STATE LIBRARY COMPLEX, MAIDUGURI

"Design for User's Comfort"

M.SC. (ARCHITECTURE) THESIS - Presented to the Department of Architecture, Faculty of Environmental Design of AHMADU BELLO UNIVERSITY, for the Degree of Master of Science in Architecture.

BY

ALHAJI MUHAMMED, USMAN

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AUG, 1989

DECLARATION

I, ALHAJI MOHAMMED, USMAN, hereby declare that this thesis is the outcome of research work conducted by me. All sources of information have been duly acknowledged.

Alhaji Mohammed USMAN

CERTIFICATION

This thesis entitled State Library Complex MAIDUGURI by Alhaji Mohammed, Usman meets the regulations governing the award of the degree of Master of Science in Architecture of Ahmadu Bello University Zaria and is approved hereby, for its contribution to knowledge and literary presentation.

FRGD B. ADDO — 28/9/89

Chairman, Supervisory Committee — Date

25/9/89

Member, Supervisory Committee — Date

M B Ahmed

25/9/89

Member, Supervisory Committee — Date

Head of Department — Date

Dean, Postgraduate School — Date

DEDICATION

This thesis is dedicated to my loving parents; ALHAJI MUHAMMADU MAIGORO and HAJIYA ZAINABU AKIKI, and their children, Without whose care, encouragement, support and ALLAH's guidance this project wouldn't have been possible.

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STATE LIBRARY COMPLEX, MAIDUGURI

Design for User's Comfort

ABSTRACT

Millions of Nigerians are increasingly yearning and aspiring to acquire knowledge in one form or the other irrespective of age, sex, and background. The increasing need for literacy and leisure time plus "Imformation expulsion" makes it necessary to develop libraries in the country. Secondly libraries are by themselves a principal agency for educational development and spread. It is for these reasons that the author decides to explore a scheme that would comfortabily cater for the three basic elements in library services namely the readers, the staff and the library materials.

Design considerations are centred around comfort needs of the readers within the prevailing climatic conditions of the site. The comfort relates to the provision of favourable indoor climatic conditions in relation to human needs (Egronomics), and the smooth or efficient circulation of both the materials, staff and the Users.

The scheme when completed would serve not only as a learning, research or reference centre but would also serve as a recreational or leisure centre with

alot of social attracting potentials, It will be a piece of monument in terms of aesthetics, functions, preservation and security of important academic and societal or historical documents.

When fully utilized it is hoped that the scheme would not only assist students or academicians but would greatly raise the literacy level of the society by taking or communication the knowledge or imformation to the grass-route.

INTRODUCTION

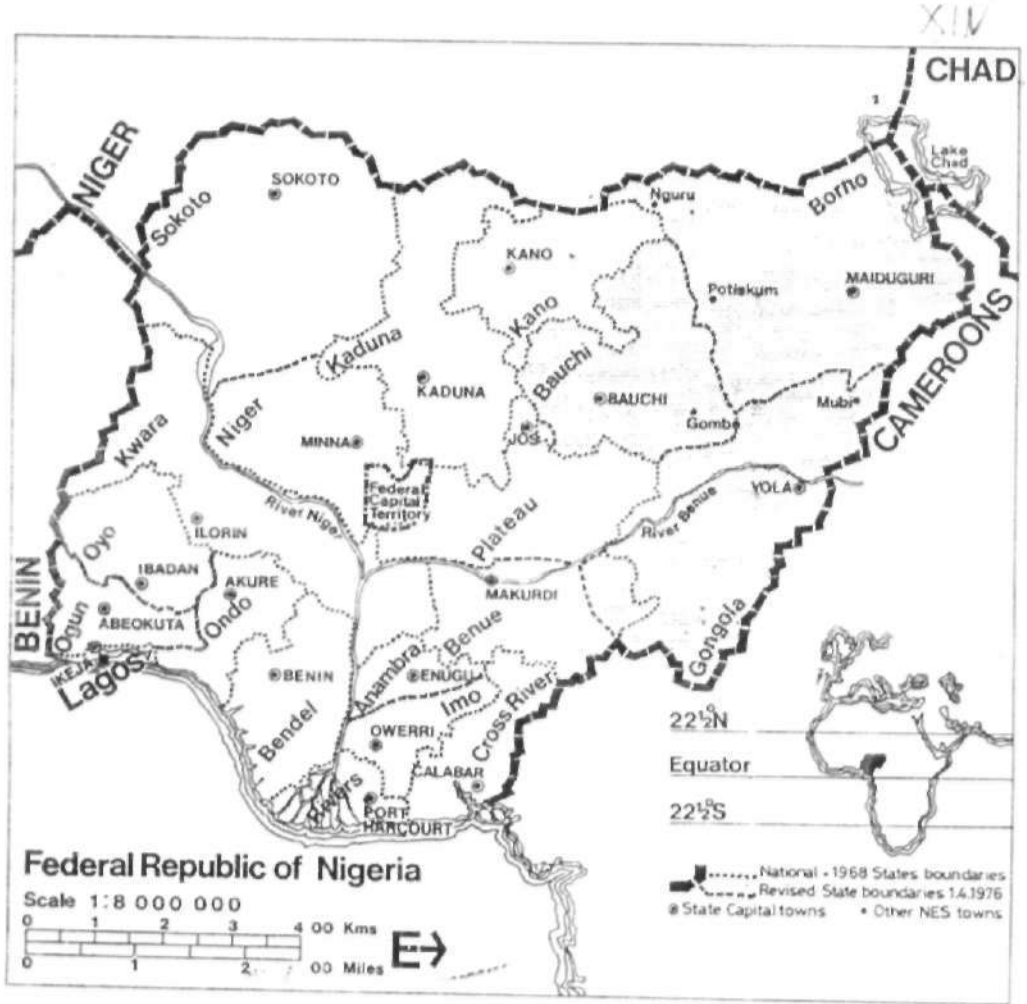
Education is the key to any form of human development and progress. The status and progress of any society depends on the level of awareness of its people in terms of educational communication,, and the major principal agency for such communication is the library. It encourages literacy and protects the society against illitracy diesease. For a man without knowledge may well be compared to one that is dead.

Library by its servies,contributes immensely to the growth of new ideals, spread of imformations or knowledge, preserved and uplifts the social and cultural values of the society. In the modern context, libraries are more than just ordinary reference or research rooms, but also serves as recreational and or cultural centres, by the virtue of its locations, functions and historical attachements. It is often

referred to as the main respiratory organ in human cultural heritage, innovations progress and information expulsions,

Nigeria with a papulation of over One hundred million inhabitants and with over 30 years of post independence educational programmes place little or no importance to the provision of public libraries, Most of the public libraries around are either ill-equiped or too small to meet the social needs and the numerous government educational programmes such as Mass literacy programmes, Free Education for all at all levels, Adult Education programmes etc. The trends of developments in the Nations library services is rather unfortunate and too slow when compared with the rapid educational policies in operation, of which Borno State with all its aged-long educational history is no exception. The literacy level, the reading habits among the elites and the attitude of the government towards library development jointly contributed to the failure and or slow phase of development in the library services. With the change in both the societal and governmental approach to education and leisure or recreational needs the author attempts to contribute directly or indirectly to the development such a very resourceful and yet neglected agency for educational growth and development which is vital to human survival.

XIV



Map of Nigeria showing the location of Maiduguri.

Source: Max Locks - Surveys.

CHAPTER ONE

1.1.0 HISTORY OF LIBARY DEVELOPMENT IN BORNO STATE

The role of eduoation in the overall development of human being need not be overemphased. In Borno, people were exposed to the art of reading and writting in arabic scripts even before the coming of the colonial masters, which greatly contributed to their strong commercial and administrative functions during the pre-colonial African days. They were noted and respected for such records, as was found in ancient historical records at Timbuktu, a one time territoriry of the empire.

KASHIM IBRAHIM LIBRARY
AHMADU BELLO UNIVERSITY
ZARIA. NIGERIA.

In Nigeria libraries started long before independence, along with the establishment of schools. Later, the then regional government establish regional libraries which later became the national library at Kaduna with branches at Sokoto, Minna and Maiduguri. After the independence, with the creation of 12 States, the then North Eastern State retained that of Maiduguri and opened branches at Mubi, Yola, Bauchi and Gombe. Assests of the then regional library were shared among the branches with Maiduguri acquiring about 8,000 volumes in addition to the existing 5,000 volumes and the large number of regional and historical records in Arabic. All these collections were stationed near the Shehu's Palace in a hall called READING ROOM.

With the creation of 19 States in 1975, the branches at Yola and Mubi went to Gongola State, that of Bauchi and Gombe to Bauchi State, while that of Maiduguri become the headquarters of the state library services with new branches at Bama, Potiskum and Biu. The state library services has a total volume of about 113,960 stacks (including all its branches), subscribing to only nine current periodicals. The library which started with the Ministry of Information, then Ministry of Education is today a parastatal on its own with Chairman and Director General. With such legal backing establishing it as a board, library services in the state would change for better.

1.2.0 NEEDS FOR LIBRARY DEVELOPMENT IN BORNO STATE.

Now that both the government and the people have geared-up their attitude towards acquiring Western knowledge, the establishment of libraries became not only essential but necessary.

The demand for its services now cuts across the whole population structure. The adult above the age of school now adopt home studies and other forms of adults literacy classes, school drop-out now have to refer for their papers at home, and even more serious now, is that fully established schools are becoming overcrowded with no seats and accommodations thus

diverting students and the like to explore other avenues near-by. Maiduguri the state capital of Borno State is no exception as it houses a University, a Polytechnic,College of Education, College of Agriculture, 3 Teacher's Training Colleges, Six Secondary Schools, Nursing and Midwifery, Health Technology in addition to private and Nursery schools coming-up everywhere. People are also doubling-up to acquire one form of knowledge or the other through self effort. Libraries that used to be full of stacks collections with little or no users now turns out to be full of users with no stacks materials. The demand of library services have drastically raising especially with the coming of free education for all, the UPE, and the Mass literacy programmes of various government.

In Maiduguri, the people lucks such amenities as library services, as even the little collectionsthey have, are stacked in one room and the reading hall in a separate single rectangular block.

These, and many other reasons to be spelt out later necessiate the need for a public library for the state to be located within the state capital with outside branches and mobile services.

1.3.0 PUPOSE OF THE STUDY

1.3.1 To critically analyses the existing situations of the library services, its operating philosophy, its proposals and implementation schedule with the view to improving on it.

1.3.2 To explore the number, types and services offered by the library to the community in order of priority.

1.3.3 To study the population characteristics of the Users, their problems and needs interms of library services, comfortable reading atmosphere, location or transportation problem and their effects on the individual performance or the average reading habit.

1.3.4 These studies along with the climatic or site data and other case studies of existing library would enable the author to come up with a sound approach to the problems with the hope of proposing a functional, comfortable and yet relaxing reading atmosphere for the teaming populous.

1.4.0 AIMS AND OBJECTIVES

1.4.1 To design within the climatic context of the site a naturally comfortable and conviently well organised space for the purpose of learning for leisure and academic reasons.

1.4.2 To attain an architectural quality of aethestics within a good landscaped environment that would attract users for both leisure and knowledge, thereby raising the literacy level and the reading habits of the average citizen.

1.4.3 To provide a functional and yet monumental structure that would preserved the available collections for the feature generations.

1.4.4 To provide instructional material for information, research, reference or records services for both public, professionals, organisations and other Users through the exchange of ideas, accessibility to libary materials and other social interactions.

1.4.5 To supplement Government Programmes towards Mass literacy campaings, Adult educations, and incalcate the habit of reading for relaxations in both adults and children alike.

1.5.0 METHODOLOGY

For the above stated purpose, aims and objectives t to be achieved a thorough data collection of the relevant information has to be carried out.

1.5.1 VISITATIONS

Visits to existing state libraries at Maiduguri and Kano were made to acquaint the author with the prevailing situations. Facilities and the services offered by the libraries were studied with the view to improving them.

1.5.2 INTERVIEWS

Interviews were conducted with some library officials to ascertain the nature and extent of their services, problems and proposals.

Their views interms of the modern trend in library development were also noted.

1.5.3 QUESTIONNAIRES

Questionnaires were prepared and passed across both the readers and the staff alike. Information collected were tabulated and used for the purpose of design. Ref. to Chapter 2. for the tables.

1.5.4 DOCUMENTED MATERIALS

Seminar papers, Annual reports of libraries, readers guides, budget papers, Newspapers were all collected and studied for these purpose. Relevant information were taken and properly acknowledged.

1.5.5 CASE STUDIES

Cases studies were carried out both home and abroad on the architectural aspects of the designs. Both Merits and demerits of the design were highlighted with the view to either incooperating it into the new scheme or avoiding it.

1.5.6 PHOTOGRAPHS

Photo graphs of the new site, existing facilities and other relevant sections were taken to give broader. understanding of the prevailing situations.

1.6.0 LIMITATIONS AND SCOPE.

Shortcomings are limited to the limitations of the questionnaires and the interviews i.e. Methodology employed for the data collection. Short comings on the part of the client briefs, finance and other available resources.

The scope of the project is expected to cater for the population within the state capital, Maiduguri, with administrative headquarter controlling other outside and mobile libraries across the state. Auxiliary or supporting facilities such as Restuarants photocopying and other recreation facilities would be incooperated into the scheme.

CHAPTER TWO

LITERATURE REVIEW

2.1.0 ANALYSIS OF EXISTING CONDITIONS

As mentioned earlier on, the development of library services in Nigeria is indeed very slow and unimpressive resulting either from the negligance on the part of the government or the attitude of the readership towards searching for knowledge and information. In-sufficient material, space and other basic facilities are among the major contributing factors to the low phase of library development in the country.

In Borno State, the state library board is housed in a small and conjected structure, which was not initially design as a full library. It has a reading room with some stack collections (closed easiles) within the same room space. Further extension and or additions gave provision for office accommodations and children's room. The children room is used for other services after the children hours. To-day the whole structure can not even accommodate the demands of a single department. Offices are used for books stacking (especially reserve or reference books) even

in the office of the director and the accounts departments for lack of space. In terms of other facilities, the library has only 120 seats including the children sections no meeting or lecture rooms, no Audio visuals, no Archives and inshort no chearly define functional divisions.

See photographs No 7 on page 32 showing the congestion in the offices and the library reading spaces alike.

The case is even worst in the case of outside libraries where houses, primary school classrooms or palaces are used for the said purpose.

In terms of managerial personel, the board has a total of 114 staff including the outside offices, heading about 8 departments. It has 118,965 volumes of which 60,446 are with the headquarters, managed by only 12 professionals while the rest of the members are either library assistance, attendants, messengers, clearners, administrators etc. Thus generally the situation of the library services leaves much to be desired and unless the gap between the desired and the current condition is bridged the people of Borno would for the next decade be denied their right to learn and know about themselves and the governments. These could be avoided by the change of government attitude towards financing library services.

2.2.0 TYPES AND FUNCTIONS OF LIBRARIES

Libraries are generally distinguished by their purpose and the character of the community they serve. Libraries ranges from public or community library, Research or Academic, schools or Educational library, Private or Welfare library, childrens library to specialised libraries. A brief discussion on each type would be made to aquant the author with various types, functions and requirements.

2.2.1 PUBLIC OR COMMUNITY LIBRARY

A monumental educational centre design to attract members of the society for both recreational and academic purpose. Its membership is open to all and sundry. It serves as a book lending centre, providing visual stimulation, information, reference and reading services. They can further be distinguished by the population they serve.

Public libraries, no matter its nature and size, it should be the principal source of communication, information, education, recreation and be free from administrative or beaurocratic intimidations. It should be seen as a part of market place with friendly and welcoming appearance

and yet serving the academic and preservation functions expected of any library. Design criteria and calculations are mainly based on the population to be served and the volumes to be housed. e.g. National Library, Kaduna, Kano State Library, Board Services, Kano.

2.2.2 ACADEMIC AND RESEARCH LIBRARIES

Forms the most vital and central part of campus design, which is fast growing and developing. Their peculiar characteristic were their stored bibliographical and audio visual materials made available to students and staff for their academic researches. Large portion of the material are open to users while the reserve, reference and documentations are only accessible to users through their respective staff for security reasons. Its design standards are governed by functions, the nature of the institution and the available volumes to be housed. e.g. K.I.L - A.B.U., Zaria.

KASHIM IBRAHIM LIBR
AHMADU BELLO UNIVE
ZARIA, NIGERIA.

2.2.3 SPECIALISED LIBRARIES

Associated with Organisations such as hospitals, private offices etc for records and reference purpose. Large portion of the library is made-up of stack collection with few seats and no functional or major subjective divisions. Usually the whole functions

are contain in a single room space. E.g. Ministry of Justice library Maiduguri and the Data Room of the Department of Architecture only for reference and records,no loan out of books.

2.2.4 PRIVATE LIBRARY

Mainly serving an individual or family at home or office, for records and or reference purpose. It can be contained in a single shelve or cupboard or room space. E.g. Study rooms at homes and records sections in offices.

2.2.5 MOBILE LIBRARY

Centrally control from the headquarters, serves the remote rural populace. Materials are conveyed to them, displayed to them, taught to them and a times loan out to them with instructors given guidance and the necessary training to the local people. E.G. Kano State Mobile Library. Audio visual materials are use to educate the rural populace as well.

2.2.6 CHILDREN LIBRARY

Design for the young children. It has also some provision for outdoor demonstration and or recreations. It may be part of main public library or be on its own as a library. Its major problem was attendance but, now every child is gradually improving the level of his reading habit.

2.3.6 POPULATION CHARACTERISTICS OF USERS AND THE STAFF STRUCTURE AND STRENGTH

This forms part of the main research work regarding the user's problems, expectations, demographic characteristics etc. Its acquants the author with a wide range of perception interms of understanding the problems associated with library design, the users comfort and circulations pattern in libraries which could assist him to come up with a good and workable solutions.

Questionnaires were prepared in two folds and were directed to either the Users or the Management in each case with the hope to obtaining a valuable information for the project. See Appendix A/B for the questionnaires samples. On page . Answers obtained were tabulated and later presented in the form of tables as shown below. All calculations are based on such data collected for the research purpose and all the inference or conclusion drawn from these are tabulate as stated below. Finally the design proposal would in one way or the other encooperate the recommended solutions.

2.3.1 USER'S DEMOGRAPHIC DATA

The scheme was proposed to primarily cater for the State capital which has a population of about 500,000 inhabitants (projected from 1963 census).

About 80 No [illegible] were presented and about 55 were answered.

The tabulated results yields the following;

a) 62% of the users are Male while the 38% are Female.

b) 56% are single by marital status, 31% married while 13% divoce

c) In terms of age, 9.4% are under 15 years, 56.3% are between 15 - 30 years, 25.1% are 30 - 40 years while 8.2% are above 40 years.

From the above, the character of the Users could be determine and hence their requirement or needs interms of social, educational or recreational provision becomes easier to analysed.

2.3.2 EDUCATIONAL BACKGROUND AND OCCUPATION OF USERS

TABLE 1

Educational Qualification	% of Attendance
Less Than Primary Six	6%
Completed Primary Education	9.5%
Secondary Education (Student fail)	42.3%
Post Secondary/Universities	37.%
No Formal Education	4.2%
TOTAL	100%

Source: Sample Answers from Questionnaires.

The above table also shows the educational standard of the average users. Information provided enable the author to have the knowledge of the provision to be made, so as to avoid provision of materials that will not be of any interest or useful to the users.

The table below also provides similar information and inference but this time the source is users occupation.

TABLE 2

OCCUPATION	% of ATTENDANCE
Full Time Student	55.8
Civil Servant/Workers	36.9
Un employed	7.3
Total	100%

Source: Sample from Questionnaires

2.3.3 REASONS FOR COMING TO THE LIBRARY

TABLE 3

REASONS FOR COMING	% OF ATTENDANCE
To Study with Personel Books	13.7%
To Study with Library Books	49.5%
Borrowing Only	15.8%
Read Magazine/Newspapers	10.5%
Reference Purpose	7.4%
Others	3.1%

Source: Sample Answers from Questionnaires

The above table provides information that can be used to determined the need for various departments and improve on their efficiency. It also indicates areas of priority in the library services.

2.3.4 PROBLEMS AND STATISFACTION LEVEL

Another survey on the services satisfaction level as regards to the building functions, weather condition, library services etc were sorted and yields the following remarks.

(a) SATISFACTION LEVEL IN % OF ATTENDANCE

TABLE 4

SATISFACTION LEVEL	LIBRARY SERVICES	BUILDING FUNCTIONS	GENERAL WEATHER
Completely Satisfy	32.0	34.0	13.8
Partially Satisfy	28.5	20.0	41.0
Not Satisfy	39.5	46.0	45.2

Source: Sample Answers from Questionnaires

(b) PROBLEMS ENUMERATED BY USERS THAT DISCOURAGE ATTENDANCE

TABLE 5

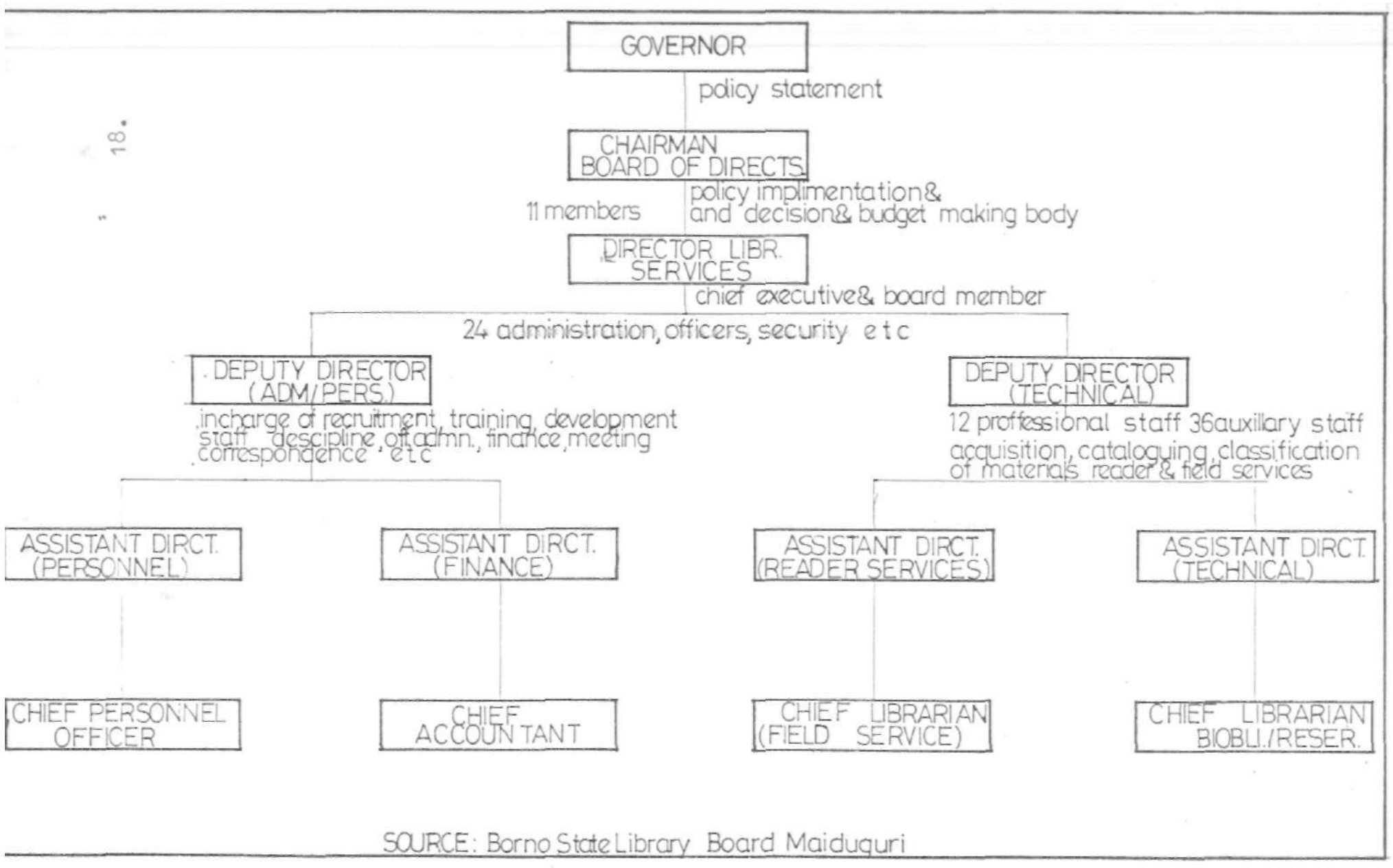
PROBLEMS	% OF ATTENDANCE
Noisy	5
Congestion	26
Library Services	11
Weather Condition	29
Hours of Operation	0.5
Materials	16.5
Location	7.0
Others	2.0

Source: Sample Answers from Questionnaires.

The above two reasons gives the major complains by Users as regards to the Services offered. The tables will provide adquate area of concentration when designing for a library under the same condition and for similar Users. The complains are centred mainly around poor building function, interior weather condition and available material. The two are directly related to Architecture and would be dealt with later.

2.3.5 STAFF STRENGTH AND SCHEDULE OF DUTY

The Chart below provides the number, heirachy and duty of officers under each section. It provides information needed for proper planning and zooning. Total staff strength is 114 as previously highlighted with break down, (See 2.1.0) as shown below;



SOURCE: Borno State Library Board Maiduguri

TABLE 6. Official Organization Chart for Borno State Library Service Maiduguri.

CHAPTER THREE

CASE STUDIES

As part of the research work, the author undertook some case studies of existing libraries (both at home and abroad) to acquaint himself with the present trend in modern library design and services, the present public demands and respond and the available resources. Visits were made to nearby existing sites for the purpose of studying the existing facilities and services offered.

Two examples in each case (home and abroad) were studied in addition to the analysis of the present reading room at Maiduguri. The two types also covers the public and Research or academic library for the purpose of analysing the various functions and or any other relationship.

3.1.0 KANO STATE CENTRAL LIBRARY

It originates from the then Northern Regional Library when the 12 States of the Federation were created, with an initial capacity of 8,000 volumes. The library occupies part of the then old Native Authority building along the emir's palace road within the old city. At present, the library has well over 200,000 volumes, with 111 professional staff,

97 library officers and assistance, 13 administrative officers and 59 auxilary staff. In terms of attendance the following tables gives an approximate turn-out for 1986 - 1987.

TABLE 7

DEPARTMENT	PERIOD	BORROWING	MEMBERSHIP	ATTENDANCE
READER'S SERVICES	1986	19,215	1,219	68,559
	1987	21,761	1,206	95,317
CHILDREN SECTION	1986	742	2,091	50,349
	1987	614	3,804	71,868
MOBILE SECTION 6-ROUTES OF 13 STATION	1987	1,814	741	3,384

Source: 1987 Kano State Library Boards Annual Report.

3.1.1 The library is located within the high density residential areas of the city near the central palace. Traditionally that was a good focal point but with the rapid and exponential city growth, the centre of activity continously changed and thus, making the site out of date. Most of the educational and commercial activities that would utilized the library are located further away and hence the need for a new site.

3.1.2 ARCHITECTURAL DESIGN

Architecturally, even though the design was not a concious or purpose design library, little consideration were given to ventilation, lighing, accoustics and with no room for feature expansion. Thus, making the environment quite unconducive for proper learning. The age long building was built of load bearing blocks and plastered with cement Mortar, which still stands strong.

3.1.3 MERITS

- Site is accessible from all parts of the city.
- Economical structure

3.1.4 DEMERITS

- No room for feature expansion and or additions
- No provision for parking space
- The building is grossly enadequate
- No functional Coordination between the various Units.
- Proper design considerations were not given interms of ventilation, lightining accoustics and furniture arrangements.

Kano State has almost the same Climatic condition with the Borno State and as such requires a thorough studies of the prevailing Climatic conditions before embarking of any design.

