIES
8. E. A. COMMUNITY
HERBARIUM RESEARCH



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IAP MACRO AND MICRO STRUCTURE.

Introduction.

As will have been noticed before in the general introduction, the Institute for African Prehistory is an entity of a unique character in this institutional world. It combines field and indoor research, storage and administration under one roof. This research concentrates on the origin of mankind, especially the Africa. It is also unique in the sense that it is the first Institute of its kind in the world according to its director Richard Leakey, the son of the man whom the Institute is dedicated to. Richard Leakey admits that as far as he knows, no other Institute of this kind exists anywhere in the world. One is inclined to take him for his word because of his world renowned expertise in this field as well as the fact that, he is the son of a man who spent all his life in this field. Due to this fact of its uniqueness, I have had to deviate from the usual comparative statistical approach derived from several case studies to arrive at an architectural solution to a problem. In fact, I will be exploring a new architectural field.

My approach to this problem will therefore be more of a descriptive nature than the one mentioned above. This will be a documentation of the processes and function which forms both macro and micro structure of the institute. I will, therefore, have to rely for my guidelines on the existing center for prehistory and palaeontology which is presently housed in the former Desert Locust Control offices. a collection double pitched concrete blocks buildings, scattered all over the

site, whose architectural appeal leaves much to be desired. (see photographs 7 to 12 inclusive, and site plan). Mr. Richard Leakey who is the director of the center as well as the director of Museums of Kenya, and also a world reknown anthropologist, and his staff have contributed alot to the research on the activities and processes which are expected to take place in the proposed institute. One other source of guideline has been the proposed design of the institute, whose construction has just started (photograph 20). Its author has an invaluable wealth of knowledge about the subject. And finally, above all this, books and relevant magazines have had to supplement most of the information.

The whole macro structure of the institute is divided into several sections and departments so that it may be possible to realize the micro structure more vividly. Where necessary especially in the case of the lecture theatre and the library books have been consulted for technical data and in other cases where technical data is not available especially in the various departments of the institute, information has been extracted from existing facilities. It is from this data where I hope to combile the design specifications both macro and micro.

Adminstration

A minimum of about 42 persons is expected to form the parmanent staff for the institute. this number will include the top manangement for Kenya museums as well as the manangement for the institute. Infact the top authority for the museums also controls to a certain extend the -

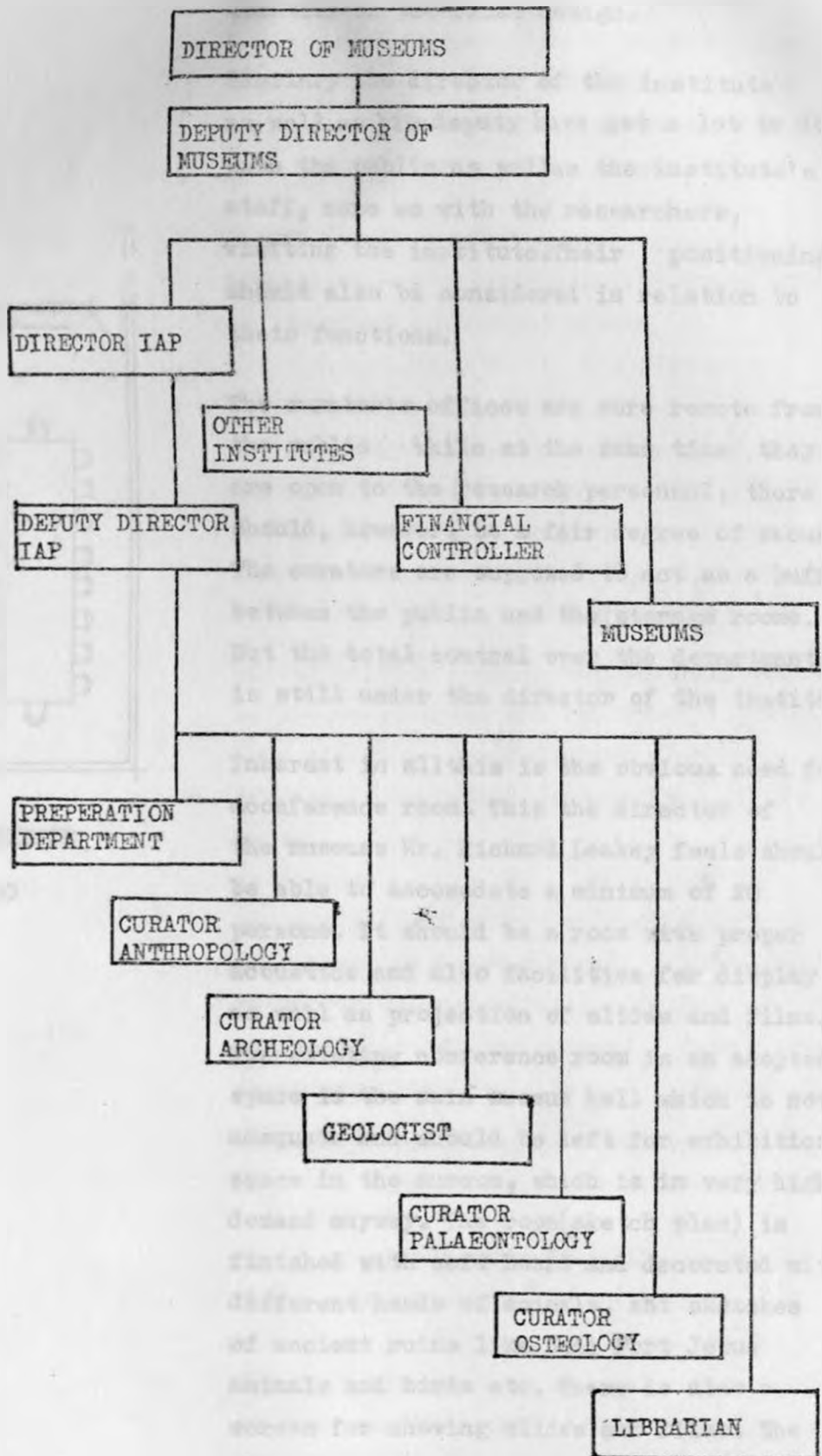
the activities of the institute. The staff can, however, be broken down as follows:-

- I Director of Kenya Museums.
- I Secretary to Director.
- I Deputy Director.
- I Director of the IAP.
- I deputy Director of IAP.
- I shared secretary.
- I Financial Controller.
- I secretary to Financial Controller.
- 4 Accounts Clerks.
- I Librarian.
- 2 Assistant Librarians.
- 4 Typists/Secretaries.
- 4 Curators
- 1 Geologist.
- II Specimen reception/casting personnel.
- I Photographer.
- I Receptionist.
- 2 Office messengers/tea boys.
- 2 Cleaners.

On the following page a diagrammatic chart of the administration hierarchy which to a certain extent illustrates the operation of the institute and the museum in general. It should be noted that this system has not been existing but is the one which is expected to start operation when the IAP comes into operation.

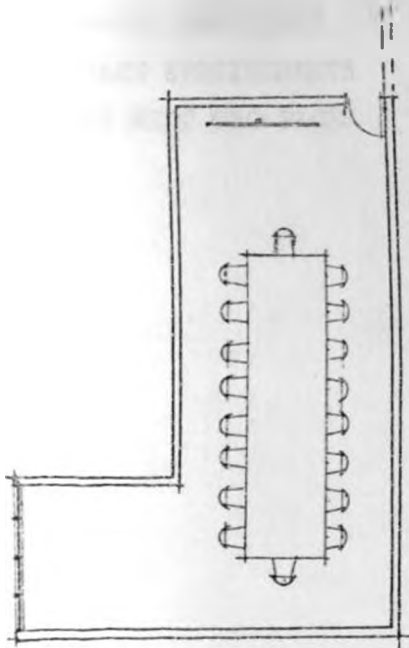
The office of the Director of museums will be mostly entrusted with the policy making of the museums and related branches in general. The deputy director is more concerned with the day to day administration of the museums. This therefore, suggests that the office of director and his deputy will be very much interwoven and also very much with the museum staff and the public.

ADMINISTRATION HIERARCHY



This suggests that a lot of consideration must be given to them as well as their location in the final design.

Similarly the director of the institute as well as his deputy have got a lot to do with the public as well as the institute's staff, more so with the researchers, visiting the institute. Their positioning should also be considered in relation to their functions.



EXISTING CONFERENCE
FACILITIES
SCALE: 1 : 100

The curator's offices are more remote from the public while at the same time they are open to the research personnel; there should, however, be a fair degree of security. The curators are supposed to act as a buffer between the public and the storage rooms. But the total control over the departments is still under the director of the institute.

Inherent in all this is the obvious need for a conference room. This the director of the museums Mr. Richard Leakey feels should be able to accommodate a minimum of 20 persons. It should be a room with proper acoustics and also facilities for display as well as projection of slides and films. The existing conference room is an adopted space in the main museum hall which is not adequate and should be left for exhibition space in the museum, which is in very high demand anyway. The room (sketch plan) is finished with soft board and decorated with different heads of animals, and sketches of ancient ruins like Gedi Fort Jesus animals and birds etc. There is also a screen for showing slides and films. The room can only accommodate about 20 persons. Ventilation is very poor with only one window at the end. This also means that

artificial light has to be used. The acoustics are, however not very bad because of its position at the back left side of the museum building where there is very little external noise. These drawbacks form the basis for the desire for a new conference room with the proper facilities.

FOR OFFICE FURNITURE
AND SPACE REQUIREMENTS
SEE THE NEXT TWO PAGES

Design determinants:

Dimensions—are ultimately determined by:--

- a) standard stationary sizes.
- b) storage space for such stationary, drawers, files etc.
- c) furniture correlated with user's stature and reach, hence, the use of the space, it has been found that properly designed furniture can increase efficiency by up to 15%.

Listed below are space requirements including office accessories and the operating area. Note also that the following area are subject to variation according to office use:--

secretary	10m ²
executive (independent office)	6-9m ²
executive (in large office)	3.8-4.8m ²
executive (shared office)	5m ²
conference rooms per person	2.5m ²
department head	15-25m ²

otherwise average space requirement per employee can be assumed to be a round 4.6m².

Depth of office depends mostly on the space requirement i.e. if individual shared or general office, other users of the building may also determine the depth of the room plus environmental factors like ventilation. 4.5-6.0m deep is found to be the optimum.

OFFICES

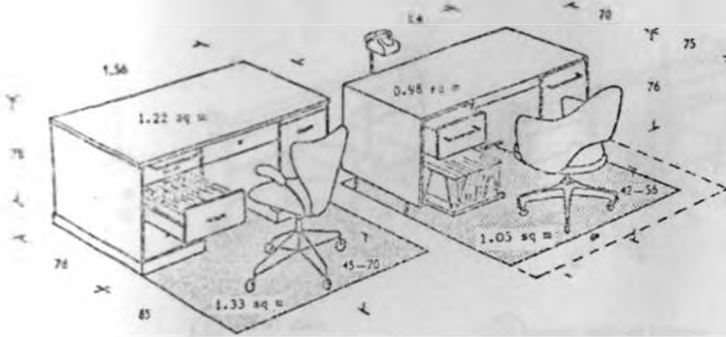
Office furniture

International standard sizes for stationery, etc. created by industry and commerce, so drawers, files, etc. for these sizes determine the dimensions of office furniture, correlated with user's stature and reach. Working surfaces should be of convenient height, free from vibration and sound absorbent; foot-rests must be at correct anatomical level.

Chairs require castor wheels and an adjustable, upholstered seat and back (modern design increases efficiency by 10-15%). Ordinary desk and typist's desk may be combined into single space saving unit.

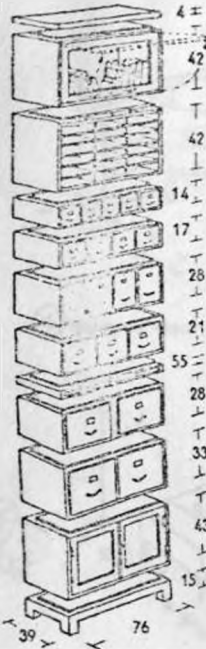
In filing cabinets and card indexes, sideless units are often used, → (11), rows being finished off with independent side pieces.

Counters for dealing with public are approx 900 mm (3 ft) high if 625 mm (2 ft) wide, → (7) or 1 m (3 ft 3 in) high if 300 mm (1 ft) wide, thus ensuring that customers cannot reach over. Behind counter is gangway with room for assistant to stand, → also p 209 (2)-(6). Continuous counter tops, → (6), (7), individual counters facilitating different organizational arrangements, → (8).

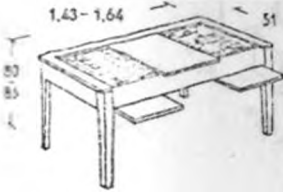


① Desk with drawers for standard stationery sizes

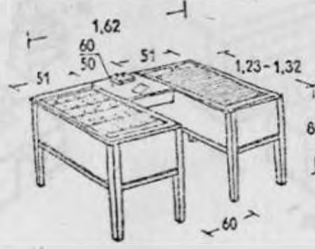
② Office desk with swivel chair. Saves 0.3 sq m (5.5 sq ft) compared with (1)



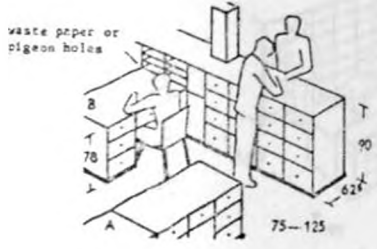
⑤ Filing cabinet for standard cards of different sizes



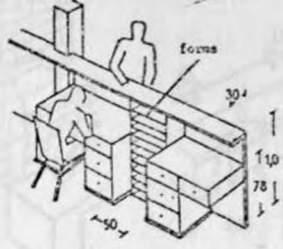
③ Table for standard size card index (approximately 1 300 cards per card container)



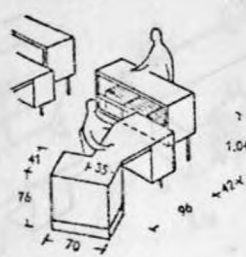
④ Double trough for standard size cards



⑥ Customer's counter
A: with gangway at back
B: with desk adjoining counter



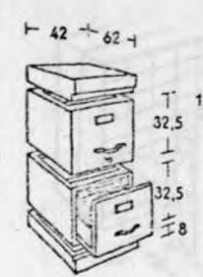
⑦ Counter with built-in desk (Swedish style)



⑧ Flexible arrangement with individual counters



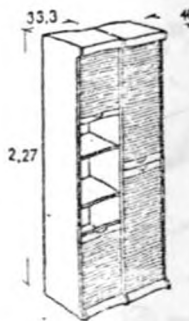
⑨ Typist's desk with swivel tray on runners



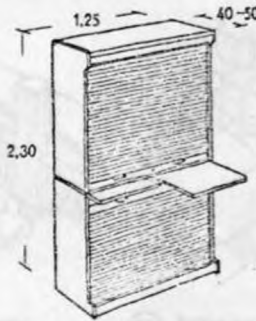
⑩ Unit filing cabinet



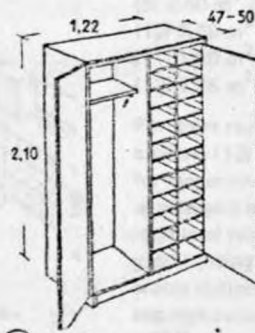
⑪ Pedestal type filing cabinets (may be built up in rows)



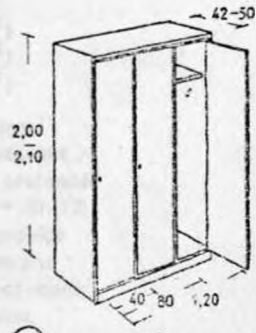
⑫ Cupboard unit for upright storage of files



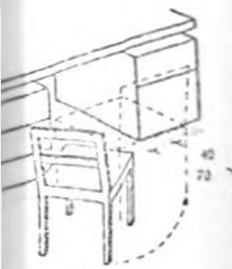
⑬ Roll-front cabinet



⑭ Cupboard with doors and cont. space



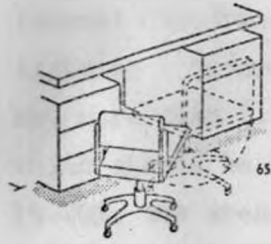
⑮ Staff locker



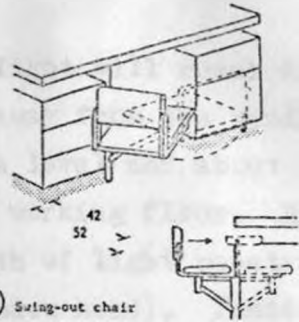
Standard chair



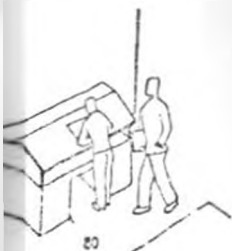
2 Swivel chair



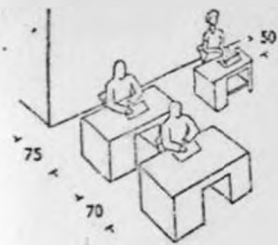
3 Swivel chair on castors



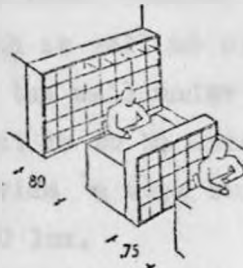
4 Swing-out chair



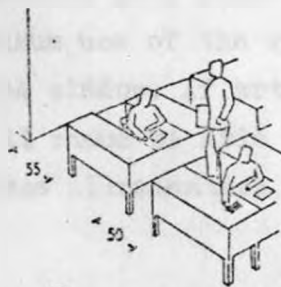
Rowing desk



6 Individual desks



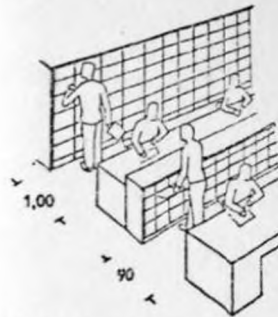
7 Individual tables with pigeonholes at back



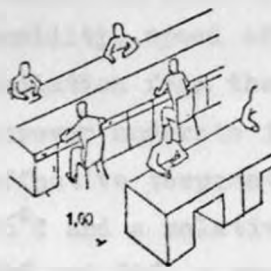
8 Trough desks



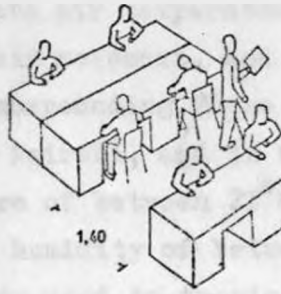
Rows of desks with aisle at back



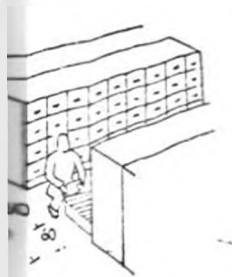
10 Rows of desks with pigeonholes at back



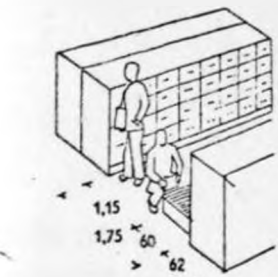
11 Rows of desks in block arrangement with staggered seats



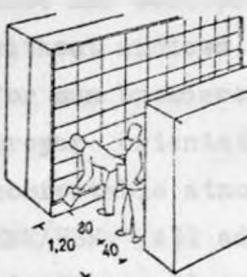
12 Rows of desks with unstaggered seats



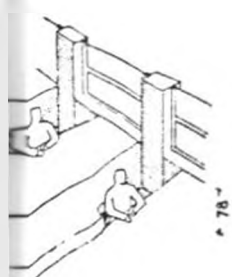
Rowing cabinets



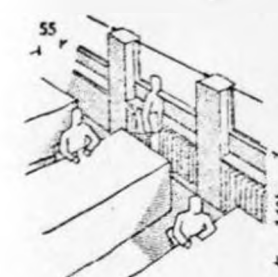
14 Filing cabinets with gangways



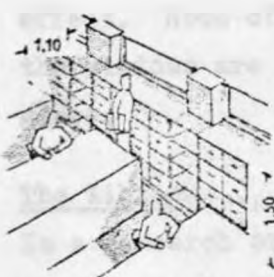
15 Open shelves for files



Desks placed directly against windows



17 Passage between desks and windows



18 Filing cabinets under windows

Space required for sitting down and rising gives \geq distances between individual desks.

→ (1)-(7), depending on their position in front of walls, other desks or pigeonhole fittings, → (5)-(12) and p. 196.

Space per seat without communicating corridors at side:

- (5) 2.46 m² (26 ft²)
- (6) 2.25 m² (24 ft²)
- (7) 2.90 m² (31 ft²)
- (8) 2.90 m² (31 ft²)
- (9) 2.60 m² (28 ft²)
- (10) 3.70 m² (40 ft²)
- (11) 1.90 m² (20 ft²)
- (12) 2.25 m² (24 ft²)

For short rows of filing cabinets (13) adequate, but for longer rows (14) preferable as passage is needed, → (8)-(12).

High level windows provide good lighting in depth and enable optimum use of room and wall below window, → (18).

Environmental control - this includes several factors:-

Lighting - Natural light will reach desks not more than 4.5m away from the window which should be high level and about 15-20% of the area of working floor. By rule of thumb D (depth of light penetration) = $1.5H_w$ (height of window head). Incidentally, high level windows provide good light in depth as well as optimum use of the room and the wall under the window. If artificial light is to be used it should be able to provide a work surface illumination of 1000 lux.

Comfort- climatic characteristics affecting comfort in Nairobi are air temperature, humidity, speed of air movement, and radiation from the surrounding. These are, however moderate in Nairobi, and if an effective temperature of between 21°C and 26°C and a relative humidity of between 80% and 20%, a person used to tropical climates will usually feel comfortable. East and west orientation for the sides without windows reduces very much the need for sun breaders as well as giving a proper orientation for wind flow for comfortable atmosphere best if window face ENE/WSW. All adjustable louvres, or venetian blinds on all openings should be outside glazed windows to avoid 'green house' effect. Rows of trees at right angles to the windows are also good for preventing glare.