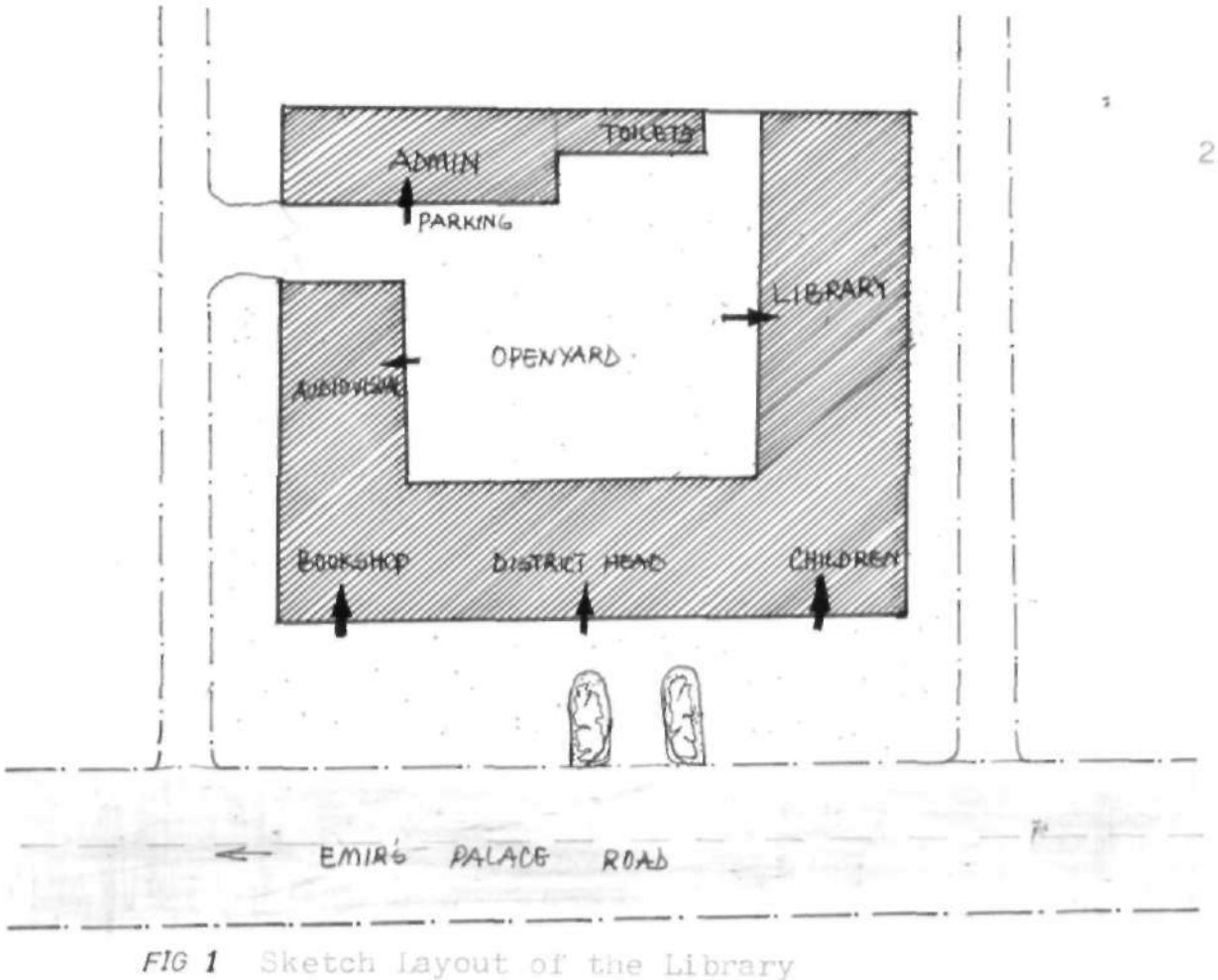


FIG 1 Sketch Layout of the Library

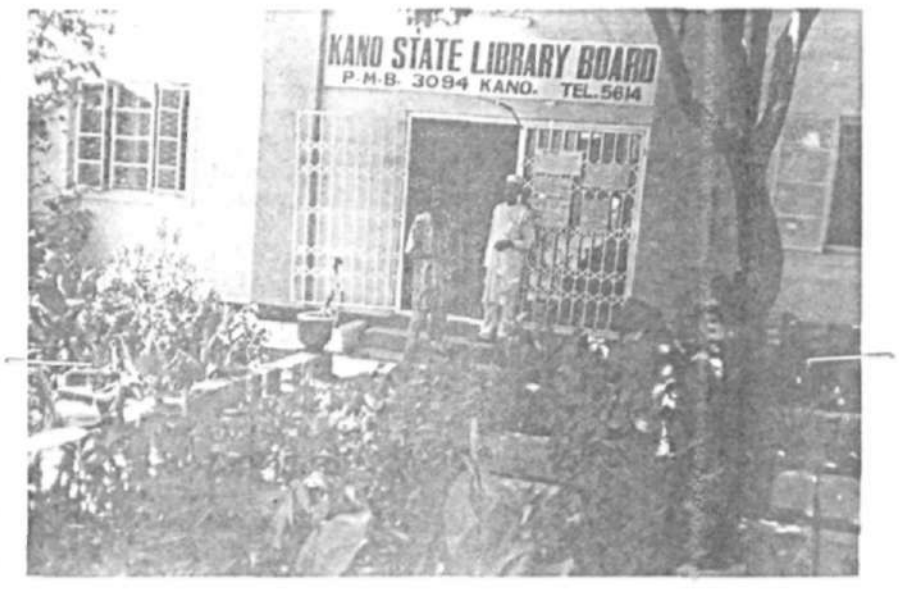
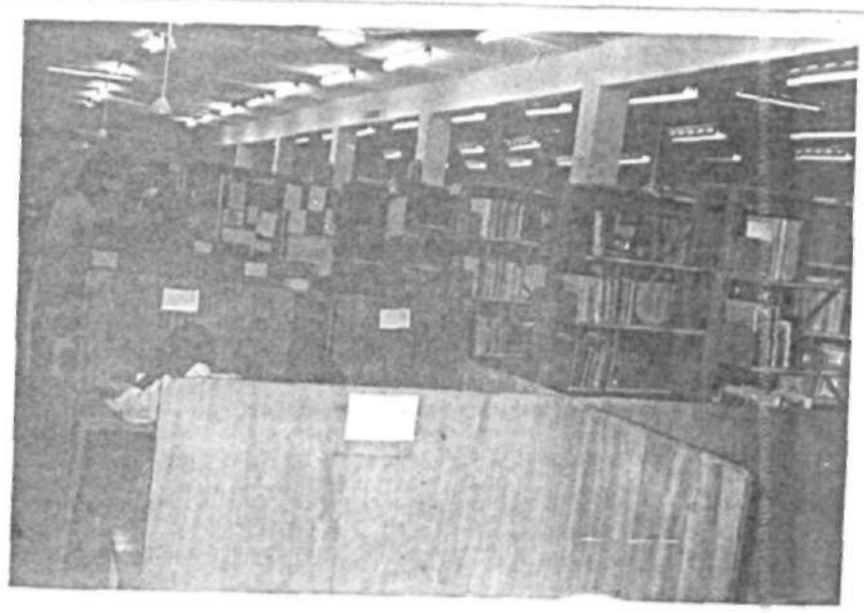


PLATE 1:
Entrance Within a Courtyard.



Very Close aisle due to luck of space.



Interior view of Kano State Library Board.
Stacks and Seats side by side.

PLATE 2/3

See Site sketches and photographs attached on Page22/23

3.2.0 SIR KASHIM IBRAHIM LIBRARY - A.B.U. ZARIA

ARCHITECTS: EGBOR AND ASSOCIATES

SITE LOCATION: A.B.U MAIN CAMPUS, SAMARU, ZARIA.

3.2.1 SITE CONDITIONS:

The site is bounded to the East by the Biochemistry department, to the South and West by the noisy computer centre and department of Architecture studies. To the approach, is a wide parking space and a dual carraige way seperating the library with the Main Student Hostel. Thus, by location the library is central and easily accessible from most part of the Campus. The Climatic condition of the site can be said to be warm humid climate characterised by:-

3.2. High durial temperature

High rain fall

High Humidity

Clear sunshine and dusty winds.

Each of which affects the design and the comfort level of the Users.

3.2.2 THE LIBRARY

The library has about 170,000 volumes of books, 2,000 microfilm items and 34,500 bound volumes of periodicals. The number of journals currently received is about 2,880 titles. The library was, however, design for a capacity of about 500,000 volumes and 2,000 seats spread over each floor and er sections. The library managed about 9 other branches in addition to departmental libraries. The fast growing library has a total of 222 members of staff of which 33 are professional librarians and has about four divisions with over 20 different units or sections. In terms of Usage, the table below gives an approximate figure of average usage.

TABLE 8 USE OF LIBRARY

REGISTRATION	1983/84	1984/85	1985/86
	2518	2900	2751
BORROWING	138,931	163,911	170,025
JOURNALS	13,816	15,520	24,278
BOOKS	164,603	81,400	143,746

SERIALS Volume in Stack for 83/84 - 62358.

Source: K.I.L. READER GUIDE - 1987.

3.2.3 THE DESIGN

The design consist of three floors with a mezzaine floor at the receiption running through the first floor. It aids in ventilating the room spaces in the first floor. The ground floor contains the reserved and periodicals sections to the left and right of the rectangular structure while the centre houses the main circulation (stairmell), administrative offices, control desk loan section, display area, toilets, information Unit and Catalogueing.

The upper floor houses the arts and social sciences collections, audio visuals, and the administrative offices with seating and stacks to the left and right.

The second floor contains the sciences and engineering collections to the right while references and general reading to the left. The centre contains documentations (Africana/thesis).

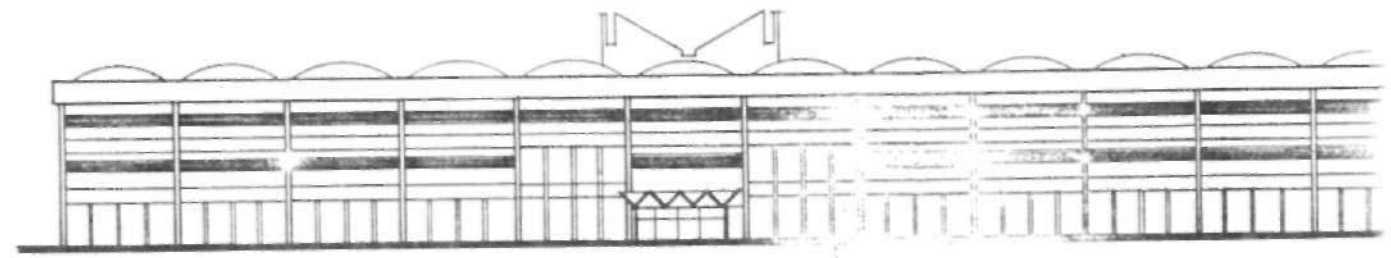
On the roof is the plant room. See sketches.

3.2.4 MERITS

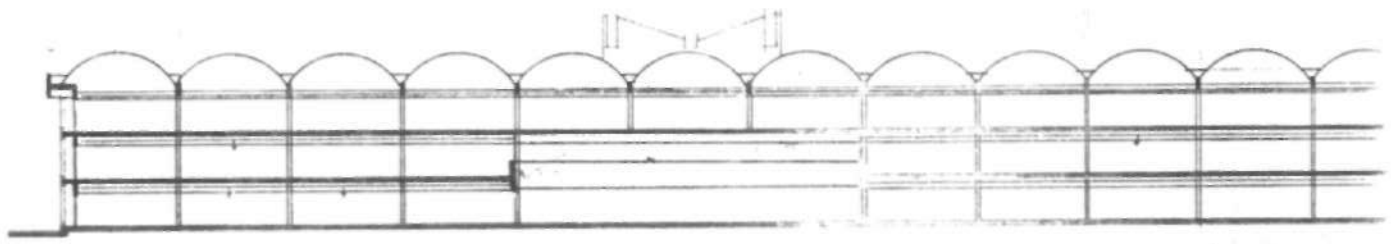
i) There is a proper functional Coordination of various Units.

ii) Good traffic floor for both Users, Staff and materials.

iii) Good structural grid system that ensures proper use of spaces and stacks arrangements.



FRONT ELEVATION



K.I.L, A.B.U. ZARIA.

PLATE 4

SECTION A-A

3.2.5 DEMERITS

i) Use of mechanical ventilation and lighting in the design which always fails with NEPA power failure.

ii) The plant room on top causes vibrations in the building when in use.

iii) As a result of technical failures some room spaces have to be put out of use either because of darkness or lack of ventilation.

iv) No provision for outside studies or activities despite the weather conditions.

v) No provision for feature additions and or expansions even by the re-arrangements of functions.

3.3.0 BORNO STATE LIBRARY BOARD MAIDUGURI

Originates from the then Northern Nigerian Library Kaduna, with an initial stack of 8,000 volumes and controls some three other outside branches. With the creation of states in 1973, the reading room near Shehu's palace was moved to the present site.

3.3.1 THE SITE

The site though very strategic for library services is quite enadequate with no provision for feature developments. Neibourhood encounchment is well pronounced given no room for outdoor reading, relaxation or parking spaces. The site is not directly opening to the main street, a number of government departments hinders the good view of the site.

3.3.2 THE DESIGN

The design consist of three rectangular blocks arranged in rows and linked externally through small room spaces (passages) and open courtyards. Administrative offices are placed at one end linked with a varander while toilets were placed at a way far distance from the main block. By functions only one reading room, a stack space and a children room is provided. These are enadequate as some of the books have to kept in offices including the Director's office and the accounts division due to lack of space. In terms of seats the library has less that 130 seats with no provision for other departments such as audio visuals.

Fig. 3. Sketch layout of the Borno State Library. as per attached sheet.

3.3.3 MERITS

i) The room spaces are well ventilated and lighten through the use of courtyards and good openings.

ii) Economical spans were used throughout the design.

3.3.4 DEMERITS

i) Accessibility to material is very difficult as some materials are kept in offices.

ii) No functional coordination between the various units.

iii) Auxiliary services are provided outside the main complex.



Borno State Library Service Board Maiduguri.

Approach View.

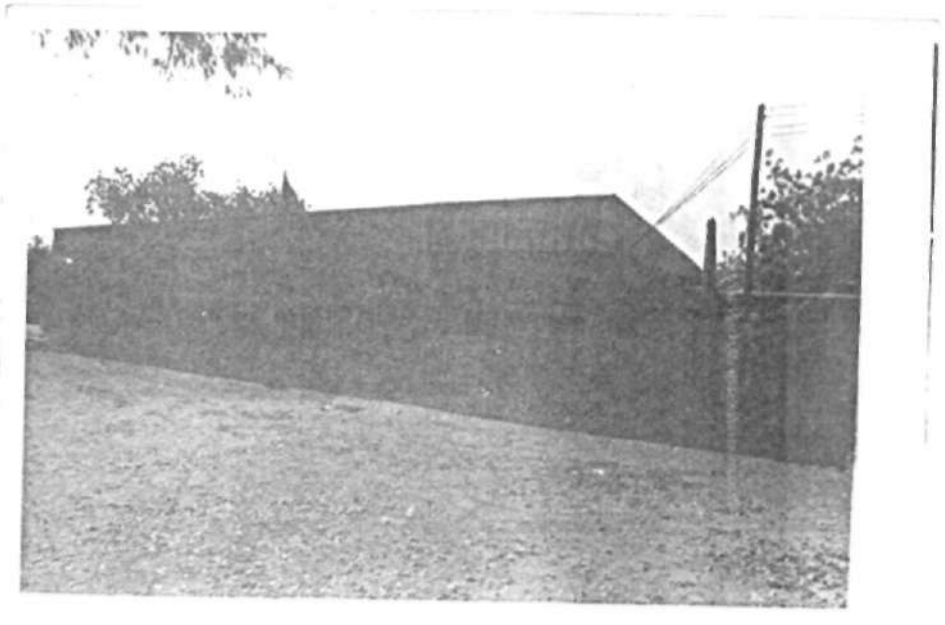
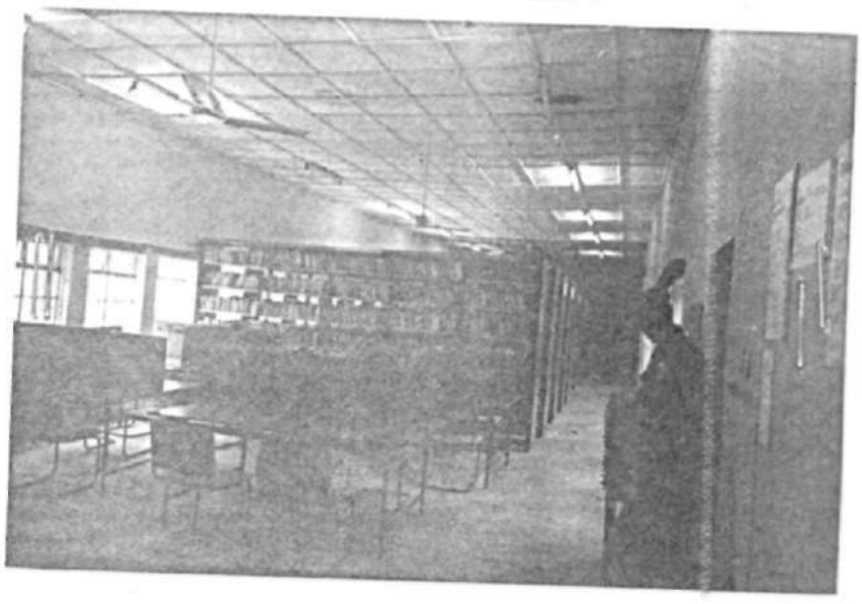
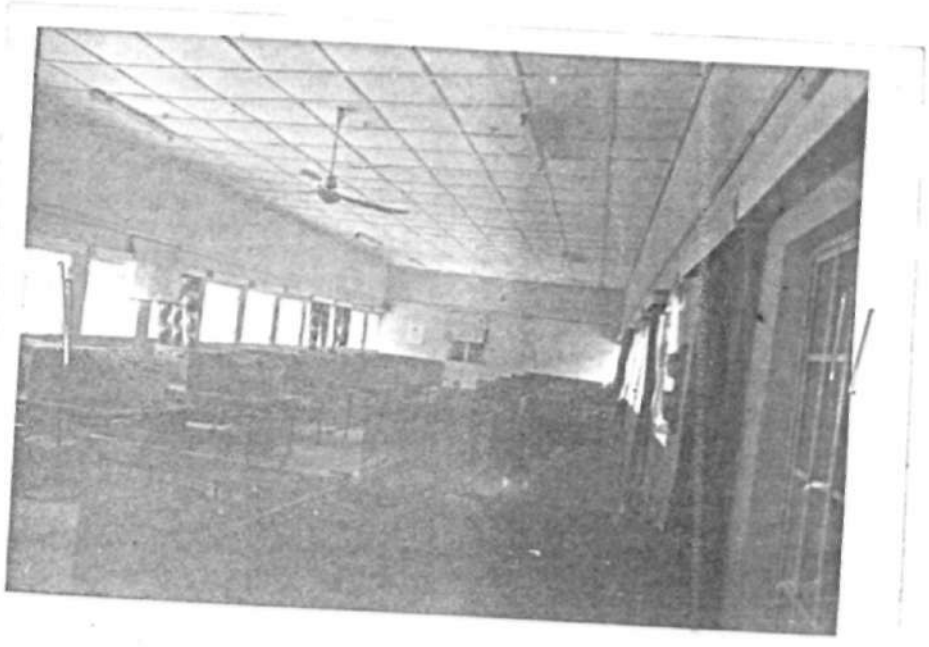


PLATE 5 Side View.



The only hall for stack with few reference seats.



The Main reading hall (80 No.)

PLATE 6

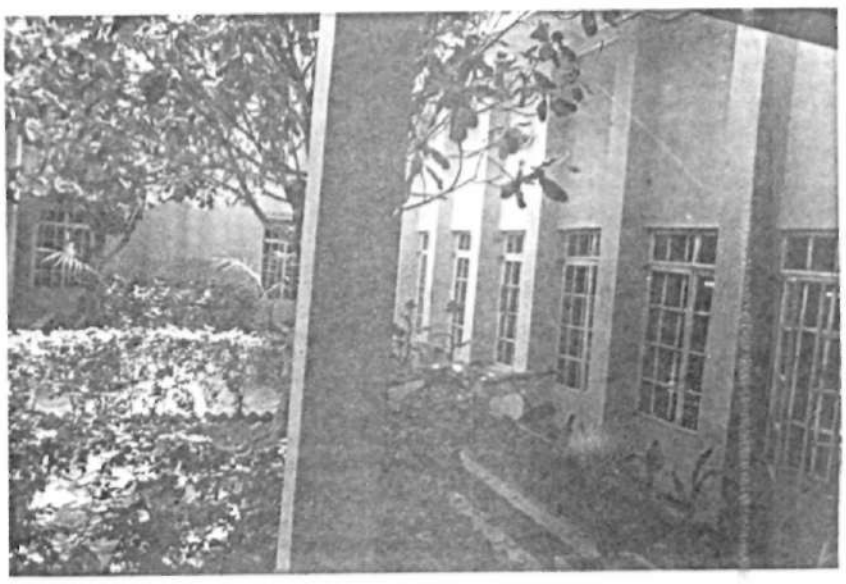


Office of the Director with Shelves for the rare and reserved books.
User's find it difficult to get access to materials.



Borno State Library Service Board Maiduguri.

PLATE 7



Use of Open Courtyards for Ventilation and Lighting - Library Board, Maiduguri.

LIBRARY
UNIVERSITY
NIGERIA.



Due to lack of spaces, books are stack in offices. Above, shows books arranged on the floor.

PLATE 8

3.4.0 HARINGEY CENTRAL LIBRARY, HIGHROAD, WOODGREEN, LONDON N22

CLIENT: LONDON BOROUGH OF HARINGRY

ARCHITECTS: ALAN WEITZEL & B. DINNAGE.

3.4.1 CLIENTS IDEALS AND PHILOSOPHY

This express the operational policy and aspirations of the clients, which may or may not be an open door policy depending on a number of factors. Central libraries are public places with public attracting potentials and the widest range of users are always expected while at the same time aspires more towards the encouragement for leisure and academic readership.

In his views, Godfrey Thomson, an International authority on libraries and the client representatives, defines, his views appropriate to the organisation and stated that;

> "I want my library to be first and foremost a friendly and welcoming building with as little trace to municipal pomp as possible. I want the library to be seen to be part of the market place available to all and not a cleared precinct for the elite. It should be comfortable and as free from intimidating decor or rules and regulations as possible. It should be User - centred and not administratively centred. It should be the principal source of communication for information, education and re-creation in the town"

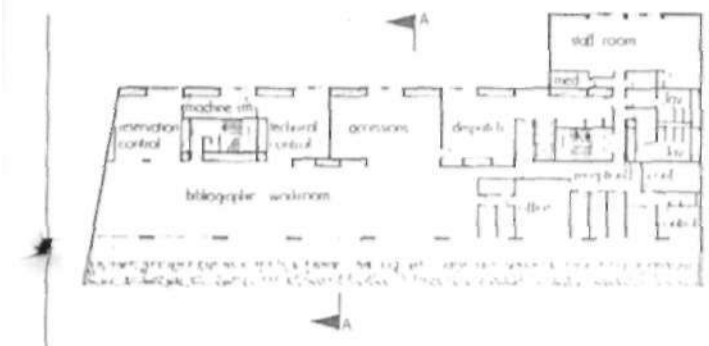
3.4.2 THE SITE

Situated on the main shopping street in Woodgreen, next to the new shopping city along the high road. The site, though central is irregularly shaped and with alot of other site constraints which the architect reasonably explored and utilized.

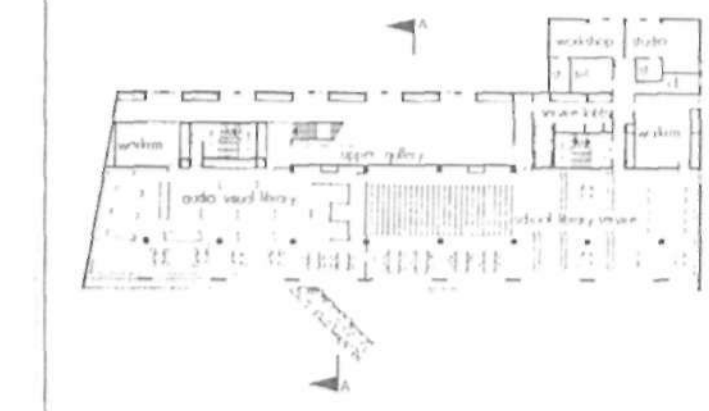
3.4.3 THE DESIGN

Consist of Four floors set up at an inclined angle from the ground floor away from the older street building line. The buildings is characterised by its horizontals, and by the inclined set back, with open and generous approach flaoked by shrubs with easy steps and unobstructive ramps painted in good and warm colours given it a very good welcoming out look.

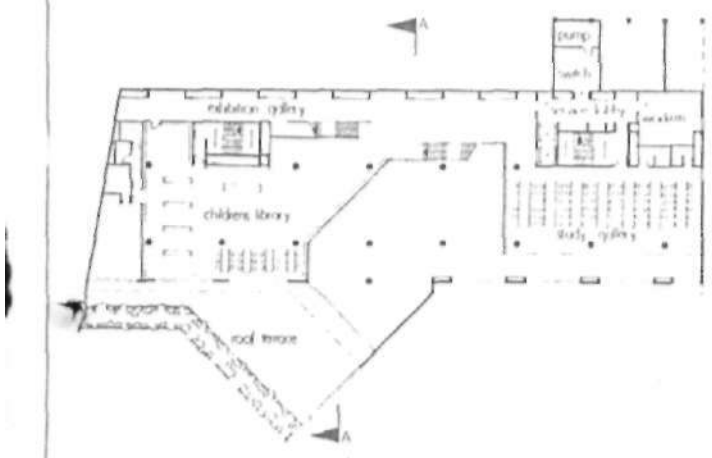
Functionaly, the building consist of the main library (stacks and seats) on the ground floor, the children library and study gallary on the first floor, the audio visual and school library service on the second floor while the last floor houses the bibliographic workroom, reserve and administrative offices. See Sketches attached.



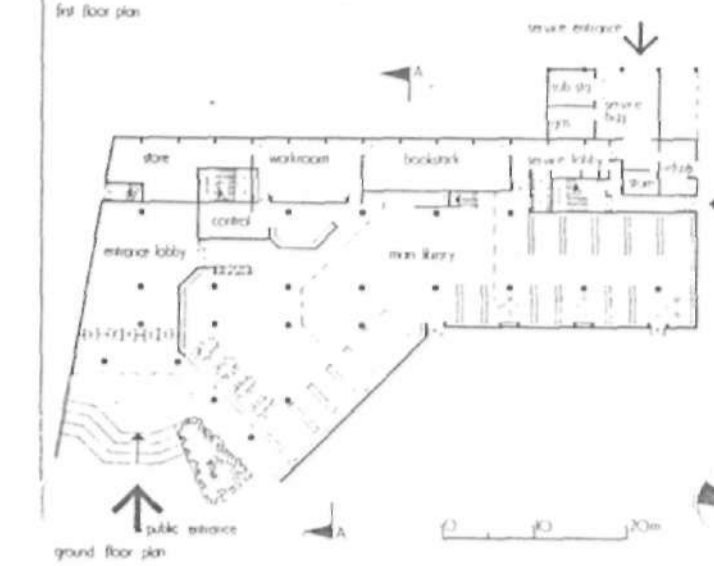
third floor plan



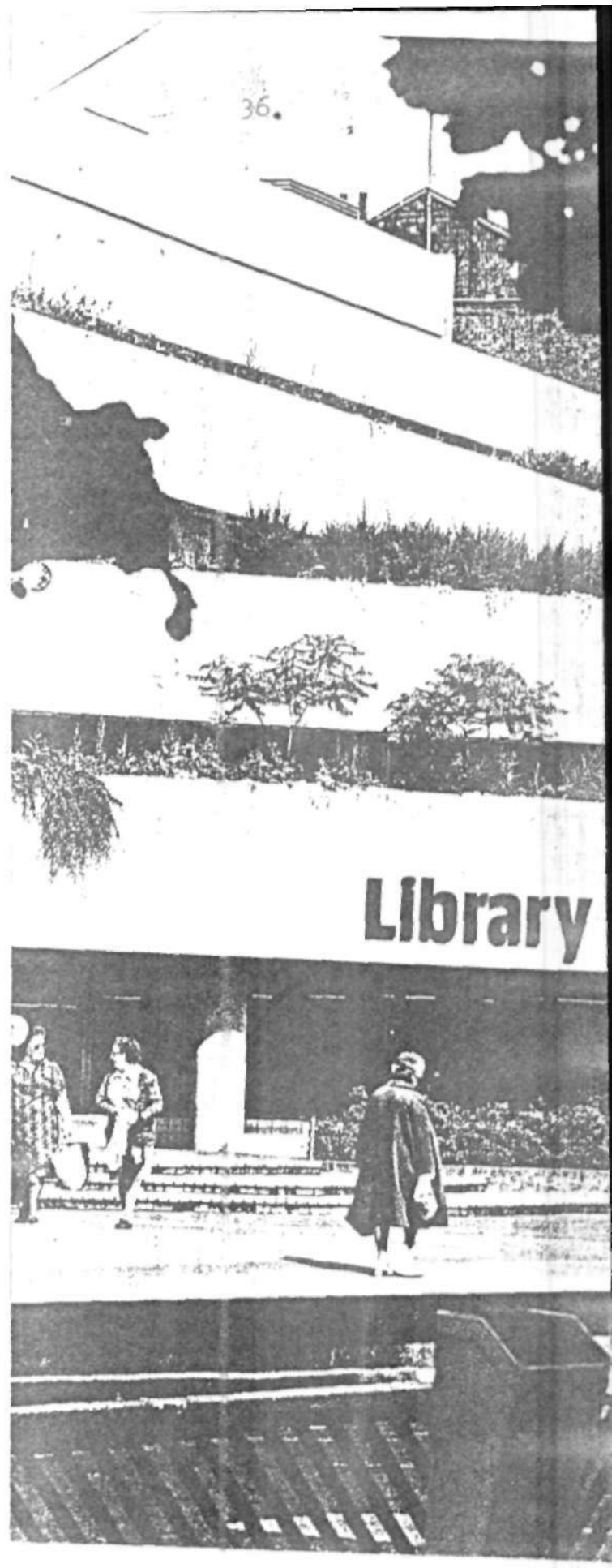
second floor plan



first floor plan



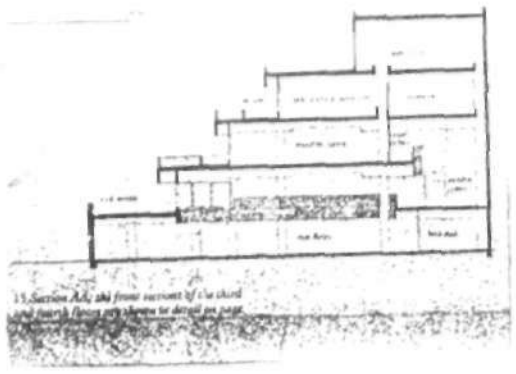
ground floor plan



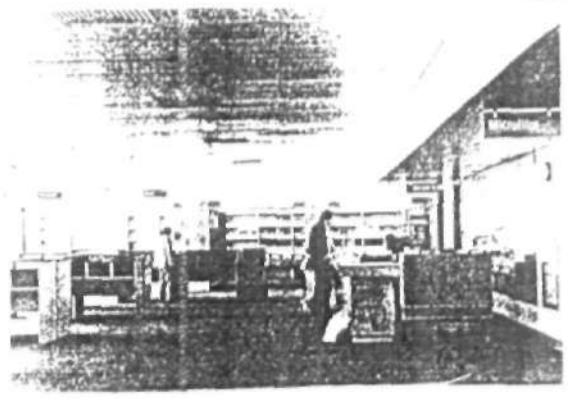
Floor plan and Approach elevation for HARINGEY CENTRAL LIBRARY, HIGH ROAD, LONDON N22.

Source: Architect Information Library Journal. 1968.

PLATE 9



Section Through the Library



Micro Film Area along with children area.





work and Relax. Indoor games within the Complex at HARINGEY Central Library, High Road London N22.

Source: Architects Journal Information Library 28 Aug. 1988.

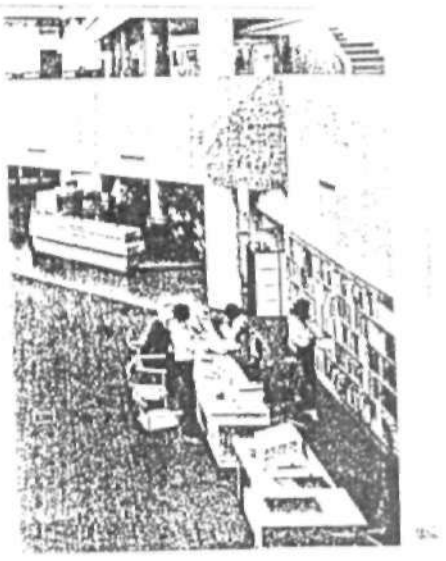
PLATE 10

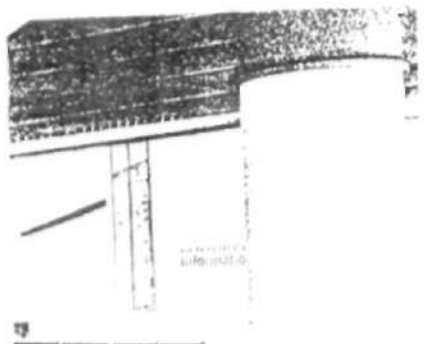


8 Site plan. Shopping City to south.



9 Books for lending and reference in one sequence









Reference Section,

PLATE 11

3.4.4 MERITS

i) Concious use of space (both the site and the design itself).

ii) Restrained use of warm colours and good natural lighting along with the horizontals and the terrace gave the whole complex a welcoming outlooks.

iii) Proper Orientation and concious approach to design gave the approach a characterised locks while the dead end was left solid.

iv) Use of plants and recessed openings reduces the direct impact of weather on the library materials and the Users.

3.4.5 DEMERITS

i) Large space reserve for circulation

ii) From the arrangement children going up through study noise control would be a problem.

iii) No provision for feature expansion

iv) Number of staircase within the main reading hall increases the disturbances.

3.5.0 UNIVERSITY OF TSUKUBA LIBRARY - JAPAN

A modern academic and research library for the new Japanese national University founded in 1975. The library forms the most vital part of the campus by virtue of location, orientation, design and its site plan

with other recreational activities. The library has a total of 1,204,395 volumes, 9,224 periodicals, 708 seats and runs through five floors including a Mezzaine and basement floors each containing a seperate function.

3.5.1 THE SITE

The library is centrally located in between the faculties, student hostel and the main University central square. It is accessible from all parts of the Campus.

3.5.2 THE DESIGN

Design is more or less L shape with set-back at some levels. On each floor stacking, Users seats, auxiliary facilities and seperate control are provided. The design which is computerised interms of stacking, security control and material movement has an automatic detective device at each of the entrance door. The researcher took this particular case to acquaint himself with the new library equipment and techniques. The elevation couple with the landscape to give the attractive potential required of the building.

See sketches attached for various Units of the library.

3.5.3 MERITS

i) Aesthetically the building is attractive

ii) Functionally the various sections are well coordinated.

INTERIOR VIEWS

3.5.4 DEMERITS

FIG 7

i) There are duplication of sections on many floor

ii) No out door reading space

iii) The Use of computer control and mechanical ventilation and lighting is not practicable here.

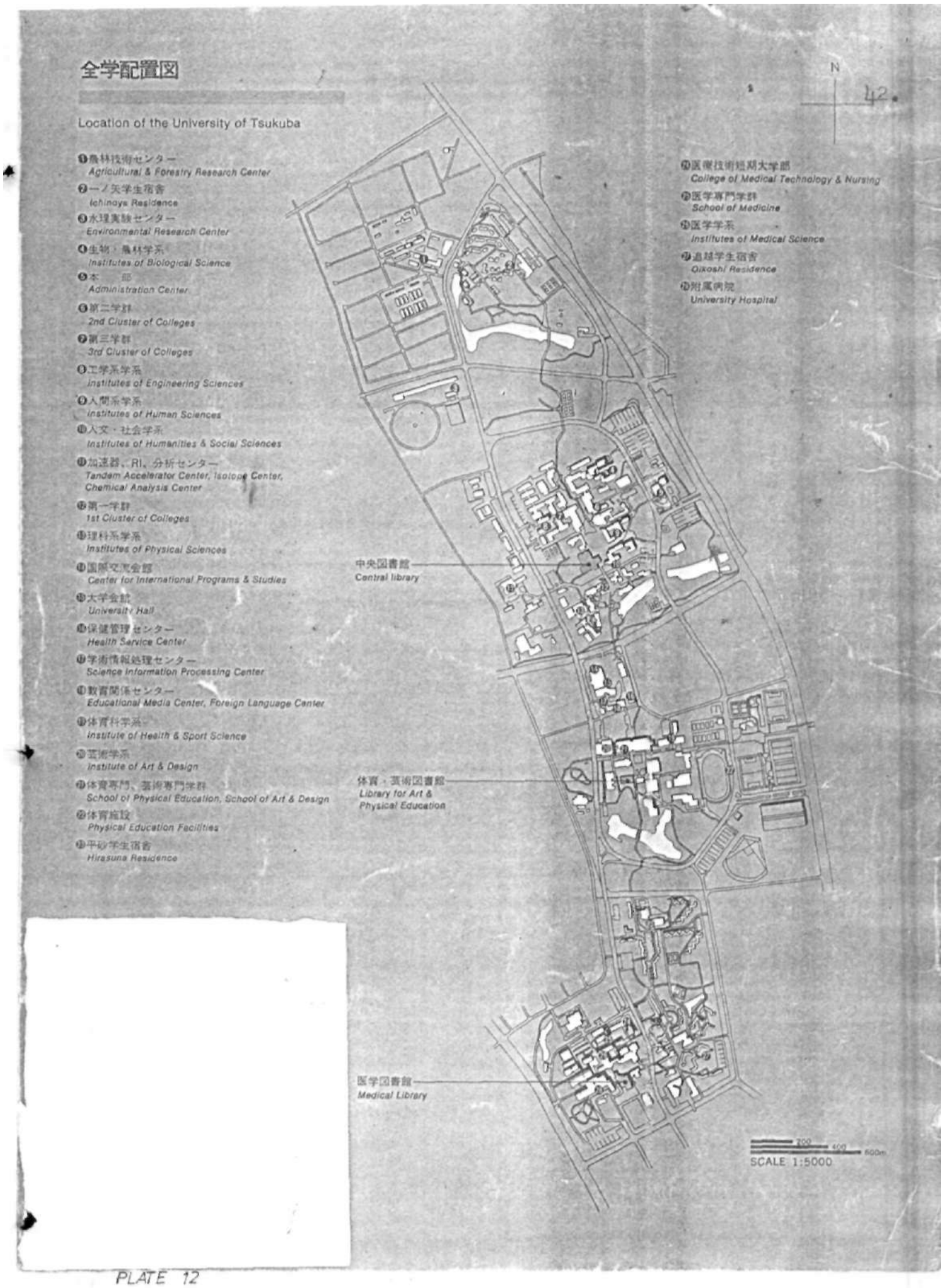


PLATE 12

LOCATION Of the Central Library on the Campus. - Tsakuba University Central Library JAPAN.



Site Plan



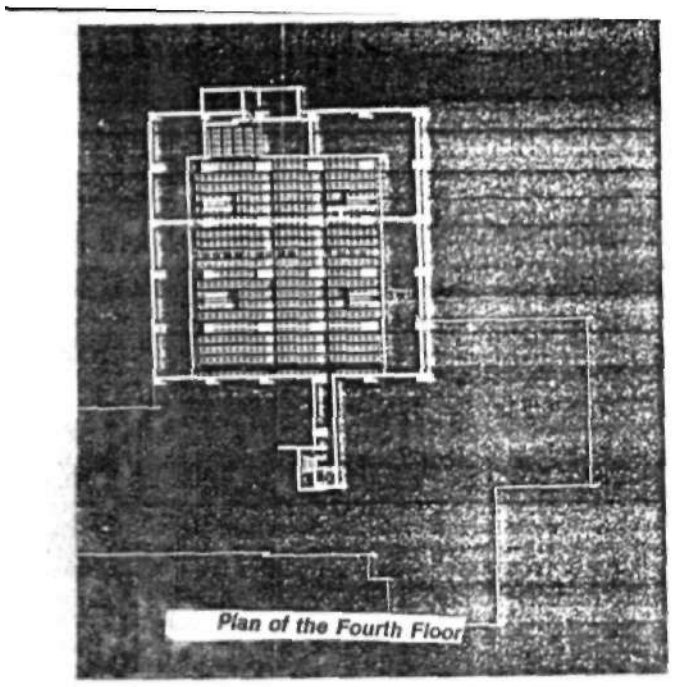
Approach Elevation

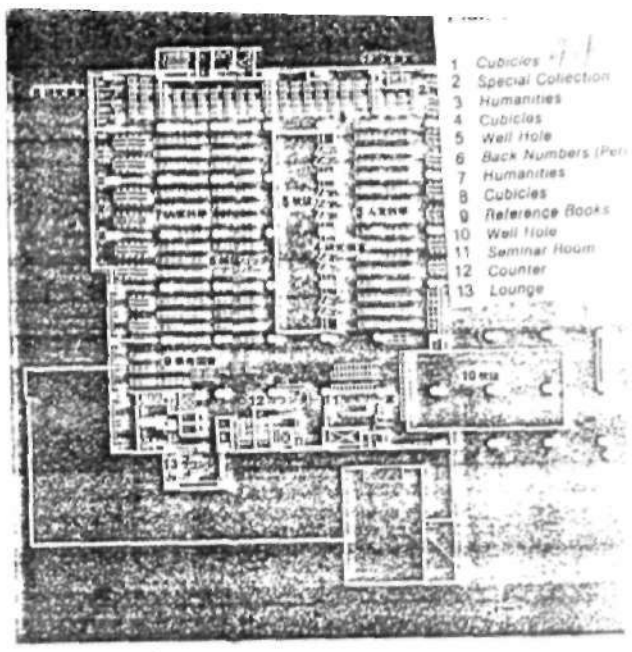


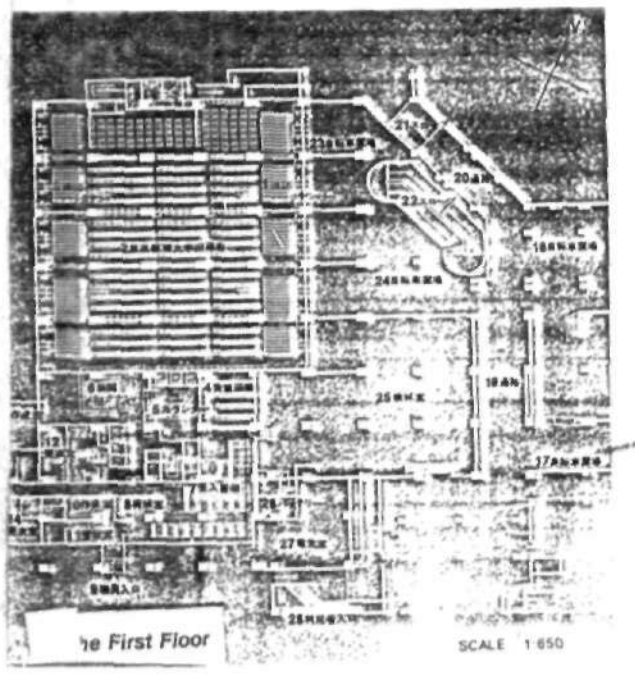
Cross-Sectional View

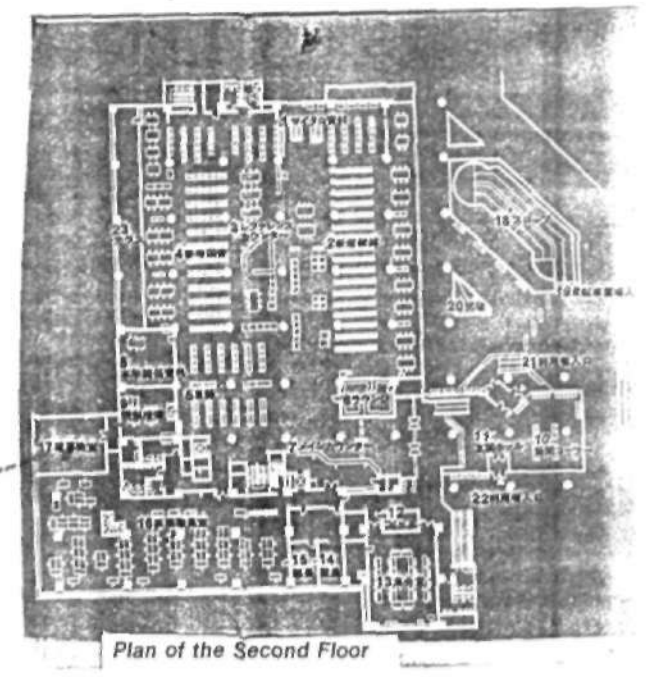
Tsakuba University Central Library. JAPAN

PLATE 13





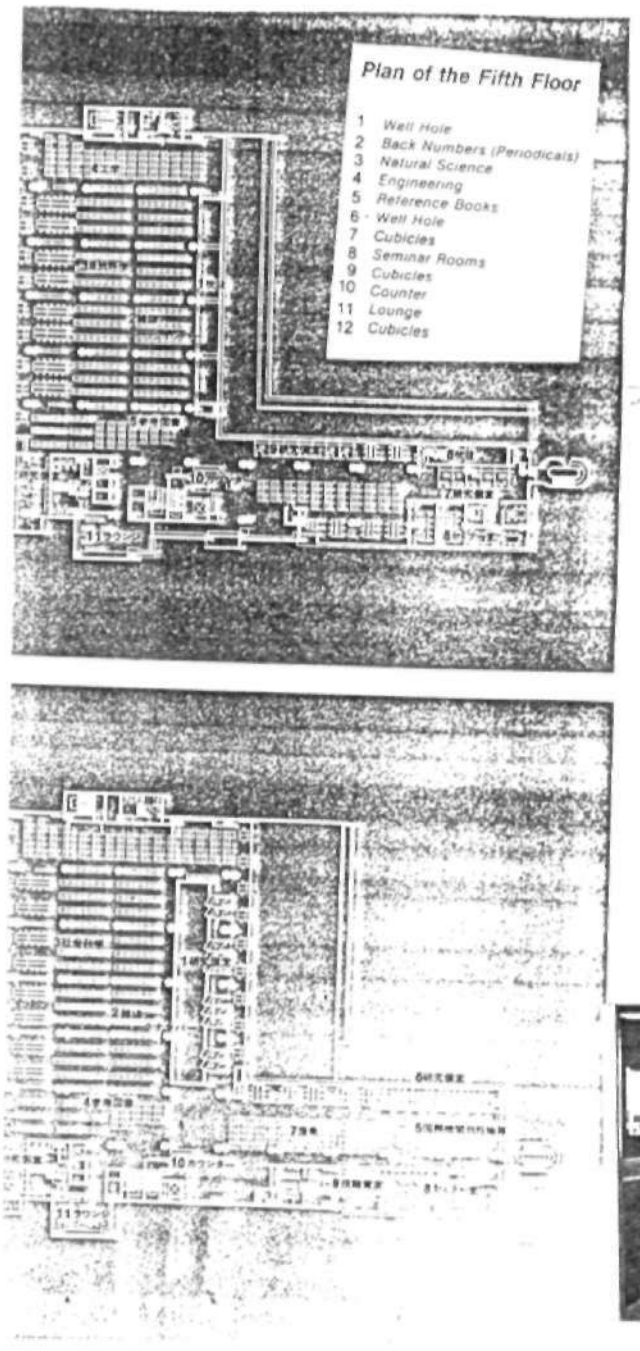


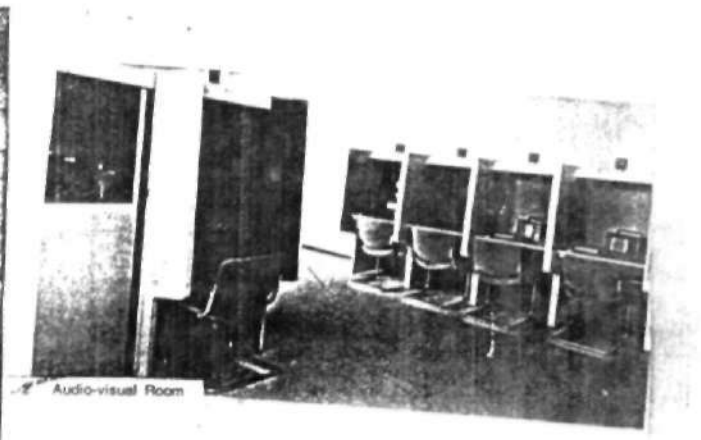


Floor Plans for Tsakuba University Central Library - JAPAN

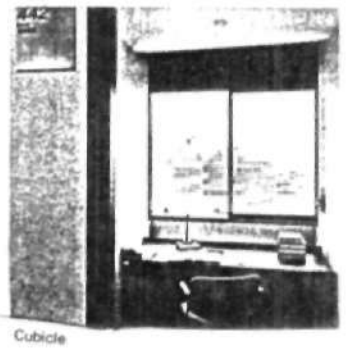
PLATE 14

45





Audio-visual Room



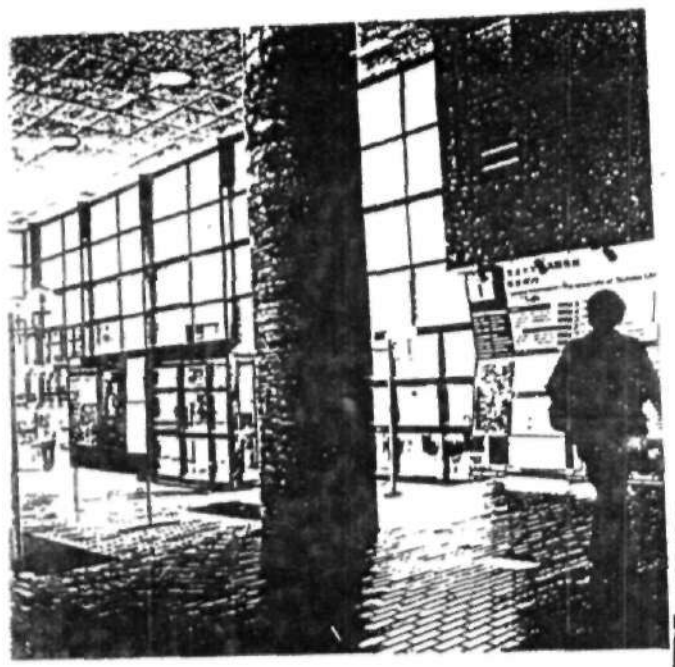
3 Cubicle



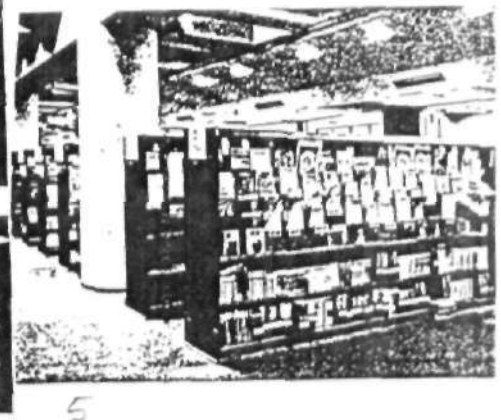
1 Cubicles

Interior views for Tsakuba University Central Library. JAPAN.

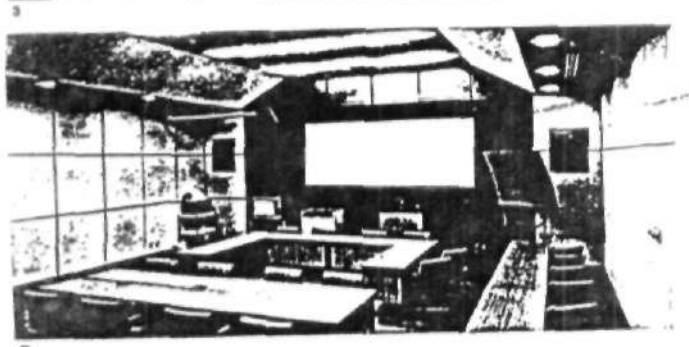
PLATE 15













Interior views for Tsakuba University Central Library J.A.A.

1. Information/ exhibitions
2. Reception/ Control Counter
3. Loan desk
4. Conference room
5. Audio /isual

CHAPTER FOUR

OPERATIONAL REQUIREMENTS

4.1.0 CLIENT BRIEFS

The client here are the Borno State Library Services Board, an autonomous parastatal under the Borno State Government. In their efforts to improve the standard of the library services, the board made several proposals and memorandom to the government on the need to provide them with adequate structure that would cater for their needs and that of preserving the materials there in. In each case the board attempts to spell out their basic requirements which the author considers as the client's briefs.

Interviews were also held with the director and other head of sections and in each case emphasis is on the provision of building design that would adequately cater for the societies library service needs. Thus, the client brief can be summarised as follows;

To provide a building complex that would serve as a central administrative control for the whole state library services and also serve as a public library for the state capital with about 200,000 volumes and provisions for feature expansions. The complex needs to includes a commercial section for self reliance and

as an attractive agent for the Users such as Bindery Unit, Book depot and Consultancy services. An auditorium for meeting or lecture with other supporting facilities are to be incooperated into the site to give the whole environment a pleasant and a welcoming appearance.

4.2.0 FUNCTIONAL RELATIONSHIP BETWEEN AREAS AND THEIR ARRANGEMENTS

The functional relationship between various areas in a library could best be understood when one clearly defines the activities that takes place in each sections, while the routes of such activities provides proper guidlines for better arrangements.

In any public library there are 3 major activities namely the Users activities the staff activities and the material preservation.

4.2.1 USERS ACTIVITIES

These defines the nature and purpose of the Users and hence the functionality of the library. Users activities includes the search for information, Reference, reading research works, materials borrowing, Exhibitions, purchase of library materials, attending lectures, seminars, drama, film shows or sympesium etc.

When these activities are properly integrated a User might be attracted to more than one activity.

4.2.2 STAFF ACTIVITIES

These covers the overall Management of the library system, from the administrative policies, its imlimentation or excusion, Maintenance, storage, staff welfare and management, directing and assisting the Users in all aspect of the library services. Such activities covers all aspects of the library services such as readers services, technical services and Admin/ Personel Management sections of the library.

4.2.3 MATERIAL PRE-SERVATION

These covers the acquiring, distribution, maintainance and storage of library materials which might either be in printed graphics or non graphics form. The later are often referred to as audio visuals consisting of microforms, microfilms, tapes, records, dies etc. They are stored within the audio visual section in a safe envelopes, files or boxes in catalogues, carbinets because they are very sensitive to weather conditions. They require an air conditioning space in large case.

The printed graphical materials mainly in the form of books, periodicals, documents, newspapers are stored in shelves according to their subject matter for easy accessibility and reference. The stacking are carried out in a manner that would provide easy accessibility and ensure security of the materials. The spacing between stacks and or books are very important interms of book warms treatment and terinites treatment through provision of proper air movement through the materials. Secondly avoid the storage of wet materials along side with book stacks. The stacking might be open or closed with or without much clearance depending on the section and context of the material.

i) The Access stacks comprising of current collections with shelves and seats arrange togather informally to give maximum attraction to Users. It is usually placed closed to the control entrance for security.

ii) The open access stack - Here only the material are stack in one place with the readers seat a side. The spacing between stacks depends on the nature of the materials and its usage. In reference sections stacks are space with enough circulation for at least 2 Users at a time while in documentation or reserve the spacing is narrowed as only the staff have access to the material. Users request them through the member of staff.

Each of these activities mentioned above have been designated a specific activity area within the library. A single space might accommodate more than one activity, as each area is related to the other depending on function or readers convience. At the entrance which is the main circulation area for both the 3 activities the following functions are commonly found to be close or in same zone;

i) Control and Information desk
ii) Exhibitions and notice boards
iii) Access to toilets and stairways
iv) Access to catalogue etc.

Near to the control and information desk are the children's library, current and documentations all within the same zone for accoustics reasons, effective supervision and security of material.

Reference section which is a little bit further away from the entrance might be subdivided further into subjects like Arts and Social Sciences, Law, Accountancy, Science and Technology etc. In case one is going up such functions are better located upstairs. The study areas which falls in the next zone, the quite zone, comprises of seating facilities, carrels, outside seatings of different arrangements.

The administration and other auxiliary facilities for both staff and readers should be made easily accessible to ensure proper control and security.

The diagram below gives an approximate functional relationship between various areas. The errors indicate the direction of movement and the possibility of direct linkage between the Units.

Fig.2 1 Relationship between various sections in a Public Library:-

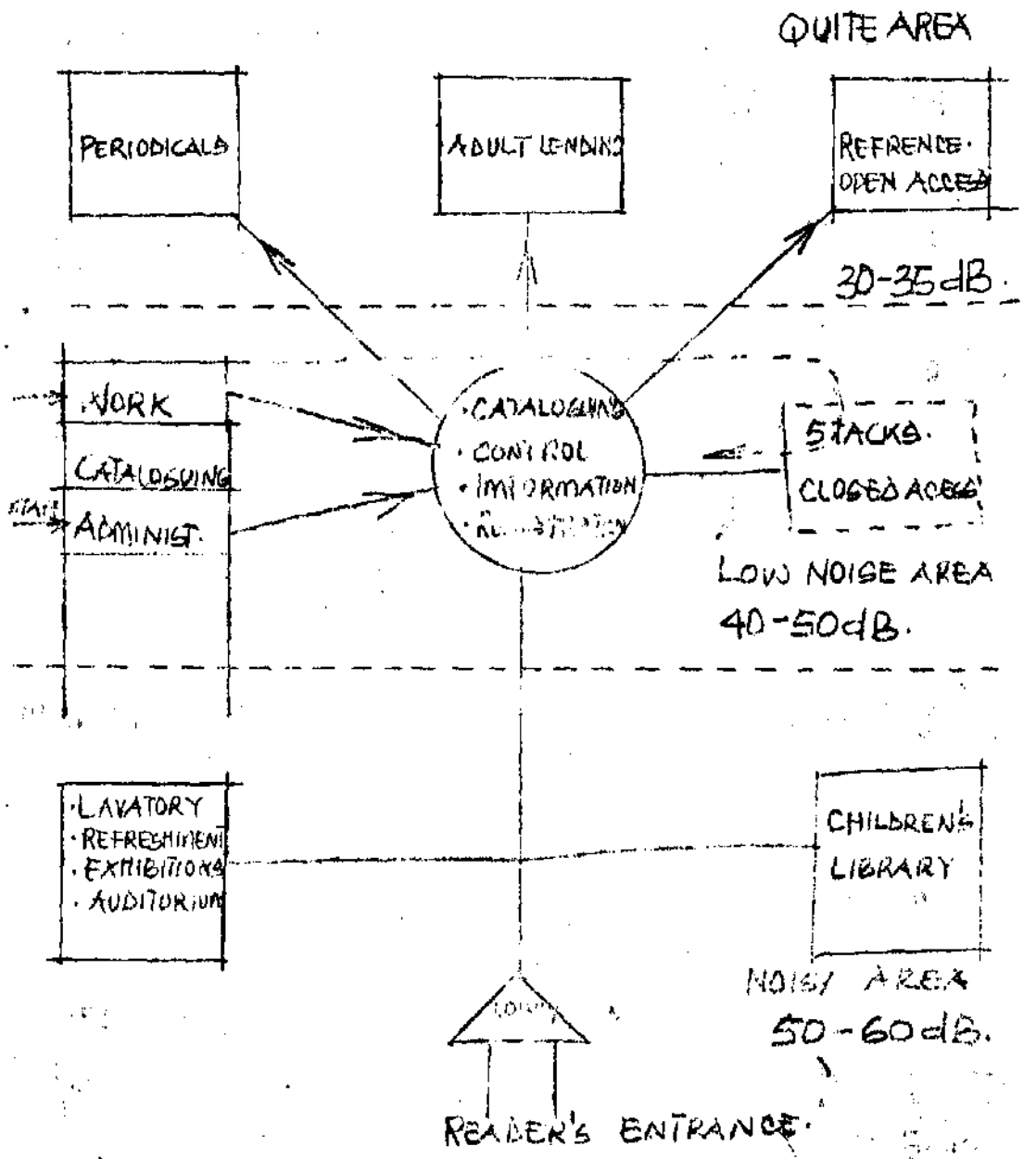
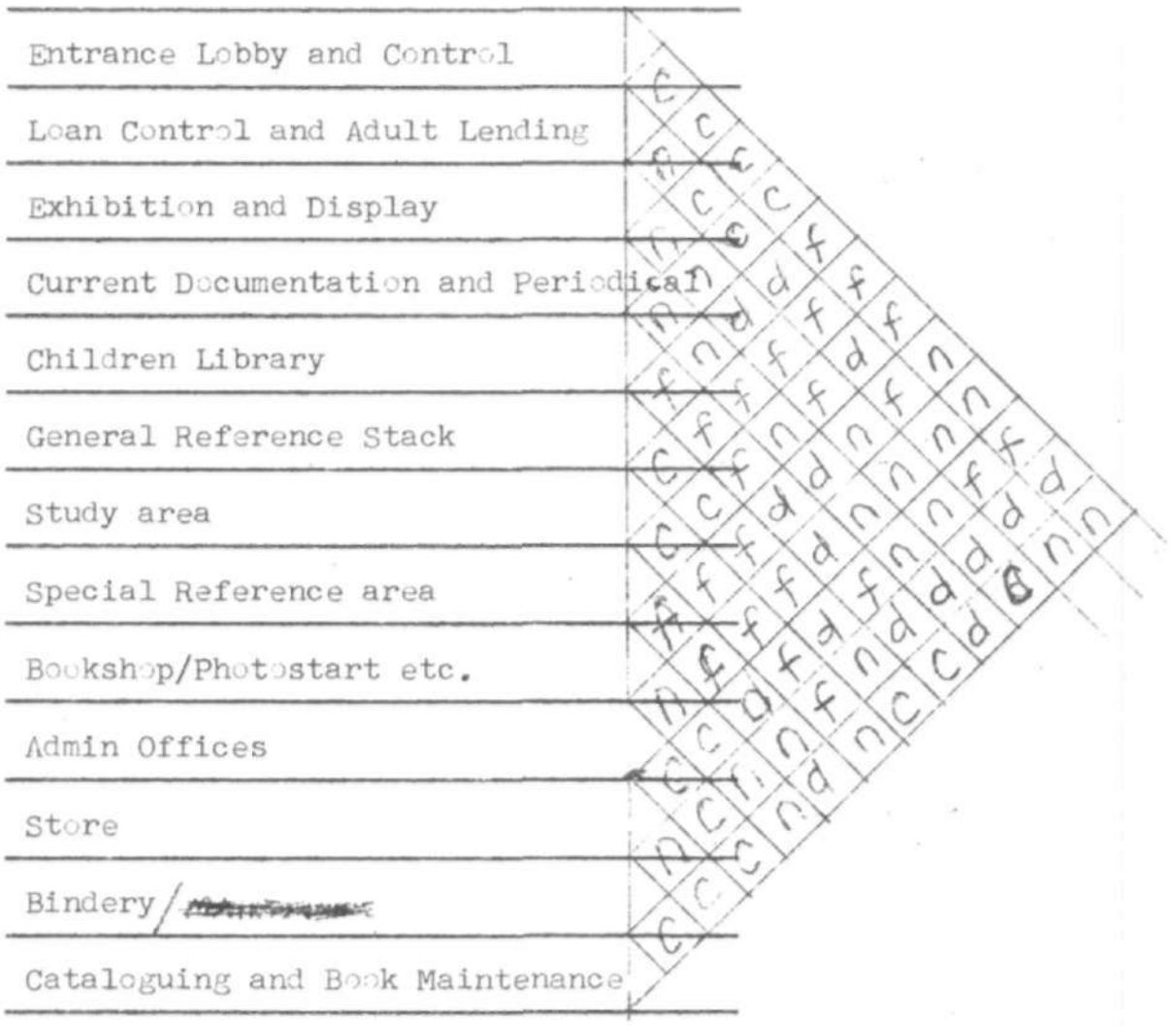


Fig.3[redacted] Relationship between various sections in a Public Library.



c - very close

f - far apart

n - near to

d - In different to closeness.

4.3.0 RELATIONSHIP BETWEEN STAFF, USERS AND MATERIALS ROUTE

These provides the convience required of a good library function in terms of traffic routes and easy accessibility. Effective and carefull planning would provide the excepted convience which is one of the authors design target as a major contribution in the scheme.