The Library

In a research oriented institution like the Institute for African Prehistory the need for a specialized library is obvious. Specialized because the Institution unlike

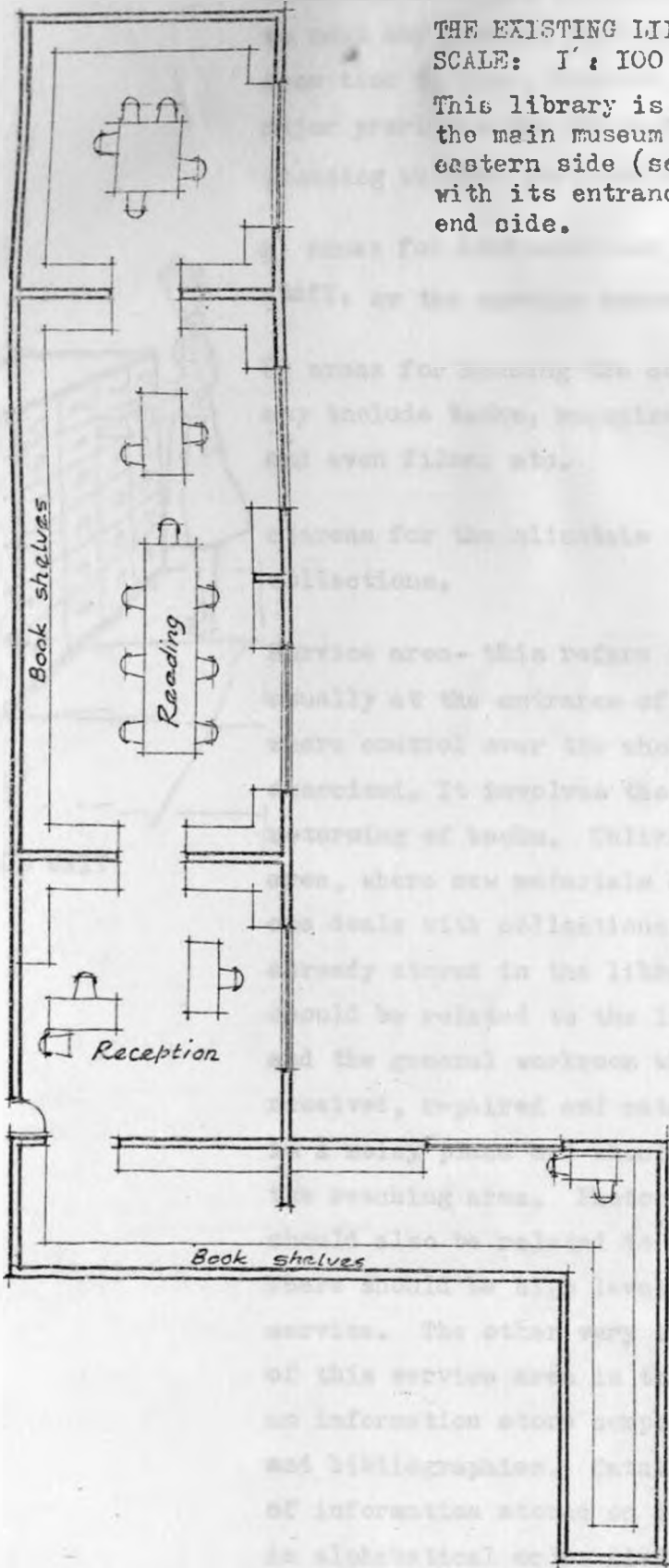
others, deals with a specific field of research. Infact it can be likened with libraries which cater for research laboratories. The advantage with such a library is; one is more likely to find the information they are after faster than in a general public or a school library. A general library exists in the main Museum but is almost inaccessible to the public apart from its unspecialize nature like the one expected to be constructed. The client expects are small (about 100m²) well planned library by modern planning standards offering facilities for books, magazines, printed pamphlets, microfilms and films. The existing library does not meet the clients' requirements, apart from the fact that it is badly planned, without proper cataloging system as well as being very small and occupying space which could otherwise be used for museum exhibition. Like many other facilities around the museum complex: it was placed here because of desperate need for space, hence, leaving very little choice for planning. On the following page, is a sketch plan of the existing library.

SEE CIRCULATION FLOW
DIAGRAM ON PAGE 22

Space planning

In general, a library should be centrally placed in relation to other activities taking place around its environment, whether in a single building or in a group of buildings. This is so because, a library being an information core, should be accessible by all persons concerned with the quest for knowledge. It should not be an architectural inconvenience. Internally rigid division should be avoided if possible. Furniture should be

Main Museum Hall.



THE EXISTING LIBRARY PLAN
SCALE: 1" = 100

This library is located inside the main museum building on the eastern side (see site plan), with its entrance at the far left end side.

used extensively to define spaces; this makes the internal organization more flexible to meet any changes that may be apparent from time to time. However, there are three major prerequisites which determine library planning whether small or big.

a) areas for administration and operation by staff, or the service areas.

b) areas for housing the collections, which may include books, magazines, microfilms and even films, etc.

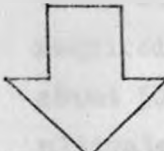
c) areas for the clientele to make use of the collections.

Service area- this refers to the area usually at the entrance of the library where control over the whole process is exercised. It involves the lending and returning of books. Unlike the other service area, where new materials are received, this one deals with collections which are already stored in the library. This area should be related to the librarian's office and the general workroom where books are received, repaired and catalogued. This is a noisy place and should not be near the reaching area. Photocopying facilities should also be related to this central point. There should be high level desk for public service. The other very important facet of this service area is the keys. This is an information store composed of catalogues and bibliographies. Catalogues are a form of information stored on cards and arranged in alphabetical order giving the whereabouts and what sources of information are contained in the particular library. The bibliographies are in a form of books



CATALOQUE STORAGE UNIT

ENTRANCE
LOBBY



SERVICE AREA

STAFF
SERVICE

KEYS

STAFF &
SERVICE

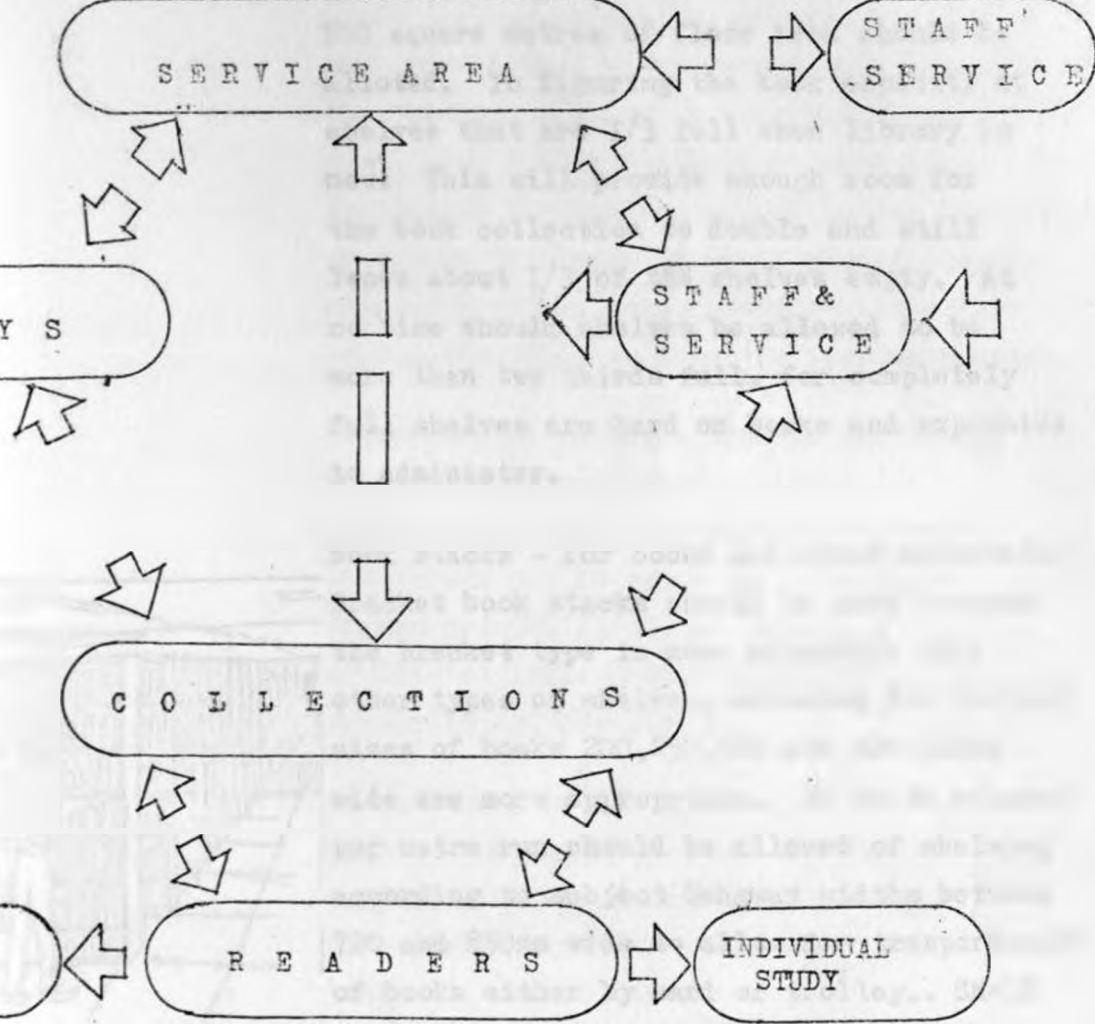
COLLECTIONS

INDIVIDUAL
STUDY

READERS

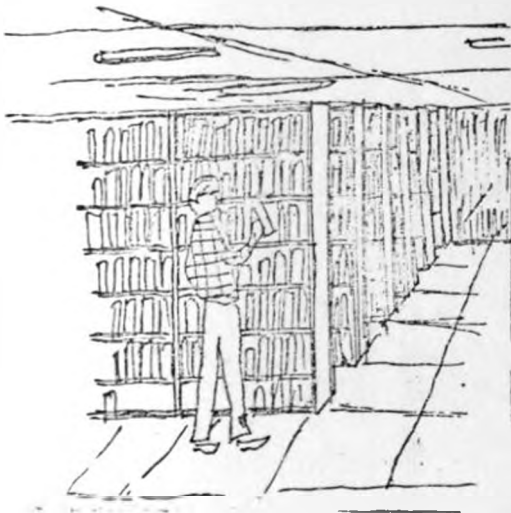
INDIVIDUAL
STUDY

CIRCULATION FLOW LAYOUT



compiled by international bodies showing everything that has ever been published in a particular subject but not necessarily in that library.

Storage area - One square metre of floor space can house about 50 volumes depending on their sizes, so 50 should only be taken as an average for determining area required. For ultimate collection of about 5000 volumes (this is the expected ultimate collection for this library), 100 square metres of floor area should be allotted. In figuring the book capacity of shelves that are $\frac{1}{3}$ full when library is new. This will provide enough room for the book collection to double and still leave about $\frac{1}{3}$ of the shelves empty. At no time should shelves be allowed to be more than two thirds full, for completely full shelves are hard on books and expensive to administer.



BOOK STORAGE FACILITIES

Book stacks - for books and other materials. Bracket book stacks should be used because the bracket type is more adoptable than other types of shelves, allowing for various sizes of books 200, 250, 300 and 400-700mm wide are more appropriate. 20 to 30 volumes per metre run should be allowed of shelving according to subject. Gangway widths between 720 and 850mm wide to allow for transportation of books either by hand or trolley. Shelf height should be within the human reach, about 2.25m high.

Audio Visual Equipment and the related material may be stored in the equipment storage room which needs more guarding because there are expensive items. This could be on ordinary shelving in bins or

in specially designed steel cabinets.

Reading area - on the following three pages are to be found illustrations of several types and layout of furniture to form study carrels aswell as providing storage for books.

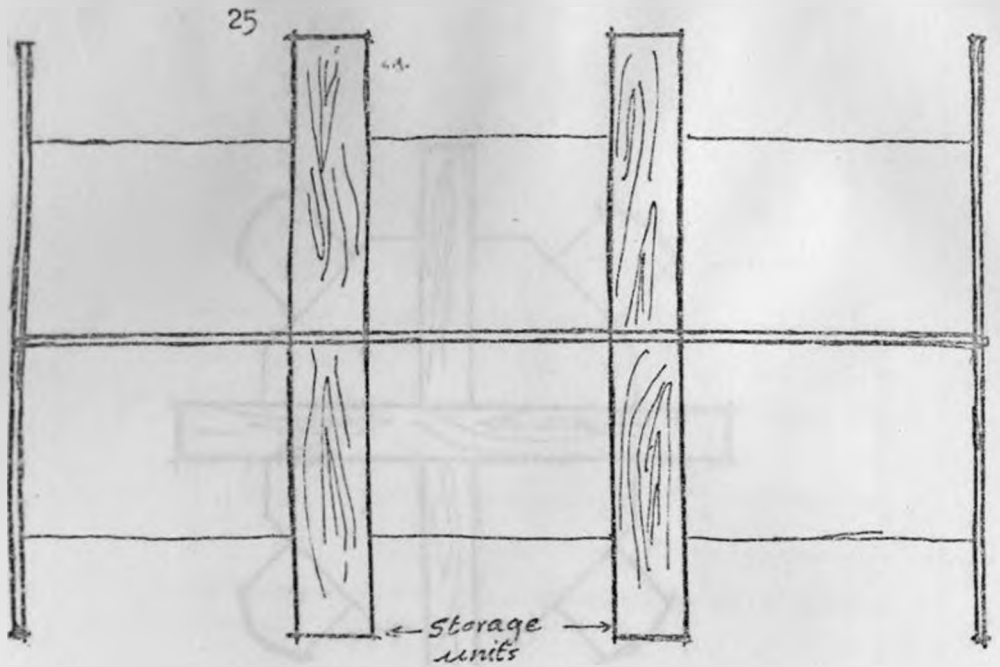
Reading spaces should generally be divided into two forms; soft open areas, where reading is relaxed and often of recreational nature, and the enclosed areas, in the form of carrels, where serious reading is undertaken. It has been proved that people prefer the latter when serious reading is required. These also, also can be designed to include facilities for reading microfilms or listening to tapes. This kind of space should comprise about 60% of the total reading space. Each carrel should allow about $1m^2$ working space.

Environmental control- windows should not be left to allow direct sunlight, it should be cut out sun breakers, however, a generous use is necessary to provide enough natural light. An extensive use artificial light should be allowed both generally and locally.

Temperatures in the building should be kept at arround $15^{\circ}C$. When the library is full this temperature is likely to increase because human metabolism. This being the reason why the temperature should be kept low so that it can allow for this increas. Good ventilation should also be allowed for; preferably artificial because it is easier to regulate. It also eliminates the problem of dust, because the windows can be kept closed.

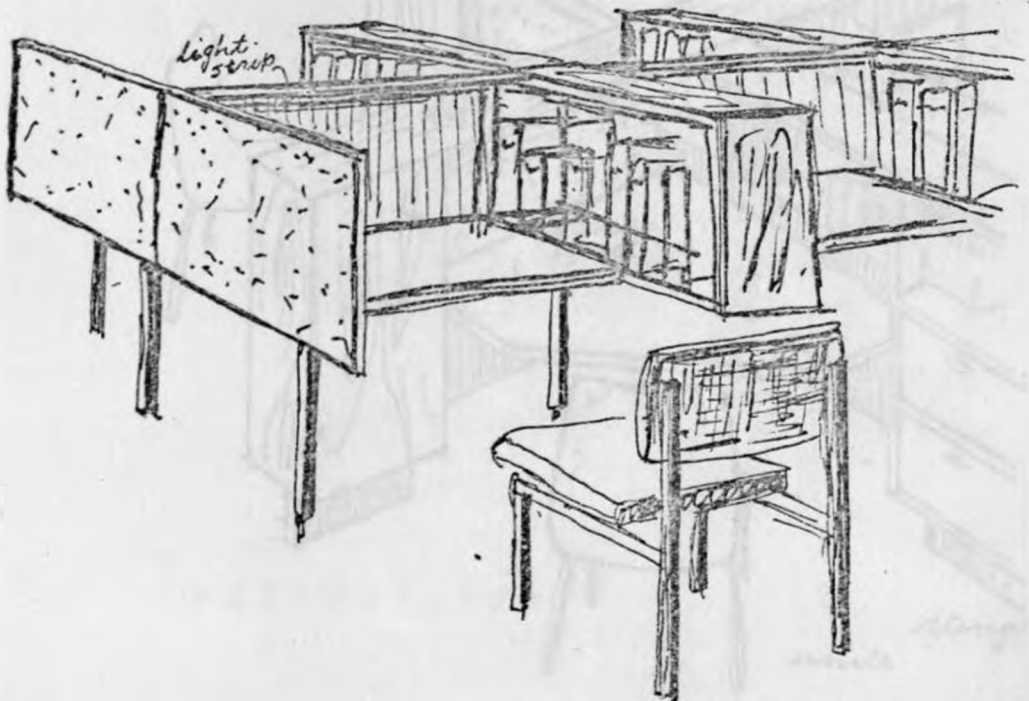
The Lecture Theatre.

A small lecture theatre does exist (see

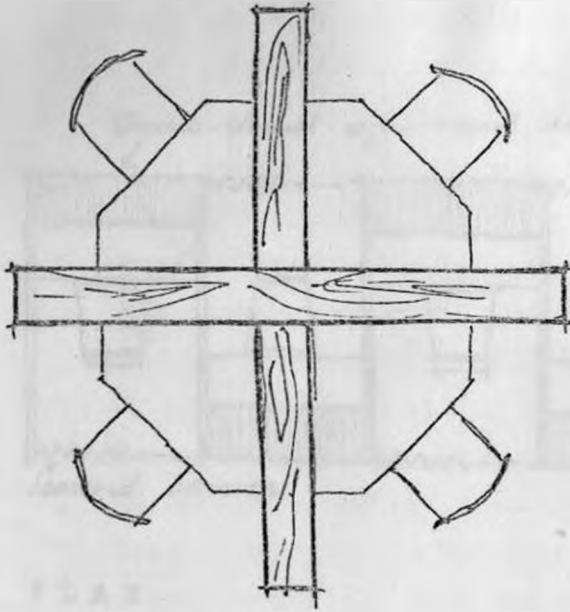


P L A N

Study carrels with storage unit as dividers,
a light strip on each study space.

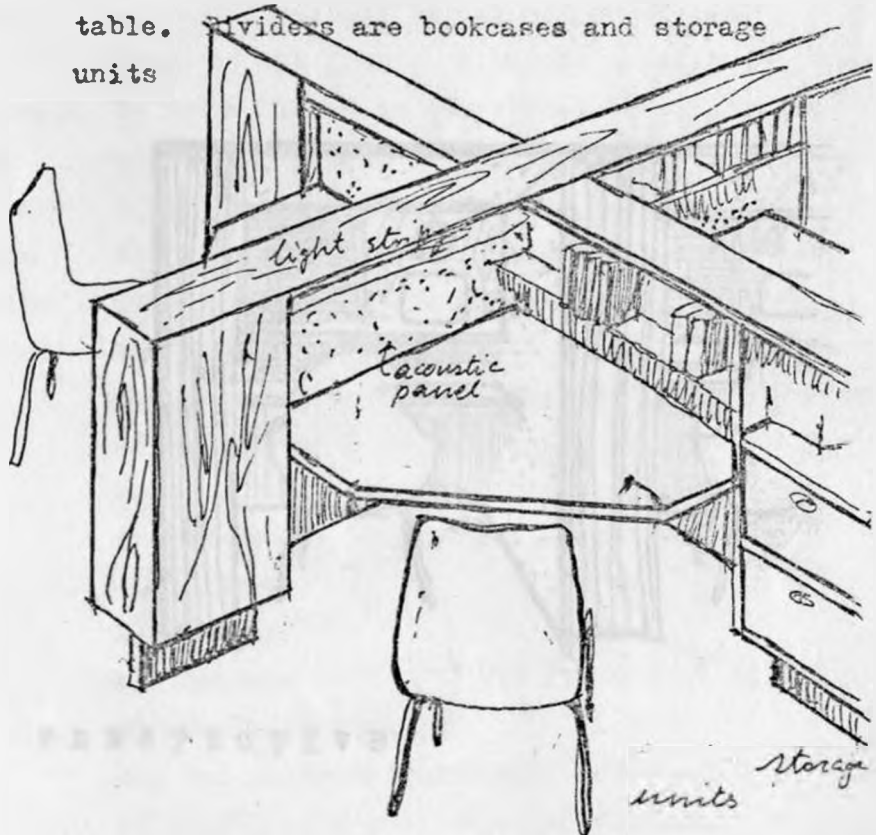


P E R S P E C T I V E

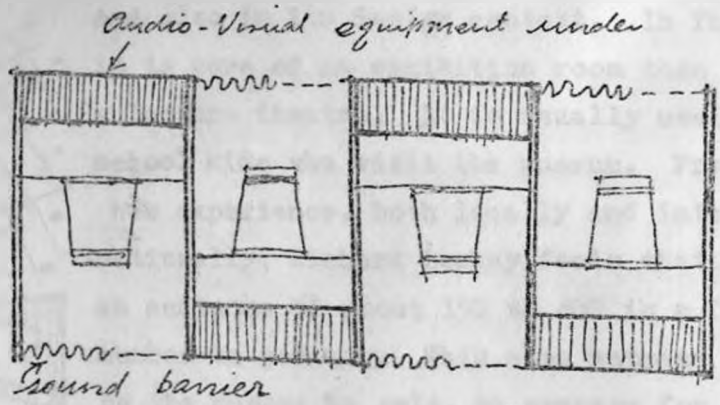


P L A N

Alternative arrangement of carrels for four readers. The base is an octagonal table. Dividers are bookcases and storage units

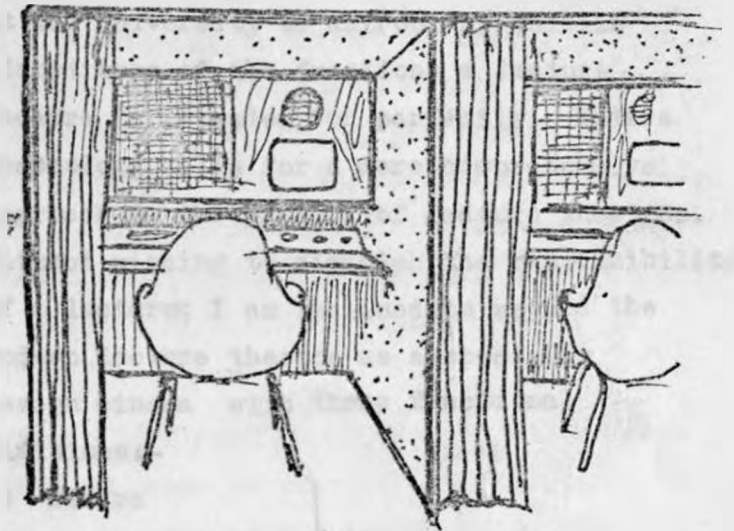


P E R S P E C T I V E



F L A N

Closed carrels with in-built audio-visual equipment



P E R S P E C T I V E

photograph 19) at the National Museum Complex for the purposes of the education section of the National Museum. The client has used it occasionally and it has proved to be completely inadequate, both in size and also in its design context. In fact,, it is more of an exhibition room than of a lecture theatre. It is usually used by school kids who visit the museum. From his experience, both locally and internationally, Richard Leakey feels that an audience of about 350 to 400 is a fair number to contain. This also happens to be the number he gets, on average for his local lectures. In the more academically mature countries, this could be more but for the time being, a lecture theatre for about 350 to 400 will be adequate.

Design determinants.

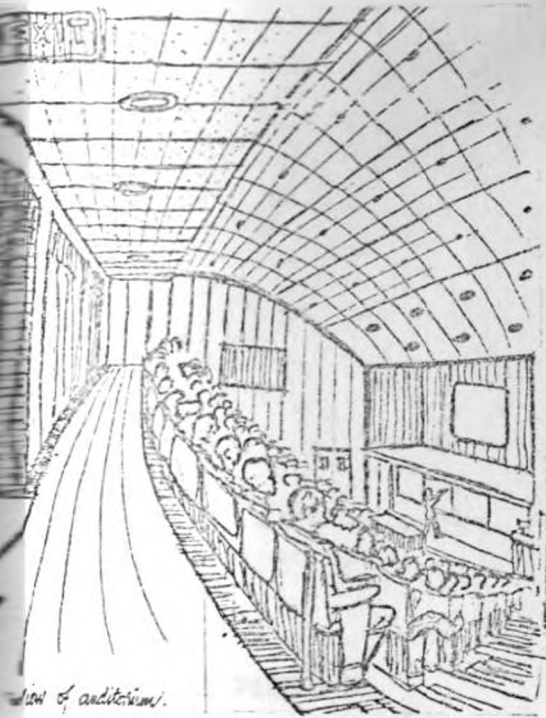
FAN SHAPED AUDITORIUM ON PLAN

ensure satisfactory viewing angle and to provide a large lecture size the projection screen recessed The recess can be closed when screen is not in use. The lecturer, and the bench are clearly visible from every point of the audience due to the steep banking of the seating.

Many institutional lecture theatres are given lip service in design. It is usually a stepped seating with a screen or chalk board at the front. Although this is to be found almost in every lecture theatre. at the University of Nairobi it fulfils almost none of the functions a lecture theatre is intended for perfectly. Modern technology calls for a more comprehensive approach to the design of lecture theatres. Without wishing to diminish the responsibility of a lecturer, I am inclined to regard the modern lecture theatre as a specially design cinema with three functional divisions:-

- | | |
|-------------------|----------------------|
| a) cinema | } SEE PAGES 30 & 31. |
| b) lecture | |
| c) demonstration. | |

Any one of these functional devisions must be immediately available and frequently these divisions will overlap. An agile lecturer may unveil a prepared blackboard



drawing, run a ten minute sound film, refer to a specimen on the demonstration bench and round off with half a dozen slides.

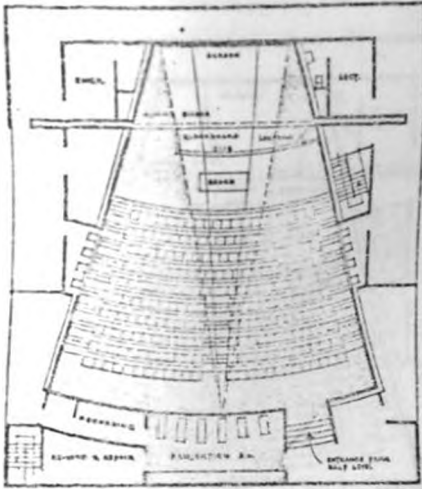
Each functional division requires the audience to look in different directions, to focus at different distances and to hear sounds from different sources. The cinema function presents further technical problem in that, different types of projectors, both for moving pictures and for slides, have different optimum and maximum throws. The throw being the distance between the projection room at the back of theatre and the screen. The three functional divisions are briefly discussed below:--

SEE NEXT PAGE FOR
ILLUSTRATION OF THE CINEMA
FUNCTION OF A LECTURE HALL.

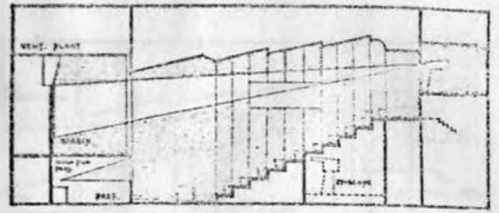
a. Cinema

The presentation of films and slides must be as perfect as in commercial cinemas. It is not sufficient merely to put up a screen and hope for the best. A clear and undistorted view of the projection screen is achieved only within certain angles and for a rough guide it may be said that the extreme viewing angle on either side of the centre-line through the screen is about 30 degrees, that the maximum elevation of the eye to the top of the screen should not exceed 35 degrees and that the critical angle of depression of the projector is about 12 degrees.

The picture must be bright and at the same time as large as possible. Projectors for large slides and for motion films require different lenses and each type of projector is likely to provide a picture of slightly different format. The screen is designed to accommodate the largest picture and fit



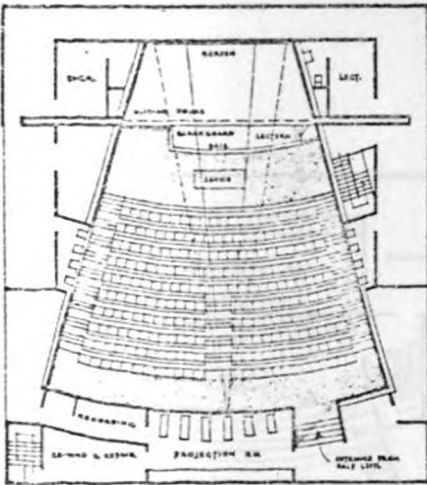
PLAN AT UPPER LEVEL



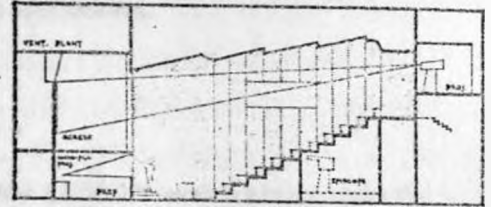
LONG SECTION

0 5 10 20 30 40 50

CINEMA FUNCTION This illustrates the full extent of the lecture theatre. The sliding doors are open and attention is focused on the projection screen.



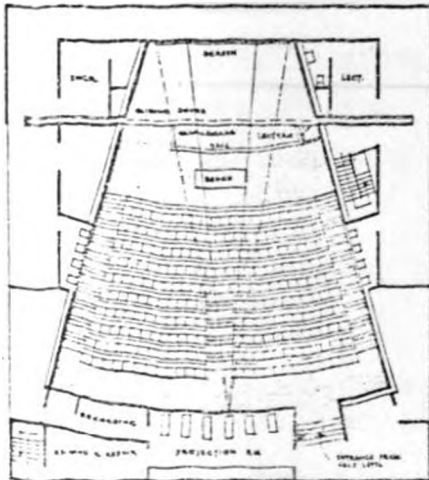
PLAN AT UPPER LEVEL



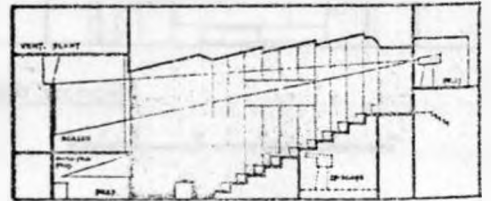
LONG SECTION

0 5 10 20 30 40 50

LECTURE FUNCTION The sliding doors are in the closed position and the projection screen is hidden from view. The lecturer either speaks from his lectern or stands on the platform in front of the black-board.



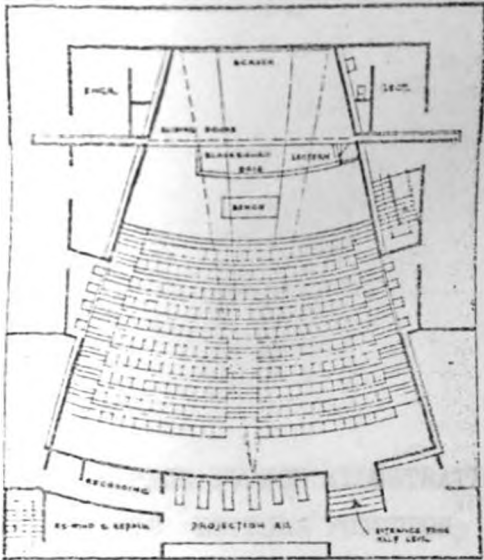
PLAN AT UPPER LEVEL



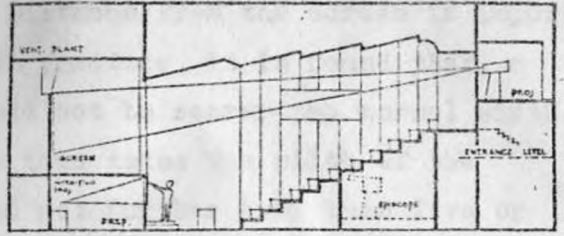
LONG SECTION

0 5 10 20 30 40 50

DEMONSTRATION FUNCTION The sliding doors are again in the closed position, but the demonstration bench is now the focal point.

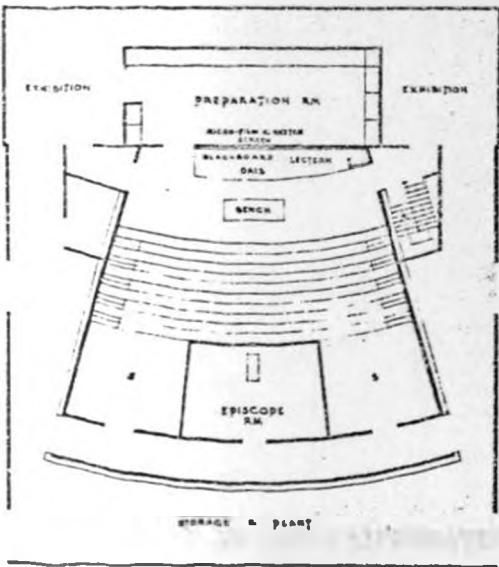


PLAN AT UPPER LEVEL



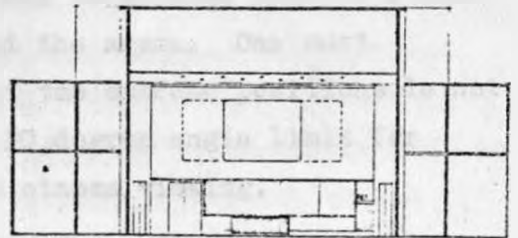
LONG SECTION

THE LECTURER stands on a raised platform to write on the blackboard and he steps down to demonstrate at the bench. During the projection of films or slides he steps up to the lectern where he gains a controlling view of both screen and audience. The lectern is equipped with a microphone, a buzzer and an electric spot pointer.



PLAN AT LOWER LEVEL

AN EPISCOPAL room is placed under the seating, as near to the screen as possible and sufficient space is provided for a television projector. The Preparation room, surrounded by exhibition space, is planned immediately behind the blackboard wall and below the screen recess. The screen is sufficiently wide for the simultaneous projection of two slides.



SHORT SECTION

should be sufficiently wide for the projection and a comparison of adjacent slides. Distance from the screen is important and in practice, it is found that, a seat should not be nearer the normal width of screen than twice the width of the screen and not further away than five or six times that width. It is therefore implicit that some technical assistance is necessary to get these locations as accurately as possible.

SEE PAGE 30 FOR ILLUSTRATION OF THE 'LECTURE FUNCTION' OF A LECTURE HALL.

b. Lecture.

When a lecturer delivers an address from the lectern, it may be an advantage to sit near the exit doors at the back. These are the expensive seats in the cinema. When a lecture draws on the chalkboard a closer view is essential and it becomes inadvisable to sit more than ten or twelve rows away. These are the expensive seats in a theatre. This presents a problem, but the solution appears to be, to limit the rows of seats to not more than ten or a dozen rows and to arrange them in a fan shape around the arena. One must, of course, that the extreme positions do not exceed the 30 degree angle limit for undistorted cinema viewing.

SEE PAGE 30 FOR ILLUSTRATION OF THE 'DEMONSTRATION FUNCTION' OF A LECTURE HALL.

c. Demonstration.

Demonstrations take place in the arena. The arena being lowered space between the lecture's dias and the front row of the stalls. The basic piece of equipment is a fixed bench fitted with a sink and supplied with electricity, water and gas. The fixed bench may be placed slightly to one side and movable bench sections may be added from time to time as required. A removable bench with flexible services coupling is dangerous, a source of trouble.

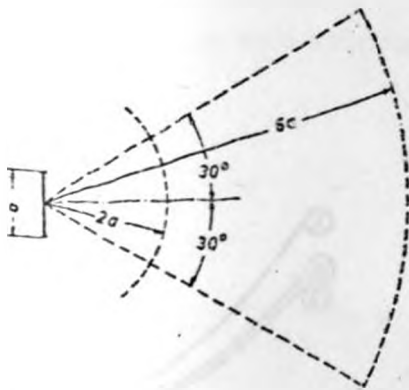
and unnecessary.

It is now necessary to take the ten or twelve rows of fan shaped seating and give them a steep rake, thus allowing each member of the audience a good overhead view of the arena. In juggling with this third dimension, one must of course keep his eyes on the angles and positions already discussed.

Technical data.

A lot of research has gone into the design of lecture of theatre and volumes and volumes produced. Therefore, it only remains for the modern designer to make use of this wealth to produce functional theatres. Below, I briefly site some of the major scientific determinants which should be read in conjunction with accompanying sketches:-

The need to provide good projection facilities lead to the following considerations:-



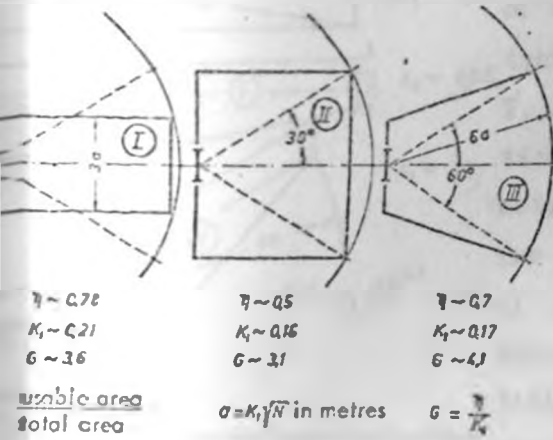
Viewing distances and angles to DIN 108

a) the DIN 108 Standard, which describes how drawn or written black and white slides should be prepared so that they can be read without difficulty when projected, assumes that the most distant viewer is no further than 6 times the width of the screen ($d. \max = 6w$).

b) when the reflection from the screen is fairly diffuse, the viewers should be as far as possible within an angle of $\pm 30^\circ$ to a line to the centre of the screen. At the edge of this area their distance from the screen should be at least twice the width of the screen ($d. \min = 2w$).

c) within these limits which are indicated on Figure I, various different plans can be drawn all of which fulfill these conditions

more or less satisfactorily. (Figure 2).



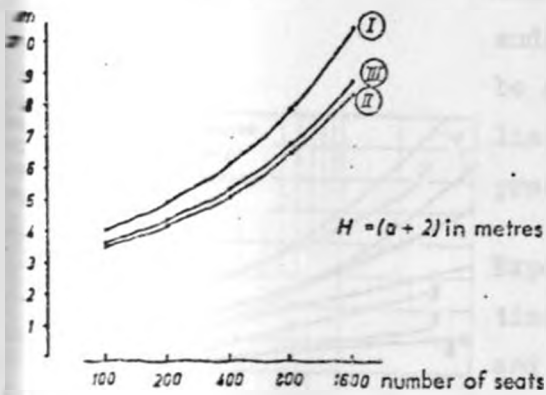
d) assuming that the central part of the room 1 metre square of area can take 1.25 seats and that the lecture room makes triple projection possible when it is needed the width of the screen 'a' necessary according to DIN 108, can be expressed as a function of the total number of seats 'N' for the different plan arrangements sketched in Figure 2. As a rough formula

$a = K_I / \sqrt{N}$ in metres, where K_I is a coefficient approx. = 0.2.

Comparison of alternative plans for triple projection (the values of a hold good for 0.8m² per seat)

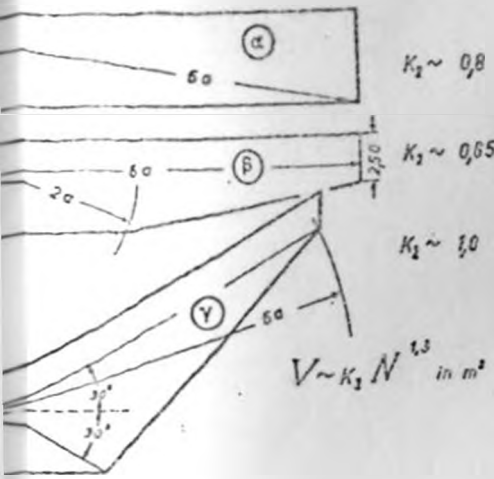
e) Figure 2 also shows 'η' the proportion of usable area to total area, in which 'usable area' means the area within the limits shown in Figure I (the best places lie between 3a and 5a). For economic reasons 'η' should be as large, and 'a' as small as possible. Thus for different comparable plans a kind of figure merit 'G' can be calculated, the quotient of 'η' and 'K_I'; this too has been shown on Figure 2. As might be expected it is highest for the plan using the shape of an amphitheatre.

f) if it has to be possible to project slides and diagrams with their larger sides either horizontal or vertical the minimum height of the wall behind the screen can be fixed if 'a' is known, and if the lower edge of the screen is to be, say 2 metres from the floor.



Minimum screen wall heights for the plans of Fig. 2

For the three plans shown in Figure 2, the graph in Figure 3 shows the minimum height of the wall behind the screen as a function of the total number of seats for a lecture theatre having between 1000 and 1600 persons.



Comparison of various longitudinal sections for projection to DIN 108

Various different sections can be imagined for a theatre which will provide the minimum height of wall behind screen, as defined above and satisfy at the same time the conditions of Figure I, for maximum viewing distance and the condition of minimum overhead ceiling height of 2.5 metres which is based on technical requirements for ventilation.

g) Fig. 4 shows three examples, chosen at the minimum volume for halls with projection facilities according to DIN 108 can be calculated when different plans are used. As a rough formula we can take the equation $V = K_2 N^{1.3}$ in cubic metres in which K_2 lies approx. between 0.65 and 1.

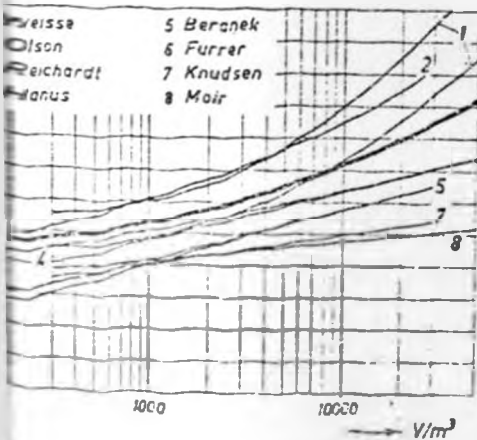
In fig. 5 the volume per seat determined by a provision of projection facilities according to DIN 108 when different plans and sections are used is given as a function of the number of seats. The minimum specific volume is about 2.5 cubic metres per seat for small lecture halls and about 4.5 cubic metres for very large ones.



100 200 400 600 1000 Seats

Volumes per seat for plans Fig. 2 and sections Fig. 4

But there are other points which are relevant when the volume of a lecture theatre has to be determined. The ventilation regulation prescribe a minimum volume of 3 cubic metres for public rooms, whereas when solely the need for good audibility is considered the auditorium should be as small as possible. Even then, lower limits are fixed by absorption of the people present.



Minimum reverberation time (in seconds) for speech plotted (at 500 cycles) against volume in cubic metres from data by different authors

Experience has shown that there is an optimum time of reverberation for every size of room, and that this varies according to the purpose for which the room is used. This optimum time is not precise. Fig. 6 shows the figures established empirically by different authorities for the optimum time of reverberation for speech. The heavily drawn mean value is used as the basis for the following calculation.

If the floor, walls and ceiling do not absorb too greatly, the relationship $T = 1/6 \frac{V}{A}$ equivalent, exists between the volume V in cubic metres, the equivalent absorbcency area of a surface A in square metres and the time of reverbaration T in seconds. If one accepts an equivalent absorbcency area of 0.5 square metres per seat (an estimate allowing a certain margin of safety) and if one supposes that the absorption of sound is determined solely by the people present, one gets the following ratio between volume per seat and the optimum time of reverbaration $\frac{V}{N} = V' = 3T$ cpt. in cubic metres per seat. The specific volume must not be allowed to fall below the value calculated in this way. as otherwise the time of reverbaration would sink below the optimum value solely because of the people present.