The diagram below explains the basic routes by Users and staff for effective control, security and decongestion.

Fig.4[illegible] PRINCIPAL AREAS WITH DIRECT FUNCTIONAL ROUTES LINKED FOR READERS AND MATERIALS

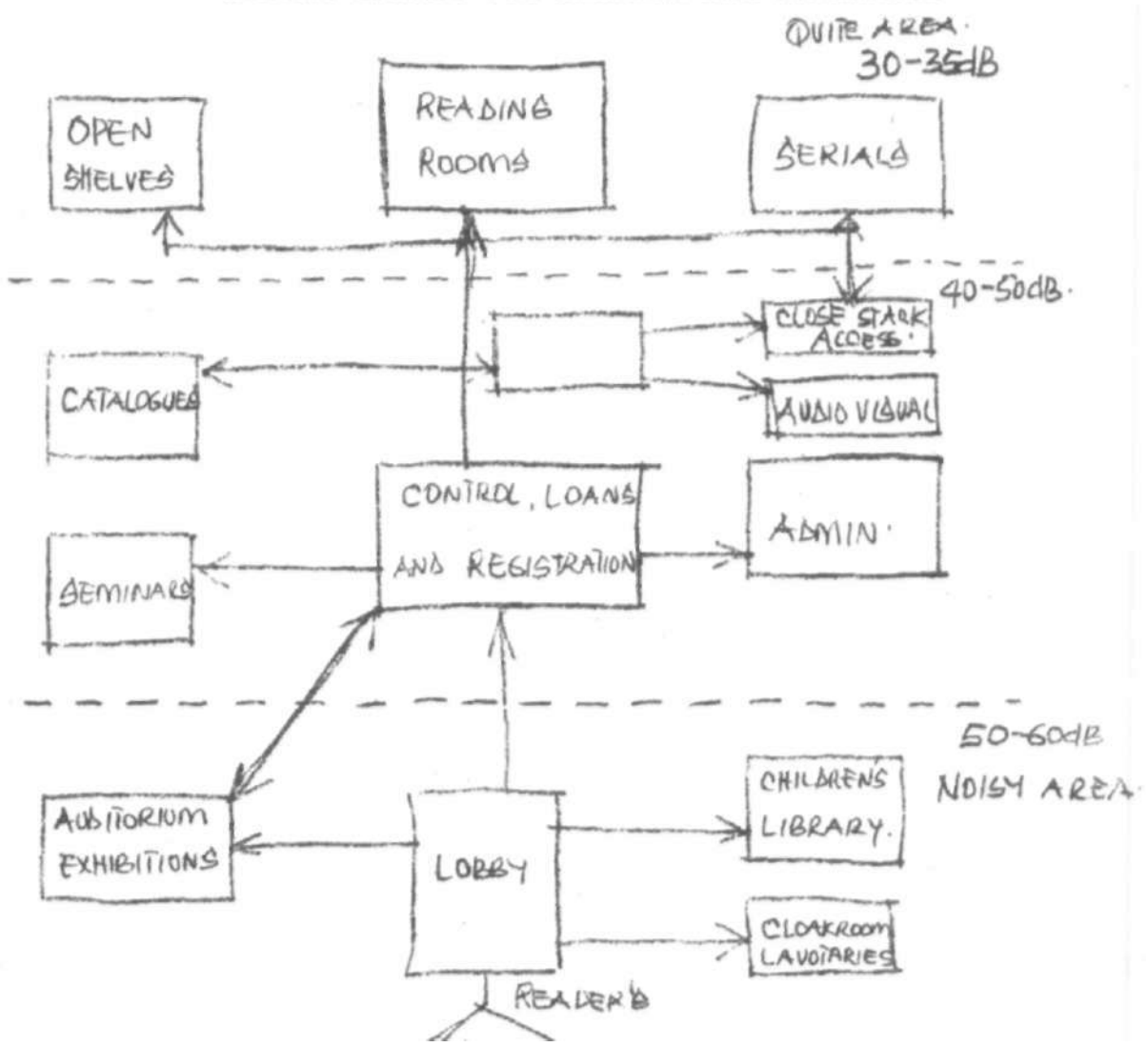


FIG 5 PROGRESS OF MATERIALS ROUTES.

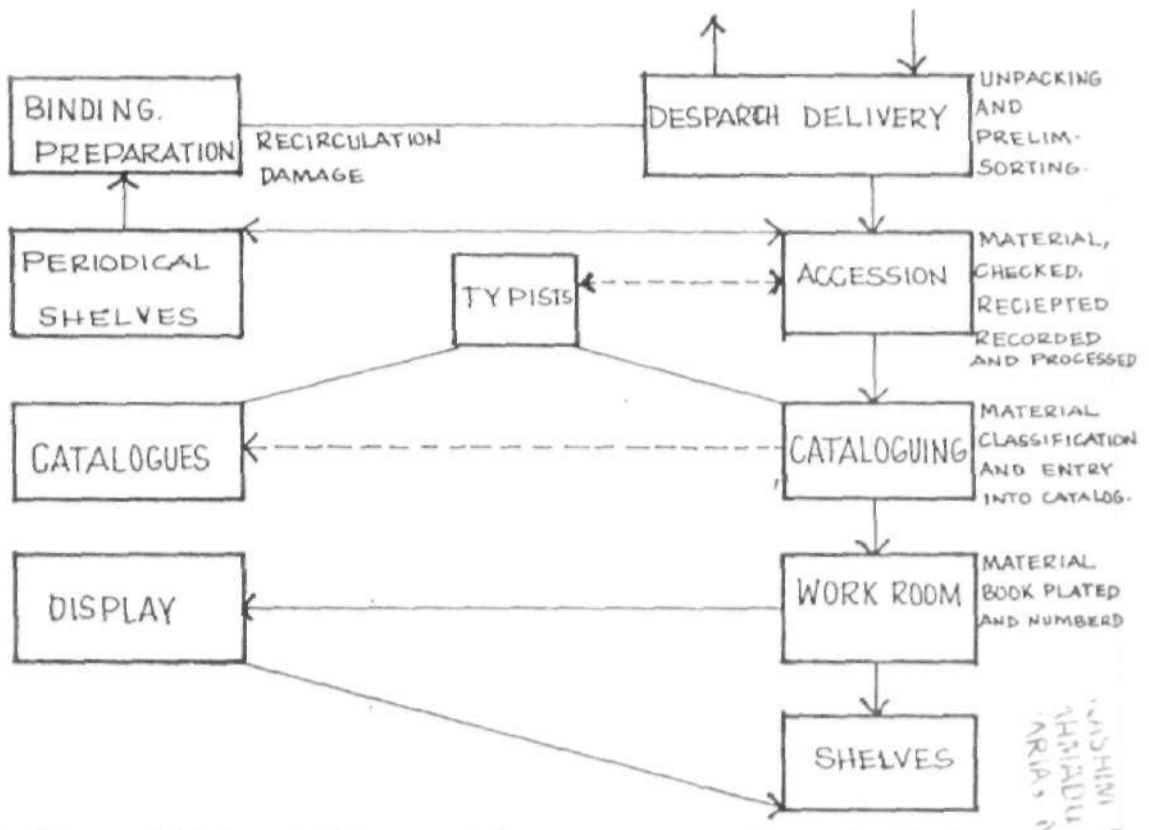
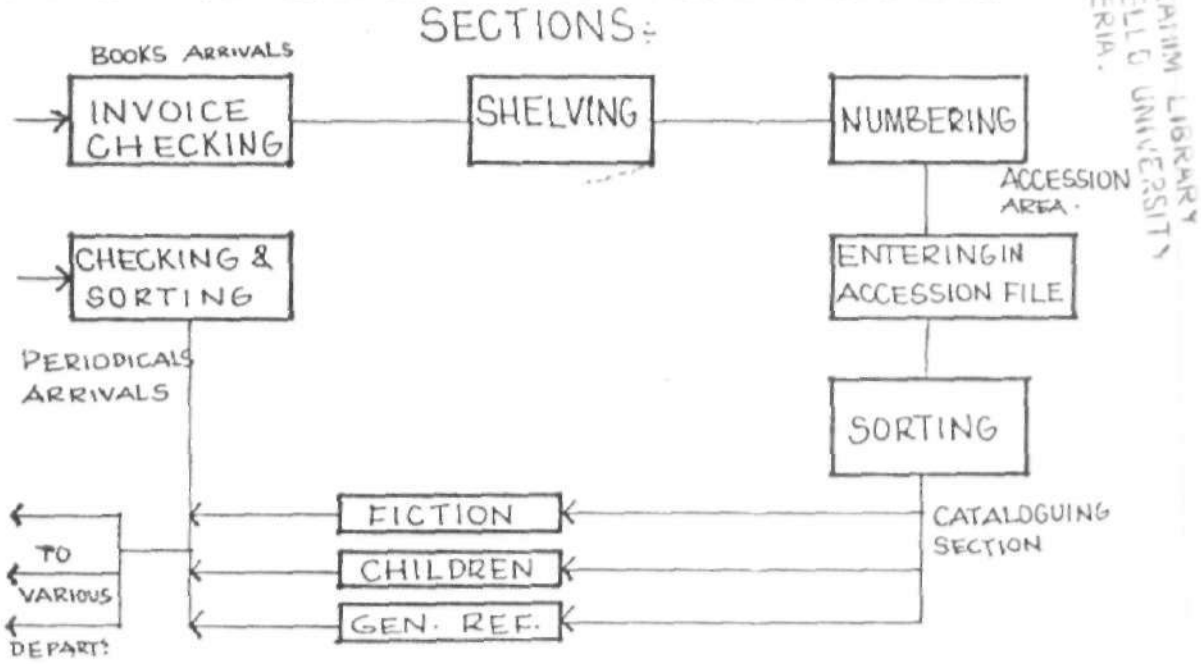


FIG 6 MATERIALS INTAKE TROUGH PROGRESSING SECTIONS:-



ABDULLAHI IBRAHIM LIBRARY AHMADU BELLO UNIVERSITY ZARIA, NIGERIA.

4.4.0 MOBILE LIBRARY AND WORKSHOP

Though very costly to run, it forms a very good and effective means of extending library service to the grassroots. It involves the transportation, distribution and loaning of essential library materials to the rural populace. They are toucht on routine bases depending on transport availability and the whole system is controlled from the headquarters. Literacy class are organised and supervise at intervals by the staff. It assisted in the adult education class for rural populace especially the nomadic class.

At the headquarters it runs a workshop and shares all other facilities with other departments. For a state like Borno we require a minimum of 5 Units to cover the five zonal educational offices.

CHAPTER FIVE

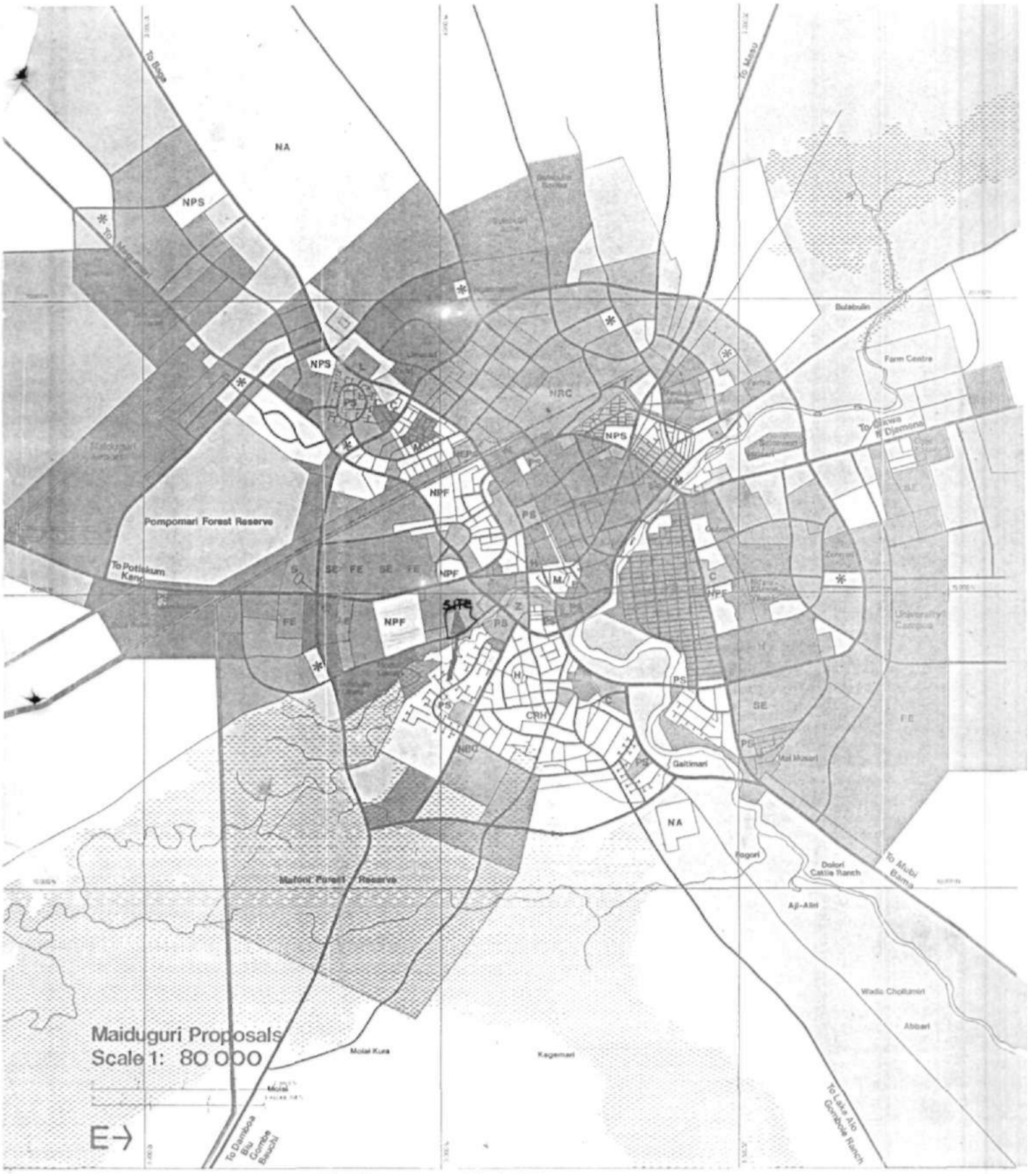
THE SITE AND ITS CHARACTERISTICS

5.1.0 SITE LOCATION

Maiduguri, the capital city of Borno State is located on latitude 11°51'N and longitude 13°05'E and stands some 350 metres above sea level. It falls within the Sudan Savanah belt with climate characterise by hot days and cold nights (70 - 110°F and 40 - 50°F respectively), low relative humidity of less than 20% during the hotest days and a short seasonal rainfall of about 26.14 inches annual average. The city falls within the lower depressed Chad basin characterised by sediments and acquifer layers in three zones (upper, middle and lower zones) to a depth of about 200 feet. The Vegetation is mainly grass land with scarted trees while soil is mainly the grey sand loams and the brown sand which forms parts of the Bama ridge.

5.2.0 SITE SITUATION

The site is situated in between Institutions, low residential areas, Government offices and the major city's recreational areas namely the Kyarimi Park [zoo] and the open air theatre. To the East across the major



Proposed Land Use

Structure Plan 4: Current Land Use Proposals
May 1976

Source: Max Lock-Survey 1973 - 76.

Mixed Urban Mainly Residential
- High Density
- Medium Density
- Low Density

Institutional
- Education
- Law & Defence
- Public Services & Administration

Services
- Public Transport & Utilities
- Mixed Commercial
- Industrial

Open Spaces
- Public Open Space
- Agricultural Production
- Land to Remain Undeveloped

- Primary Roads
- District Roads
- State Secretariat



Existing Land Use

Residential:
Low density
Med. density
High density

POS & forests

Allocations
Institutional

Commercial / Industrial

Transport

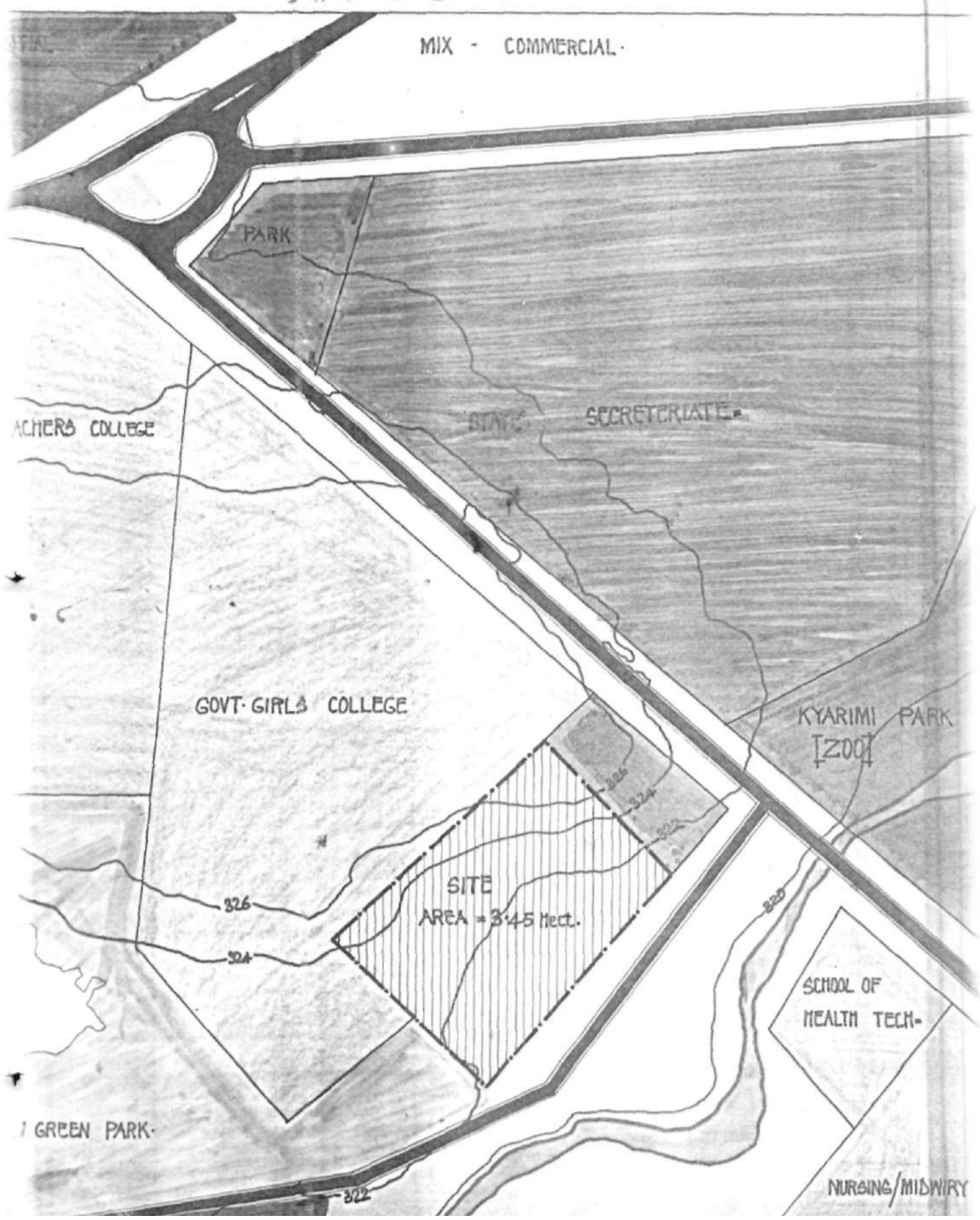
The major land-use pattern in Maiduguri reflects Yerwa as the high density core, with Gwange its main expansion area. The disproportionately large Government allocations foreshadow future development.

1.2.13

FIG 6. Proposed site for the library complex

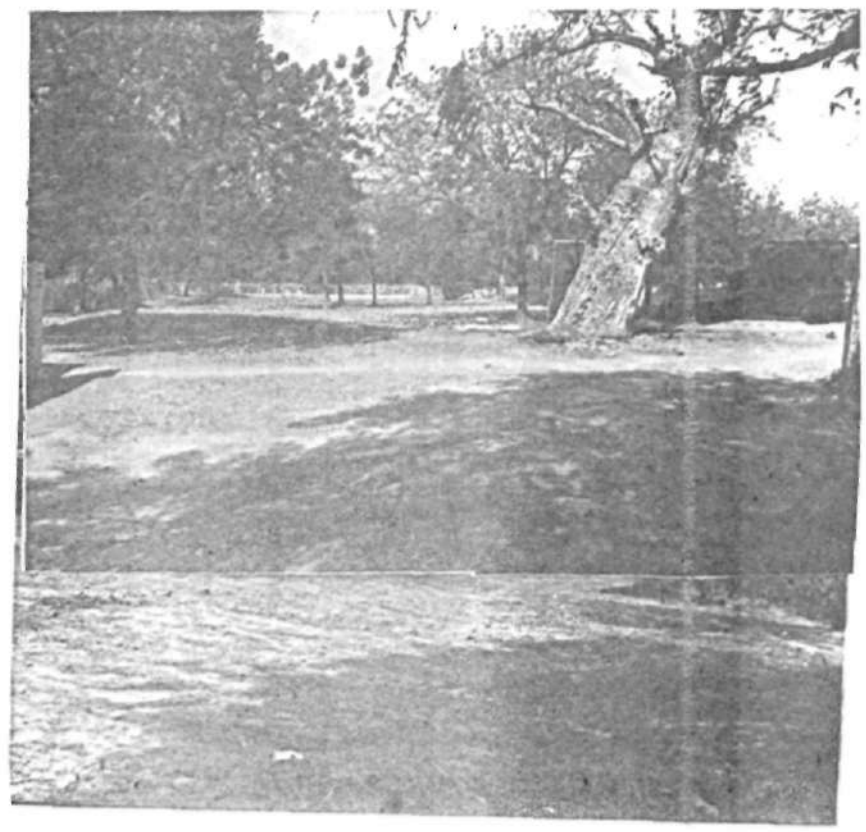
~~THIS BEING WHAT THEY ARE TO THE SOCIETY TODAY, REQUIRES~~ NOT ONLY QUITE SPACE FOR ITS SERVICES BUT ALSO AN EASY ACC WITH RECREATIONAL AND OTHER SITE ATTRACTIVE OUTLOOK. ITS LOCATION SHOULD LAISE PROPERLY BETWEEN OTHER URBAN ARKET PLACES, RESIDENTIAL, INSTITUTIONAL AND OTHER GOVERNMENT OFFICES FOR MAXIMUM ATTENDANCE AND EFFECTIVE UTILIZATI

E FALLS WITHIN THE INSTITUTIONAL AND GOVERNMENT OFFICES LAND USE TO THE NORTH AND WEST WHILE TO THE EAST AND NECT IS ONAL RESORT CENTRE [ZOO, PARK, OPEN AIR THEATRE] AND THE GREEN SPACES AROUND.





The Site - A view towards the Educational Resource Centre.



The site with scattered vegetation at the Centre is used as a farm land. The edge are well planted for boundary reason.

PLATE 17

road are the state Secretariat, the Park and the open air theatre, to the South are the School of Health Technology and the Nursing and Midwifery across the access road. Shearing the boarder to the North are the Schools of Government Girls College and Women Teachers College and an open green space to the West. The site is about 1km distance by road to the Main Market and the Main City gate of Dandal Way, with mixed Commercial residential in between them. Under the existing and proposed land map use attached the site has been earmarked as oepn space and therefore part of it will be utilize of this purpose.

5.3.0 SITE SELECTION CRITERIA

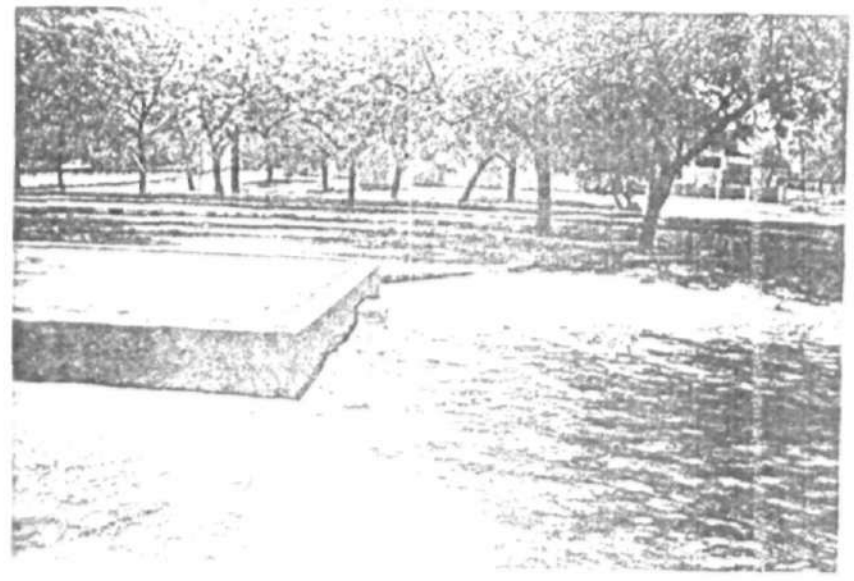
The site has the following advantages which justifies its selection of for the project.

5.3.1 PROXIMITY TO EDUCATIONAL INSTITUTIONS

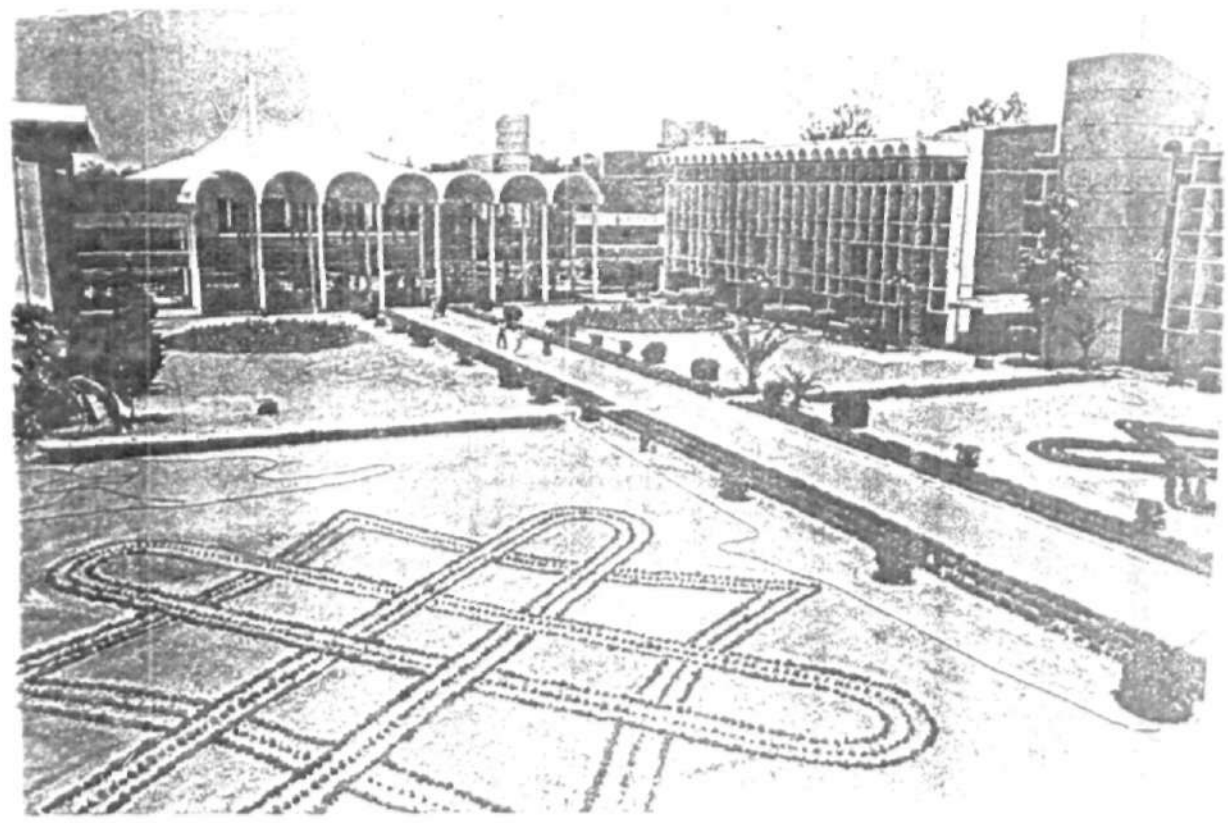
Over 70% of the cities post primary and post secondary institutions are situated within a working distance of less than 1,2km and they consitute about 60 - 65% of the regular readership.

5.3.2 PROXIMITY TO RESIDENTIAL AND COMMERCIAL LANDUSE

Proximity to residential and commercial areas another category of active Users.



Nearby re-creational facilities [illegible]



Also Close to the site is the State Secretariate with a good and Concibusly landscaped approach.



Kyarimi Park(200) Also a re-creational facility close to the site. Shaddin around the site [illegible] well pronouced.

PLATE 18

5.3.3 PROXIMITY TO RECREATIONAL FACILITIES:-

Proximity to the Kyarim park (ZOO) and the open air theatre makes it easier to integrate recreational aspects in the design for those reading for leisure.

5.3.4 TOPOGRAPHY:-

The site is relatively flat with gentle slope and goodviews towards the river Ngadabul to the south. To the north the schools are properly shaded with tree plantings and to the west is a forest reserve (farmlands) which will ensure good landscape, wind and dust control and provide a source of freshair for ventilation.

5.3.5 ACCESSIBILITY:-

The site is easily accessible from all parts of the city with transport facility in all directions.

5.3.6 SITE FOR EXPANSION:-

Enough opportunity/area for feature expansions and or additions.

5.3.7 SERVICES:-

Good existing services (water, drainage electricity and telephones lines) by the site fence.

5.4.0 CLIMATIC CONDITIONS

The climate of any area has an over-riding influence on the growth and development of that area be it interms of Agricultural development, Physical construction or other form of human activity. In each case, the climate consequently determines the final outlook of the environment, the mode and adoptability of the life style of the people around. These are determine by six major climatic elements.