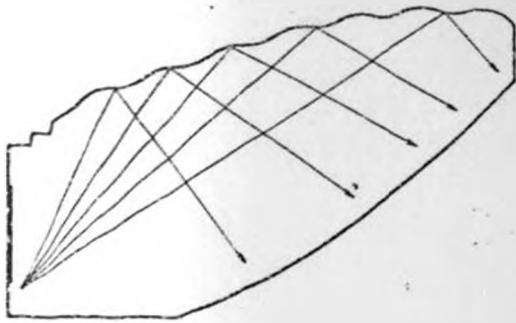
Environmental Control

In this section, I have no intention of getting involved in the mathematical calculation which supports the specification because environmental control is a specialized field and does call for expert advise at the early design stages. It is, however, emportant to note those basic factors that may affect the initial stages of a theatre design and which would probably be difficult or expensive to alter after construction. I will therefore discuss those under four headings, space accoustics, seating, lighting and ventilation.

a. Space Accoustics.

In space accoustics it is necessary to maintain the favourable reverberation time which can be achieved by use of the proper shape and right use of internal finishes; however the room shape

should be able to direct sound to listeners. This should not only take account of the sound energy reaching the listeners but also the time interval between this sound and the time its vibrations reach the listener. For the clarity with which the speaker is heard depends not only on the loudness of his speech, but also on the particular portion of the speech that reaches the listener within the first $1/2$ second after the first wave - front from the sound source. The more reflections can be provided at small time intervals the better the audibility. This leads to other considerations.



10 Section for a Lecture Theatre with good viewing conditions and favourable projection of sound

In figure 2 it was seen that the shape of an amphitheatre was favourable for projection requirements. It also satisfies the acoustic demands since it makes good use of the directional quality of the human voice and since it does not give rise to flutter echoes. Chairs in rising tiers provide good viewing conditions and make fullest use of the directed sound. In a lecture theatre where the seats rise in one way or another, the sound pressure of the direct sound decreases in roughly, inverse proportions to the distance from the source of the sound as no considerable weakening is caused by the seating in front of the listener. The decrease in the direct sound which is caused by the waves spreading out in spherical shapes ought to be compensated as far as possible. This can be achieved by a suitable geometric shaping of the ceiling so that it acts as a sound reflector and directs the sound energy, once reflected more to the back seats. Figure 10, a longitudinal section of an amphitheatre planned space, illust-

-rates these considerations. And finally, to prevent physical strain on lecturer as well as the listeners it is necessary to some amplifications of sound by electro-acoustic methods especially for lecture theatres of above 450 seats although this may be needed for smaller rooms because some lecturers have smaller voices and sometimes not trained on public speaking.

b. Seating.

The number of listeners is likely to vary from time to time according to the type of lecture being delivered. If then the accoustics for both the natural and amplified speech are not to vary too much, seating must be provided where the seats, even when empty, have a considerable absorption. This does suggest the use of porous upholstery which will let the sound pass through (e.g rubberized coconut fibre). The comfort of the listeners is also very important and seats should be designed to allow listeners to listen, write and turn around without causing any disturbance internally.

c. Lighting.

The demand made on air-conditioning becomes heavier if large windows are provided. The optimum shape of room, good sound-protection and good heat isolation can be obviously provided most easily if there are no windows at all. For psychological reasons, however, an intensity of illumination of about 400 lux on a horizontal plane will then be necessary. If this is provided it does not give the impression of a closed space. The lack of windows is generally not noticed.

With a lighting illumination of 400 lux,

there is generally no danger of direct glare even if ordinary light fitting are used. There should, however, still be placed in such a way that neither the speaker nor the audience can look directly at any source of light.

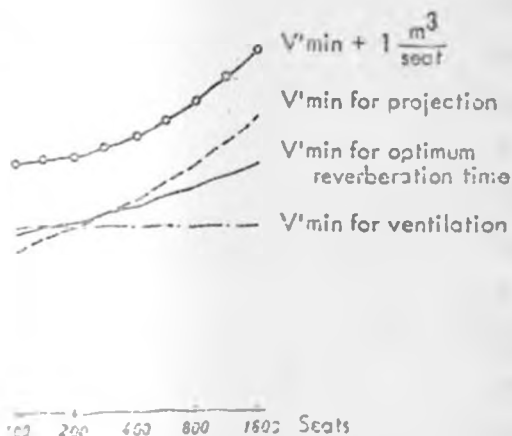
If it is necessary to change the intensity of illumination especially for projected illustration. this should be done gradually (at least allow 6 seconds for the change) to save the audience fatigue. Whenever possible. it should be avoided.

d. Air Conditioning.

Since windows in a lecture theatre are likely to be more of a liability than an asset, it is advisable to do without them and opt for air conditioning. It will be therefore necessary to install a proper air-conditioning plant with equipment for cleaning, heating and cooling humidifying or dehumidifying the in-going air and also with control section so that any desired temperature can be maintained. Even if a lecture theatre is lit by daylight, this equipment should be considered so that physical fatigue may be prevented.

About 40 cubic metres of air per person per hour should be provided in lecture theatres where smoking is not allowed. For volumes, according to Figure 7, this means that the air should be changed between 7 and 10 times an hour, if a suitable arrangement is chosen for the introduction of air, this can be done without draughts being felt. For lecture theatres designed to provide optic and accoustic apparatus it is better to have the air introduced from above. It should be made sure that the ducts do not become a source of noise, this calling for co-

Minimum volume per seat for lecture theatres with projection facilities



-operation with accoustic specialists.

Summary.

The diagram on the next page is a summary of how closely all the aspects involved are interwoven with one another and how necessary it is to have co-operative planning. The basic requirements of accoustics projection equipment, air-conditioning and lighting as regards the shape of rooms and the materials used for floor, walls and ceiling are summarised. It should also be remembered that accoustics, and projection ventilation and lighting also influence each other as far as their design is concerned.

FOR SUMMARY OF LECTURE HALL
DESIGN DETERMINANTS . SEE
NEXT PAGE.

And finally, it should be realized that the sizes of projection room and their related activities can only be determined by the equipment used and related activities all these being available from technical data. Exit doors and number of toilets and any other mandatory requirement are all available in the building bye-laws which should be adhered to.

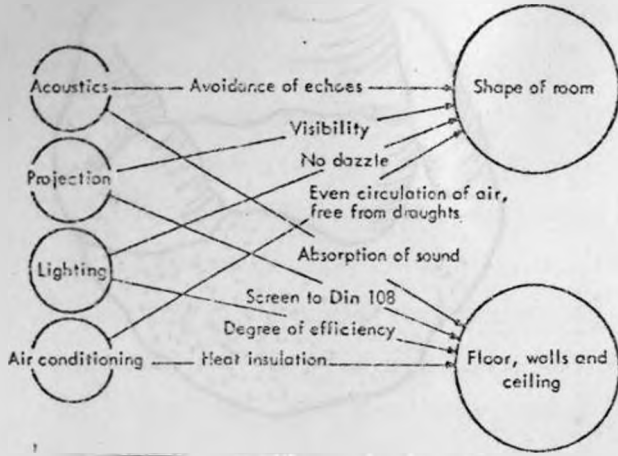
Department of archeology.

Archeology is the study of physical remains of man's existance. These remains are man-made objects known as artefacts.

They are simple basic aids for his survival usually made from stone by chipping it to produce sharp edges which can be used for skinning animals just as a way of example. Originally, they were known as hand-axes, but research has since proved this to be a misleading terminology since no one can, for sure, tell what these tools were used for. Hence. the simple terminology of just 'stone tools'. Research has also proved that these stone tools , evolved in such the same way as plants and animals

SEE PAGE 42 FOR ILLUSTRATIONS
OF STONE TOOLS.

Fig. 14 Shape and materials of floor, walls and ceiling: interaction on Acoustics, Projection, Lighting and Air conditioning.



The aim of these two diagrams is to point out how closely all aspects involved are interwoven with one another, and how necessary it is to have cooperative planning.

Figure 14 sums up the basic requirements of acoustics, projection equipment, air-conditioning and lighting as regards the shape of the rooms and the materials used for floor, walls and ceiling; and Figure 15 is a reminder of acoustics, projection, ventilation and lighting as design determinants which influence each other very much.

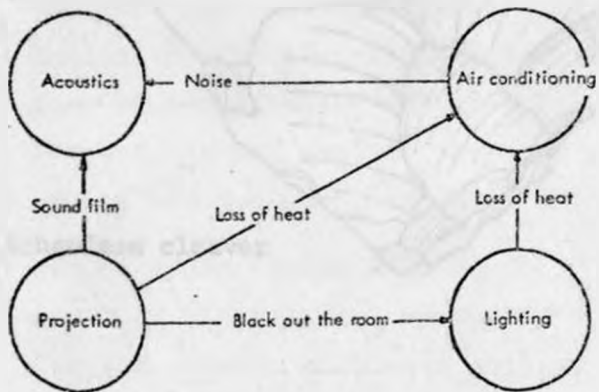
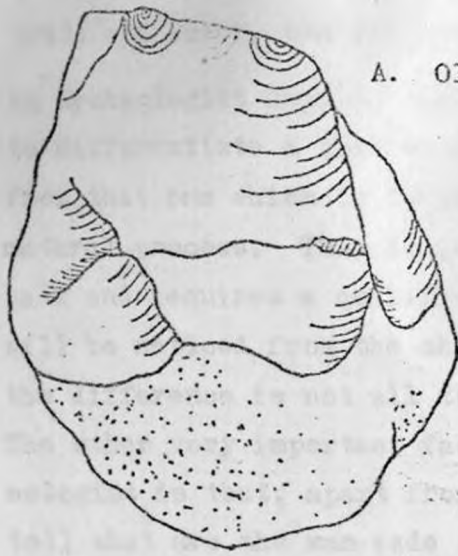


Fig. 15 Interaction between Projection, Lighting, Air conditioning and Acoustics.

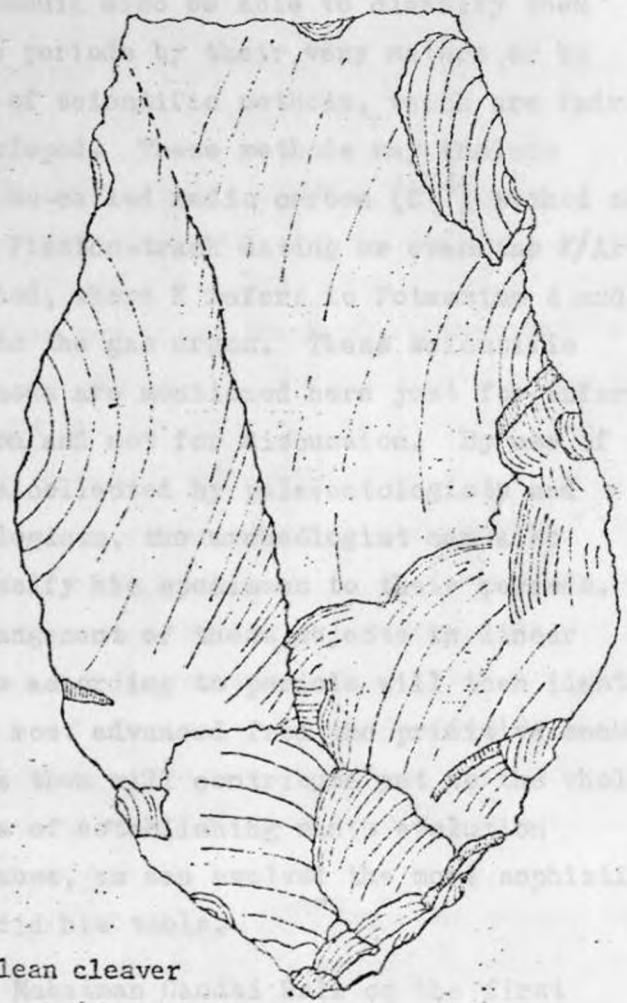
A. Oldowan chopper



B. Acheulean biface

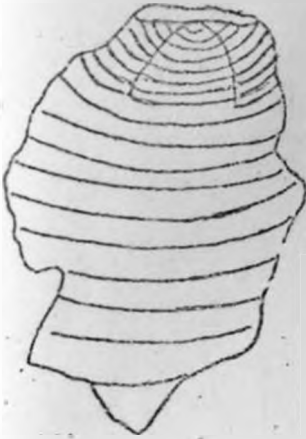


C. Acheulean cleaver



HAND-AXES OR MORE APPROPREATELY STONE TOOLS

except that human, rather than natural trail and error, was the propellant.



MAN-MADE FLAKE



NATURAL FLAKE (CRUSHED)



NATURAL FLAKE
(HEATED AND COOLED)

An archeologist should, therefore, be able to differentiate a tool which is man-made from that one which is formed by earth's natural process. This is quite a difficult task and requires a qualified person as it will be noticed from the sketches that the difference is not all that obvious.

The other very important facet of an archeologist is that, apart from being able to tell what are the man-made stone tools, he should also be able to classify them into periods by their very nature or by use of scientific methods, which are fairly developed. These methods may include the so-called radio carbon (C^{14}) method or the Fission-track dating or even the K/Ar method, where K refers to Potassium 4 and Ar to the gas argon. These scientific methods are mentioned here just for information and not for discussion. By use of

data collected by palaeontologists and geologists, the archeologist can also classify his specimens to their periods. Arrangement of these objects in linear form according to periods will then identify the most advanced from the primitive ones: this then will contribute yet to the whole idea of establishing man's evolution because, as man evolved the more sophisticated so did his tools.

The Mahatman Gandhi Hall on the first level of the National Museum in Nairobi, has got a quite elaborate collection of man-made tools which have been displayed according to their periods, besides a geological display that vividly explains the whole theory behind archeology.

Incidentally, it is in this same hall where

casts of all the fossils are displayed, including the latest, the so catalogued '1470 man' who caused a controversy last year in the world of anthropologists.

This hall is exclusively for the display of man's evolution. Any preliminary research about these artefacts was done at the existing centre for prehistory and palaeontology, otherwise the rest was done abroad, where facilities are available. At this juncture, it may be necessary to mention that all the originals are deposited with the banks only the cast are left to be handled by the public, but in the proposed institute, there will have to be provided maximum security so that these invaluable artefacts can be stored without fear of loss.

Department of (Palaeo)anthropology.

Palaeoanthropology is the study of ancient science of man. This discipline is divided into two major branches, even though to a certain extent, they compliment each other. These are the physical anthropology and the cultural anthropology.

Physical anthropology is a discipline which deals with:-

- a) man as a biological organism in the past and the present; this calls for a lot of comparisons between fossils from different periods, trying to form some kind of a sequence as to how man evolved biologically.
- b) using information from (a) above, this discipline seeks to establish steps and processes which brought about the existence of the human being as he is today; this to a certain extent seeks the merits and demerits of the theory of evolution.
- c) it also seeks to establish the nature or variation within the human being, again

with reference to (a) above and any valid theories which have been put forward

d) it is also a study of the anatomical and physiological characters of the human being, both in the past and the present comparing the two, this being where archeology may be very useful.

e) the evolution of the human frame.

The other major division of anthropology is the cultural anthropology, whose field of operation can be briefly described as:-

a) that disciplines which deals with the behaviour of man and the products of his behaviour. As mentioned previously, man was a tool maker, it is this discipline which seeks to relate man's behaviour to these impliments, producing as it were, a progressive chart as to how man evolved his technology, and

b) culture, the man-made part of the environment at this point one cannot help thinking of present day cities not to mention the simple dwelling at the micro-scale, however, this discipline deals with the more older fashions of culture, which may lead again to the present day confusion; from the cave to the skyscraper.

It is, therefore implied above that physical anthropology deals mainly with the fossils. Fossils being the remains or traces of former living plants and animals, which are found in rocks which often take the form of mineralize bones. although feathers, wood, leaves, fruit and insects are also found. But more specifically, the fossils of man. Cultural anthropology then deals with specifically the artefacts and the environment where they are found, this could be stone tools found in a cave etc.

Cultural anthropology is therefore, very closely related to archeology.

The most important things in the department of archeology is the fossils and the artefacts; unlike any other specimen, these ones require special attention:-

- a) these fossils and artefacts take a number of straineous years in adverse climate to find. They are invaluable and irreplaceable; this calls for maximum care possible. In fact the practice has been to deposit them with banks. It is therefore, implied that the need for a strong room cannot be overlooked as well as its relation to the rest of the building as regards security.
- b) when it comes to their storage, it must be such their visible but possible to be handled by untrained persons, this then does suggest some kind of glass display. These precautions are necessary because these specimens are very delicate and it could be disastrous if they got broken, because assembling them is a process that takes months of skilled craftsmanship.
- c) fossils are composed of minerals which in the cause of time and weather-changes, have replaced the original bone. This process only takes place at particular places where the mineral composition and climate are favourable. It is therefore, important when these fossils are brought for storage that the same weather conditions are maintained. This is possible by use of air-conditioning since this one can be ajusted to give the desired conditions.
- d) casting of these fossils must be done by very qualified personnel and if necessary, it should be done in a separate room to avoid any damage by carelessness or accidents as a result of too many people

and activities going on in one room.

The existing centre for prehistory and palaeontology does not offer facilities for a department of anthropology. The original are deposited with local banks for safe-keeping while their casts are open for research, either locally or abroad, where the technology is available. Sometimes, it has been necessary for the specimen to be taken to Europe, this has been done, usually under the personal care of its owner. emphasising once more how important these specimens are. A cast of the recently discovered skull I470, can be seen at the Mahatma Gandhi Hall in the National Museum.

Department of Palaeontology.

Palaeontology, is the study of fossils, which are the remains or traces of former living plants and animals. These take the form of mineralized bones and teeth, although feathers, wood, leaves and insects are frequently found. They are usually found in rocks.

Maybe it is important at this point to discuss briefly, how these fossils are formed, which will explain why the fossils especially those connected with man's evolution, must be preserved as mentioned earlier on.

Certain conditions must exist if bones are to become fossilised. This means then fossils cannot be found everywhere. The bones must be protected from the normal process of decay which occurs when bones are exposed to air. For bones to be fossilised, they must be covered by either air-borne soil, or sand or more frequently by water-borne material. It is essential

however, that the bone should be buried in the right kind of medium. an acid soil will quickly destroy a bone. Lime soil is very important for preserving bones. Once the bone is in the right medium, the soft parts decay, producing in the process such minerals as carbon dioxide, ammonia and water. Loss of these materials leaves pores in the bones, which water from the soil penetrates. This soil water contains mineral salts such as iron, calcium and manganese compounds. Seasonal drying out of the soil and consequently of the bone, causes the water to evaporate leaving these minerals in the bone. Eventually, the bone gets replaced completely by the minerals.

These fossilised remains can then be used to indicate past climate and vegetation because different animals tend to be confined to different habitats. This may give a clue as to whether man lived there and what kind of life he lead. The fossils also provide evidences as to how groups of animals evolved. This then requires the expertise of a geologist to tell at what levels the fossils were found; here level reffers to geological layer of soil.

Unlike the department of palaeoanthropology, which deals only with the fossils related to man's evolution, it is apparent from above that the department of palaeontology takes a more wider perspective regarding evolution of all living animals. It should be noted at this juncture that this department is very closely related to the department of osteology to be discussed later.

A lot of casting takes place in this department so as to facilitate research. It is a department which attracts a lot of scholars. Other than confine these scholars in the institute casts are made available to them so that they can study them else where. It is also a department which produces casts for exhibitions in museums.

Normally, the size of the fossils may vary from about 1mm speck to the size of elephant bones: which also vary in sizes. This does bring storage problems but these are normally overcome by storing these fossils in numbered pieces.

The department of palaeontology is well established with a fair collection of fossils. Unfortunately, these collections are scattered all over in the research rooms (see site plan and photographs 9 to 14 inclusive). This is the department which provides the casting facilities (photographs 12, 13 and 17). However, these facilities were forced into an existing building as a result, the working spaces are not efficient. Many amenities are lacking like worktops, sinks in the research rooms. These research rooms are also very crowded leaving very little room for work. One research fellow I interviewed said that he feels that a research room should be a space with a storage space for a sizeable number of fossils, probably shelves on one side of the room, and a similar allocation for books. He felt very strongly that there should be at least a worktop with provision for water and power points. Also he said that there should be a work desk which can be used by at least a panel of

SEE SITE PLAN AFTER
PAGE 53

four scholars, a researcher, his assistant, one or two supervisors or experts. And finally, he felt that facilities should be more closely related than what they are now. For example, to make a cross reference between the department of palaeontology and that of osteology has to work a fair distance, besides, it might mean carrying valuable specimens, hence exposing them to unprecedented danger of losing them.

Department of Geology.

Geology is the study of earth's evolution in broad terms. The earth's surface is constantly changing especially when a storm, an earthquake or a volcanic eruption takes place. There is also the factor of slow but constant moving away and depositing of materials over the earth's surface. It is this fact which makes it possible for ancient objects to be preserved and found later. Sand or soil covers them and later, due to those factors mentioned above, particularly soil erosion are uncovered.

A geologist can interpret the history of an area from the rocks, drawing pictures of past lakes desert conditions and the like: generally known as geomorphology. As the rocks of an area are studied, the fossils collected and the complicated structure unravelled, there emerges a coherent story of that area extending back hundreds of millions of years. New clues are always being found in the field, in laboratories and in writings of other geologists. This uncovers the evolutionary history of our planet the life it bears..

At this point, I feel it is necessary to point out that the intended geology is

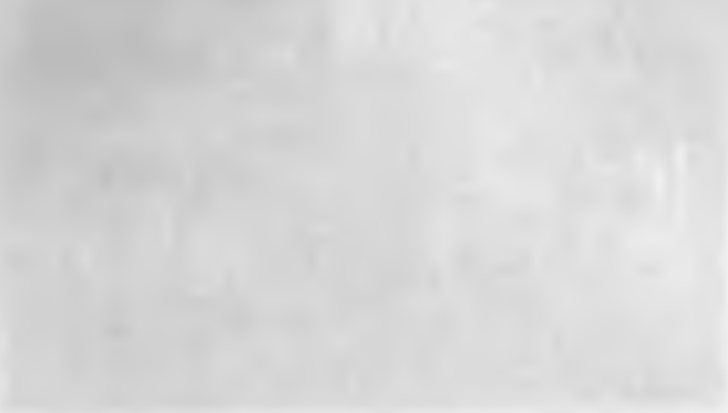
not meant to be a complicated as it may sound. What the client has in mind is a place where a qualified geologist can work. The work of this geologist being some kind of liason officer between the institutes's researchers and other geologist who have got the facilities and knowhow to interpretate the history of the historical sites. What is therefore, required is a simple laboratory for preliminary analysis comprising of work-top, sink(s) and storage area. An extra room is also required where maps can be displayed and where the geologist can meet researchers. This department is therefor more of a reference section than of research. It has not been existing; any necessary reference was made elsewhere.