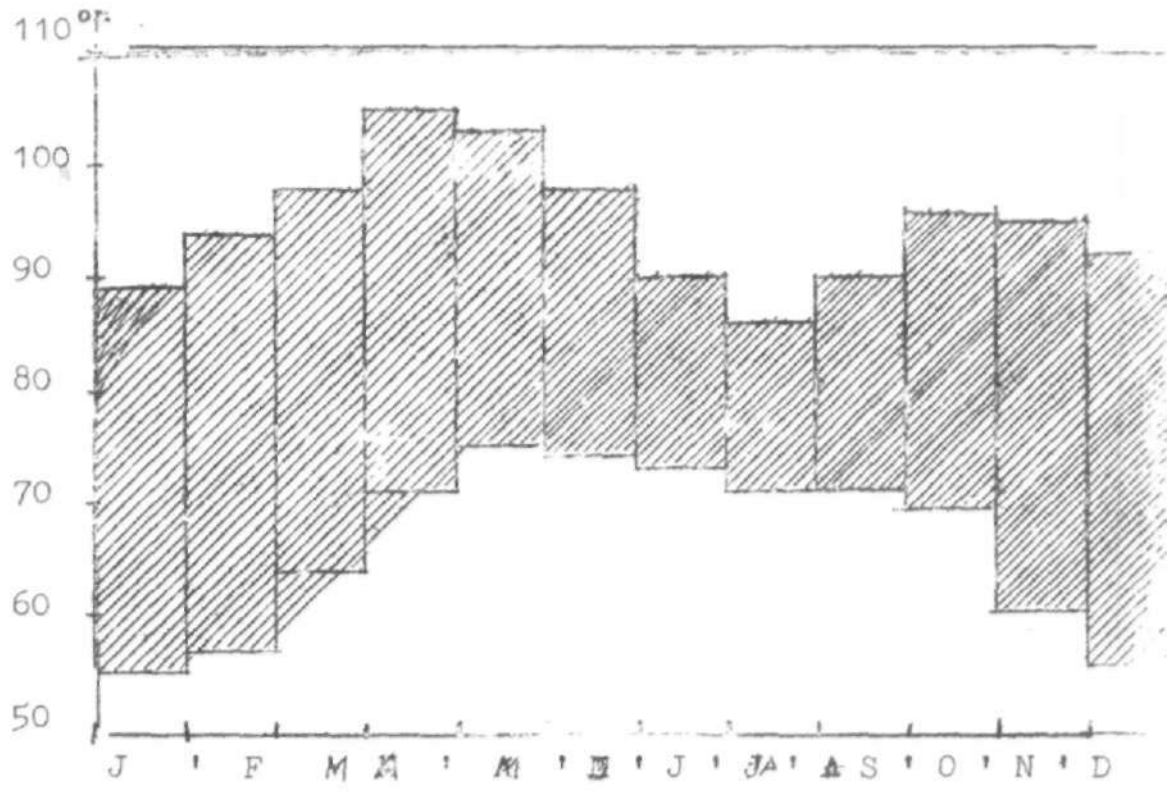
5.4.1 TEMPERATURE

Maiduguri experiences extreme of temperature: both duirnal and annual ranges are wide, with the day temperature during the hamattan ranging from 85 - 95°F and night temperatures of 40 - 50°F. This time the sky is haze with poor visibility because of the fine dust in the air. From April - June a sudden rise in temperature is noted with daily maximum exceeding 110°F and night temperatures are also hot. From July to August because of the rain the temperature begins to fall to between 75° - 80°F.

For such extremes the designer has to be conscious of the human and building thermal response and control to achieve maximum design comfort.

Fig. 7

Mean Monthly MAX - MIN Temperatures in Maiduguri



Source: MARX - LOCK SURVEYS 1973-76.

5.4.2 RAINFALL

Rainfall in Maiduguri is seasonal covering between April to September, characterise by single maximum around August with an annual average figure of 26.14 inches recorded over 56 years, maximum record of 34.65 inches and minimum record of 14.9 inches within the same period.

[redacted]

TABLE 9:

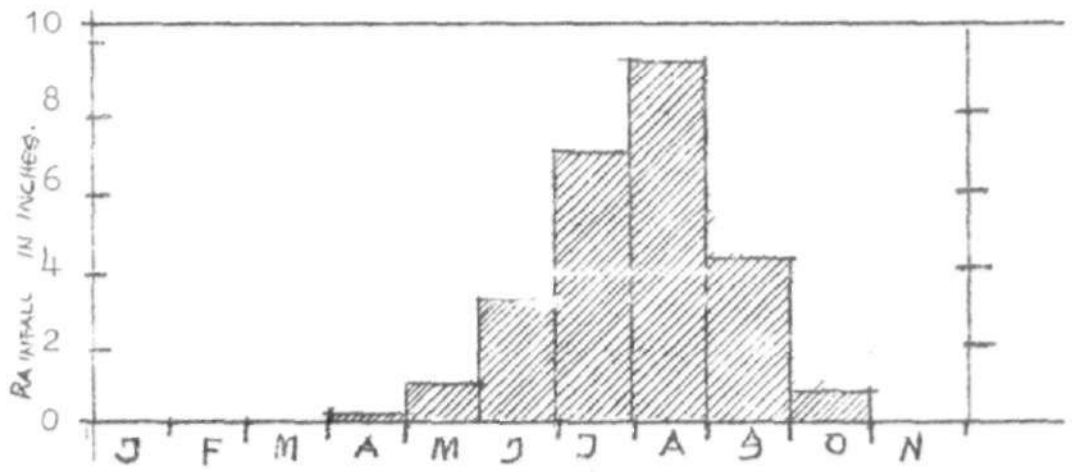
MEAN MONTHLY RAINFALL FOR MAIDUGURI 1915 - 1970

J	F	M	A	M	J	J	A	S	O	N	D
0.01	0.01	0.01	0.33	1.41	3.31	7.12	9.16	4.99	0.77	0.01	0.0

Source: Maiduguri Master Plan By MAX-LOCK.

The rainfall is characterise by Thunderstorm or short sharp showers with rarely falls reaching 2 - 3 hours. Most of these falls are not effectively put into human Use, largely due to evaporation, evatranspiration and run-off. The actual amount of water left over is the effective precipitation as water loss through the sky is high due to the nature of the sky.

Fig.8: MEAN MONTHLY RAINFALL IN MAIDUGURI



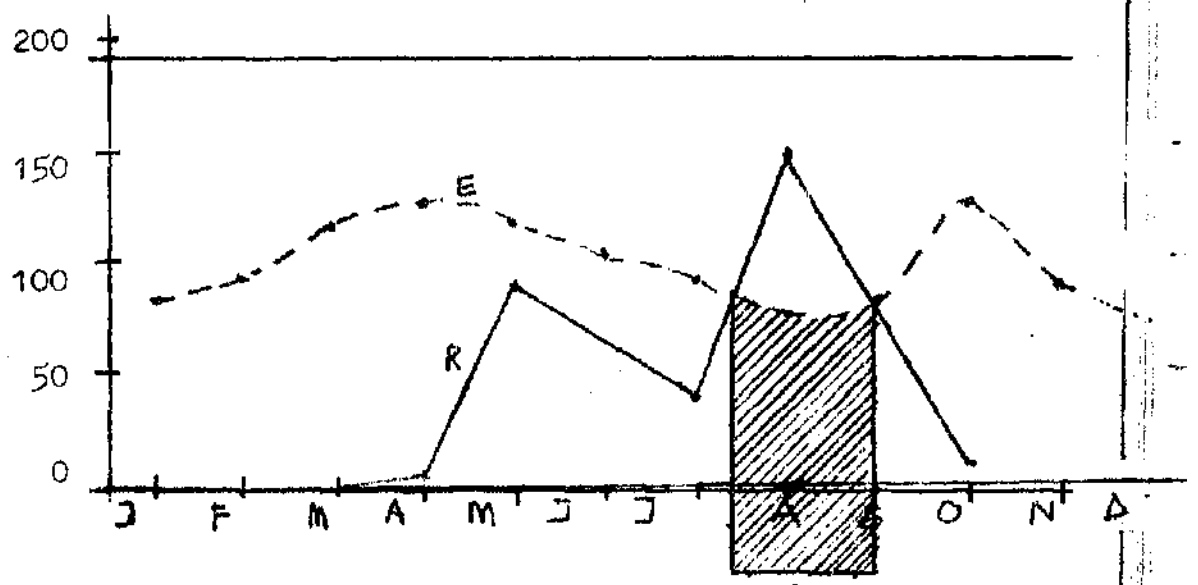
Source: MARX LOCK SURVEYS 1973 - 76

5.4.3 RELATIVE HUMIDITY

In Maiduguri, during the hamattan period (Nov - Feb) low relative humidity prevails due to dry interior continental winds - the North - East trade. Relative Humidity was fall as low as less than 20% during the hotest day and as high as to 50% on the raining days. High evaporation is experience throughout the except for the month of July - September during which precipitation exceeds evapouration.

This is the only period which can be considered as humid as the relative humidity plus the ground water stored during the last year exceeds over 50%.

Fig.9 Graph of Evapouration and Rainfall in Maiduguri.



Source: MARX-LOCK SURVEYS 1973 - 76.
E: EVAPORATION
R: RAINFALL.

5.4.4 WINDS AND DUST

There are two trades winds that characterise the climate of Maiduguri namely the North-East and the South-West trade winds. The former is persistent from Nov - Apr while the later from May - Sept. The speed and direction table below shows that both breeze of less than 10knot account for nearly 80% of the recordings, and highly destroctive winds of 30knot cable of blowing off roofs and trees accounts

for less than 0.1%, strong winds of around 20knot, often associated with the squalls and storms, tend to be from the North-East in Feb-March. The stronger South-West predominate May-July while the calms of less than 10knot occurs mainly between August - Sept. The winds though not very destructive consist of fine dust that affects both the health and visibility of the eye commonly referred to as hamattan carried by the North-East around the month of Nov - Feb. Generally the winds alleviate the extremes of high temperature and solar radiation, thus good orientation and layout of building would ensure proper Ventilation.

TABLE 10.

Wind speed/direct, % Frequency 1951 - 75

WIND SPEED	NW-N-NE-E		SE-S-SW-W		ALL DIRECTIONS	
	1951-60	1961-75	1951-60	1961-75	1951-60	1961-75
Calm	-	-	-	-	10.0	11.1
1-10 knots	40.1	37.1	37.1		77.2	
11-21 knots	8.4		4.0		12.4	
over 21 knot	0.2		0.2		0.4	
All speed	48.7	50.4	41.3	38.4	90	88.5

Source: Maiduguri Airport.

5.4.5 VEGETATION AND SOIL

Maiduguri falls within the Savanah wood land (Sudan Savanah in particular) characterised by a relatively light tree growth with a more or less contineous cover of grass. The rainfall and relative humidity records can only suport a sparse vegetation of sort grass, with minor differences cutting across the belt/site. Sandy loam soil and neem, acacia, cactus, booboo and thorny herbs species are the common features of the site. The soil only allows little surface erosion and is usually good for construction purposes.

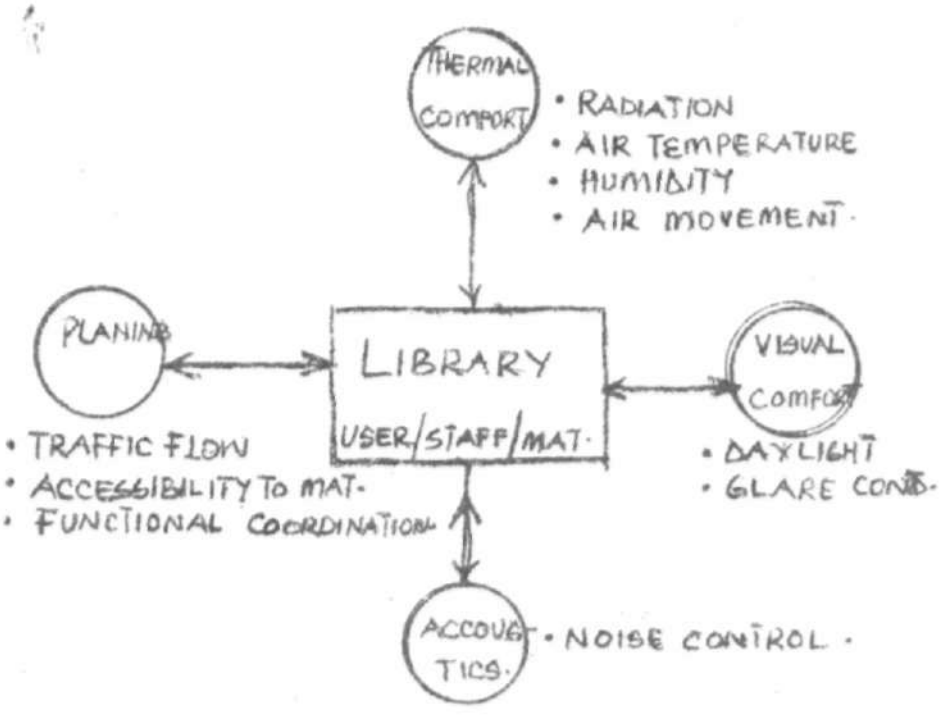
CHAPTER SIX

COMFORT CONSIDERATIONS IN DESIGN OF LIBRARIES

6.1.0 COMFORT ANALYSIS

Comfort in building designs can be categorised into four parameters each attemting to satisfy a system of conditions between the User and the environment in terms of either thermal, visual, accoustical or planning aspects of the design. These factors are the basic essential requirement for the design of a comfortable library environment, where the user, the materials and the structure have to be taken into account and there effects and response to climatic condition fully integrated.

FIG 1[redacted] COMFORT PARAMETERS.



6.1.1 THERMAL COMFORT AND HUMAN RESPONSE

Thermal comfort can be define as a thermally nuetral range in which the climatic strain or stress on the body's thermoregulatory mechanism is minimal and the whole environment can be judged as neither too cold nor too warm for any learning or recreational activity. The maintenance of such a thermal balance between the body's state of equilibrium and the environment deponds on the combined effects of six contributing parameters nemely; Activity level, nature of clothing, Air temperature, Relative humidity, Air movement and solar rediation.

The equilirium state of human body maintained a constant internal tissue or skin temperatures, and depending on the surrounding temperature, it determines the direction of heat flow between the human body and the environment. The body can through radiation, convection, conduction or evapouration, exchange heat with the surrounding in a bit to attaining a comfort level. The exchange of heat by conduction depends on the nature of clothing and can be considered low, depending on the thermal conductivity of the material.

The heat exchange by other means depends primarily on the temperature difference between the skin and the air temperature, the air movement and the relative humidity which are largely determined by the intensity and distribution of solar radiation. A body may gain

or loose heat depending on wheather the surrounding is cooler or warmer than the body. When the environment is cooler, the body becames warmer and tends to loose heat to the surrounding thereby shievering is experienced. In hot condition the reverse is the case and sweating and lost of heat through evaporation is experienced. Both these has to be avoided for any academic work requiring full attention and concentration.

The organs of the body, its chemical processes and the functions of its physiological mechanisms, such as the nervous, muscular, circulatory and breathing systems, all operate optimally within a narrow temperature range. This temperature is maintained by a thermoregulatory system which establishes a balance within a wide range of environmental condition. Deviations from the narrow range of optimial deep-tissue temperature first causes stress, then temporary or permanent damage and finally death. The deep tissue or core temperature is about $37^{\circ}C$, but during heavy work or excercise it rises by a few tenth of degree and in extreme cases up to $39.5^{\circ}C$ (by $2.5^{\circ}C$) for short duration. Above this, whilst the thermoregulatory system still operates to some extent, various other system may be damaged, then breakdown and finally death.

Deep tissue temperature - $37^{\circ}C$.

Dead temperature - $12^{\circ}C$.

Marathon temperature - $41^{\circ}C$.

Irreversible Chemical action - $43^{\circ}C$.

∴ Environmental thermal temperature range - $17^{o}C$ - $32^{o}C$ is acceptable for comfort in an enclosure according to Hampzey, P. But according to Mahoney Table the range of 12^{o} - $33^{o}C$ is given with Age, Sex, Locality and Situation as variation factors.

In the downward direction chilling of deep tissue by $1^{o}C$ is possible without damage but below this muscular weakness, exposure and then death results. It is thus, clear that while the deep tissue temperature range is very low, the environmental range of temperature is very wide ranging from the artic conditions to deserts conditions, and in each case the thermo-regulatory system operates and maintains the tissue temperature constant within a clothed body. Therefore, it is necessary for effective shelter, to provide an interior condition that would ensure the maintenance of the deep-tissue temperature and the surrounding temperature within the thermoregulatory process so as to attained a proper heat balance of the system. To maintain heat balance, the heat loss must increase with the increase in internal heat production and conversely decrease as it falls. For comfort conditions the skin temperature drops by increase in the level of activity rate from about $34^{o}C$ at rest M = Metabolic rate $=58Wm^{-3}$ to about $30.5^{o}C$ under very active conditions $M=200Wm^{-3}$. Sweat rates varies from $0-60Wm^{-2}$ at the same two levels.

Thus, at higher activity rate evapouration is a source of comfort as sweating is required to maintained tissue temperature regular.

$$\therefore \quad \text{Body heat production} = \text{Rate of sweat screation} + \text{Plus Metabolic rate}$$

The sweat screation/skin temperature results from the basic mechanism of the thermoregulatory system.

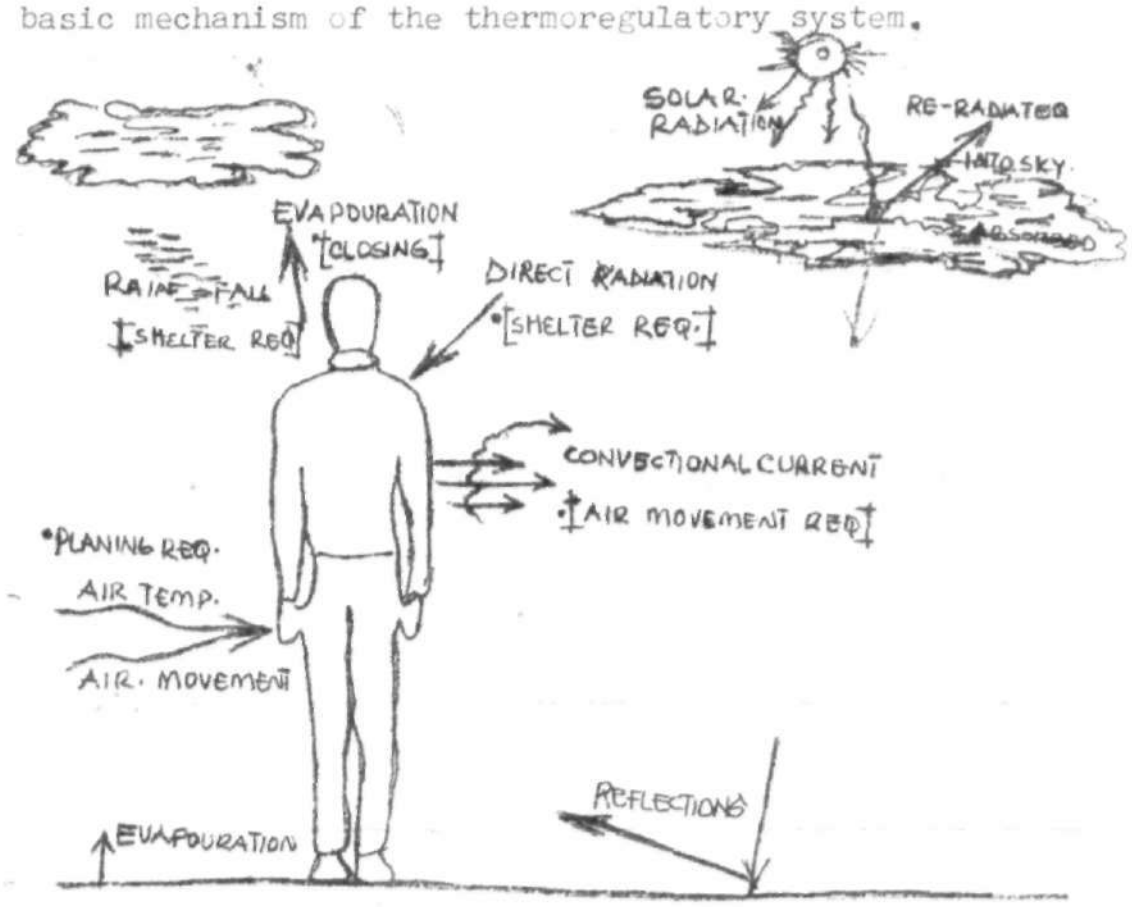


Fig.11 HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT. HOT ARID CONDITIONS.

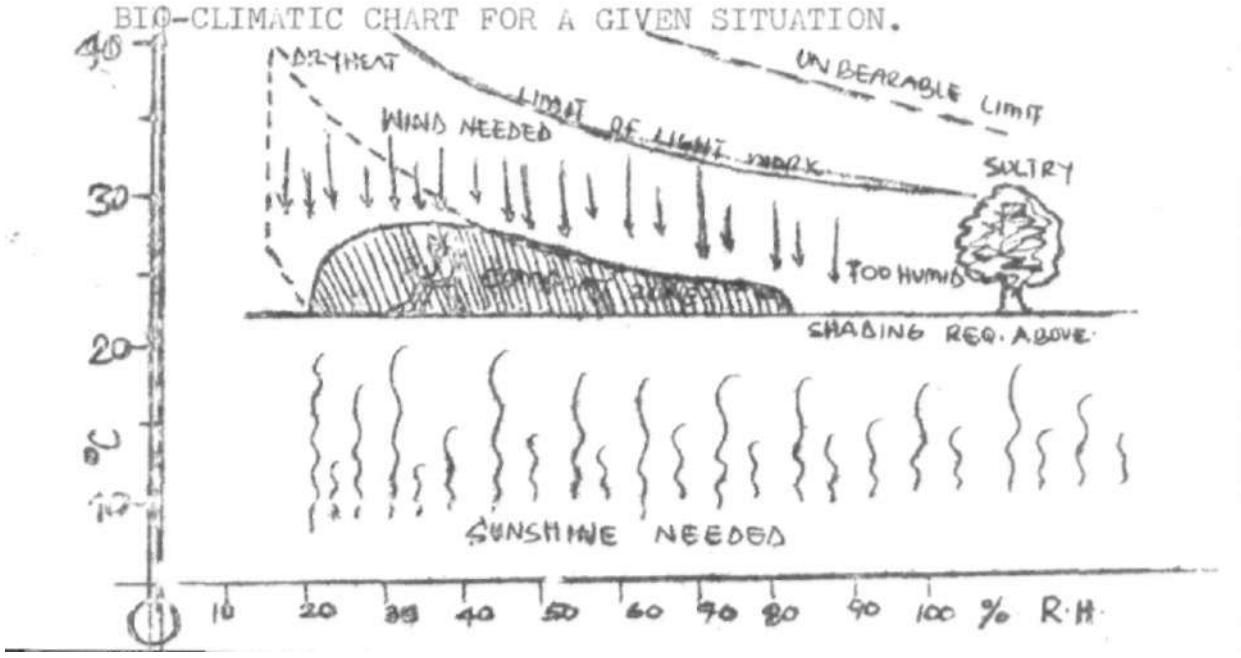
For human comfort, the body must be protected from the direct heating and the built-up environment must filter, absorbed or repel the climatic conditions to the comfort needs of the Users.

6.1.2 COMFORT ZONE.

Since the environmental temperature range is wide and that of the deep tissue temperature range is narrow, it is, therefore necessary for the attainment of human comfort, to establish a range of required conditions for a given activity rate within a defined environment in which the human body would feel comfortable. This range of conditions are reffered to as comfort zone which normally falls within performance and survival levels for a given activity in which the body experiences thermal comfort. It differs with individuals clothing, geographical location, age and sex.

The limits of the zone do have a physiological basis; the range of conditions under which the thermoregulatory mechanism of the body are in a state of minimal activity. In essence the comfort zone cannot be express using only one determinant or factor as VictorAlgyay's Bio-climatic chart has put it.

See Fig. 12 below for a BIO-CLIMATIC CHART FOR A GIVEN SITUATION.



6.2.0 FACTORS RESPONSIBLE FOR COMFORT CONDITIONS.

Now, having known what comfort and the human thermal response are, it is therefore necessary to study and analysed the sources or causes, effects and influence of the contributing factors so as to find ways of controlling them. This contributing factors includes;

1. SOLAR RADIATION
2. AIR TEMPERATURE
3. AIR MOVEMENT
4. RELATIVE HUMIDITY

6.2.1 SOLAR RADIATION/SUNSHINE:-

Outside the earth atmosphere the intensity of solar radiation is approximately $1.4 KWm^{-2}$ at normal incidence to the solar beam referred to as solar constant. About 50% of this radiation penetrates the earth atmosphere and is absorbed at the surface of the earth. Since the atmosphere is almost opaque to the longwave radiation emitted by the earth, this is largely absorbed into the atmosphere and contineously re-radiated to the outspace.

The sketch diagrams below gives the annual solar budget at the earth surface seperately for both the short ware and the long ware radiation. However, various factors affects the intensity of the solar radiation recieved at any point and hence it temperature. These includes the following:

a) Solar Altitude and solar Azimuth

b) Angle of solar incidence/Sun movement

c) Nature of ground surface

d) Medium of transfer and the earth albedo.

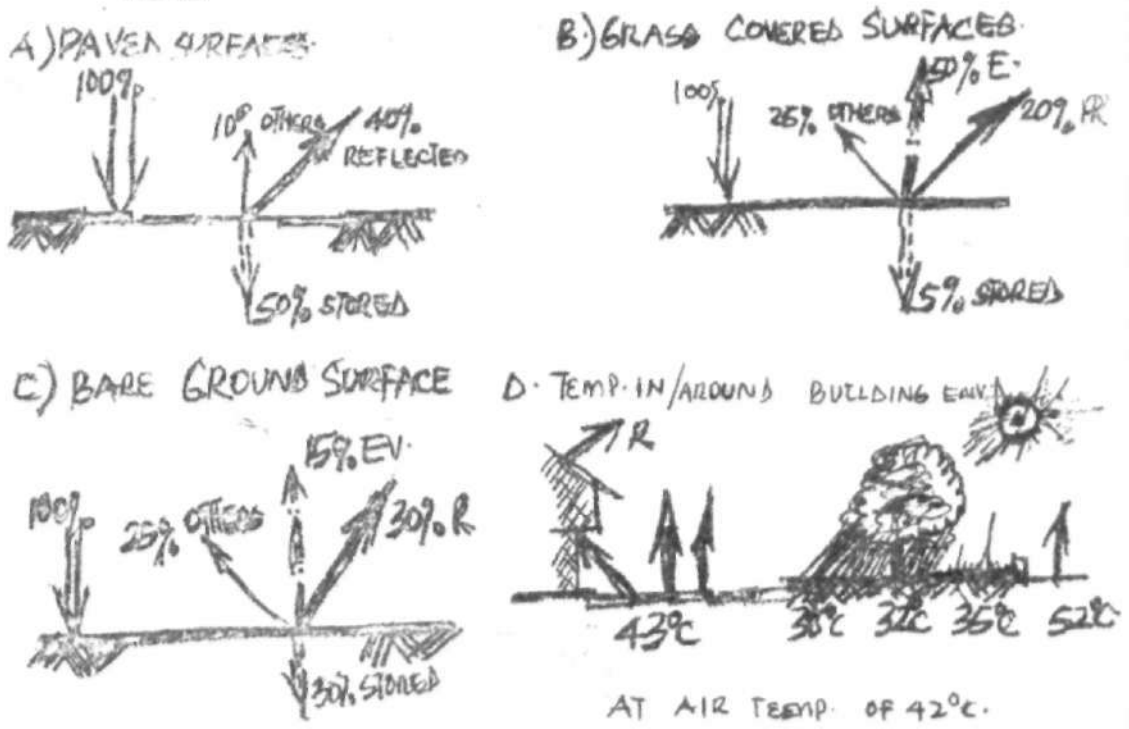
For the architect concerned with the thermal design of buildings which are influenced by global radiation and other plamentary movements or forces to which he can do no more than studies its properties, analysed it and calculate its impact on the earth surface for the purpose of protecting his building. For example knowledge of the earth and the sun movements, the position of the sun on a given date and time ~~he~~ enables prediction be made as to which faces of a building are sun lit which is important for calculating the shadow cast and proper orientations. The sun altitude and azimuth are important information required for the prediction of the solar intensity radiation at a particular position.

The tilt of the earth axis accounts for the changes in radiation, length of the day and the climate of the season and hence the duration and intensity of solar radiation recieved. The intensity of direct irradiance is a function of the angle of incidence, being maximum at 0^{o} and drop down as a cosine of the angle until it reaches 0 at 90^{o}. These angles enables the shadows cast and the patches of sunlit surfaces within and outside to be predicted. Further prediction of the maximum clear sky irradiance values is primary of interest in computing maximum cooling loads or maximum internal temperatures in buildings without cooling or maximum heating benefit which can be expected from solar radiation during the heating session.

Variation in latitude and longitude predicts the increase in length of days from December - June and decreases from June - December in the northern hemisphere an information required to calculate activity and heating periods.

TOPOGRAPHY - Shape, Orientation, elevation, hills or valleys at or near a site affects the distribution of solar radiation, air temperature, precipitation, winds and vegetation. Temperature in the atmosphere decreases with altitude, a height of 7 - 8m up can cause an air temperature difference of 5°C while a change of ground level of up to 300m above sea level can show a drastic change in all the climatic elements between the lee ward and the wind wards. Hence location of buildings has to be carefully studied. Nature of the ground accounts for difference in solar response by different surfaces in terms of absorption reflectance and emittance.

FIG 13



All these factors enumerated above, have in one way or the other a direct impact on either Users psychology or reasonings (reading habit) and the preservation of the library material in Use. Thus, both the Users and the materials have to be protected against such forces.

6.2.2 AIR TEMPERATURE

The knowledge of Air temperature is necessary as it is the most important and influencial of all the four variables which determines thermal comfort. Extreme temperature values are required for the thermal design (both heating and cooling loads) and all other related energy computations in building design. Statistical tables, constants, and various coefficient values have been computed and tabulated for different thermal design purposes.

The air temperature varies from one side of a building to another i.e. from shaded to unshaded; paved or bear ground to grass covered ground which greatly influence the heat movement within and around the building. Thus, the building design itself imposes some influence on the micro-climate and hence the comfort level within the whole environment.

The rate of heating and cooling of the earth surface is the main determing factor of the air temperature above the ground level. As the ground level is heated by the short wave incoming radiation

which raises its temperature, the air layer in direct contact with the ground is heated by conduction and the heat is transferred to the upper layers mainly by convection as a result of turbulance and eddies in the air. Since the air temperature depends on the convection, turbulance, eddies and of course the long wave radiation emitted by the surface, the nature of the ground is therefore of importance to the air temperature. More so, the soil particles enclose a great deal of air which is an effective insulation. It is therefore, necessary for the architect to gather information regarding all the possible determinants that would influence the ground temperature at the site under considerations such as temperature characteristics, Hunidity, Winds and the surface itself, before embarking on his design, and for his designs to make allowances for all the factors.

The orientation of a building is affected by the quantities of solar radiation falling on different sides at different times. It has, however, been recognised that both radiation and temperature act together to produce the heat experience by a body or surface. This is expressed as the solar-air temperature which includes outdoor air, solar radiation absorbed by the body and the long wave radiant heat exchange with the environment. Therefore optimum orientation for particular site must be made and the east-west facades be made shorter and with less openings.



FIG 14

6.2.3 AIR MOVEMENT

Wind force and direction will affect the thermal requirement of a building by determining the external surface resistance and hence the insulation of the shell; and it will affects the air change rate due to infiltration through openings and hence the total heat balance. The winds over a region, their distribution and characteristic are determine by several global and local factors such as seasonal differences in atmospheric pressure between places, the rotation of the earth, the daily variations in heating and cooling of land and sea, and the topography of a given region and its surroundings. The weather at any place, however, can be affected not only by air moving under the influence of huge air masses, but also by winds of local origin which are typical of that area and are caused by a feature of that particular locality such as mountains, lake or sea.

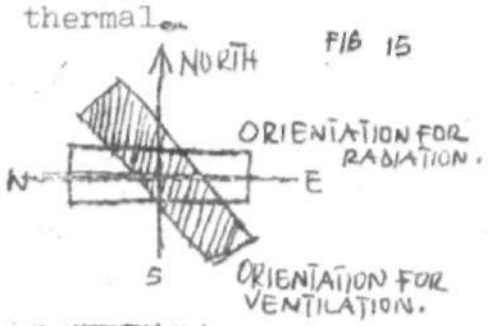
Wind velocity increases with height above ground as frictional effects becomes weaker and depends on the roughness of the ground such as lakes, buildings in cities, forest etc. The presence of bluff body in the wind stream will cause 'rolls' and turbulance around the base, edges and roof of the building. Areas of negative (-ve) and positive (+ ve) pressures will develop, which can be Use to determine and control the movement of the wind and the character of the building facades and its immediate surroundings.

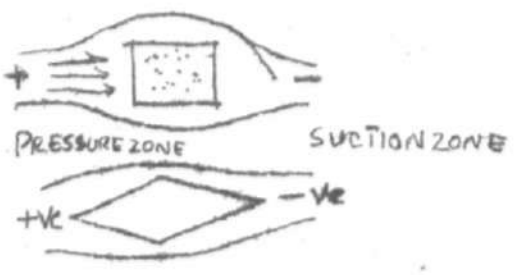
Wind breakers in the form of walls screens and tree belts can be useful but will increase turbulance, thus, the height, density, permeability, and distance of a shelter screen will all affect its efficacy.

The difference in pressure between the inside and outside of a building under windy condition will cause air to flow into the building through holes, cracks, gaps, openings such as windows and doors, on the windward pressure side and out on the leeward suction side. Such air flow will be a cause of heat loss or gain depending on the outside temperature. Therefore, the size, position of the openings and the nature of the roofs in design's are based on this pressure differences, the climatic condition and level of ventilation required.

In terms of comfort, air movements which is the main cause of ventilation, provides a continuous heat balance between the pressure belts (in and out), supply of fresh air for human metalobic activity, removal of excess CO_2 and heat generated through sweating and other sources, and the body odour as well. When the activity rate increases, sweat secreation at certain level increases and henoe air movement has to come in to speed evapouration for comfort. In design, conditions that are responsible for the transfer of energy across surfaces or through the building Fabrics and for determining the thermal

FIG 15





sensation of people are, the specific heat values of the materials and the local climatic conditions classified under microclimatic conditions namely winds, solar-radiation, temperature, humidity obtained around the building (the roofs, walls or window surfaces). The building itself, causing a bluff obstruction to the windflow, and casting shadow on the ground and on other buildings, will change this Microclimate by its positioning.

Thus, the Architect, must acquinant himself with the characteristic and distribution of these winds and assess if possible their impact on the environment before finally orienting the building design for both ventilation and solar radiation. One of the Architects task is to predict, from a knowledge of the general and microclimate of a site, how the relative positioning and spacing of a particular building on the site will alter that microclimate and also to creates a comfortable interior condition within the building.

6.2.4 RELATIVE HUMIDITY

At any given temperature, the air can contain only a certain amount of water vapour. When the air cannot contain any more moisture, it is said to have reached its saturation point. The amount of moisture that the air can contain before it reaches its saturation point increases with temperature.

R.H - is the measure of the degree of saturation of the air at any dry bulb tempearature.

$$\text{Thus, Relative Humidity} = \frac{\text{Vapour Pressure}}{\text{saturated vapour pressure at the same temperature.}} \times 100$$

$$\text{or R.H.} = \frac{\text{Amount of water vapour in the air}}{\text{Amount of water vapour for air to be saturated at the same temperature}} \times 100$$

Variations in Atmospheric humidity with time or in space resulting either from evapouration from exposed water surface, moist ground, plant transpiration or precipitations affects the thermal design of buildings in many ways. These includes;

a) Affects peoples thermal responses, both physical and psychologically as vapour pressure affects the rate of evapouration from human body.

b) Affects the probability of condensation occuring on the surface of or within the building fabric.

c) The moisture content of porous materials will affect their thermal insulation properties.

d) Affects the behaviour of many building materials and their rate of deterioration.

The psychometric charts show that, at high temperatures evapouration becomes increasingly important and, naturally, the humidity of the atmosphere, as this will determine the ease of evapouration. They also show that, other things being equal, under these conditions, air velocity plays an increasingly important role, in increasing the

rate of evapouration. Air velocity has little effect on evapouration at low humidity,

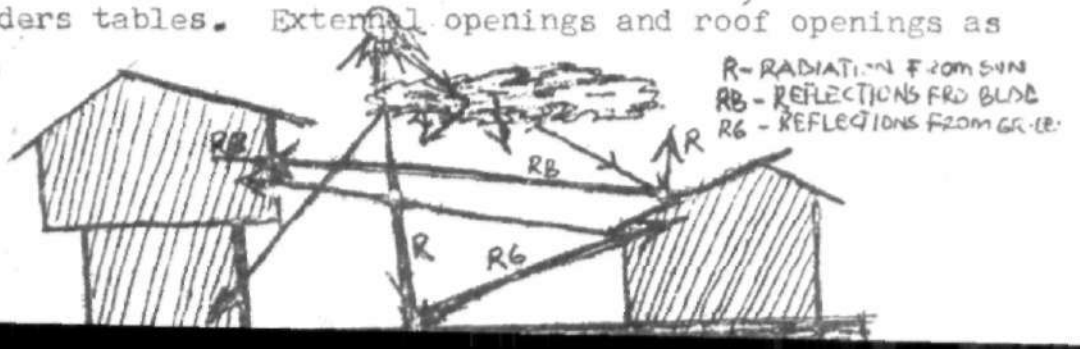
although it is, of course, of great importance in hot, dry conditions in affecting the convection transfer. The effect of air movement depends both on the amount and permeability of the clothing. The effect of humidity in limiting evapouration depends on the activity due to significance of sweating. Comfort level can always be achieved through humidity changes by influencing the microclimate (planting of trees grass and locating of water bodies), changing the other parameters, location of the design on site, shape and size of the design and its relationship with the surroundings. All the factors considered above 6.2.1 - 6.2.6 have direct impact on both the library services (Users, materials and staff) and the library structure itself. The solar radiation, temperatures, humidity, winds, dust, and precipitation all affects human comfort directly and damages in different forms the various library materials. It is therefore necessary to study in details all these forces and the services required so as to effect a proper design solution that would preserve the materials and provide a conducive learning atmosphere for academic and leisure purposes.

The other factors to be considered below only have a direct influence of human comfort, namely lightning Accoustical and planning considerations.

6.3.0 DAYLIGHT AND GLARE IN LIBRARY DESIGN

The basic function of a library is the provision of good reading and visual materials and the provision of space for such activities. It, thus, follows that libraries should have a good illumination and evenly distributed day light for the said purpose. A library with graphical and non graphical services, must ensure proper and effective vision within the interior and control all sources of glare which is a source of discomfort to the eye. By the principles of physics, light rays travels in a straight lines, and this constitues the need for controlling the rays entering the building directly. The main constraint in the lighting designs is the glare mostly coming from surrounding reflection (sky, ground and near by structures). From the above it shows that interiors can be lighting by diffuse light rays from the sky with glare problems from the surrounding reflections.

Various sections in a library requires different illumination intensity and distribution based on the nature of activity and space area of the unit e.g. Reading space requires more light than the stacks either open or closed, hence the need to locate them close to external windows. Stackings also consitute the problem of obstructing views when place in the same hall with the readers tables. External openings and roof openings as



much as possible should be design so as to give even and good quality lightening to interiors just as is the case with ventilation and other design considerations.

6.3.1 GLARE CONTROL

Glare from the sky can be controlled by properly positioning the openings and the use of good glazing and shadding device (Internal blinds or externals). Avoid admitting direct solar radiation as it damage library materials, paints and affects the eye. Thus, good orientation, sizes or dimensions of openings, their locations and the material to be used must be determined at designed stage.

Glare from the ground surface can be reduce by good landscape of the environment and the avoidance of irregular or undulating surfaces. Reflections coming from nearby structures can be reduce by the use of good non-reflective surfaces or paints and or creating a buffer zone nearby to abstract direct reflective rays. In general curtains, venetain blinds, internal vertical pirot louvers blind can be use as good protectants against glare.

At the design stage, the spacing, sizes, types and materials to be use for the openings are the major determinants for the interior illuminations. Also important determinants are the furnitures, fixtures, Users activities and dimensions of enclosures. For

good lighting of the working plane for the reader, light need be admitted preferably from the left side to avoid casting of shadows on the reading materials. Also avoid admitting direct sun rays and or direct reflecting glares as they will distruct proper perception and makes identification difficult.

6.4.0 NOISE NUISANCE IN LIBRARY DESIGN

Noise is an unwanted output which may damage hearing, interfers with concentrations of mind, and causes unnecessary vibrations. In library designs, they consititute a nuisance to the environment because of the nature of the activity within and hence has to be controlled for effective and comfortable services.

Frequency response of the human ear ranges from $20H_z$ - $20KH_z$ and decreases with age until it reaches $15KH_z$. Old people response to low frequencies while children response to the high frequencies. The threshold of the ear gives the limit of audibility at $1H_z$ which is the upper limit of sound pressure that could be heard without pain. Lower units is 2×10^{-4} Mbars. The threshold of pain is 2×10^{-4} bar at 1000Hz. The sound acceptable to the ear for comfortable hearing occur between the two threshold zones. Ear is not linear to increase in sound level and its response is logarithm.

6.4.1 SOURCES OF NOISE IN LIBRARIES

i) Externally, coming from the surrounding high ways, nearby buildings and machine rooms, at the Air Port and noise across the cities.

ii) Internally, the circulation zone comprising of stairwalls, entrances or, control and display areas, constitute a source of noise resulting from vibrations due to movement and open verbal discussions within the areas.

iii) Childrens sections, technical workshops, Audio visuals section forms the other source of noise resulting from the nature of their functions within the complex.

It is therefore necessary for the effective running of the libraries to controlled all these unwanted noise, either from the source by blocking or using barrier, or re-radiating it from its original path or at recipient by moving it away from the direction of the noise and the use of accoustical treatment in the complex. A good library design must ensure proper control of this nuisance and where required it should be within the acceptable range and limited boundries.

6.4.2 NOISE CONTROL IN LIBRARIES

Noise or sound is a radiating wave energy from a source and travels in a wave motion, which can either be controlled at the source, on its path or at the recipient end.

1. EXTERNAL CONTROL

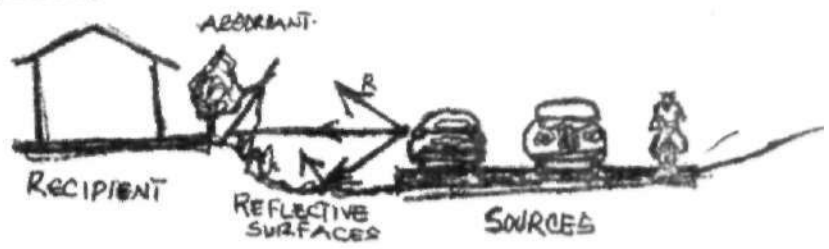
a) By construction of barrier in between the source and the recipient.

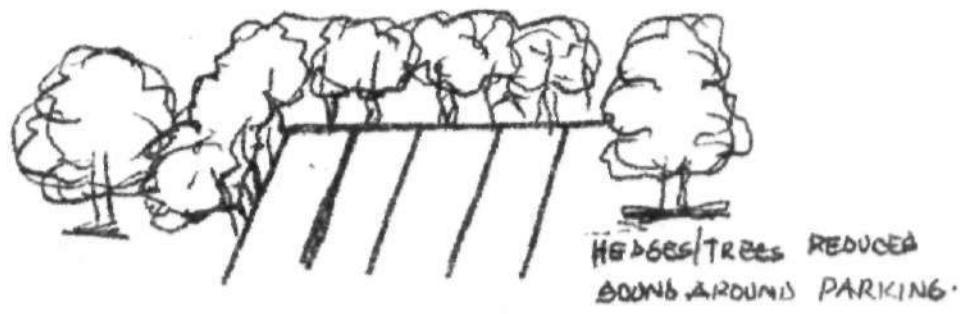
Fig. 38



b) By creating levels in between the source and the recipient to give room for greater reflections in all direction which will finally reduces the output of the noise at recipient.

Fig. 38





ii. INTERNAL CONTROL

Airborne noise within the building can be control by reduction of reflection surfaces and increase the absorption coefficient of the surfaces.

a) Noise Control by Design:-

i) Selection of appropriate site with due considerations to the neibourghring landuse.

ii) Site zoning - Identification of noise source on site and the characteristics of the sources.

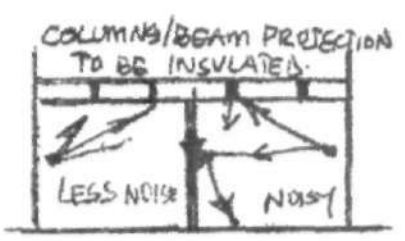
iii) Selection and use of Accoustical materials

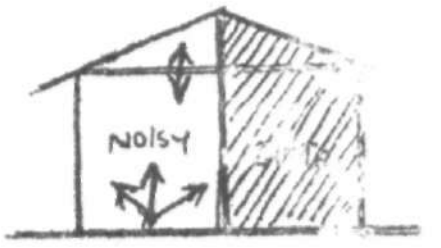
iv) Techniques and supervisions i.e. quality of finishing

b) Noise Control by Practice:-

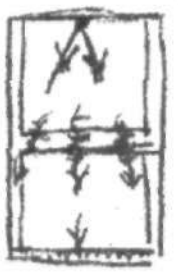
i) Proper zoning of functions into noisy intermediate and quite zones with good and controlled transition - zones in between.

ii) Control of Air borne noise by blocking the path and doors, windows, cracks from one room to the other, open partitions in between a space with an absorbent material along the reflective line.





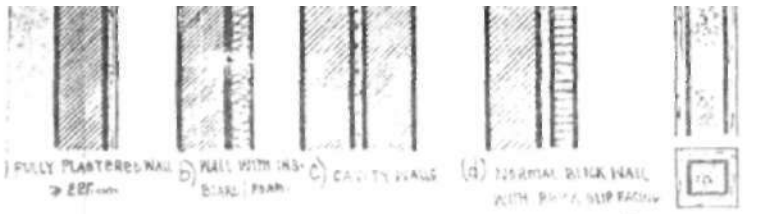
iii) Increase area density of partition wall, side walls and floor structure.

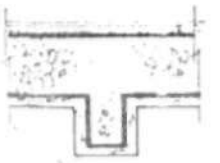






iv) Cobine structural and air path control mainly through roofs.





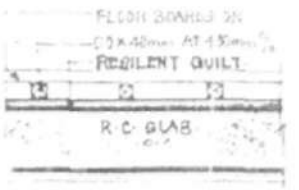
c) COLUMN TREATED WITH TIMBER FURRING BOARDS

f) BEAM PROJECTIONS TREATED WITH SOUND ABSORBENT.

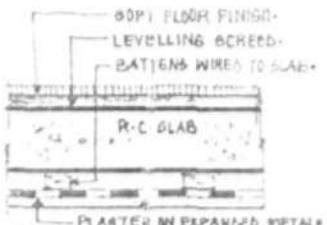
FLOORS DESIGNED TO REDUCE SOUND TRANSMISSION.



FLOATING SCREED



FLOATING WOOD RAFT.



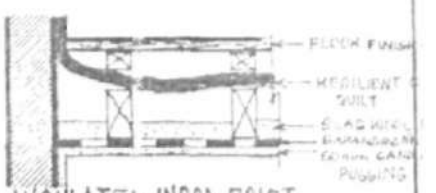
SUSPENDED CIELING/SOFT FINISH.



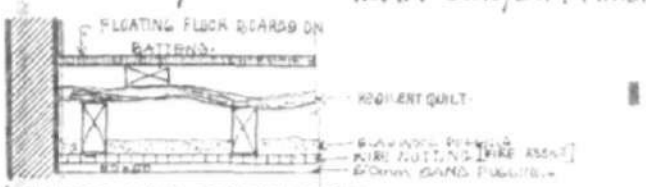
LIGHT WT. SCREED/SOFT FINISH.



HEAVY CONC/SOFT FINISH.



INSULATED WOOD JOIST.

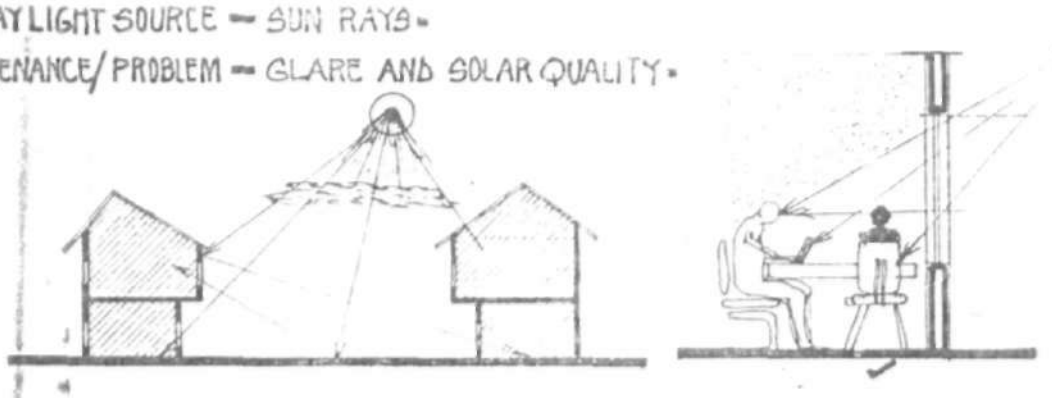


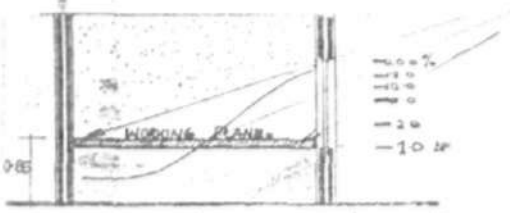
INSULATED WOOD JOIST FLOOR

DAYLIGHT AND GLARE: CAUSES, MENANCE AND CONTROL:

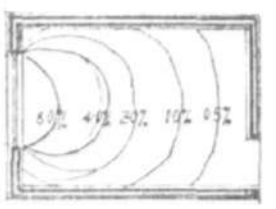
DAYLIGHT SOURCE — SUN RAYS.

MENANCE/PROBLEM — GLARE AND SOLAR QUALITY.





GRADIENT OF ILLUMINANCE ON CENTRE LINE OF WINDOW.

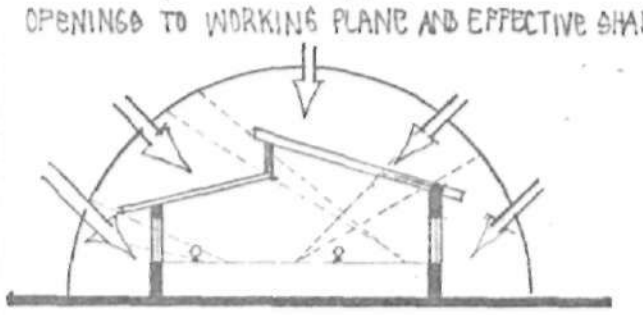


DAYLIGHT DISTRIBUTION ON HORIZONTAL PLANE SHOWN CONTOURS OF EQUAL DF.

AVOID DIRECT RAYS OR REFLETED RAYS OVER USERS FACE. ADMIT DAY LIGHT PREFERRABLY FROM THE LEFT HAND SIDE. FUNCTIONS SHOULD BE LOCATED WITH DAYLIGHT DISTRIBUTION.

FIG 19

■ GLARE FROM SKY CAN BE CONTROL BY USE OF MATERIALS [SKY LIGHTS], RELATIVE POSITION OF OPENINGS TO WORKING PLANE AND EFFECTIVE SHADING.



LIGHTING & GLARE CONTROL

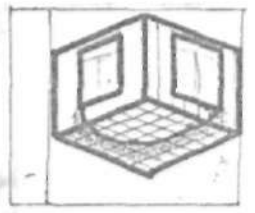
■ WINDOW POSITION RELEVANT TO DAYLIGHT PENETRATI



TALL WINDOWS CAN GIVE GOOD DAYLIGHT PENETRATION TOWARDS BACK OF ROOM.

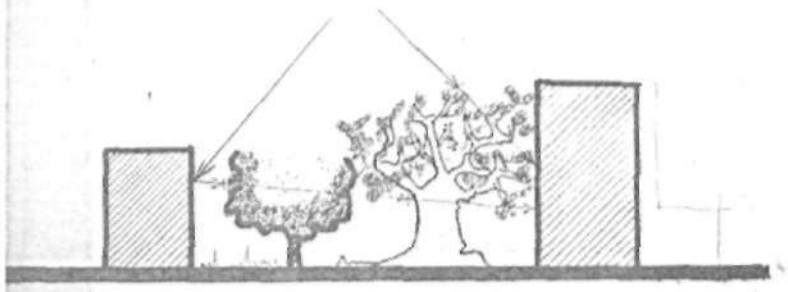
LONG HORIZONTAL WINDOW CAN GIVE GOOD LATERAL SPREAD OF DAY LIGHT CLOSE TO WINDOW

TWO TALL WINDOWS CAN GIVE GOOD SPREAD OF DAY LIGHT BUT IF WINDOWS ARE WIDELY SPREAD LIGHTING CAN BE UNEVEN.



CAN GIVE GOOD SPREAD OF DAYLIGHT AND USEFULL LIGHT ON WALL SURROUNDING OPPOSING WINDOW.

GOOD POSITIONING, SPECIFICATION OF DIMENSION AND ORIENTATION OF WINDOWS IN DESIGNS PROVIDES GOOD DAY LIGHT DISTRIBUTION AND GLARE CONTROL ■



TREES SHADES THE SURROUNDING AND CONTROL REFLECTIONS [GLARE] FROM NEARBY BLDGS / GR. SURFACE



HEDGES / GRASSES PROTECTS REFLECTIONS DUE TO GROUND SURFACE ■

■ THUS, FOR GOOD VISUAL COMFORT IN LIBRARY DESIGN, WINDOWS SHOULD LOCATED NOT ONLY FOR VENTILATION

STATE LIBRARY SERVICE

c) Materials and Techniques

i) Positioning of windows along noise line should be discourage.

ii) Use insulative doors and or Accoustical doors.

iii) Use boarded ceiling.

In case of structural air borne, isolate the buildings and or suspend the floors with flexible and rigid connections.

Floors - Use recilient cover on floors to reduce internal traffic noise. Rubber tiles and or carpets can be use in some areas.

- Use vibrating insulation mounting with heavy base for heavy installations within the complex to reduce structurally borne noise.
- When pipe or rod of a vibrating machine cut across or through a wall, flexible connections should be used throughout.
- Where mechanical ventilations are used, source should be as much as possible be away or on a seperate foundation from the main foundation.

6.5.0 PLANNING CONSIDERATIONS, FIRE HAZARDS AND SECURITY CONCIOUS IN LIBRARY DESIGNS.

In library design, functional coordination in terms of traffic circulation, accessibility to materials and proximity to escape routes and other auxiliary facilities forms the other aspects of the Users comfort

in design. It reduces the rate of distruption, saves time and gives security concious to the Users interm escape routes when in danger, and the menance of his own goods while away. There impact is more on psycology of the users and the library staff unlike the previous considerations. The architect therefore has take the precausion to guards against any licky chances that might arise. His design proposal must identify this chances and enter the solutions for the benefit of the average User.

6.5.1 PLANNING CONSIDERATIONS.

Traffic circulation for both Users, materials and staff, spacing of services and facilities are very important design considerations in library design. Design must reduce conflicts and avoid interferance as this would inconvience both the Users and the staff in terms of noise accessibility to materials and the obstruction or distruption of readers minds.

Proper circulation pattern must be evolved for each of them and points of conflicts resolved at design stage. This will improve the concentration of mind and conserves the energy of the average reader or researcher.

6.5.2 SECURITY CONCIOUS.

The menance of theft in libraries must be thought - off at design stage. Such menance may be in terms of stealing or mutualating library materials or stealing User's materials while attending to some other things.

Though a social problem, provision of modern automatic security detective device, proper classification or seperations of functions and materials, and the provision of check counters at each unit would reduce such menance and ensure the security concious of the average User.

6.5.3 FIRE HAZARDS

Though accidental, all sources and or chances of fire outbreak on the site and within the building must be noted and controlled. Smoking rooms and other smoke or fire related areas must be provided with proper insulations and fire resistance materials.

6.5.4 FIRE CONTROLS

i) Easy accessibility to the site and the surroundings of the building

ii) Avoid the use of automatic showers except for admin, Users seating area, display and circulation routes as the library materials would be damage by water.

iii) Fire extinguisher points to be provided

iv) Use fire resistance materials for walls roofs and floors.

v) Provision of escape routes within an average working distances of 25 - 30m

vi) Use warning alarms bells and fire lights for escape routes and entrance or exit identifications.

vii) Adequate provision of spacing between stacks to control spread of fire within the building.

viii) Use of smooth iron pole for the upper floor (up to 3 - 4 floors) for grapping and running down.

ix) Proper Roof seperations to control spread.

6.5.5 CONCLUSION FROM ANALYSIS

Any good Architectural design must by itself provide its design solutions that would attempt to resolve and or control the problems highlighted above. In this regards the author attempts to analyse his site situations, comfort level requirements and the available resources so as to come up with a workable and yet comfortable design proposals. Stresses were given more toward natural lighting, natural ventilation and sound control within the complex for reader's comfort.

CHAPTER SEVEN

THE SCHEME

7.1.0 This Chapter describes the proceedures adopted in the design and the design itself. It explains the authors approach to the analysed problems and his design proposals.

7.1.1 SITE ANALYSIS AND SITE CONCEPT

Having obtained a site as per the land map use attached in Chapter six, which has an area of about 3.5 hectres. Existing physical features were fully analysed Topography, slope, Good views, bad views, noise sources, possible ingress and egress and existing vegetation were carefully studied and forms the basis of the design concept.

The site which is bounded by Institutions and government offices on two of its sides has a major road running along its longer axis and an open green space to the west. Thus the only entry point to the site has to be from the south ward. The site which is generally flat with scattered vegetation and tress mostly by the edges, constituting a lesser problem interms of construction. The major source of noise on the site is the road, generating traffic noise.

Accordingly, in developing the site concept, areas producing noise, and the areas that do not mind noisy were located closed to the entrance. The main study areas were placed far away for effective planning and concentration. A rough idea of horizontal relationship was, thus, develop given further re-grouping of functions within the library. See sketches for site analysis and Noise zoning attached. On the vertical plane, a similar concept was developed given account of all internally generated noisy areas and or activities and the frequency of use of such areas. This provide a further clear grouping of functions based on functional relationship and noise level. Frequently used areas are placed on lower floors to reduce internally generated traffic noise.

A further analysis of the functions in the public library and their inter-relationships provides easy accessibility to materials and traffic flow. A flow diagram for both materials, staff and Users was developed both horizontally and vertically.

A study of standard Library furniture or equipments provides a guidelines for spacing structural elements and functions to achieve maximum use of space. Their dimensions were used to determined the structural grid employed through out the design and hence the interior design. Functions are easily interchangeable incase of expansion and or additions. Grid spacing

ensures uniform floor loadings and easy traffic flow and maximum utilization of space or floor area.

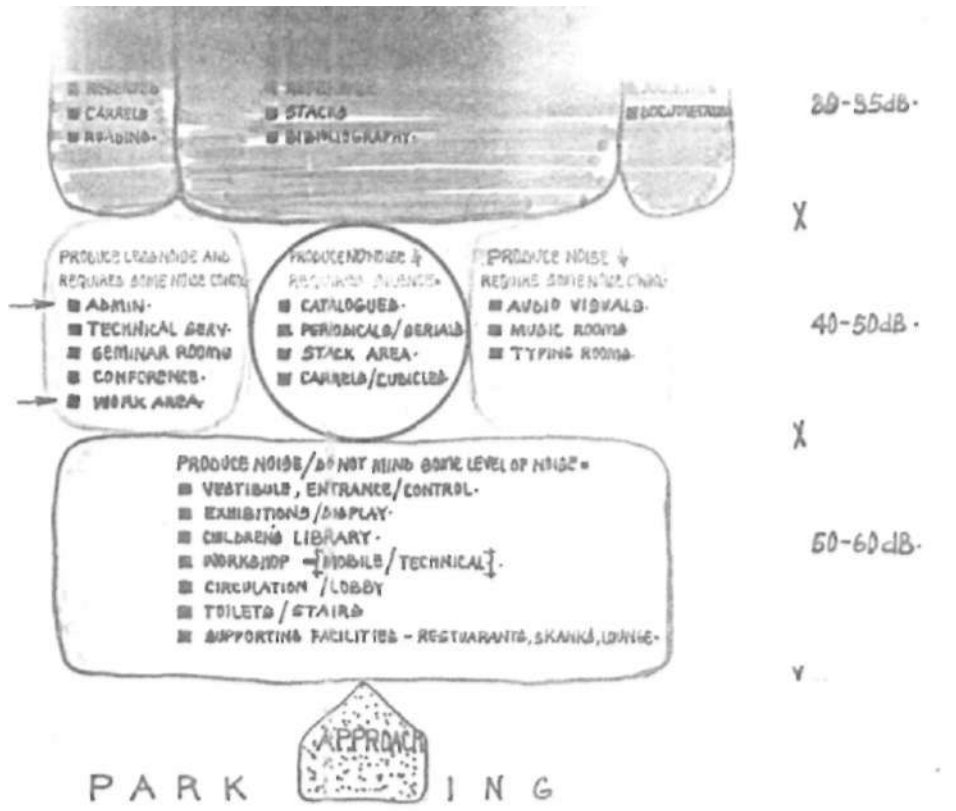
The development of concept finally encooperated the major problem analysed during the data collection which is that of the harsh climatic conditions of the area. A detail study shows that the use of open landscape courtyards usually reduces the harsh effects. To this end, open spaces were employed within the complex to controlled not only the weather conditions, such as temperature, humidity and rainfall but also the noise transmission and circulation efficiency by reducing the points of conflicts. A concious landscape of such open space provides another potential attractive force to the library. This concepts while ensuring functionality, noise zoning, flexibility, economic structural solutions to the scheme places emphasis on the provision of natural lighting and ventilation. Thus, cutting the operational cost and utilizing the available resource at disposal.

313559

7.1.2 Development of Form

- Having analysed the site and its concepts, the next stage is the development of form. The author here makes use of the existing standard forms of library furniture and equipment to design his ultimate form so as to save space and ensure uniformity in the internal arrangements. The basic shapes of such

KASHIM IBRAHIM
RECEIVED
OCT



20-35dB.