Department of Osteology.

Osteology is the study in anatomy of the structure, both gross and minute, of the bones and skeletons. This department deals mainly with the collection of all kinds of bones of living animals as well as extinct where possible. Like the geology department, the department of osteology offers reference facilities especially when it comes to the study of fossils in the departments of palaeontology and anthropology. It offers an invaluable collection of bones and skeletons for students of biological sciences.

Like the department of palaeontology, this department is already well established (see sketch I and photographs' 9 , 13 16 15 and 16 and also the site plan). It is homed in a two-level concrete blocks double-pitched block. The department has got a team of hunters who go out in

the bush to kill animals or even collect bones, prepare them and then hand them over for safe storage.



9

CENTRE FOR PRE-HISTORY
AND PALAEOBIOLOGY
9. OSTEOLOGY BUILDING
10. PALAEOBIOLOGY
BUILDING
11. RESEARCH ROOMS
BUILDING



10



11



03. case studies



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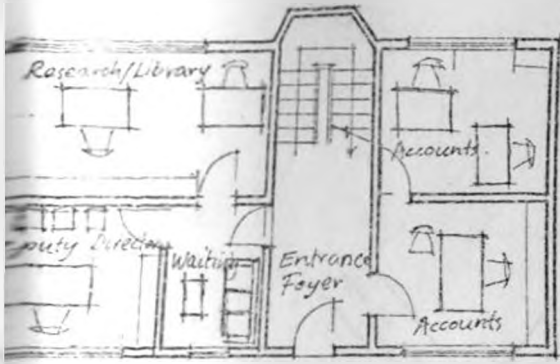
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CASE STUDY.

The Centre for Prehistory and Palaeontology.

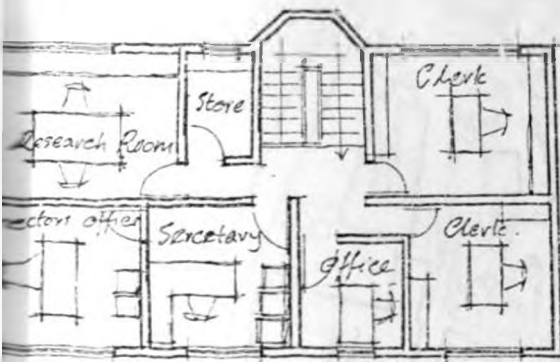
Site layout.



GROUND FLOOR

This section should be read in conjunction with photographs I to I4, the site plan and sketches IA & IB. The whole complex of the centre together with its administration are located at the back of the National Museum after the Institute for African Studies' building of the University of Nairobi. (photograph 7); and the Herbarium (building belonging to a research body of the East African Community. (photograph 8) This makes the centre completely invisible from the front. One only sees the Museum building and it is quite a task finding your way to the centre because there are no defined paths. It is, however, a well wooded site, making it a fairly cool area.

Administration block.



FIRST FLOOR

This is a two level stone block double-pitched roof building housing the administration section of the Museum and the centre. Like all the buildings housing the Centre, this one was also adopted for the purpose of administration. No one really knows what this one was particularly intended for. The fact is that it is not enough for the expected staff, leave alone its architectural weaknesses.

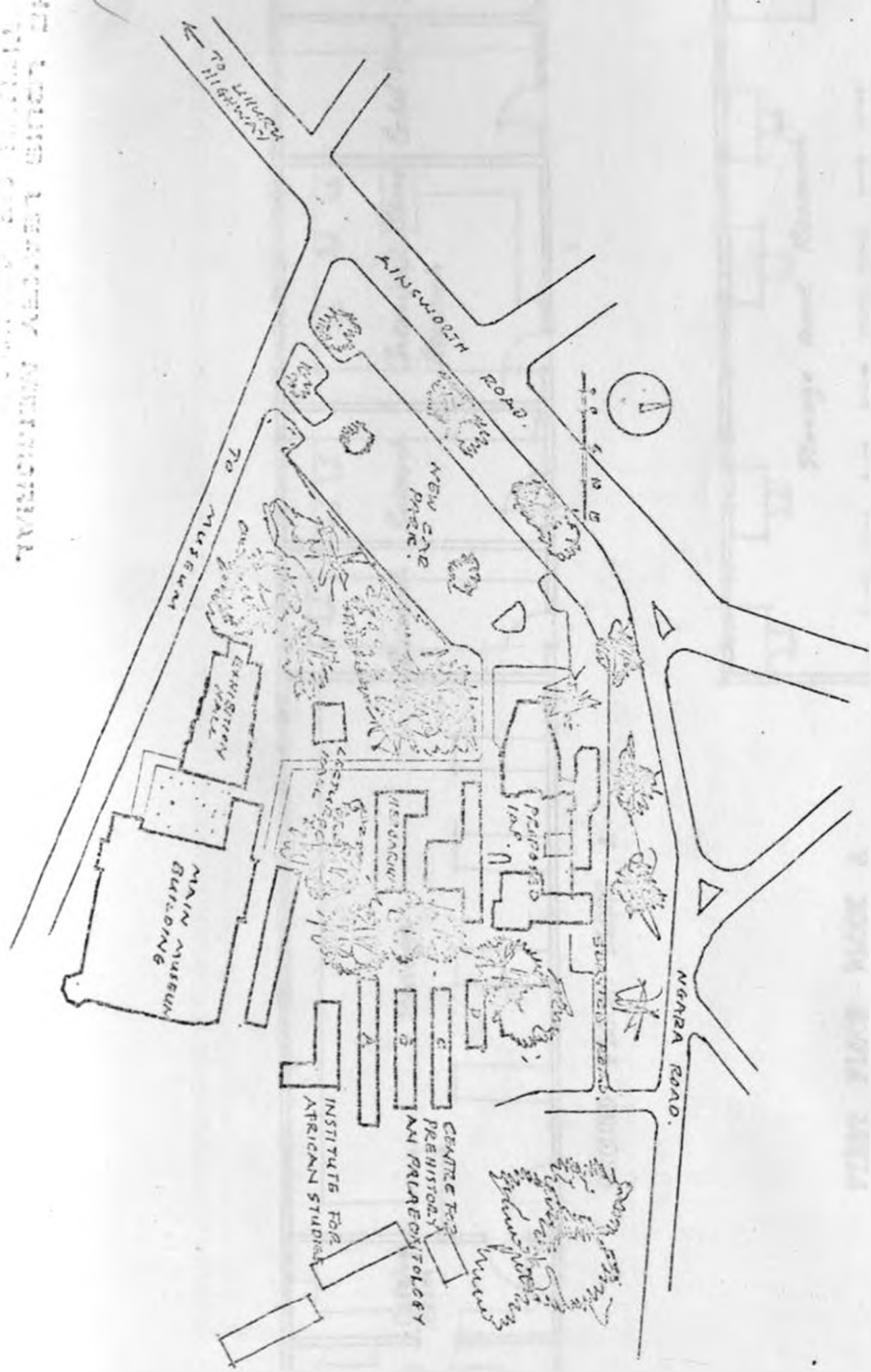
ADMINISTRATION BLOCK

SCALE : 1 : 200

On the first level, are to be found the deputy director's office, a research room (some kind of a library), a waiting room and two offices used by the accounting staff.

The second level houses, the office of the director of Museums who is also the director of the centre. The director contents that his office area is too small for

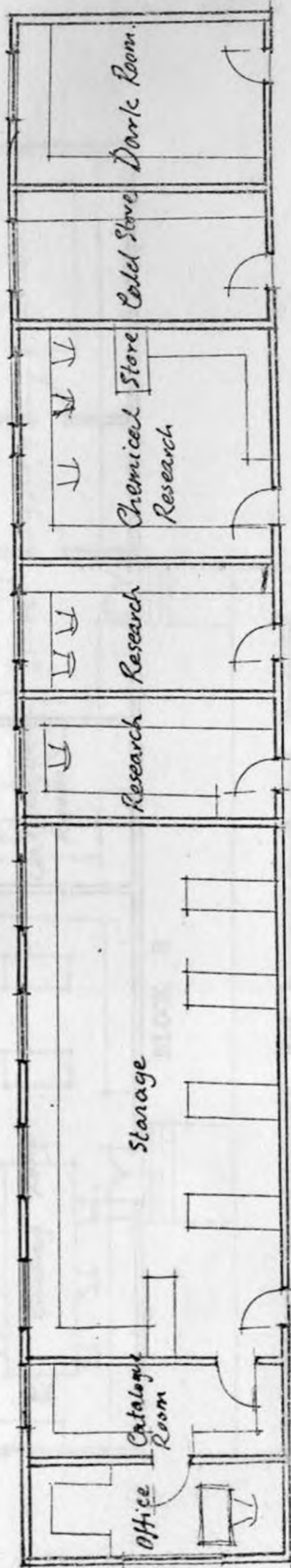
THE UNIVERSITY OF CHICAGO
MUSEUM OF EAST ASIAN STUDIES



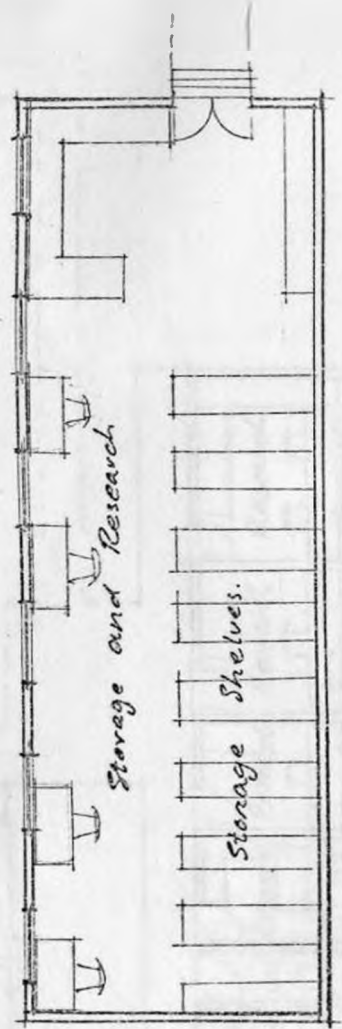
UNIVERSITY OF CHICAGO

SKETCH IA.

SCALE : 1 ; 200



GROUND FLOOR BLOCK A

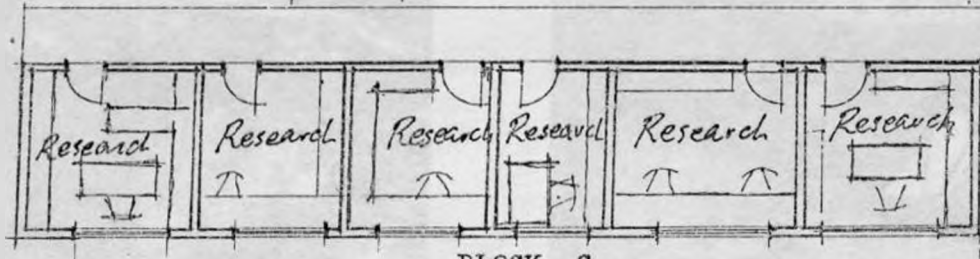


FIRST FLOOR BLOCK A

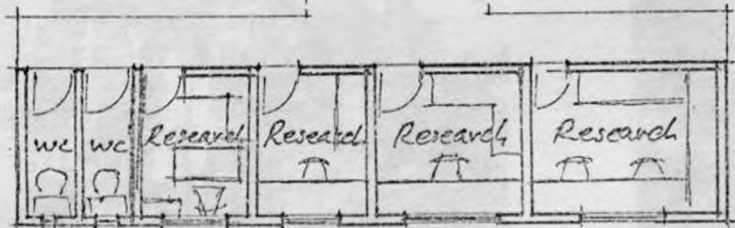
POSITION OF BLOCK A



BLOCK B



BLOCK C



BLOCK D

SKETCH
IB:
SCALE : 1 : 200

12

CENTRE FOR PRE-HISTORY
AND PALAEOZOOLOGY
12. PALAEOZOOLOGY AND
RESEARCH ROOMS BUILDINGS
13. OSTEOLOGY AND PALAEO-
ZOOLOGY BUILDINGS
14. RESEARCH ROOMS
BUILDING



13



14



his liking. Attached to his office are the secretary's office, and the directors research room. A part from these, there are two more clerical typists' offices and a store on this level.

Construction - the building is constructed with nairobi-building stone which forms a 250mm thick load bearing system. The roof is a timber construction with mangalore tiles. Internally it is finished with cement, plaster and soft board ceiling. General colour is in the shade of light cream.

Environment - a cool working place, probably because of the shading provided by the trees; although it can get a little cold during the month of December, making it necessary to use heaters. It is also dark sometimes which may mean extensive use of artificial light. The neo-classic ceiling height, gives the rooms some kind of openness which gives the impression of lack of privacy.

Below is a description of some of the offices, the furniture and the user reaction:-

Office of the Director - $5 \times 4 \text{ m}^2$..

This is a carpeted office whose furniture includes, a confidential file cabinet, bookshelf, a working desk, two visitors chairs. This office is directly connected to the secretaries/receptionists office and also to a research room cum library which the director uses for his research. (this and the other research rooms on the first level are in this building because of lack of space elsewhere). The director's reaction is that a more generous office would be more appropriate for his efficiency - this should provide a table that he could

use for up to four persons committee, there should also be a soft area where he could meet people without having to sit at his table, probably another four easy chairs.

Secretary/Receptionist Office $4 \times 4 \text{ m}^2$.

This is a well positioned office in relation to the director's office, but a bit too open to the public, the size is adequate if only another waiting space could be provided outside or the office expanded and also cut away from direct public because it is a busy office: those were the feelings of the secretary. Furniture included a typists' desk, stationary container, file cabinet and two visitor's chairs; more chairs were required.

Deputy director's Office $5 \times 4 \text{ m}^2$.

Although same size as the director's office, which according to the user was adequate, the floor was not carpeted, this could have made it more attractive. Furniture included a working desk, two visitor's chairs and a file cabinet. The user felt he needed at least two more chairs for visitors. Unlike the Director he did not have a secretary which he felt was a necessity especially for controlling people's movements to his office. This would give him some privacy for conducting his work. His office opens directly to what should have been the secretary's office, but now used as a waiting area.

Other Offices. $4 \times 4 \text{ m}^2$ and $5 \times 4 \text{ m}^2$.

These include offices for clerks, accountancy and typists. These offices have got the basic furniture for the functions; these include working desks, filing cabinets and visitor's chairs. Some of the offices are the right size while others are slightly

oversize, the later category may include
 • an office $4 \times 4 \text{ m}^2$ used by a clerk. This
 could be very easily shared, otherwise
 the user's reaction was generally positive.

General - office relationship was not
 very good especially when some of the of-
 fices are exposed to the public when they
 should not. The director and his deputy
 should be more closely related. A more
 close relationship of all the offices would
 be more effective.

SEE PHOTOGRAPHS

9 TO 14 INCLUSIVE.

I Blocks A, B, C, and D.

In this section, I will deal with these
 four blocks as a group, because when
 taken together form an architectural entity
 which to a certain extent performs the
 same functions which the proposed institute
 will perform. The major difference will
 however, be the fact that while the exist-
 ing centre houses the functions in different
 blocks, the proposed institute would house
 all the functions under one roof. The
 four blocks are located on a site which
 slopes northwards and eastwards. The
 second level of block A is approached
 straight from the ground without the need
 for steps (see section). Vehicular approach
 to these blocks is only possible from
 the eastern end although still very
 difficult because of the slope. There was
 evidence that this is where the collections
 are brought. Below I briefly deal with
 each block in general and later discuss
 the processes in detail.

Block A.

Location - This block composed of two
 levels located on the upper side of the
 slope, next to one of the main Museums
 buildings. The upper level is approached
 from the ground level because of the slope.

to get to the first level one has got to go down steps. As will be noticed on the sketch, it is directly connected to the other blocks by small paths, it is also easily approached from the administration block.

Function - The major purpose of this block is to house the Osteology collection. These are to be found mainly on the second level. There are a few research rooms, a cold room, collection reception room and a small dark room for minor photography.

Construction - This block is constructed with concrete blocks, and a double pitched roof finished with clay tiles. Inside cement plaster is used, finished with white paint. Metal glass windows and wooden doors are used. This is a fairly new block compared with the last two C and D.

Block B.

Location - This block is located between blocks A and C. There is no direct connection between this block and block A, probably because they have little relation except for the casting section which is in this block. The block has got two entrances from the lower side. These being in direct connection to the research rooms in blocks C and D. Connection between this block with C and D is by means of a paved covered path. Connection to block A and the administration is by means of unpaved and uncovered paths.

Function - This block has got three major functional sections (a) casting section (b) cataloging section and (c) storage section. The storage section contains collection for palaeontology, anthropology, geology and archeology. It should, however be noted, although these are fossils

they are the ones which are not very important because the important ones are deposited with banks as mentioned before. There is also a store for the field equipment at the eastern end of this block.

Construction - Like block A, this one is also constructed using the same materials. In fact they were constructed at the same time. One thing about this block is that an extensive use of windows was apparent especially for the casting sections where adequate light is very important.

Block C and D.

Location - These two blocks are at the lower end of the site. They are joined to block B by a paved covered walk-way while they join block A and the administration by unpaved walk-way. Block C is on a lower level than block D and block B. Therefore, steps are used for the connections.

Functions - These two blocks mainly provide most of the research rooms for the centre. It is also here where toilets are found in block D. Collection storage in the research rooms was also evident: this probably because of lack of space again.

General Processes.

In the centre for Prehistory and Palaeontology, there are processes which are common to all the departments. These include field work, reception and/or preparation of collections, and storage of the same. Other activities which take place in the centre once the collections are in store are casting, photography and/or X-raying (these being necessary for exhibitions publication and intensive study of bones) and of course the process of research.

Next page is a diagrammatic representation of these activities and processes while below I describe them in detail as observed from the centre.

Field Work.

Although this activity is not particularly important as a design determinant. it is important to mention what goes on in the field so as to establish what equipment are used, the field work involves many months of camping while travelling here and there looking for excavation sites. This then requires the use of the following equipment:-

- a) camping gear, tents, furniture, household equipment, working tables and chairs etc.
- b) excavating equipment, jembes, pangas, hand axes etc.
- c) transport equipment, motor vehicles, wheelbarrows etc.

As already mentioned, there is an existing store in block B which is about 40 m^2 , this is not enough, because

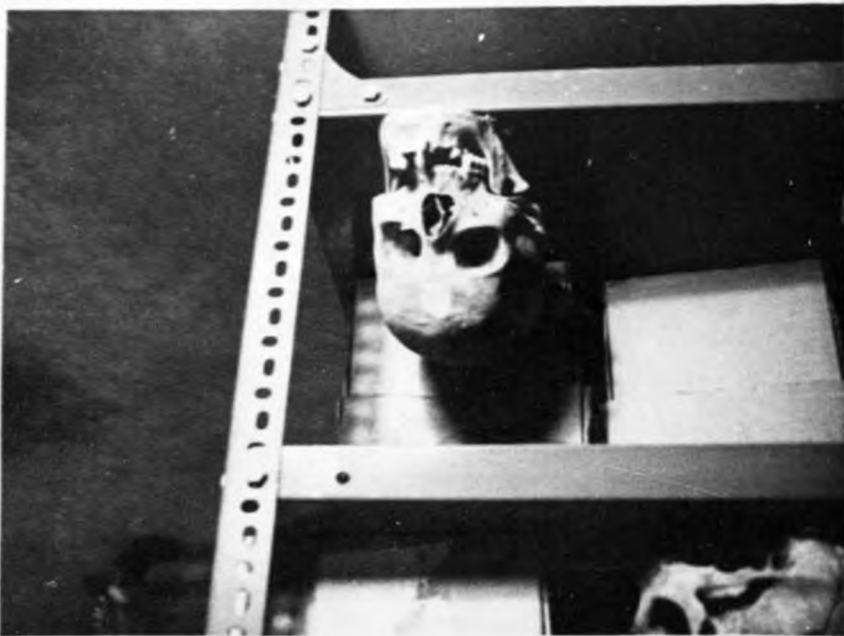
- a) a lot of equipment is kept by the research personnel either because it belongs to them or there is no secure place to store them.
- b) since the number of equipment may vary from time to time according to the number of researchers being carried on experience has shown a store of over double (10%) the size of the existing one will be required.
- c) the Institute hopes to acquire its own equipment for research.

Specimen Preparation.

Sometimes the specimens from the field may not be dry (especially for the department of osteology). So what happens is



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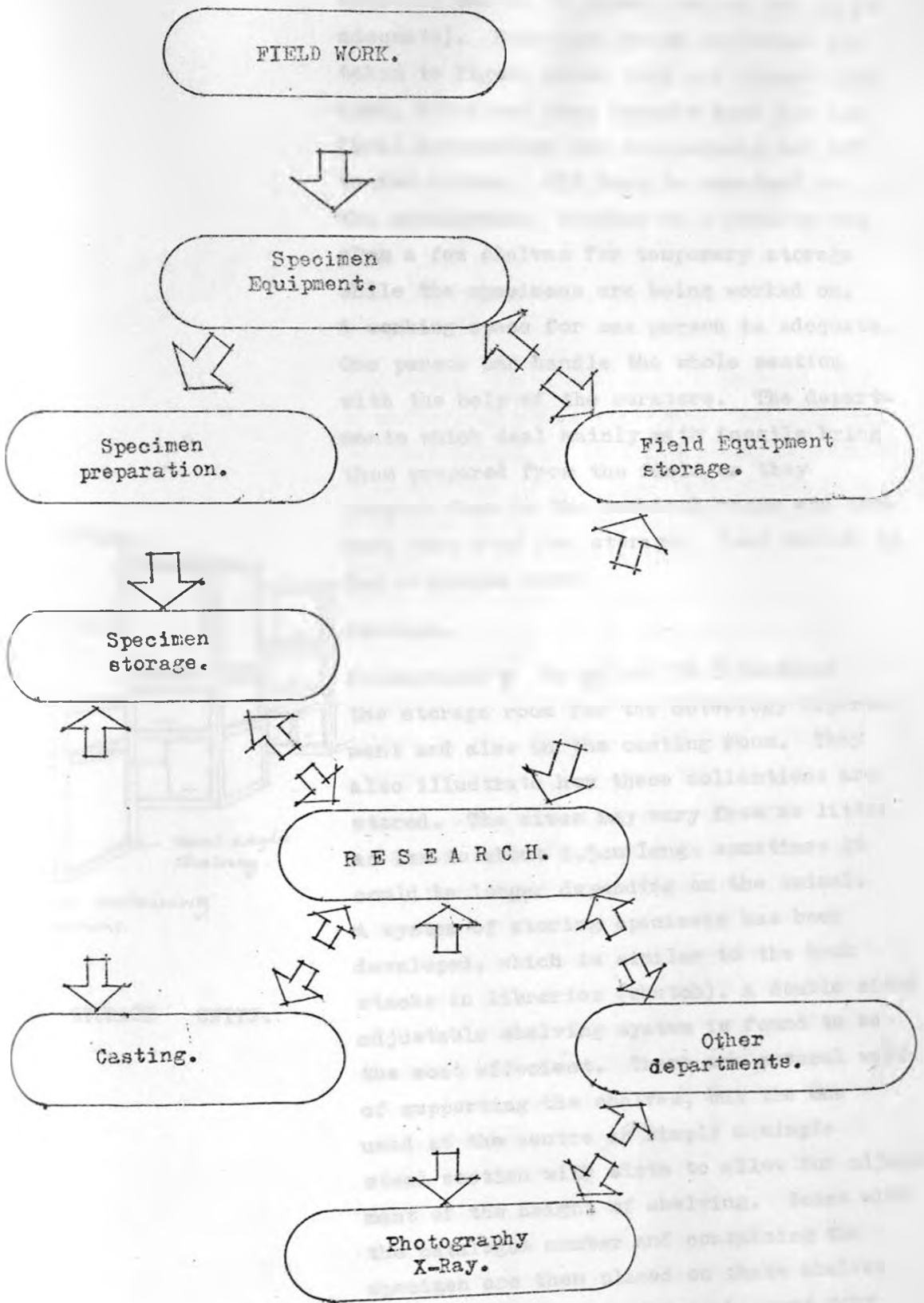


16



15

AGE AND CASTING
STORAGE SHELVES IN
BIOLOGY DEPARTMENT
CLOSE-UP OF STORAGE
CASTING ROOM



GENERAL PROCESS RELATIONSHIP.

that they are put in a cold store (the existing one is 24 square metres and it is adequate). From here these specimens are taken to Tigoni where they are cleaned and dyed, dried and then brought back for the final preparation and cataloguing and off to the stores. All that is required in the cataloguing section is a working top plus a few shelves for temporary storage while the specimens are being worked on. A working space for one person is adequate. One person can handle the whole section with the help of the curators. The departments which deal mainly with fossils bring them prepared from the field or they prepare them in the research rooms and then hand them over for storage. (see sketch IA for catalogue room)

Storage.

Photographs 9 to 15 and 16 illustrate the storage room for the osteology department and also in the casting room. They also illustrate how these collections are stored. The sizes may vary from as little as 1mm to about 1.5cm long: sometimes it could be longer depending on the animal. A system of storing specimens has been developed, which is similar to the book stacks in libraries (sketch). A double sided adjustable shelving system is found to be the most efficient. There are several ways of supporting the shelves, but the one used at the centre is simply a simple steel section with slots to allow for adjustment of the height of shelving. Boxes with the catalogue number and containing the specimen are then placed on these shelves in certain order so that it becomes very easy to locate a required specimen.

The existing shelving system is a bit



COLLECTION STORAGE UNITS.

narrow about 600 mm wide, forcing some of the boxes to protrude into the corridors which are about 900 mm: this making it difficult for two people carrying specimens to pass each other. If the shelves could be about 1000 mm wide, leaving another 1000 mm between them this would then provide enough space for two persons to pass each other comfortably. This also offers flexibility for the varying sizes of collections.

Presently, the shelving is supported at 2 m centres by steel angle sections. These shelves extend up to the ceiling necessitating the use of a ladder (see photos I5 & I6) One other very important property about bones is their weight, at between 1760 to 2000 kg/m³, compared say with books on shelves at 64 kg/m³ or concrete at 2240 kg/m³ it will be found that they are fairly heavy and a lot of consideration must be given to any structure which is meant to carry them.

Environmental conditions - it will be noticed that these collections are kept away from the side with windows, because the micro climate next to the window, varies very much especially the temperature, this may affect the specimens, sometimes breaking them. Hence the storage area has been kept on the side without windows. Damp atmosphere must be avoided. The side with windows can be used as the working area. Artificial light is extensively used for lighting the storage area. (photograph). With the very important fossils like I470 man, these must be stored in air-conditioned rooms maintaining the same climate conditions as in the field. All the stores must be strong enough as well

as guarded from public interference especially so when it comes to rare collections.

THE CASTING PROCESS

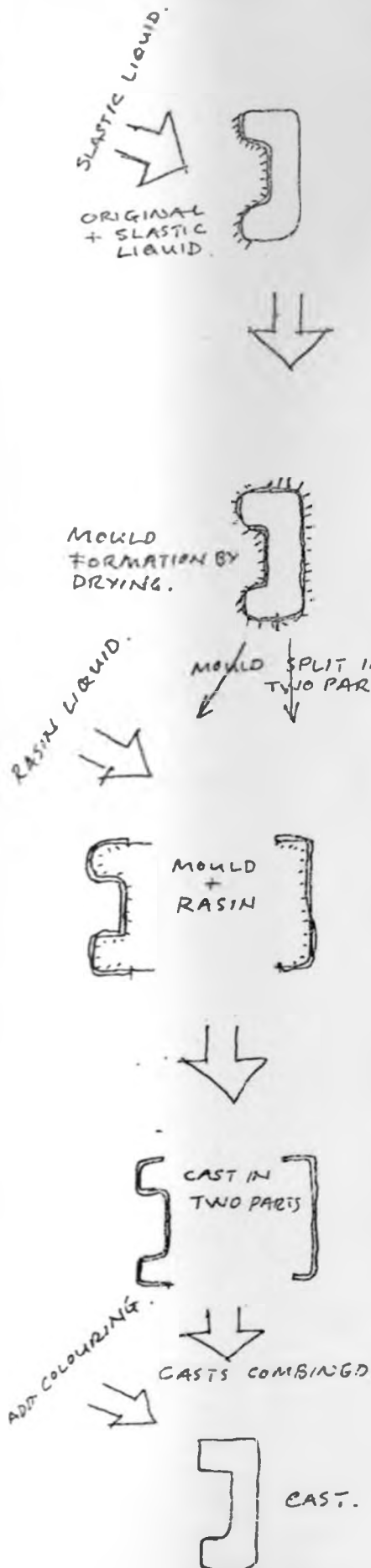
The following table gives the estimated storage area giving allowance for future expansion. These figures are established by use of the existing collection plus a certain percentage for expansion. The areas also include working space inside the stores.

Department	estimated area m ²
Archeology	500
Palaeoanthropology	70
Palaeontology	800
Geology	25
Osteology	1200

The existing storage areas are best expressed by the sketches: however, these are in a very disorganized condition especially in block B where a mixture of palaeontology, archeology and geology are put in one place. Collections will also be found stored in the research rooms.

Casting.

This is the process where replicas of the originals are reproduced. These replicas are then used for research, and exhibitions, the latter usually for museums. This process is similar to photography where a negative is made which leads to the positive or the finished product. Photographs I & II illustrate the scene in the casting room. Casting is a skilled profession. When I was there I was told it can take up to five years to master the profession. A team of technicians are engaged in this process. The diagram on this page describes what goes on in this room.



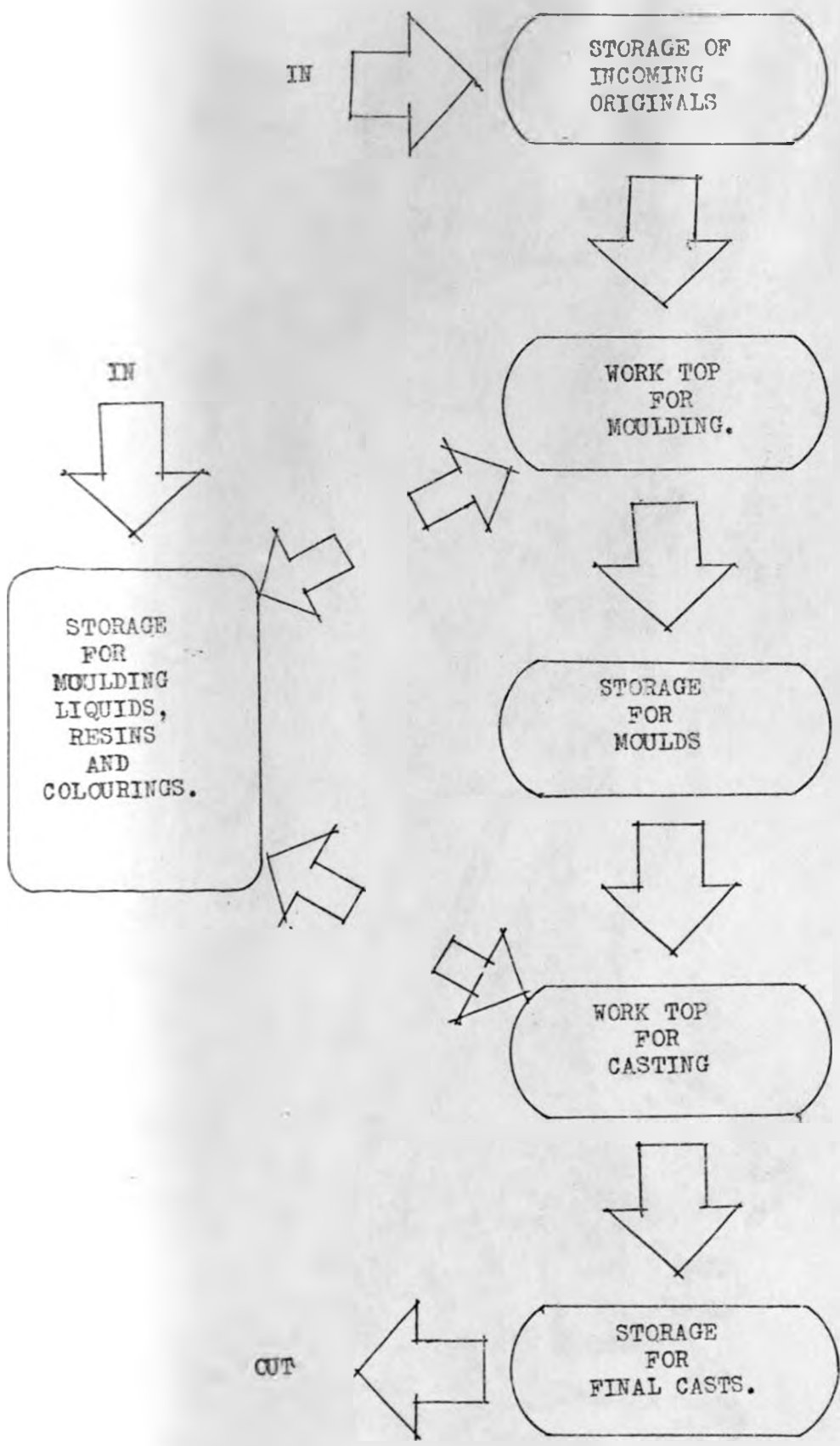
Mould or the negative-

A liquid which comes in tins and by the brand name Silastic liquid, is smeared on one half of the original. The same thing is also done to the other half so that when the liquid hardens, two halves of the original re produced in the negative form; technically known as the mould. When this liquid hardens, it looks like fibre-glass. It is then from these moulds where the final cast is made.

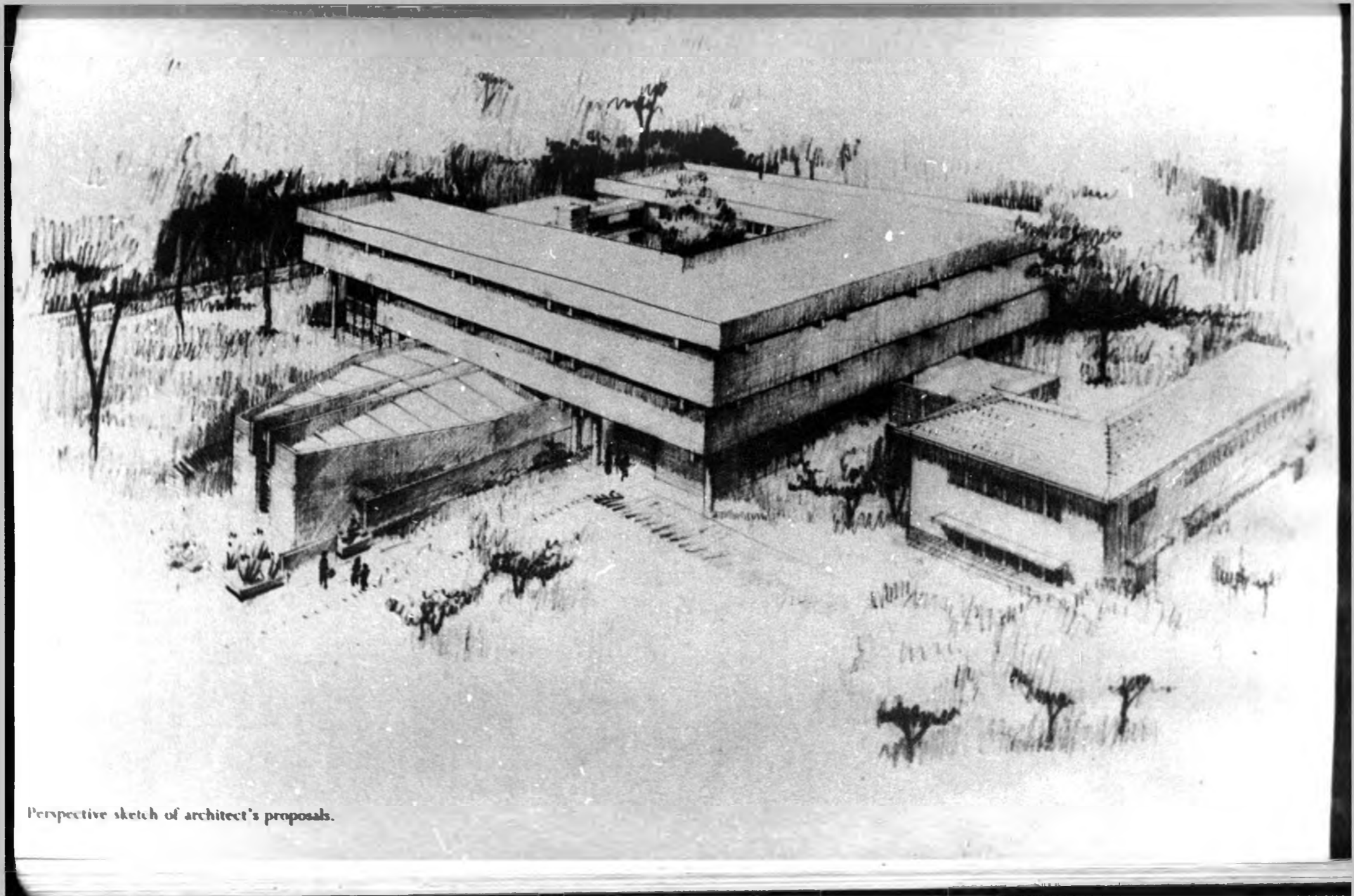
The cast or the positive - by a similar method but this time using a different liquid or resin, two positives are made. These tow are joined to form the cast which resembles the original in detail but not in colour. This is later achieved by selective use of special colouring making the final look exactly like the original.

Casting room - the existing casting room is littered with tins, originals, moulds and finished casts. This is because there is not adequate storage facilities. One can almost imagine a process that follows closely the various activites and processes to avoid this untidy atmosphere. Next page is an illustration of such a process. Furniture in this room includes a worktop with two in-built sinks, a working table in the middle of the room and finally storage shelves which seemed to be full of collections.

In spite of the extensive use of windows to give maximum natural lighting, I observed that artificial lighting was still necessary. When I asked the staff why they had to use that much light, they replied that it was because of the high degree of quality required in producing the casts. Eight



CASTING ROOM ACTIVITY RELATIONSHIP.



Perspective sketch of architect's proposals.

people worked in this rooms which to me seemed to be a little crowded or may be this was because of poor organization of the processes. Ventilation was adequate due to the extensive use of windows.

SEE PLANS ON THE FOLLOWING
THREE PAGES AND THE SITE
PLAN FOLLOWING PAGE 53.

The proposed IAP

Location

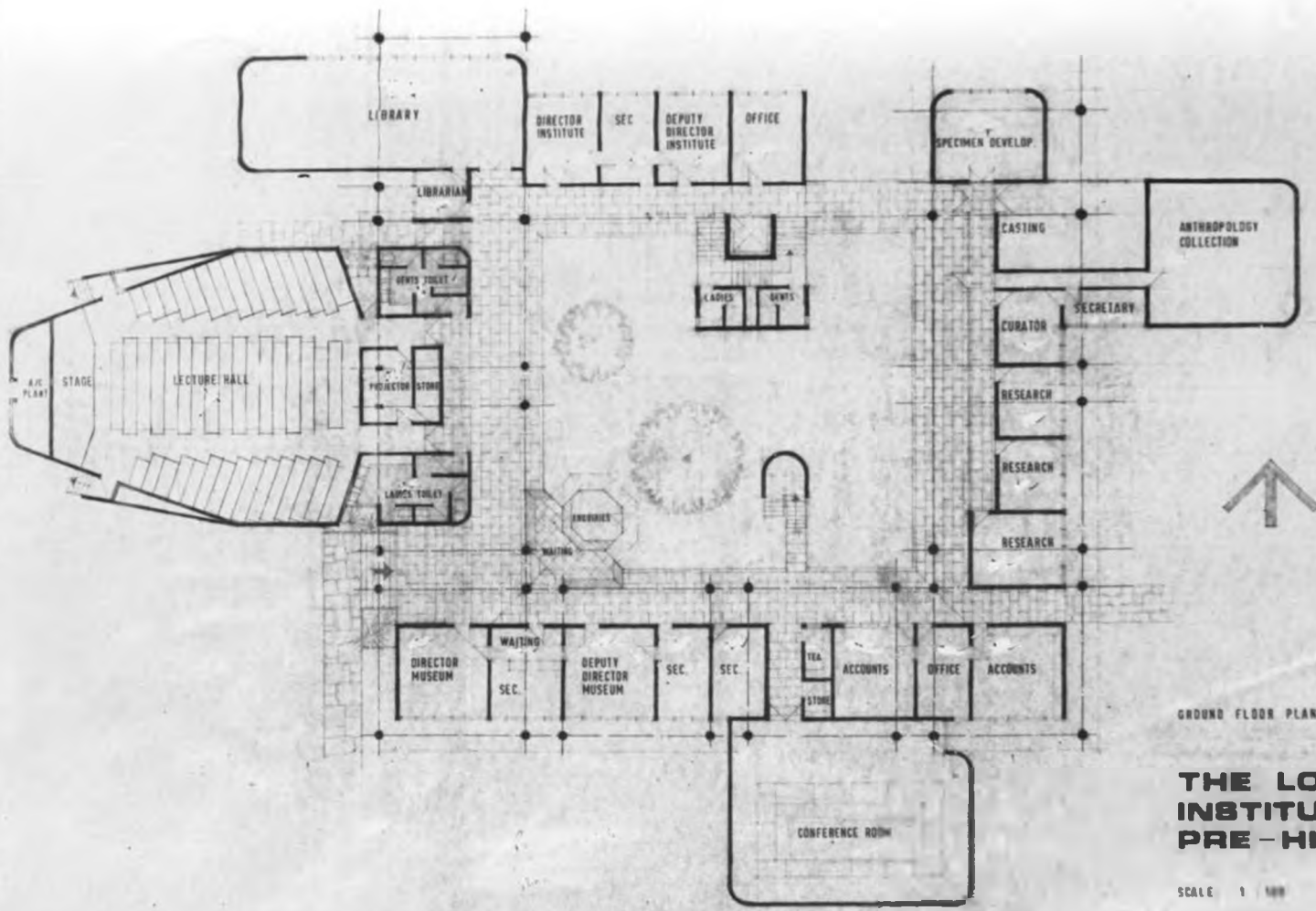
This new institute will be located next to the existing centre for prehistory and palaeontology. a well wooded part of the National Museum (see site plan) ground close to the city centre and a few metres from the University of Nairobi campus. One can get there either by Ainsworth road through Kenyatta Avenue the Ngara road via Globe Cinema.

Site Layout.