X

40-50dB.

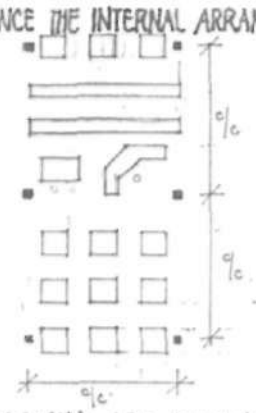
X

50-60dB.

Y

DESIGN CONCEPT: FLEXIBILITY/FURNITURE/ EQUIPMENT/STRUCTURAL CONSIDERATIONS.

THEIR DIMENSIONS ARE USED TO DETERMINE THE GRIDS AND HENCE THE INTERNAL ARRANGEMENTS.



FUNCTIONS ARE EASILY INTERCHANGEABLE INCASE OF EXPANSION AND OR ADDITIONS.

GRID SPACING ENSURES UNIFORM FLOOR LOADINGS AND EASY TRAFFIC FLOW AND MAXIMUM UTILIZATION OF

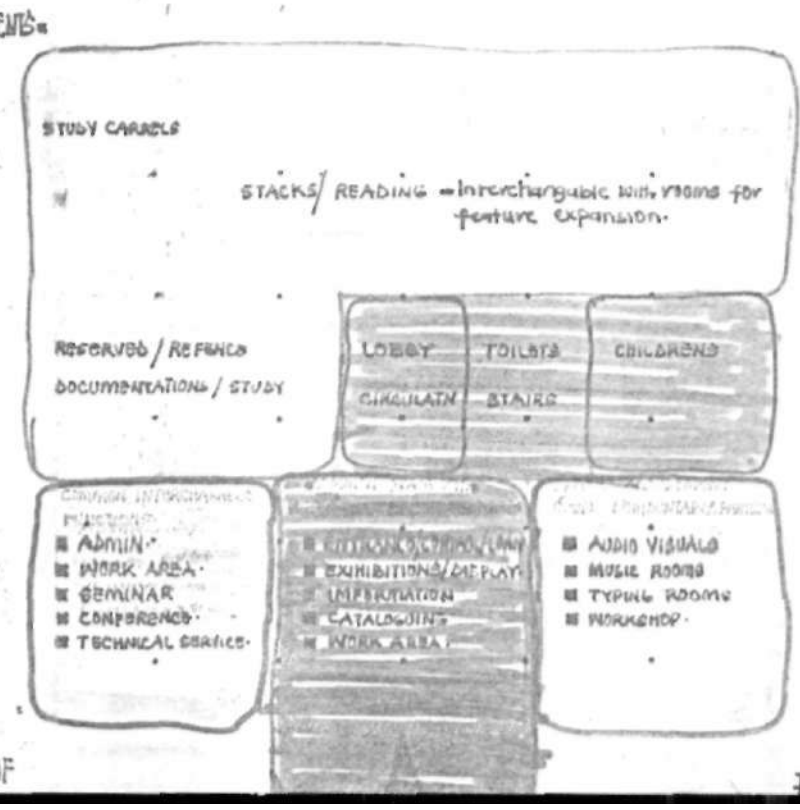
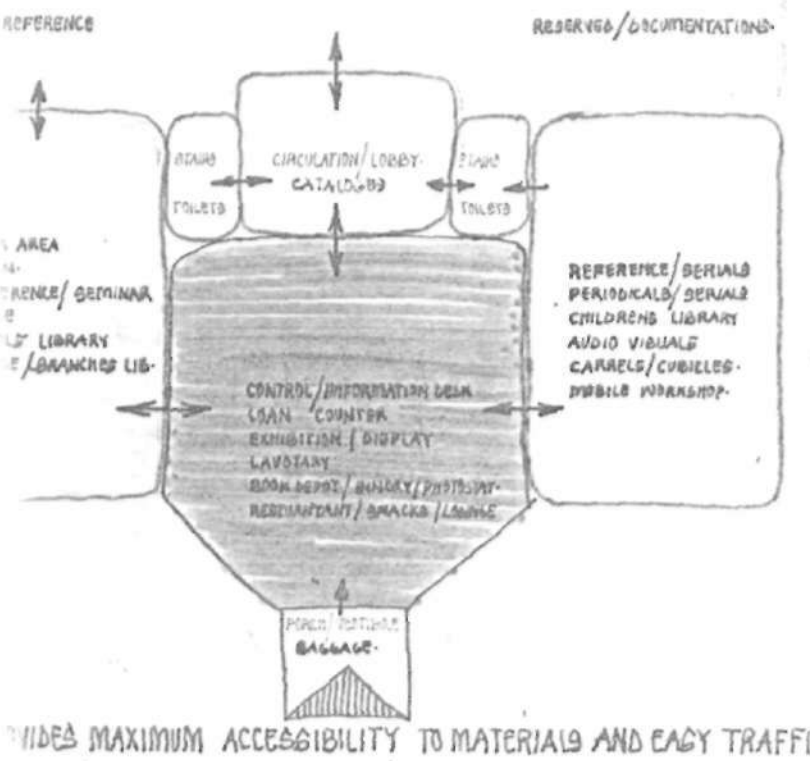


FIG 21

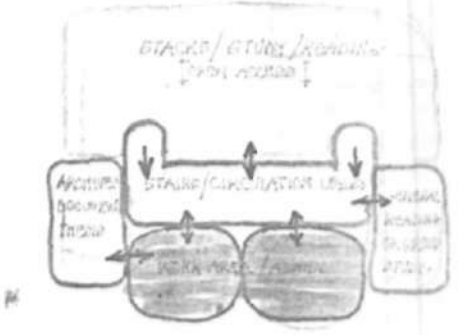
STACKS / READING / STUDY.



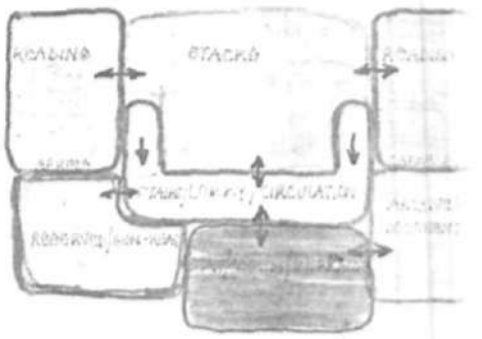
VIDES MAXIMUM ACCESSIBILITY TO MATERIALS AND EASY TRAFFIC FLOW.
ERS CENTERED AND NOT ADMINISTRATIVELY CENTRED THROUGH
ARRANGEMENT OF SPACES. PROVISION FOR EXPANSION BOTH
D VERTICALLY.

UPPER FLOORS CONCEPTS.

ALTERNATIVE 1: FUNCTIONS ARE GROUPED AND PLACED ON THE UPPER FLOORS BASED ON ZONING / PROXIMITY / TRAFFIC.

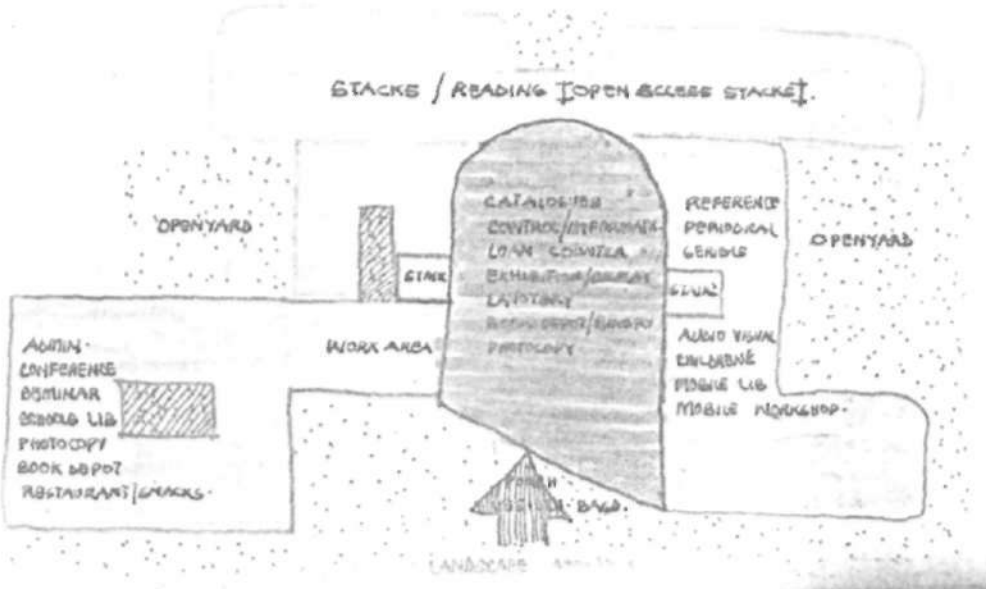


ALTERNATIVE 2. ‡ CLOSED ACCESS STACK



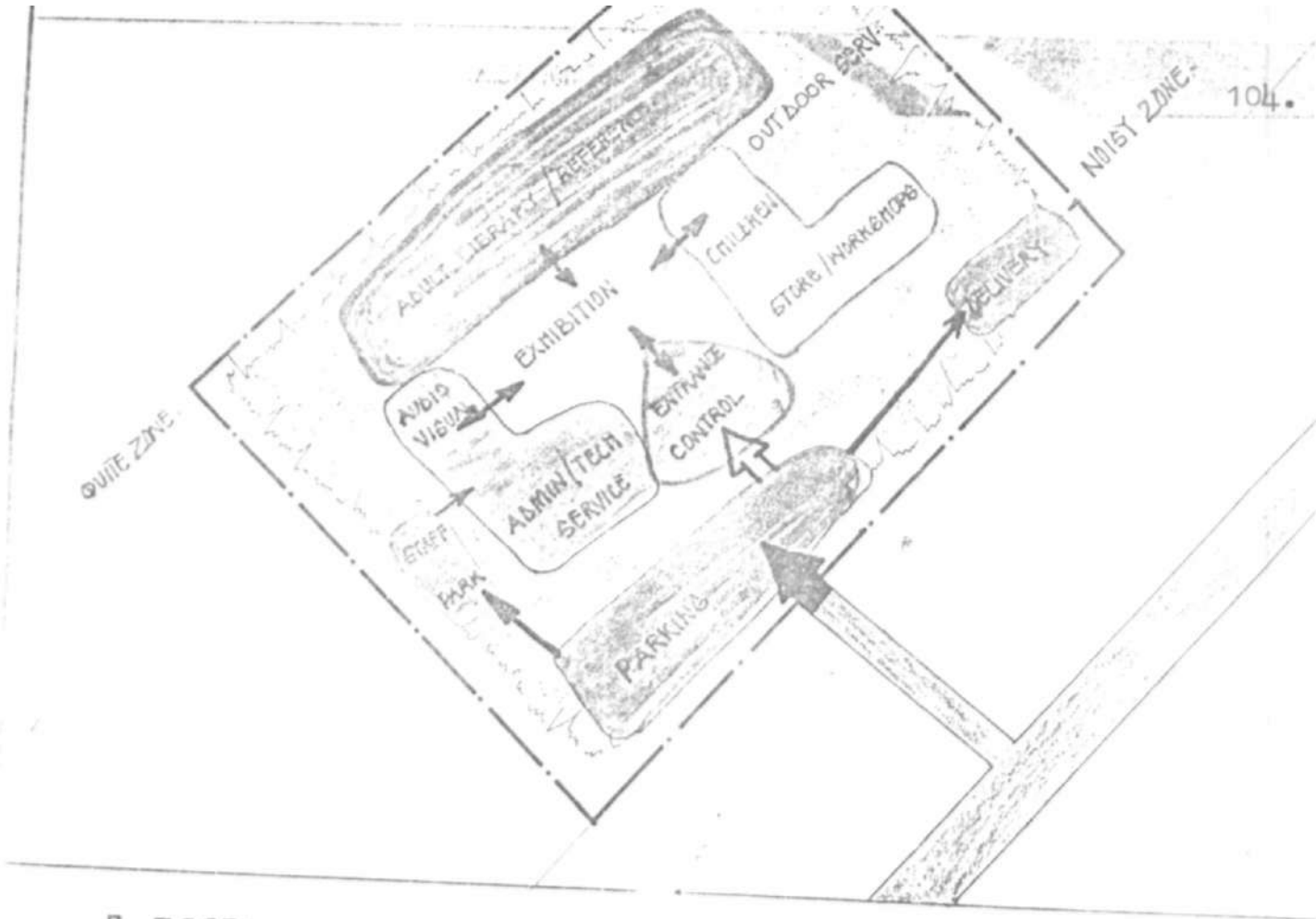
CONCEPT: OPEN COURT - YARD APPROACH

WHILE ENSURING FUNCTIONALITY, NOISE ZONING, FLEXIBILITY AND STRUCTURAL EMPHASIS WERE PLACES ON PROVISION FOR NATURAL LIGHTING AND ORIENTATION AND OTHER CLIMATIC CONSIDERATIONS WERE TAKEN CARE.



GOOD VENTILATION.

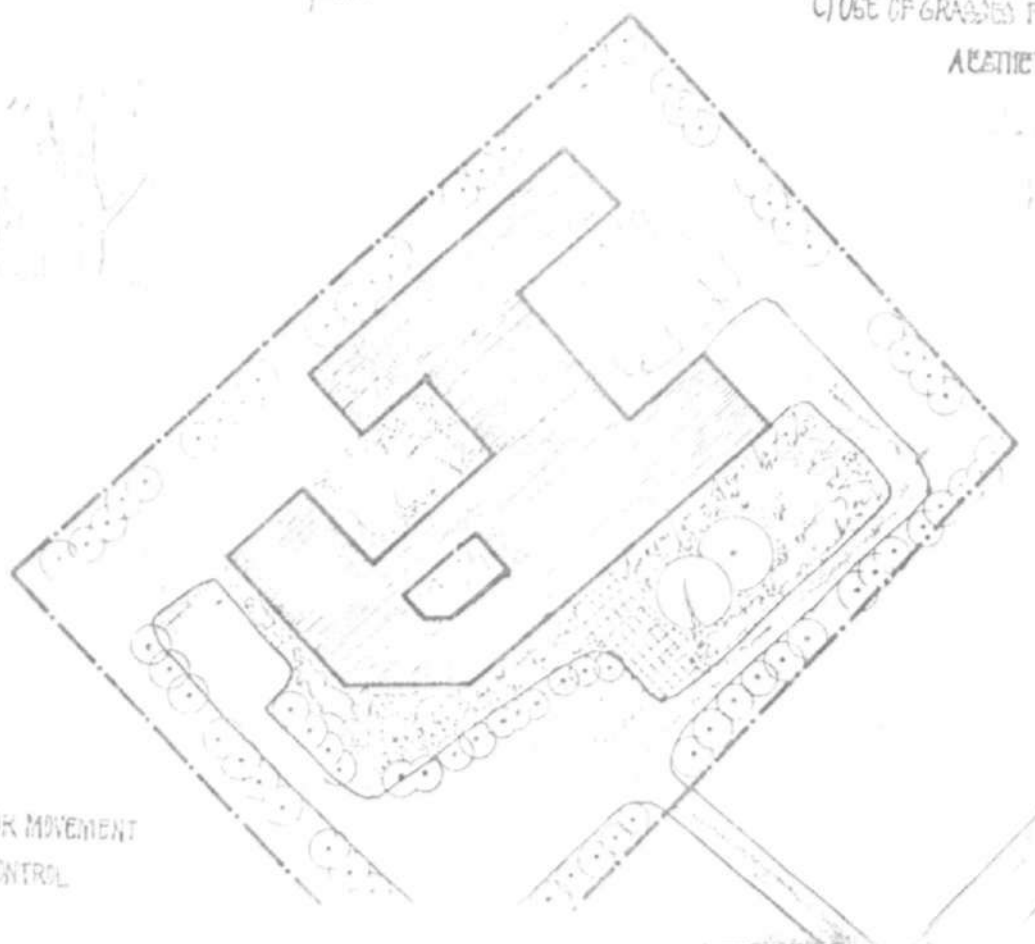
FIG 22



LAND SCAPE CONCPT: OPEN COURTYARD SYSTEM ARE USE FOR LIGHTNING AND V

A)-USE OF TREES FOR SHADE AGAINST SUN/RAIN

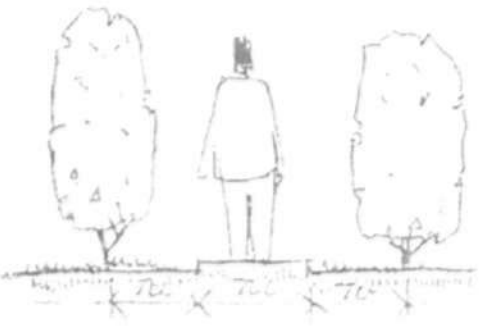
C) USE OF GRASSES FOR EROSION, RAD. AESTHETICS.



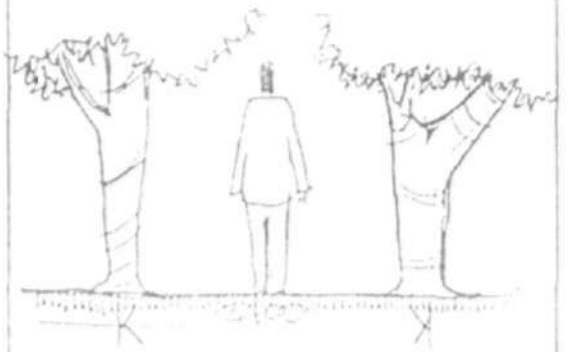
USE OF HEDGES FOR MOVEMENT AND NOISE CONTROL

FIG 23

FIG 24 LANDSCAPING ANALYSIS DIAGRAMS.



CIRCULATION BETWEEN CONIFER HEDGE

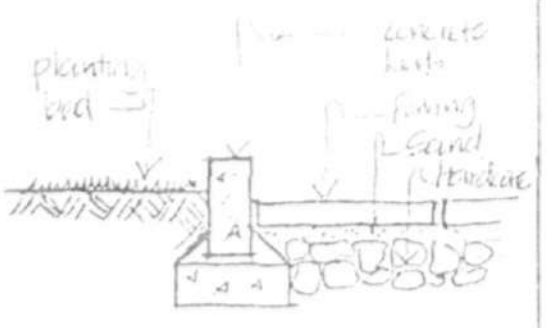


CIRCULATION BETWEEN TRUNKS OF TREES

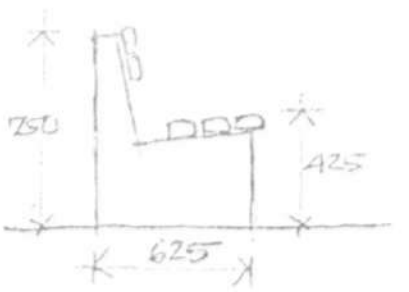


CIRCULATION BETWEEN HEDGES AND MECHANICAL PLANTS.

KERB SET FLUSH PREVENTS WEAR OF EDGE OF PAVING.



KERBING USED TO SEPARATE PATH FROM PLANTING BED



SEATING REQUIREMENTS FOR CONCRETE TRAMEY SEATS.

furnitures or equipments are mainly either rectangular or square in shape and hence the adoptation of rectangular forms for the main structures.

7.1.3 Choice of Structure

With the use of open courtyards and rectangular forms in the design, both the span and roof shapes have been simplified. Thus, the use of columns and beams would provide an economical approach to the design. It also provides a further reinforcement to the arrangements of stack and demarkation of circulation routes.

However, some architectural elements would be employed to characterised the building with the environment. Barrel vaults were employed to some extent to conform with the existing traditional dome shapes commonly Used in the area.

7.2.0 Furniture and Equipments

Furniture and equipments forms another aspects of the design, which requires a thorough analysis of their dimensions and spacing. Standard manufactural specifications and minimum space required by each arrangement has to be taken into account for proper and convient use of space.

7.2.1 Book Sizes and Shelf Dimensions

It has been established that over 90% of the books in adult libraries are less than 230mm deep. Metcalf noted that "97% of all books would go without difficulty on 230mm (9ins) normal shelves in a 508mm (20ins) wide double sided stalk". The exception is of course in children and music libraries. Width of shelves varies from 200mm, 250mm, 300mm and 350mm deep depending on manufacturer and clients requirements or materials.

The length of [illegible] also with the space available and the nature of stalking. Several manufacturers offer 750mm, 1m, and 1.5m shelf lengths for ease of fitting into many modules. Longer shelves saves spaces provides it conforms with the design module.

7.2.2 Shelf Height

- Majority of books can be housed in a 280mm centres less 20mm shelf thickness gives a clear allowances of 260mm, and allowing 13mm for inserting fingers above the top of the book gives a comfortable books size of upto 240mm. For the reasons of sizes greater than this each tier should have one deeper shelf of say 300mm or 330mm centres.

In an open access libraries, wall shelving should not be higher than 2.0m for lighting and accessibility to materials by users. Height of an Island case depends on its position and ranges 1.375m - 1.5m [illegible]. No shelf for use by public should be less than 300mm from the floor, while for Island cases a 400mm space at the bottom gives an increase in lightness of appearance.

TABLE: STANDARD SHELVING SIZES

BOTTOM SPACE	300mm								
FASCIA	50mm			75mm			100mm		
No of shelves at 250mm c/c	4	5	6	4	5	6	4	5	6
Over all Height (mm)	1475		1750	2030			1500	1775	

BOTTOM SPACE	400mm		
FASCIA	50mm	75mm	100mm
No of shelves at 280 c/c			
Over all Height (mm)			

See also attached photostat copy of optimum shelving conditions and the standard space requirements around.

7.2.3 Shelf Loadings

According Poole "All standard Bookshleves are presently designed to with stand loads of $2KN/m^2$ with no permanent deflection and with no temporary deflection in excess of 20mm".

7.2.4 Books per shelf

This is generally difficult to determine largely because of the variable usuage of the stalk, the stalking system, frequency of users, handling of the books, their sizes and the continuous needs for expansion. It is therefore necessary to allow for an empty space if the convience of the library staff inserting returned books are to be considered. Such space allowance applies right up to the end of the life expectance of the library as when the whole space is filled-up, the growth of the library has been brought to an end and an alternative place has to be sort of. The table below gives a generally accepted estimate for shelves 3/4 full (or 75% full).

Number of books per shelf (assume 3' 900mm)

Type of Book	No per 300mm run of shelf	No per 900mm run of shelf
Children books	10 - 12	30 - 36
Loan and fiction in Public Libraries	8	24 - 25
Literature, history Politics economics	7	21
Science and Technology	6	18
Medicine public documents and bound periodicals	5	15
Law	4	12
Averages	7	21

7.2.5 SHELVING

Shelving could either be fixed or adjustable depending on the nature of the library stalking and the books sizes. However, adjustable shelving allows greater flexibility and in particular the opportunity to fit an extra shelf into each bay of popular books without much changed. A good shelving layout mo st ensure stalking of maximum ber of books that can be considered as convient to both staff and users. In open access rooms, shelving plays an important visual role in the internal lighting and circulation and hence due consideratiɔn has to be given to it. For accommodation of large stalks, shelving determines the spacing of the columns and the circulation pattern (cross aisle) within the space.

The table below gives a rough idea of the sizes.

Grid size (m)	Stalk Centres (m)	No of double sided stacks	Books per grid square		Books per m^2 rule	
			One aisle per sq.	One aisle every other	One aisle per sq	One aisle everyother sq
6.5	1.1	4	6160	6860	204	226
6	1.2	4	6860	7560	191	210
7.2	1.20	5	10276	11116	198	214
	1.25	5	10780	11620	192	207
7.7	1.1	6	12992	13972	219	237
8.4	1.2	6	14364	15344	204	217

Also shelving could either be close or open stalk.

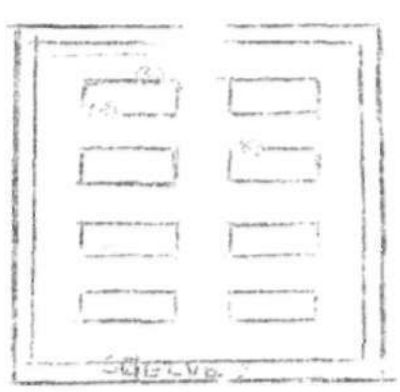
a) Closed Stalk - Usually double sided to maximise the use of space, or stachs with single sided stachs along walls. Aisle is usually sonall as traffic flow is low, usually accessible to staff or authorised users only. Aisle sizes ranges from 685mm - 750mm allowing passage for trolleys.
It could also be closed to the floor as possible with only allowance for dusting of books and as high as to the cieling level. Short ladder may have to be use to reach the upper shelves.

b) Open Stack

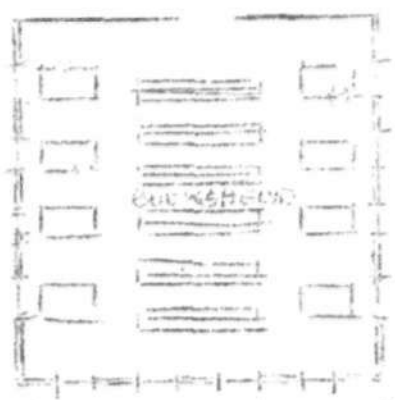
This form of stack is usually better as it provides good circulation network, easy accissibility to materials, good lighting, allowance for feature addition of materials, easy reference and good control of fire spread. Minimum distance between stalks is 900mm - 1375mm c/c and where heavy traffic is expected up to 1680mm c/c could be used. Because of heavy use it is prefferable to have one cross aisle for each grid square. In open access where there is wide/greater attracting potentials, the spaces have to be wider ranging from 1500mm c/c - 1800 aisle.

7.2.6 Study Areas.

In public libraries, Academic or Universiti libraries, study areas consitutes the major part of the area. The utilization of such spaces depends on the arrangement patterns and the sizes of the furniture. Shelving could be around the wall with seats at the centre or shelving at the centre with seats along the water. The later ensure more lighting of the interior.



SHELVING ROUND WALL

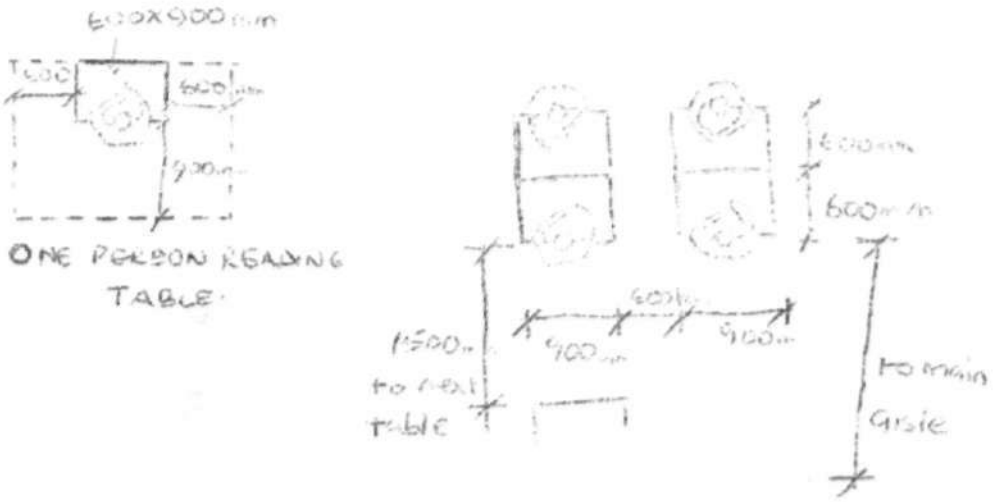


BOOK SHELVES IN CENTRE

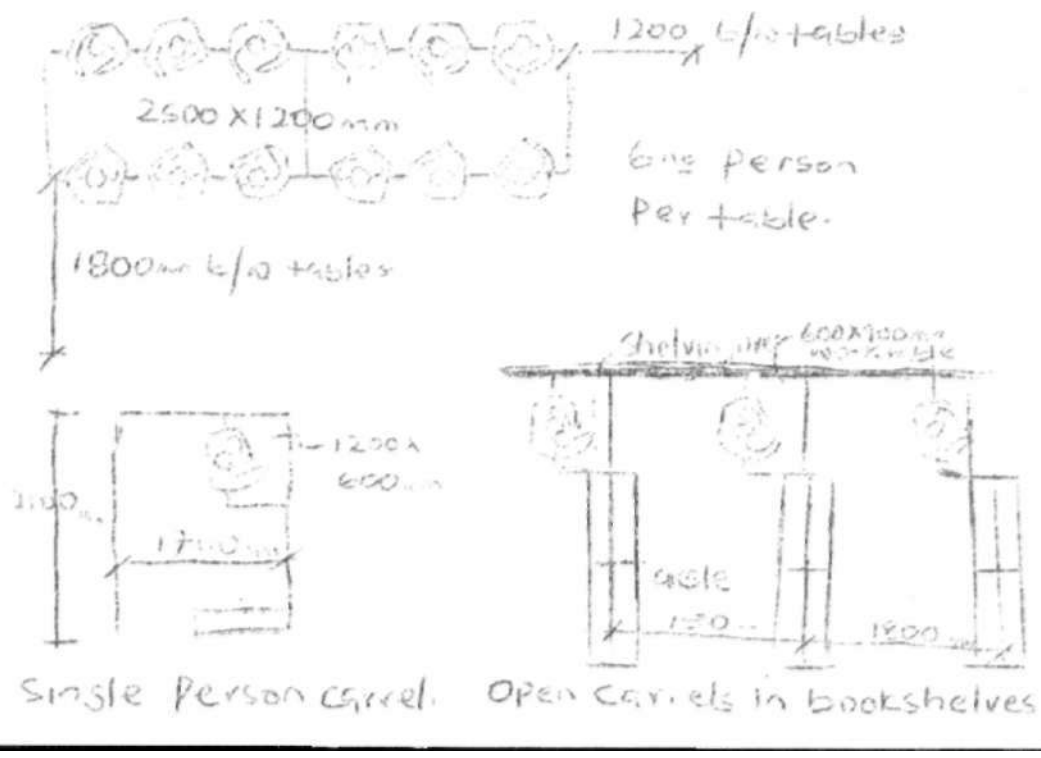
Furnitures

Standard acceptable dimention of an individual table is 600 x 900mm with additional allowance an individual occupies 1.35m^2. With individual shares due to access aisles and other passages space an Individual reader would take up an approximate space of 2.3m^2/reader.

Table dimensions and side allowance



Dual tables -



Single Person Carrel. Open Carrels in Bookshelves.

taken to control interference by neibourhood either using divider or any other means.

Long tables for 6 - 8 or more persons could also be use especially in group study area and serials sections.

See sketches attached for the various sizes and dimensions.

Carrels - A single or individual study rooms for serious works or research. It has a table, cupboard and power points in case of audio visual usage.

7.3.0 Schedule of Accommodation

The space requirements and are figures obtained, are all based on population figures, educational and economic levels, resources and the international standards for library designs.

Maiduguri with a projected population of about 850,000 inhabitant by the year 2000 (Projected from 1963 census using 10% increment) will require a very large floor area for its library. According to IFLA standards, for population range of 659,000 - 1000,000, you allow 31m^2 total floor area per 1000 population.