Perhaps one of my major criticism about the location of this Institute is the way the architect seems to have sacrificed what I consider would have been a more appropriate location and instead located a car-park there: a less important function though still necessary. This may have occurred probably because of two major reasons:

a) wanting to locate the Institute building next to the existing casting facilities which the architect could not provide due to unavailability of funds.

b) difficulties in trying to locate the carpark on the more steeper side of the site. I feel, however the significant of this institute, which should be some kind of a land-mark, has drastically been minimized by merely locating it behind the rest of the Museum buildings. It takes a secondary place when it could have made one of the leading building designs in the Museum complex. One can almost imag-



GROUND FLOOR PLAN

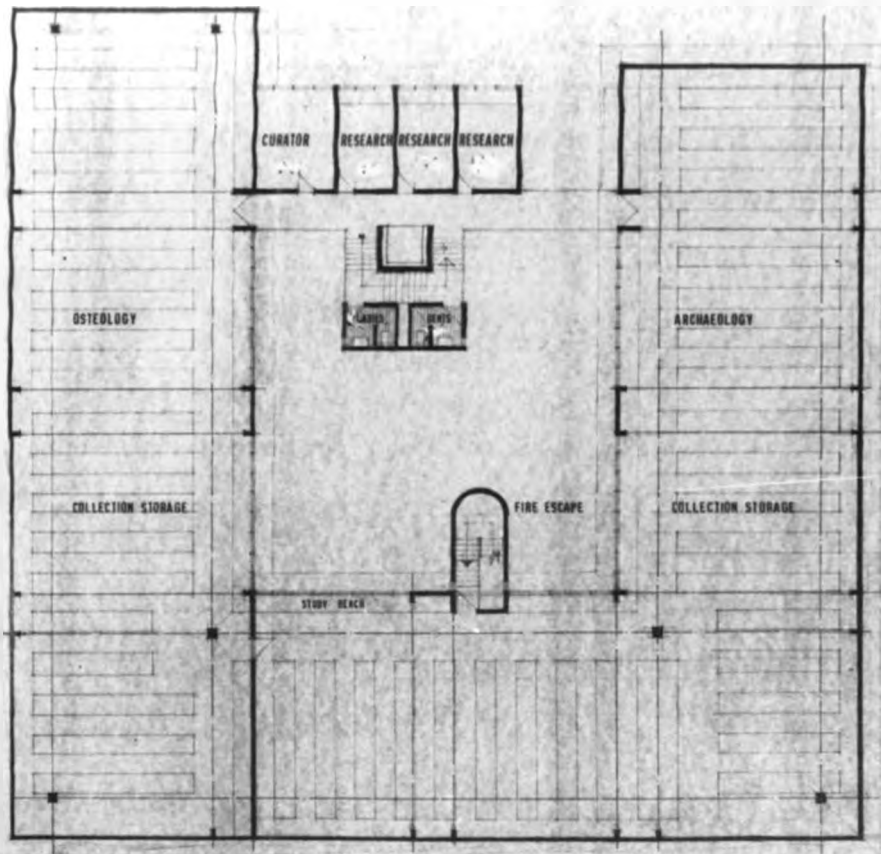
**THE LOUIS LEAKEY MEMORIAL
INSTITUTE OF AFRICAN
PRE-HISTORY**

SCALE 1/100

006 N. 395/25.

3rd SEP 1973

DALGLISH MARSHALL ARCHITECTS
P O BOX 42070 NAIROBI



SECOND FLOOR PLAN



THIRD FLOOR PLAN



SECOND FLOOR PLAN & THIRD FLOOR PLAN

**THE LOUIS LEAKEY MEMORIAL
INSTITUTE OF AFRICAN
PRE-HISTORY**

SCALE 1/800

DRG No. 395/48

3rd SEPT 1973

BALOGESH MARSHALL ARCHITECTS
P. O. BOX 4277, NAIROBI

ine a situation where the visual impact has completely disappeared, when it could have been otherwise pronounced by merely locating the building more ostentatiously. Locating it at the back of the Museum - complex reduces its socio-economic and academic character. It should, I feel be one of the major attractions among the Museum's exhibitions: after all, it is supposed to be some kind of a monument. Especially when the National Museum is probably the one single greatest tourist attraction - a foreign exchange earner. This fact alone should be fully exploited to advertise this institute to the rest of the world, after all Dr. Leakey was famous all over the world. Or may be the architect did not consider these facts, which to him may have seemed unimportant, but to me they make all the difference, leading to an entirely different architectural solution.

The building.

This building (see plans) is in a form of an enclosed courtyard, sited in detail to retain as many of the fine indigenous trees as possible. Again an unnecessary limitation which renders the building devoid of any architectural vocabulary. The external appearance gives the impression of an unrelaxed atmosphere reminiscent in some 19th Century architecture. The lecture hall, the library, the conference room and the anthropology store give the impression of an after thought or inability to produce an integrated architectural solution. A more open planning approach could have incorporated these units without necessarily interfering with the courtyard idea. The main entrance to the building is invisible and it is anyway tacked between the lecture

hall and the director's office at the bottom right hand corner. with no emphasis whatever.

Planning Macro and Micro.

The natural slope of the site allows a small basement for specimen reception rooms. initial preparation area, field equipment, store, photolab, etc. to be inserted under the corner close to the proposed service access from Ngara road. A single goods lift and staircase connects the basement to all other floors. it is also intended to serve any future extentions.

The only general public access to any part of the building is situated between the lecture-hall and the offices of the director and his secretary, thus forming a control point. The architect is trying to separate the public, the semi-public and the private functions of the Institute but this specification does not of necessity mean the apparent confusion from this design. However, the author seems to have succeeded, to a certain extent, on the ground floor, in grouping similar functions together: lecture-hall and library together; research rooms and storage together while the administration is next to the entrance;; but he has failed completely to resolve vertical communication which is just as important. Apart from their unequal size, and their unarchitectural appeal, two staircases suddenly appear in the courtyard; one cannot immediately tell which one to use. In fact, the tendency will most likely be to use the smaller staircase although it was intended as fire escape. whether it meets the fire regulations or not, is another question and it most like-

ly does not. It is even placed near the entrance then the main staircase. The main staircase should have been more obvious. It is important at this stage to break this design into its smaller parts.

Ground Floor.

The enquires cum reception desk is located at the focal point and will probably be efficient for the intended function. The two staircase suddenly spoil the whole idea of a courtyard by protruding into this space which was intended to be continuous giving a relaxed working atmosphere. At this scale of the first floor the location of the lecture hall is proper and does meet the design specifications ie. it should be possible for the public to use this facility even when the rest of the building is closed. But the library, the anthropology store and the conference room were obviously forced into a predetermined planning grid: again another case of superficially resolved spaces. They should have formed part of the planning grid determinants. At yet a lower scale of planning it is again obvious that the office of the secretary to the anthropology curator was located where it is, because that space turned up to be empty. This fact is again exemplified by one of the research rooms being larger than the others. The toilets for the lecture hall are another case in point: confused planning. The office of the director is too close to the public. This could have been elsewhere but at the same time not cutting its relation to the public. At least the office of the director needs more serious treatment. And finally, one other apparent disadvantage at the ground floor will most

likely be the fact that rigid office divisions have been used; any alterations in future will be difficult.

Environment - extensive use of windows assures adequate natural light. Cross ventilation can be achieved if permanent vents are provided at all doors. The courtyard might be some source of heat, however, this seems to be taken care of by the open gap on the north right corner. The library and the offices to the north are an obvious target of disturbance by vehicular noise from the road.

First and second levels.

Apart from the problem of finding the way to these floors from the lower level, it appears that the planning problem here was not complex. Curators are placed at advantageous positions when it comes to control over the collection. One disadvantage, however, is where the collection occupy two floors like the osteology or where the curator is at the opposite end, away from the entrance to the store due to planning constraints like services etc. For the archeology control over the store is reduced to locking due to this planning problem, visual control is not possible. Curators offices, research rooms on different floors communicate vertically by means of a generous service core which carries a staircase, a goods lift and the toilets with an access balcony connecting the offices to the core.

Although a fire escape staircase has been provided its positioning is not proper, its positioning implies going through the stores in case the main staircase is blocked by fire. besides its distance from some points is a little bit more than the 25

metres required by the building by laws.

Environment - Enough natural lighting is provided by the generous use of windows for the curators and research rooms. This however, may have got one disadvantage. they open directly to a noisy road. This may force the users to close them depriving them of cross ventilation. The view from these windows is excellent, small windows are provided in the storage area to provide cross ventilation which may serve to clear damp air from the stores.

Construction and Materials-

A combination of framed structure and load bearing walling forms the main skeleton of the building. although there is an obvious tendency to use rigid walling for office divisions, a disadvantage sited beforein case of alterations. Reinforced concrete columns and beams are used cast in situ together with the floor slabs. Other materials suggested include local building stone or brick-facing for the blank walls of the collection storage and brickwork (or some form of moulded blockwork expressing the work of the institute for the administration section. lecture hall and the plinth generally). The use of stone here is motivated by its relative cost compared to other materials, and although the range of colours and texture may be limited. it does provide a relative maintenance free surface. The architect intends to hammer the concrete frame to expose the aggregate. he, however favours avoiding exposed concrete surfaces in preference to the long life maintenance free material of richer and less aggressive appearance. this could be the brickfacing or the stone.

The sub-structure includes extensive use of metal glass windows and wooden doors both in the offices and the storage.

Internal finishes will include P.V.C. for the office and research floors while terrazzo will be used for the storage areas and other working areas. Internal smooth cement plaster finished with a range of colour paints will be used. In the archaeology store a carpet will be used as the standard floor finish.

General environment- All the working spaces are oriented north/south, in Nairobi north/south orientation is relatively cool and well-lit naturally; west/east orientation provides excessive sun penetration and unpleasant hot working conditions, unless expensive sun control devices are used. Where it was not possible to orient the offices north/south an overhang is left to provide shade throughout the year; the anthropology research offices on the ground floor. In spite of this generous natural lighting, provision for artificial light is allowed in case of a dull day, especially in a shaded place like this one. Traffic noise from the roundabout joining Ainsworth road and Ngara road will cause a lot of problems to the north facing working areas; and this is where the vehicles are shifting to a lower gear. A vehicle passes approximately every ten seconds more during the peak hours. Cross ventilation is possible on all the working and storage areas.

The Library.

Area - about 110 m² have been provided for a library which includes 9 m² for the librarian's office.

Organization - layout of this small library has been left up to the client to decide when the building is completed: but one obvious location is the librarian's office: this takes the appropriate position.

Construction - the main structure of this library is concrete construction. Both reinforced and concrete blocks, cement, plaster and paint will be used for the finishes. Metal glass windows, metal doors and wooden doors will be used.

Ventilation - cross ventilation is not provided, neither is artificial ventilation allowed for. Ventilation will only be through the window and the main door.

Acoustics - External noise will probably be the main source of disturbance, since the windows will have to be kept open and these face a busy road junction.

Lighting - natural and artificial light will be used.

Furniture - this has not yet been decided but will most likely be adjustable timber shelves for books and a mixture of metal section and timber for chairs and tables.

The Lecture Hall.

Area and shape - about 375 m² have been provided for this funnel shaped lecture hall, which includes 10 m² for the projection room, 14 m² for the air conditioning plant and about 25 m² for the stage. The projection room is sandwiched between the two main entrances at the back, the other two entrances (fire escape) are on either side of the stage. The floor is terraced

to allow seating for 350 persons.

Purpose - mainly lecturing but teaching and films will also form an integral part among the activities. It will also serve as a conference centre.

Construction.

Walls - these are constructed of reinforced concrete cast in situ.

Roof- the roof is a reinforced concrete structure finished with bitumen felt sloping away from the main building.

Floor - the terraced floor is a reinforced concrete construction resting on the ground.

Ventilation - facilities for air conditioning plant have been allowed for. This will pump conditioned air (optimum temperature and humidity) through the ceiling and receive it from the floor. This will be by means of ducts hidden behind the suspended ceiling and other ducts incorporated in the floor.

Acoustics- - the reinforced concrete construction will most likely cut away all external noise; internal acoustics will depend on the internal finishes and their detail.

Seating - timber constructed tip up seating fully upholstered with arm rest will be provided.

Audio-Visual - sound reinforcement system has been provided for. The front wall will serve as the screen. Things like demonstration table, and chalk-board will be provided when required. Stage lighting will be provided.

Lighting - artificial lighting will be used. This will be provided with a dimming system. It will also be recessed in

the suspended ceiling to reduce glare.
Control will be in the projection room.

The main auditorium will have a suspended ceiling
of aluminum panels over main lecture hall
and orchestra. The location of these panels
will be in the study of the architect and
will be determined. The main lecture
hall will be divided into three parts, the
orchestra, and orchestra is located in front of
the hall and the lecture.

General

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Although the actual building as a whole, would not comprise a real case study for the IAP, I felt it had some relevant sections of interest; namely the main lecture hall and the library. The relation of these two and even to the rest of the building are quite successful. Therefore, here below I discuss the layout of these facilities in general, and thereafter a critical study of the hall and the library.

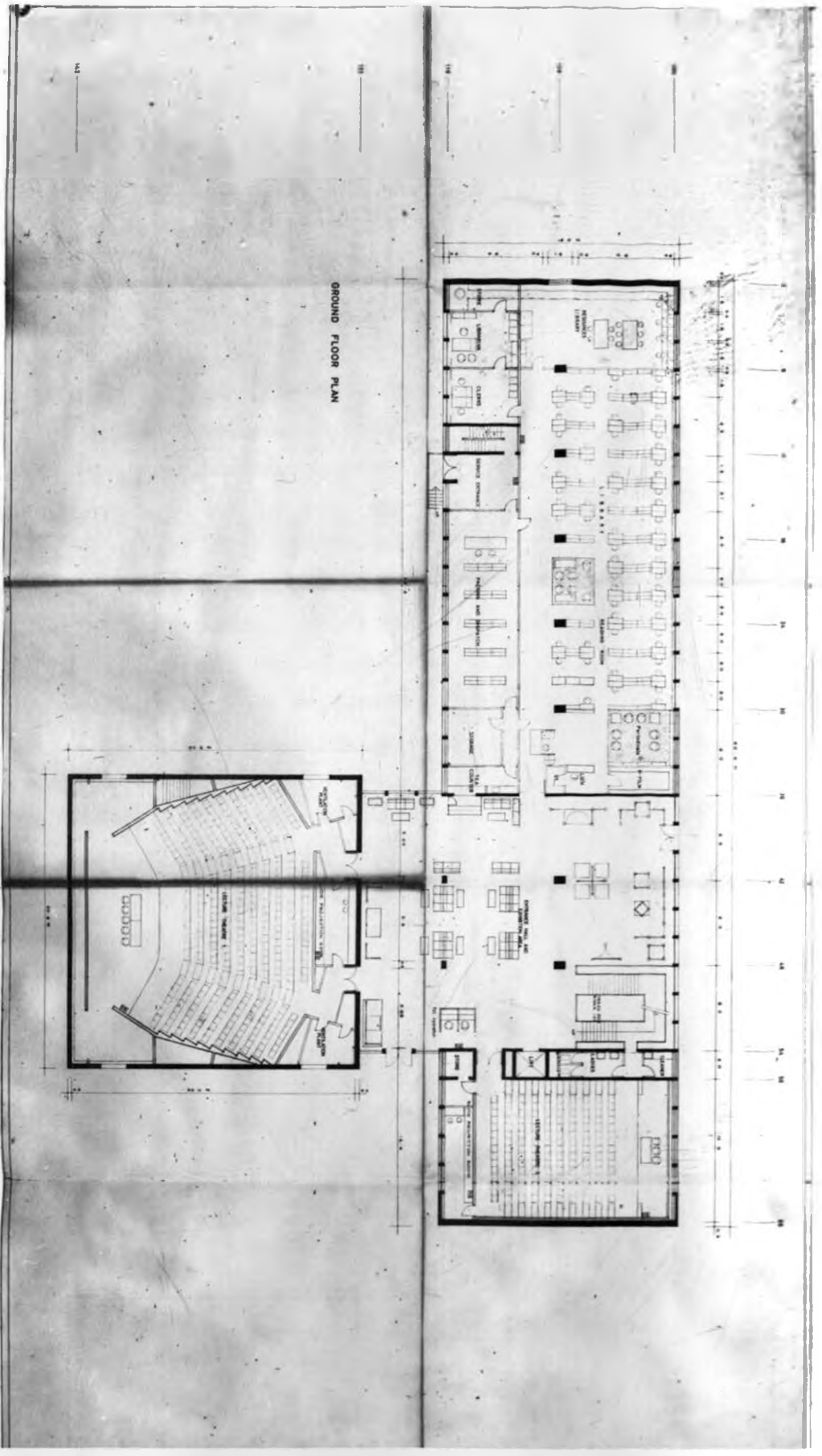
General.

SEE NEXT PAGE FOR THE
GROUND FLOOR PLAN.

Approached by means of a covered paved walkway from either the main library or the science block, the entrance to this five leveled building is centrally located. The entrance is raised about 1 metre above the ground level, giving it even more prominence especially because the staircase leading to the floor forms some kind of a bridge between the building and the paved walkway. This bridge raised above the flower garden between the building and the paved walkway this emphasises the entrance even more.

Once inside, one finds a generous open space punctuated by two central massive columns. This vast space was meant for exhibitions as well as the foyer for the two lecture halls, the library and the offices and classrooms above. Straight ahead the entrance to the main lecture hall is obvious; on the right the library entrance and the reception and on the left the small lecture hall, toilets and the vertical communication, comprising of one massive free standing staircase and one lift. There is another secondary entrance to this space on the left between the two lecture halls.

GROUND FLOOR PLAN



The library.

Areas-

total area about	500 m ²	including
main library	240 m ²	
parking and dispatch	100 m ²	
resources library	60 m ²	
librarian's office	24 m ²	
service	24 m ²	
etc.	16 m ²	

Organization.

At the entrance to the library are located the service desk, with an IN and an OUT entrance, giving the assistant librarian ultimate control. On the left of the service desk is a store for personal effects next to the periodicals section: this store was originally intended for films. Straight ahead, are the storage shelves and on the left and at the far end are the reading space, where the keys are also found. Alterations have been made to the original design as shown on the sketch next page. This may have been forced by the desire to have more light or to concentrate storage in one place. The librarian's office is at the back of the main library next to the service entrance and the dispatch store. The reference and resources library are also located at the back of the library.

Construction and Finishes:

The main structure is construction of reinforced concrete as it is the whole building. Windows are of aluminium frames with glasses. These are two types: the main ones about 2m wide which do not open and then small ones which form the opening part. Doors are mainly of timber except for the main entrance where it is aluminium and glass.

The floor is finished with wooden slabs. These tend to produce disturbing noise as readers walk about. Walls are of smooth cement plaster finished with shades of cream paint: there is a tendency of avoiding bright colours, probably because they are not good for the eye.

Ventilation.

From the interviews conducted among the students, this probably is the one biggest failure. Unlike in the main library where temperatures seem to be generally optimum, here the readers are faced by the extremes; quite cold in the morning and becoming very warm in the afternoon. This can be explained by lack of cross ventilation and almost lack of open windows, and even those which open are small and at a high level. The generous use of glass contributes much to the cold atmosphere in the morning. Air-handling unit could have saved the situation. The discomfort is probably the one which contributes to the fewer numbers using this library relative to the main library.

Acoustics:

Very little external noise is experienced because the main windows are never open otherwise the walkway and the main great court are a good source of noise. The fact that the floor level of the library is above ground level by over 1 metre also helps in external noise reduction. Internal noise is only produced by the readers as they walk around the wooden slatted floor. There seems to be enough insulation from other rooms.

Lighting.

Recessed fluorescent lamps covered with a louvred reflector are used to supplement

day-light while being adequate for use at night. Daylighting is not adequate so the use of artificial lighting is a necessity. More use of window could have solved this problem. Although illumination requirement vary with individuals, the general consensus was that this was the optimum.

Furniture.

Reading carrels, timber constructed and steel-framed timber tables are provided. Comfortable reading chairs made of steel section and fully upholstered with plastic cloth are also provided. Easy chairs are part of the furniture, this is a place where the students seem to do their relaxed reading. The finishes on the furniture also avoid sharp contrast, since this is straineous to the eye. The collections are stored in adjustable timber constructed shelves which do not reach the ceiling. This gives the feeling of openness.

The Lecture Hall.

Area and Shape

This lecture hall is contained in a 20x20 m² plan, only when one is inside does the fan shape manifest itself. This area includes two ventilation gear rooms which occupy about 40 m², a projection room occupying 20 m² and the stage which takes about 150 m². It has got two back main doors and one front door on the right. The floor is terraced to allow seating for 300 while the stage is raised for better viewing.

Purpose.

This lecture hall was mainly intended for teaching, lectures and films. Recently,

it has been used for drama, although this is not very successful due to lack of back-up facilities like changing-rooms etc.

Construction and Finishes.

Wall - 300 mm thick reinforced concrete wall is used. This was cast in situ to give an attractive finish externally.

Roof - the roof is constructed with a reinforced concrete slab finished with bitumen felt. It is flat which slopes gradually to the sides to pour the rain water into in-built down pipes.

Floor - the floor is also reinforced concrete, cast in situ to give the terraced shape.

Internal finishes - the fan-shape of the hall inside is created by detailed use of timber which also becomes the finish. A suspended timber construction forms the ceiling stepping it in sympathy with the seating. Internally, the hall appears a timber construction which is very pleasant. The screen is a concrete block construction finished with cement plaster and white paint. In front of this is an automatic curtain. The floor is carpeted.

Ventilation-

Ventilation is supposed to be provided by two propeller machines at the back of the hall but this seems to have failed because-

(a) they make unbearable noise.

(b) they do not give any noticeable ventilation effect. Therefore, the hall is usually used without this mechanical ventilation and it can become uncomfortable especially when full. Perhaps a more sophisticated system would have been more appropriate.

Acoustics.

No sound reinforcement system is installed and therefore when the lecture is full it is quite a problem to hear the speaker; sound reinforcement was necessary. Sound absorption internally, seems to have been resolved by the use of timber finish and the carpeting.

Seating.

Timber constructed fully upholstered tip up seating with arm-rest is provided. The seating is finished with plastic cloth which also helps in sound absorption.

Audio Visual.

A movable chalkboard is used. An internal wall is used as a screen provided with a curtain to alter the size of the screen. A projection room is located between the two back entrances. Stage lighting is provided although no system exists for connecting projector to in-built speakers, which do not exist anyway.

Lighting.

General lighting is provided by individual tungsten lights located in the suspended ceiling. These are recessed into the ceiling to avoid glare. The stage is lit by means of stage spot lights which are provided in different colours. All lights can be dimmed from the projection room.

SEE NEXT PAGE FOR THE
LAYOUT PLAN.

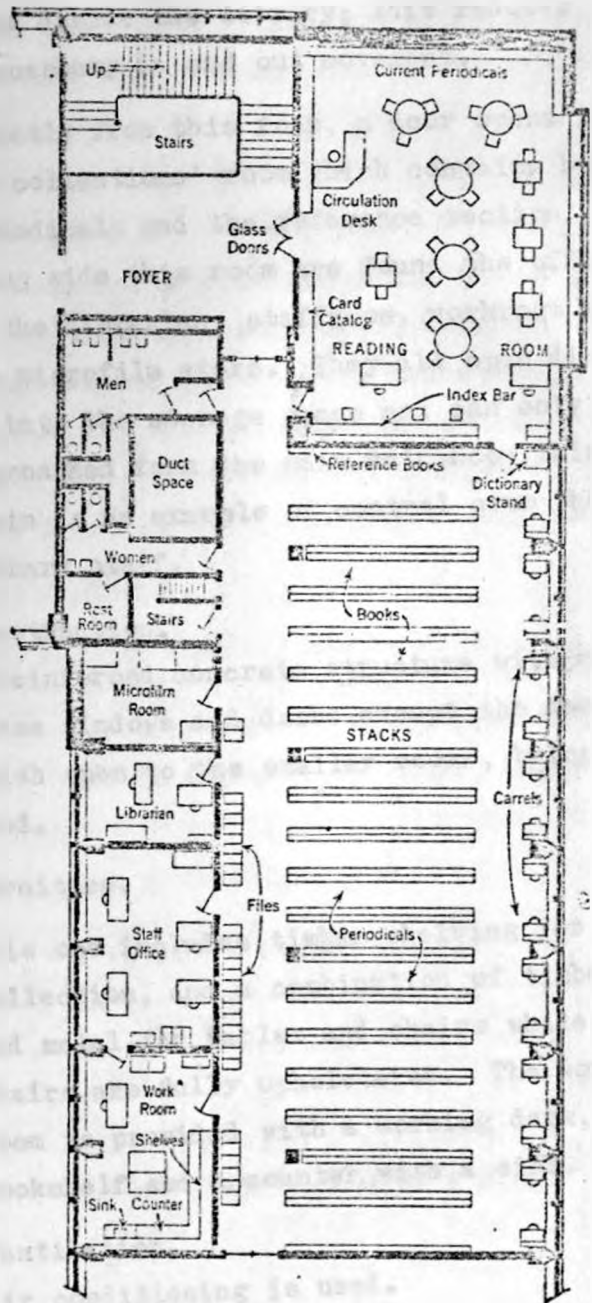
Ford Motor Company Staff Library.

Organization.

Although a fairly big library compared to the one proposed for the IAP, this library presents an interesting layout plan.

Next page will be found the plan for this library.

From the entrance, one enters directly into the reading room. but before this, on the left is the circulation desk and



Ford Motor Company Engineering Staff Library.

on the right, the catalogue: the circulation desk is the control of this library. In the reading room are to be found the current periodicals, hence not a serious reading space. Toilet facilities are provided inside the library; this reduces unnecessary in and out movement.

Directly from this room, a door opens into the collections' room which contains books, periodicals and the reference section. Along side this room are found the office of the librarian, staffroom, workroom and the microfilm store. They all open directly into the storage space and can only be approached from the main entrance: this again is an example of control over the library staff.

Construction.

A reinforced concrete structure with metal glass windows and doors except the doors which open to the smaller rooms, being of wood.

Furniture.

This one includes timber shelving for collection, and a combination of timber and metal for tables and chairs while the chairs are fully upholstered. The workroom is provided with a working desk, bookshelf and a counter with a sink.

Ventilation.

Air conditioning is used.

Lighting.

Artificial and natural lighting are used to supplement each other.

SEE PAGE 85 FOR PLAN
AND SECTION.

University of South Wales

Arts Theatre No. I.

General.

This fan-shaped lecture hall with a curved.

near the wall which follows the profile of the site was originally designed for normal lecturing, but later on extra facilities were added in the form of extended stage lighting and curtain to enable drama to be performed. Cloakroom are provided on either side of the stage where the four entrances are also provided. The rear entrance is by means of a staircase which opens indirectly into the hall.

The hall has got a total area of over 280 m² and seats 221 persons. The floor is terraced (see section and plan next page) The seating area occupies 35% to 40% of the total area. The volume of auditorium per seat 3.8 m³.

Construction.

This hall is constructed with reinforced concrete walls, roof and floor.

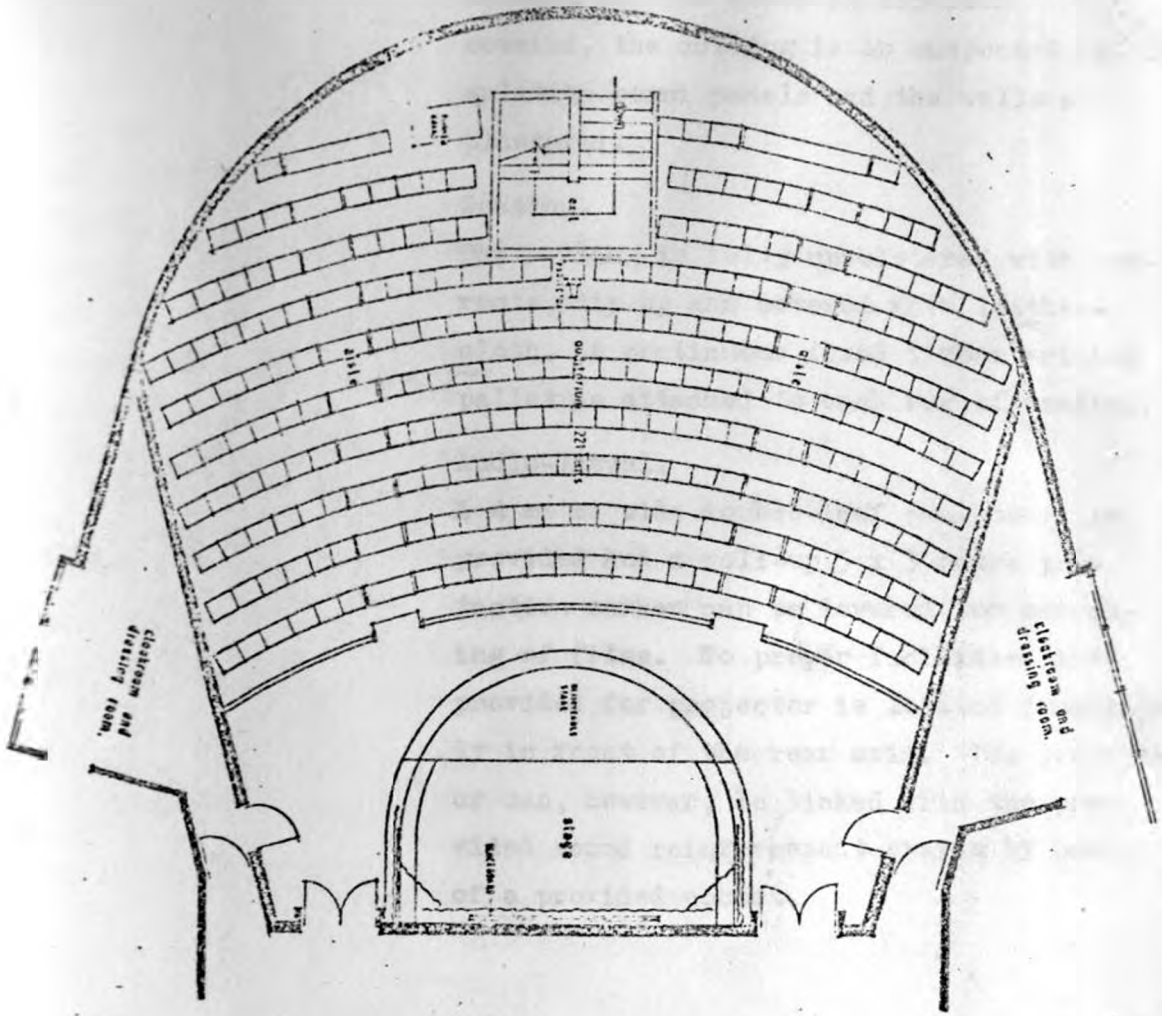
Ventilation.

No natural lighting or ventilation. Ventilation is provided in the form of a warm air attenuation to give a sound level of 45 decibels and an ambient temperature of 18.3°C. 28.2 cubic metres of air per hour is provided for each seat space. The warm air system is thermostatically controlled.

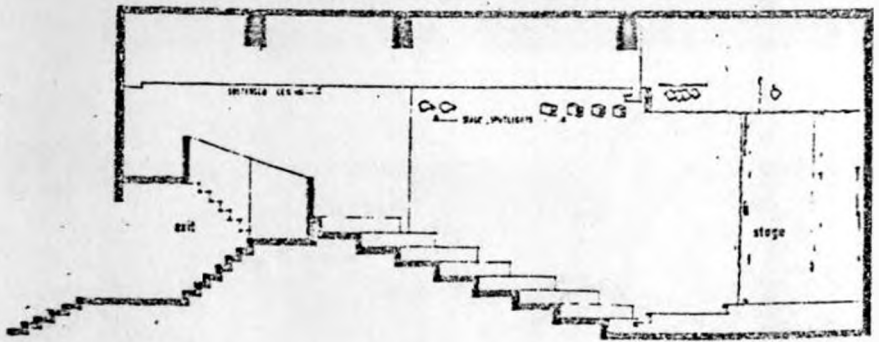
An extract system is designed to provide an air change of 80% of the supply system being automatic to maintain the same ambient temperature of 18.3°C.

Acoustics and finishes.

Sound reinforcement system has been achieved by two line source speaker, one being located on each flank wall of the hall. The accustical problems are dealt with in the normal finishes to the floor, ceiling and walls and no special treatment were



PLAN



SECTION

UNIVERSITY OF SOUTH WALES
ARTS THEATRE NO I

necessary. The floor is linoleum covered, the ceiling is in suspended insulation board panels and the walls are plastered.

Seating.

The seating is fully upholstered with arm-rests, tip up and covered with leather-cloth. A continuous fixed timber writing pallet is attached to each row of seating.

Audio-Visual.

A 4 metre wide double-leaf chalkboard is provided and a roll-up 5 x 3 metre projection screen can be lowered for screening of films. No proper facilities are provided for projector is located immediately in front of the rear exit. The projector can, however, be linked with the provided sound reinforcement system by means of a provided socket.

18

18. WOODED GROUNDS
18. TERRACE AROUND THE
MUSEUM COMPLEX
19. MUSEUM EDUCATION
LECTURE HALL
20. PROPOSED IAP UNDER
CONSTRUCTION
HERBARIUM AT THE
BACKGROUND



19



20



04. summary

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AI SUMMARY

CS	CASE STUDY	CENTRE FOR PRE-HISTORY AND PALAEOLOGY	PROPOSED IAP.
1	CONTEXT	Research centre. Part of Museum Institute. Historical archives. Reproduction facilities.	Research Institute. Memorial to Leakey the anthropologist. Kind of monument. Tourist attraction. Historical archive. Administration. A Museum Institute.
2	ENVIRONMENT	Highland equatorial climate. Urban setting near city centre. Part of Museum complex.	Highland equatorial climate. Urban setting near city centre. Part of Museum complex.
3	COMMUNICATIONS	Efficient communication system. Near University. Research material easily available.	Efficient communication system. Near University. Research material easily available.
4	ARCHITECTURE Y	Simple concrete block building. Double pitched tiled roofs.	Modern architecture. Fails to portray itself. Not attractive.
5	CONSTRUCTION	Load bearing concrete block walls. Double pitched timber tiled roof. Cement plastered walls. Soft board ceiling. Metal glass windows Wooden doors. Painted walls.	Framed reinforced concrete structure. Concrete blocks and stone walling. Cement plastered finish. Concrete roof P.V.C flooring on concrete floor. Metal glass windows. Wooden doors. Painted walls.
6	CIRCULATION	Very complicated and inconvenient. Bad zoning.	Simple but unsuccessful. Proper zoning.
7	SIZE	1500 m ²	3,300 m ²
8	VENTILATION	natural.	natural.
9	ACOUSTICS	Not very important.	Not very important. Research rooms have too much external noise.

10	LIGHTING	Natural and artificial.	Natural and artificial.
11	SERVICES	Water, Electricity and Telephones. Toilets.	Water. Electricity and Telephones. Toilets shared.
12	FURNITURE	Normal office furniture	Normal office furniture

1	Detailed description of the building.	Detailed description of the building.
2	Floor plan of the building.	Floor plan of the building.
3	Detailed description of the building.	Detailed description of the building.
4	Detailed description of the building.	Detailed description of the building.
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8	Detailed description of the building.	Detailed description of the building.

BI SUMMARY

CS	IAP LIBRARY	IAP LECTURE HALL
1	Reference source Information store Archive Reading facilities Audio-Visual facilities.	Lecturing facilities. Conferences Films and slides Teaching facilities.
2	Highland equatorial climate. Part of a building in urban setting.	Highland equatorial climate. Part of a building in urban setting.
3	Part of IAP building	Part of IAP building.
4	Modern architecture	Modern architecture.
5	Same construction and finishes.	Reinforced concrete walling. Reinforced concrete roof. Reinforced concrete floor. Acoustic ceiling. Cement-plaster finish.
6	Circulation not yet decided. Librarian's office at control point.	Successful. Two main entrances at the back and two exits at the front.
7	110 m ²	375 m ²
8	natural	Air conditioning.
9	External noise the major problem.	No external noise. Internal finishes to determine.

B2 SUMMARY

IO	Natural and artificial	Artificial only.
II	Electricity and telephone Toilets shared.	Electricity. Sound reinforcement. Toilet shared.
I2	Normal library furniture.	Normal lecture hall furniture.

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CI S U M M A R Y

CS	EDUCATION BUILDING UNIVERSITY OF NAIROBI	EDUCATION LIBRARY
1	Training Centre. Library. Lecture hall Exhibition Administration Classrooms.	Reference source. Reading facilities. Storage of books, micro- films periodicals.
2	Highland equatorial climate. Part of a University complex. Part of city centre.	Highland equatorial climate. Part of a building in University.
3	Efficient communication system. Located on the main campus.	Part of Education building.
4	Modern architecture.	Modern architecture.
5	Framed reinforced concrete structure. Concrete block walling Cement-plaster finish with paint. Metal glass-windows. Wooden doors. P.V.C flooring.	Some as education building. Wooden floor finish.
6	Very successful.	Not successful.
7	Not necessary.	500 m ² .
8	Natural.	Natural.
9	Not very necessary.	No external noise Little internal noise from movement.

C2 SUMMARY

10	Natural and artificial.	Natural and artificial.
11	All necessary services Electricity, telephones Toilets shared.	Electricity, telephones Toilets shared.
12	Normal administration and school furniture.	Normal library furniture.
1	Light and ventilation part of a building by & TRANSPARENT.	Part of a building in building system Type system.
1	part of structure building.	Efficient communication system. Part of facility complex.
2	Various applications.	Various applications.
3	Type of structure building. Structural steel building. Building for structural steel Composite structure.	Reinforced concrete truss structure. Metal glass structure concrete structure. Plastered finish with plaster. T.V.C. structure.
4	Structural. The main structure of the building and the walls of the building.	Very structural.
5	The main structure of the building.	The main structure.
6	The main structure.	The main structure.
7	The main structure. The main structure. The main structure. The main structure. The main structure.	The main structure. The main structure. The main structure. The main structure. The main structure.

DI SUMMARY

CS	EDUCATION LECTURE HALL	FORD MOTOR COMPANY STAFF LIBRARY
1	Teaching facilities Film shows Drama facilities	Mainly reference source Recreation reading Storage of information.
2	Highland equatorial climate. Part of a building in a University.	Temperate climate. Part of a building in factory complex. Urban setting.
3	Part of Education building.	Efficient communication system. Part of factory complex.
4	Modern architecture	Modern architecture.
5	Same as Education building. Suspended timber ceiling. Panelling for internal finish Carpeted flooring.	Reinforced concrete framed structure. Metal glass windows. wooden doors. Plastered finish with paint. P.V.C flooring.
6	Successful. Two main entrances at the back and one exit at the front.	Very successful.
7	300 seats 400 m ²	not established.
8	fan system.	air conditioned.
9	No external noise. Too much noise from ventilation system. No sound reinforcement system.	No external noise. Internal noise from movement.

D2 SUMMARY

IO	Artificial only.	Natural and artificial.
II	Electricity, toilets shared.	Electricity. telephones and water. Toilets etc.
I2	Normal lecture hall furniture. Stage and curtain.	Normal library furniture.

1	[Faint text]
2	[Faint text]
3	[Faint text]
4	[Faint text]
5	[Faint text]
6	[Faint text]
7	[Faint text]
8	[Faint text]

FI SUMMARY

CS	UNIVERSITY OF SOUTH WALES' ARTS THEATRE I.
1	Originally for lectures Adopted for drama.
2	Temperate climate. Part of a University building. Urban setting.
3	Efficient communication system. Part of the arts building.
4	Modern architecture.
5	Reinforced concrete construction. Plastered finish. Suspended acoustic ceiling.
6	Not very successful. Main entrance at front, one exit at the back.
7	221 seats.
8	air-conditioning.
9	No external noise sound reinforcement system. Finishes not good for sound absorption.

E2 S U M M A R Y

I0	Artificial only.
II	Water, electricity Toilets Sound reinforcement facilities.
I2	Normal lecture theatre furniture. Stage. Screen and Curtains.

05 design brief

05 design brief

1.00 Administration.

1.01 Director of Success' office.

- easy chairs for visitors
- working desk
- book shelves and collections
- soft board for display.

1.02 Secretary's office.

- sitting area
- working desk
- stationary storage facilities
- file storage facilities

1.03 Deputy director of success' office.

- as 1.00 above

1.04 Secretary's office

- as 1.01 above.

1.05 Director of IAF office

- as 1.01 above

1.06 Deputy director IAF

- as 1.01 above

DESIGN BRIEF.

The main object of this project is to develop a scheme that clearly distinguishes three major zone segments related to three major activities. These should be treated as separate entities but at the same time allowing some level of integration. The activity zones could be divided into three--

- a) a public zone,
- b) semi-public zone and
- c) a completely private zone.

Zone 'a' may include spaces like the lecture hall and the library and to some extent the reception: zone 'b' includes the administration while zone 'c' includes the storage areas and research rooms. Whatever method of separation is used should produce a single architectural component.

I.00 Administration.

I.01 director of Museums' office.

- easy chairs for visitors
- working desk
- book shelves and collections
- soft board for display.

I.02 Secretary's office.

- waiting area
- working desk
- stationery storage facilities
- file storage facilities

I.03 deputy director of museums' office

- as I.00 above

I.04 Secretary's office

- as I.01 above.

I.05 director of IAP office

- as I.00 above

I.06 -deputy director IAP

- as I.02 above

- I.07 shared Secretary office
as I.01 above.
- I.08 financial controller office
 - storage for financial files
 - working desk
 - visitors' facilities
- I.09 Secretary/typist office
 - as I.01 above
- I.10 accounts clerk offices.
 - working desks.
 - file cabinets
 - visitors' facilities.
- I.11 Typing pool office
 - provide typing facilities for 4.
 - stationery storage facilities
 - receiving and dispatch facilities
- I.12 Conference room.
 - minimum seating for 20
 - display facilities.
- I.13 Environmental control.
 - provide enough artificial and natural day-lighting.
 - proper ventilation for comfortable working conditions.
 - privacy as well as noise control.
 - enough power and other service points.
- 2.00 The library.
- 2.01 Service area/Reception/Lending
 - service desk/worktop
 - keys
 - storage for bags
 - duplicating space/photocopying
- 2.02 Service area.
 - facilities for reception of collections.
 - service room with worktop and wet area.

- 2.03 Librarian's office.
 - bookshelf
 - working desk
 - visitor's facilities
 - display noticeboard.
- 2.04 Collection's space.
 - provision for bookshelves
 - storage for microfilms
 - storage for magazines
 - storage for films.
- 2.05 Reading space.
 - carrels for reading
 - easy chairs for relaxed reading
 - space for reading microfilms, listening to tapes.
- 2.06 Environmental control.
 - adequate artificial and natural lighting
 - proper ventilation
 - noise barriers
 - orientation.
- 3.00 Multi-purpose Lecture Hall.
- 3.01 Main Hall.
 - seating for minimum of 350
 - facilities for, (a) speech
 - (b) projected illustrations
 - (c) physical demonstration and
 - (d) discussion
- 3.02 Environmental Control.
 - comfortable furniture
 - adequate lighting
 - sound control material
 - air conditioning
 - optimum shape
 - sanitation for 350 persons
 - adherence to by-laws.
- 3.03 Projection room.
 - adequate room for two technicians

- allow for two projectors
- allow for small storage/workshop.

3.04 Ventilation room.

- allow for two air conditioning machines.

4.00 The departments.

4.01 Archeology requirements.

- (a) storage-- provide 500m^2 as storage for collection

- shelving for collection storage
- worktop in the store
- enough artificial lighting
- humidity control
- security

(b) Curator's office.

- working desk
- work-top with a sink
- power points
- adequate artificial and natural lighting
- visitor's facilities
- storage shelves.

(c) Research rooms.

- 3 No research rooms
- work-top with sink
- working desk.
- book and collection shelves.
- power points
- adequate artificial and natural lighting
- comfortable working atmosphere.

4.02 Palaeoanthropology requirements.

- (a) storage provide 70m^2

-as 4.01 (a) above

(b) curator's office

-as 4.01 (b) above.

(c) 3 No research rooms

-as 4.01 (c) above

(d) secretary's office

-as 1.01 above.

4.03 Palaeontology

- (a) storage - provide 800 m²
- as 4.01 (a) above
- (b) Curator's office
- as 4.01 (b) above
- (c) 3NQ research rooms
- as 4.01 (c) above.

4.04 Geology.

- storage provide 25 m²
- shelves
- work-top with sink
- working desk
- map room - pin board

4.05 Osteology.

- (a) storage provide 1200 m²
- as 4.01 (a) above
- (b) Curator's office
- as 4.01 (b) above
- 3 (c) 3NQ research rooms
- as 4.01 (c) above.

5.00 Ancillary facilities.

5.01 Field store.

- area about 100 m²
- security

5.02 Reception area.

- worktop and sink
- working table
- storage shelves
- cold area

5.03 Casting area

- facilities for eight persons
- continuous work-top with sink
- storage shelves for material
and collections
- power points
- place for overalls.

5.04 Darkroom.

- working area for one person
- photographing facilities

6

-work-top and sink

-power points.

5.05 Sanitation.

-toilets and urinals:

5.06 Tea room.

--sink

--work-top.

5.07 Reception.

-desk

-visitor's chairs.

5.08 Staff room

-- an informal meeting place

- facilities for refreshments and snacks

- provide easy chairs , chairs and tables.

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