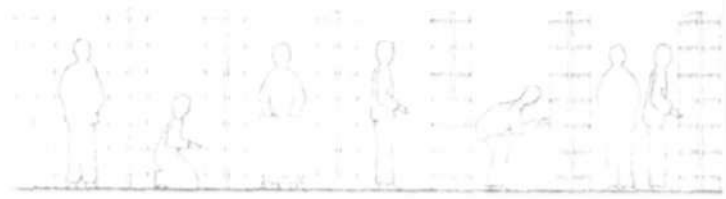
Thus, 850,000 inhabitants would requare about 26,350m^2 of floor area.

PLATE 19





Central Library, Utrecht. Tetterode Hout & Ltd







Interms of Bookstacks IFLA (International Federation of library association) information of standards for stacks based its work on the recommended figures of

1 - 3.5 volumes/inhabitant.

∴ For a population of 850,000 inhabitants we would require approximate 850,000 volumes - 297 5,000 volumes

Using the rate of growth for the libraries studied, one can assume a ratio of 1 - 1 taken into account rate of publications and rate of educational growth.

Therefore an approximate figure of 850,000 volume would be obtained.

The IFLA also provides standards for the percentage of Book stock to be provided in each case.

Adult	-	45 - 52%
Reference	-	2 - 10%
Children	-	25%
Reserved	-	20% of the stock provided

in various department. The state library complex would comprises the following functions.

1. Administration headquarters for all public library services within the State
2. A library service complex for the state capital
3. Schools, outside and mobile library control section.

The reading areas would be grouped according to subjects and would comprised of Arts and Social Sciences, Engineering, Science and Technology, Actual Science, Law, Religious Studies, Business and Management Studies, Reserved, rare or documentation and archives among others.

Below is the breakdown of the areas which would be used as a guideline in the design.

SCHEDULE OF ACCOMMODATION

SECTION	FLOOR LEVEL	TYPE OF ACCOMMODATION	PROPOSED AREA (M^2)
READER'S		Entrance Porch	$18m^2$
	GROUND	Vestibule (Laggage)	$108M^2$
SERVICES		Counter Control	$24m^2$
	FLOOR	Loan Control desk	$64m^2$
		Catalogues	$60m^2$
		Exhibitions	$360m^2$
		New arrivals display	$60m^2$
		Sales/Photo copy room	$72m^2$
		Restaurant	$108m^2$
		Kitchen/store	$72m^2$
		Lecture theatre(cont)	$376m^2$
		Mosque	$100m^2$
		Serials/Journals	$360m^2$
		Reference	$360m^2$
		Archives	$440m^2$
		Bibliography	$44/m^2$
		Toilets	$200m^2$
		Study carrels (cubicles)	$60m^2$
		Circulation	$300m^2$
		Parking space	$1172m^2$

SECTION	FLOOR LEVEL	TYPE OF ACCOMMODATION	PROPOSED AREA (m^2)
CHILDREN		STACKS AREA	$30m^2$
	G ROUND		$216m^2$
SECTION		Demostration Area	$9m^2$
	FLOOR	Store	$9m^2$
		Control Area	$54m^2$
		Display Area	
ADMINIS		Dept. Director Admin	$40m^2$
	GROUND	Sect. Dept. Director Admin	$15m^2$
TRATION		Chief Accountant	$25m^2$
	FLOOR	Cash Office	$15m^2$
		Open Registry/records	$45m^2$
		Toilets	$12m^2$
		Circulation	$96m^2$
		Contral Stores	$162m^2$
		Bindery	$108m^2$
		Workshop	$72m^2$
		First Aid	$10m^2$
		Asst. Director Personol	$45m^2$
		Waiting	$18m^2$
Readers	First	Stacks for Arts/Social/Sc	$653m^2$
		Readers seat	$900m^2$
Services	Floor	Circulation	$400m^2$
		Toilets	$200m^2$
Techical	First	Dupt. Direct. Tech	$40m^2$
		Sect. Dept. Direct. Tech	$15m^2$
Services	Floor	Asst. Direct. Tech	$25m^2$
Section		Asst. Direct. Resers/Ser	$25m^2$
		Chief Lib. (Field Serv)	$25m^2$
		Chief Lib. (Bio/Reach)	$25m^2$
		Chief Lib. (Schools Lib)	$25m^2$
		Catalogning	$108m^2$
		returned books	$108m^2$
		damaged books	$108m^2$
		Audio Visuals/Store	$144m^2$
		Mobile Lib Officer	$12m^2$
		Maintenance Officer	$12m^2$
		Toilets	$36m^2$

SECTION	FLOOR LEVEL	TYPE OF ACCOMMODATION	PROPOSED AREA (m^2)
Admin	First Floor	Director Lib. Services	$40m^2$
		Sect. Director Lib. Serv.	$15m^2$
		Sect. Registry	$45m^2$
		Toilets	$12m^2$
		Chief Person	$25m^2$
		Asst. Director Finance	$25m^2$
		Waiting Space	$36m^2$
		Circulation	$96m^2$
		Store officer	$15m^2$
		Conf. room	$136m^2$
Readers Services	Second Floor	Science Eng. and Tech	
		Stacks	$653m^2$
		Readers seats	$590m^2$
		Circulation	$360m^2$
		Toilets	$200m^2$
Readers Services	Third floor	Reserved and General reading area	
		- stacks	$100m^2$
		- readers seat	$614m^2$
		- Group study	$72m^2$
		- study carrels	$30m^2$
		- Circulations	$148m^2$
		- toilets	$200m^2$
Services on	Roof Plan	Water tank	$7.5m^2$
		lift Machine space	$7.5m^2$
		Airconditioning	$9.0m^2$
		duct service space	

7.4 OTHER DESIGN CONSIDERATIONS

Design emphasis have been geared towards the provision of a condusive leaving atmosphere within the clients operational terms and available resources at disposals. To this end, a study of the factors responsible for the uncondusive atmosphere were carefully analysed.

Solutions to such problems were later reflected in the design through the use of good materials, provision of adequate and attractive design, good orientation, concious selection of forms and landscaping of the entire environment. Openings were adequately protected and positioned. Approach entrance - (for both able and disable) and the whole circulation network were properly inter-related with minimal conflicts. Draining of rain water and sewage waste water lines were also considered so as to avoid damaging the elevations and other structures around. Provision of good escapes routes, concious interior planning to reduce fire and sound spread were also considered in terms of lighting which is also an important design aspect in libraries, an attempt has been made to keep all the spaces within the reach of natural diffuse light through the provision of adequately positioned clear openings and the control of the depth of the structure (span). The orientation of the structure on the site ensures not only good ventilation but also control the direct penetration of sunrays.

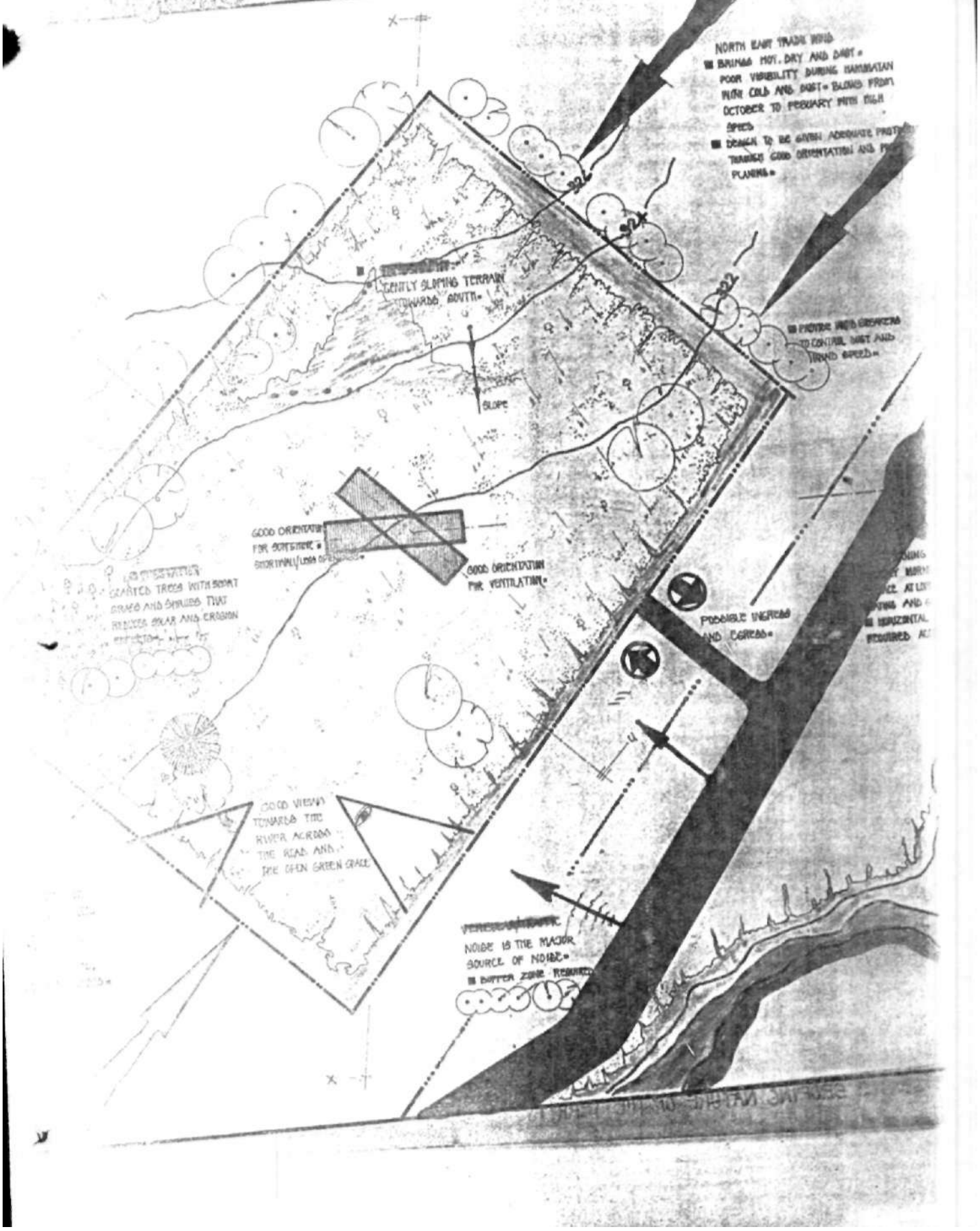
Provision was also made of other services as restuarants, Mosque and a standby generating plant to improve the services of both the staff and the readers. Points of waste disposals within the complex was indicated properly by signs to keep the whole environment clean.

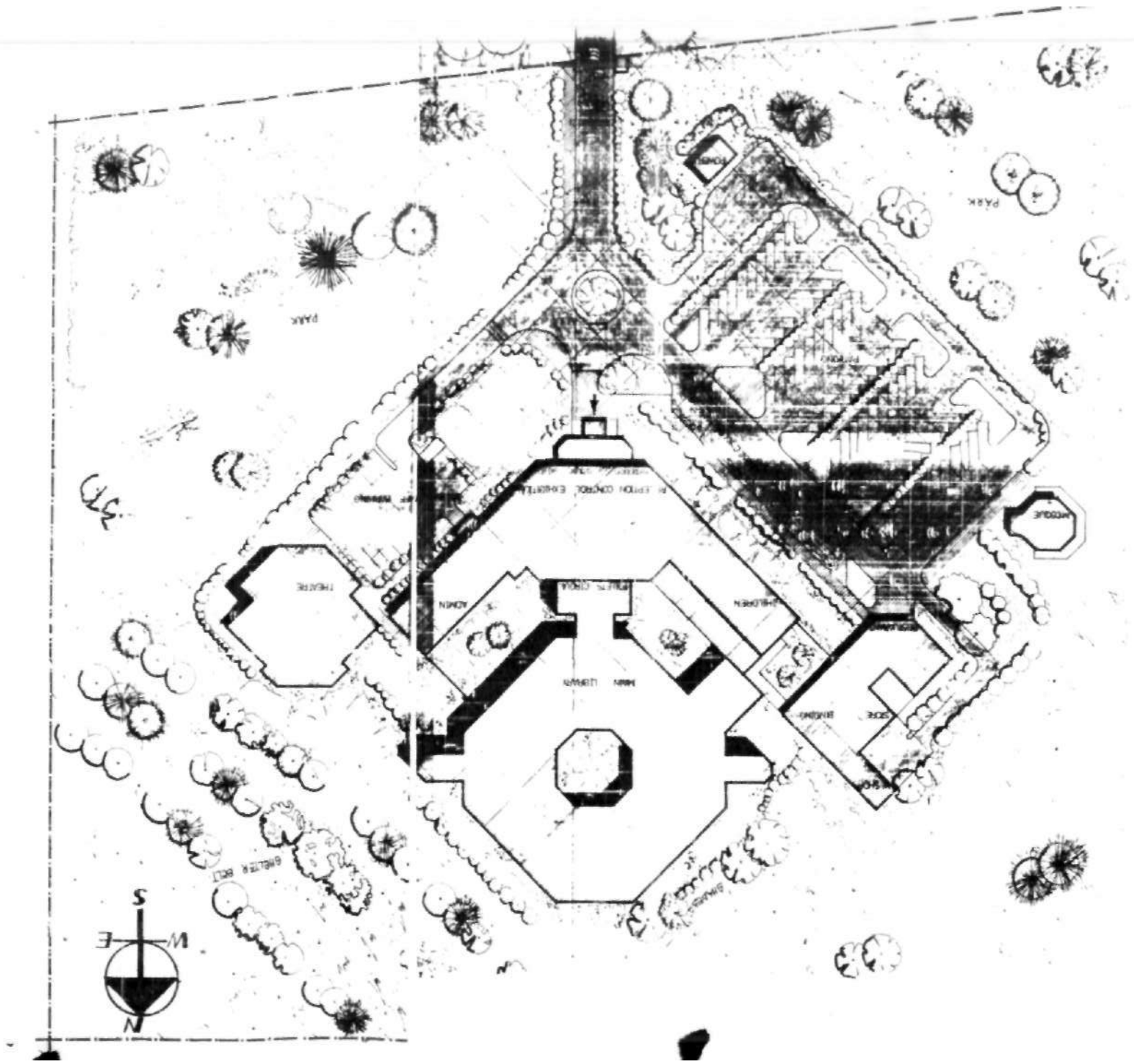
Finally provision of adequate parking space for both staff, readers and delivery bays were made. A park for relaxation has been provided within and outside the complex to give the whole scheme a welcoming approach.

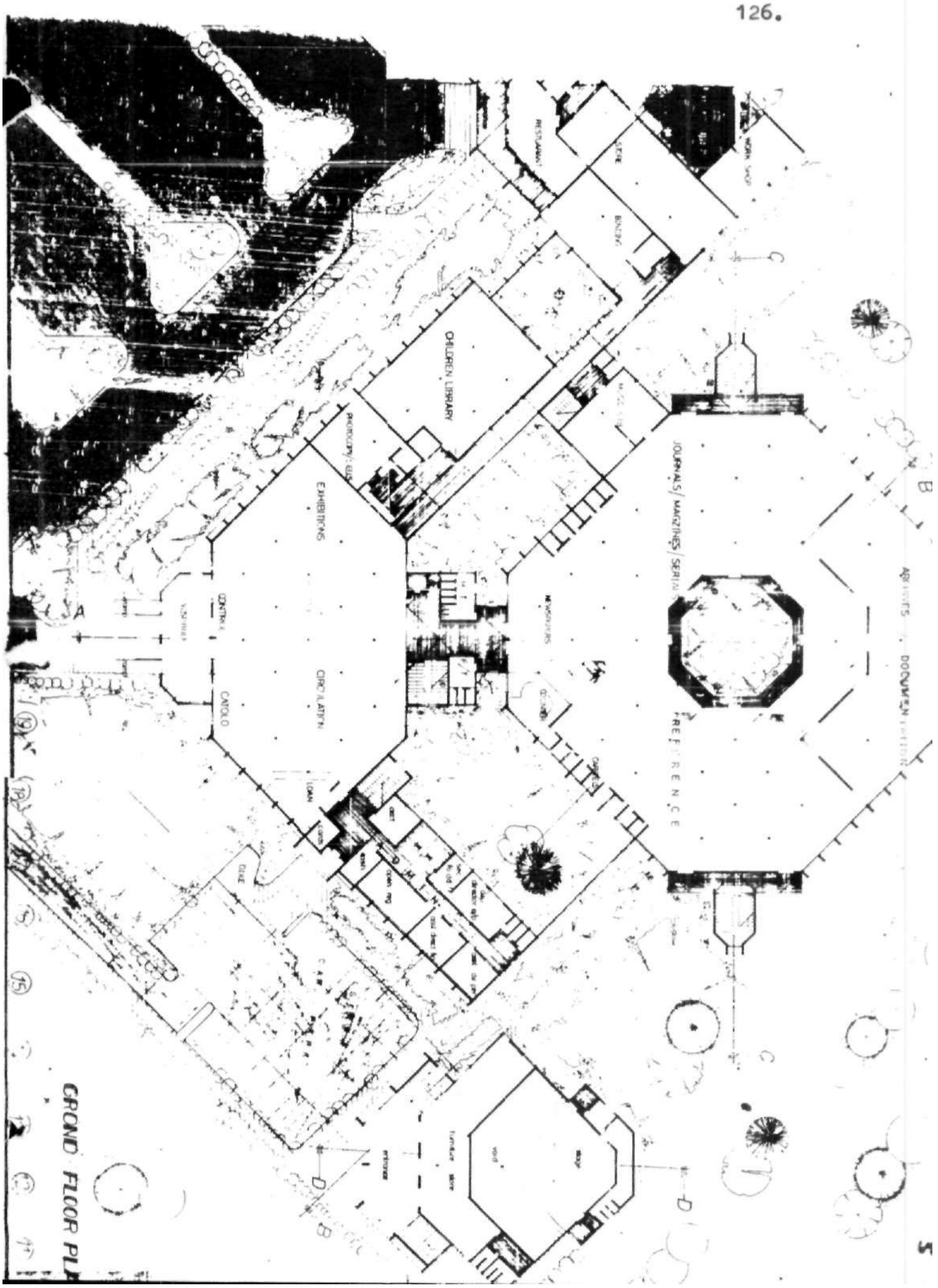
CONCLUSIONS

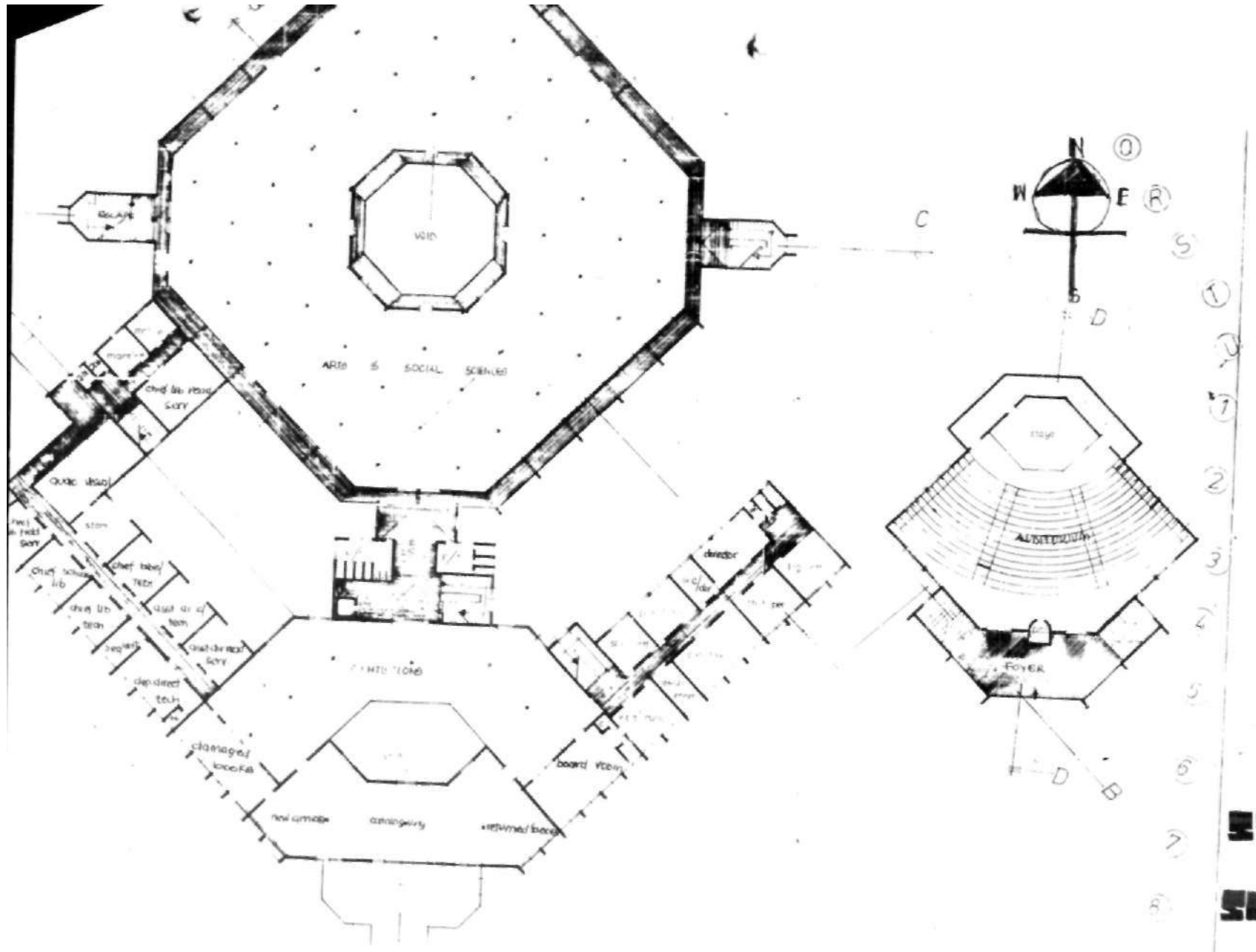
For any society to progress either interms of Industrialisation, communication, defence or any other form of societal status, the government in power must double its effort to educate its citizens. In Nigeria, the government has been spending huge sum of money on this sector, (opening of schools every where, different educational policies and programmes) but upto date the government could not incalculate into the minds of Nigerians the habit of self reading either for leisure or academic purpose. This attitude is common even among the educated class, thereby discouraging the illiterate grtups from making any effort to learn. School dropouts could not continue their education because of lack of assistance and facilities as mass failure in examinations are attributed to lack of materials for research and reference. Yet no government has made an effort to give priority to the development of library services despite the role libraries plays in incalculating the habit of self reading and the preservation of valuable teaching and research materials. Its opendoor policy to all and sundry, its extended services to rural populace and the relatively low cost of operation (both the public and the government) ranks libraries as one of the principal agency for educational communication and development.

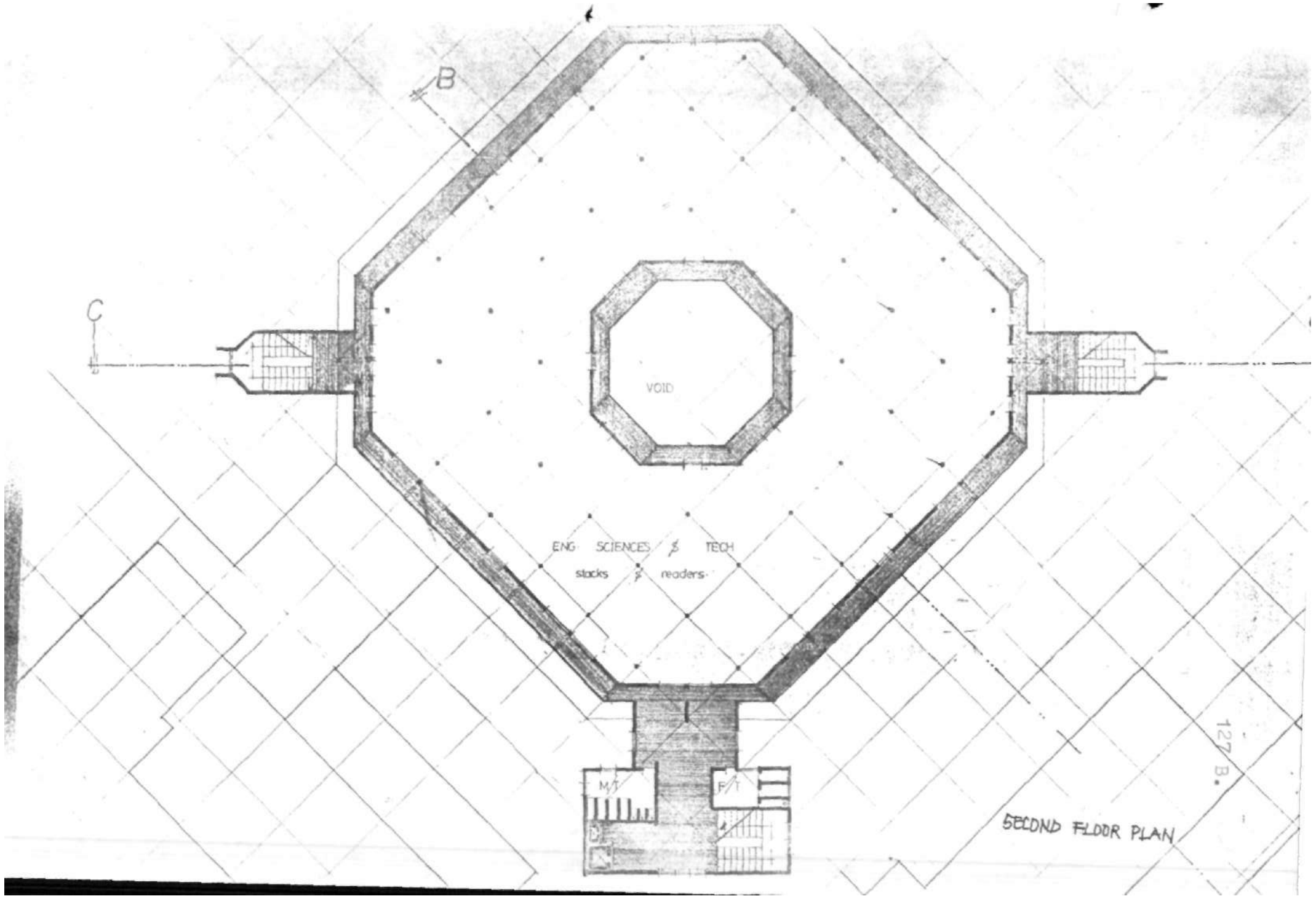
SITE ANALYSIS




PARK
PARK
THEATRE
MAIN LIBRARY
SCHOOL
S
W
E
N


CHILDREN LIBRARY
EXHIBITIONS
CIRCULATION
JOURNALS / MAGAZINES / SERIALS
REFERENCE
GROUND FLOOR PLAN


N
W
E
S
C
D
B
ARTS & SOCIAL SCIENCES
AUDITORIUM
FOYER
director
board room
new curricula
+returned/back
FIRST FLOOR PLAN
ALHAJI
127 A.


B
C
VOID
ENG SCIENCES & TECH
stacks & readers
M
F
127 B.
SECOND FLOOR PLAN

THIRD FLOOR PLAN

12'-8"

GENERAL READING

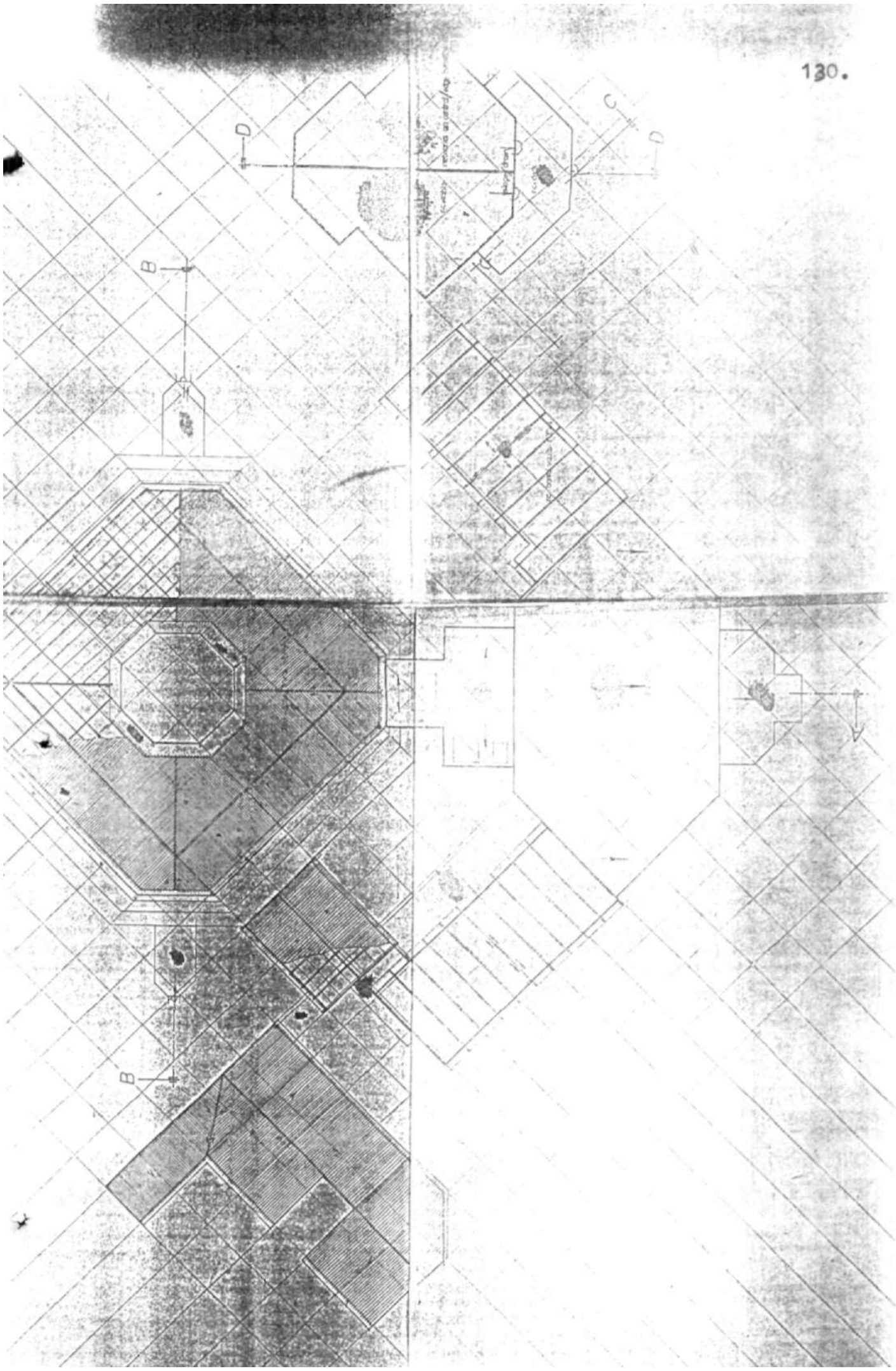
VOID

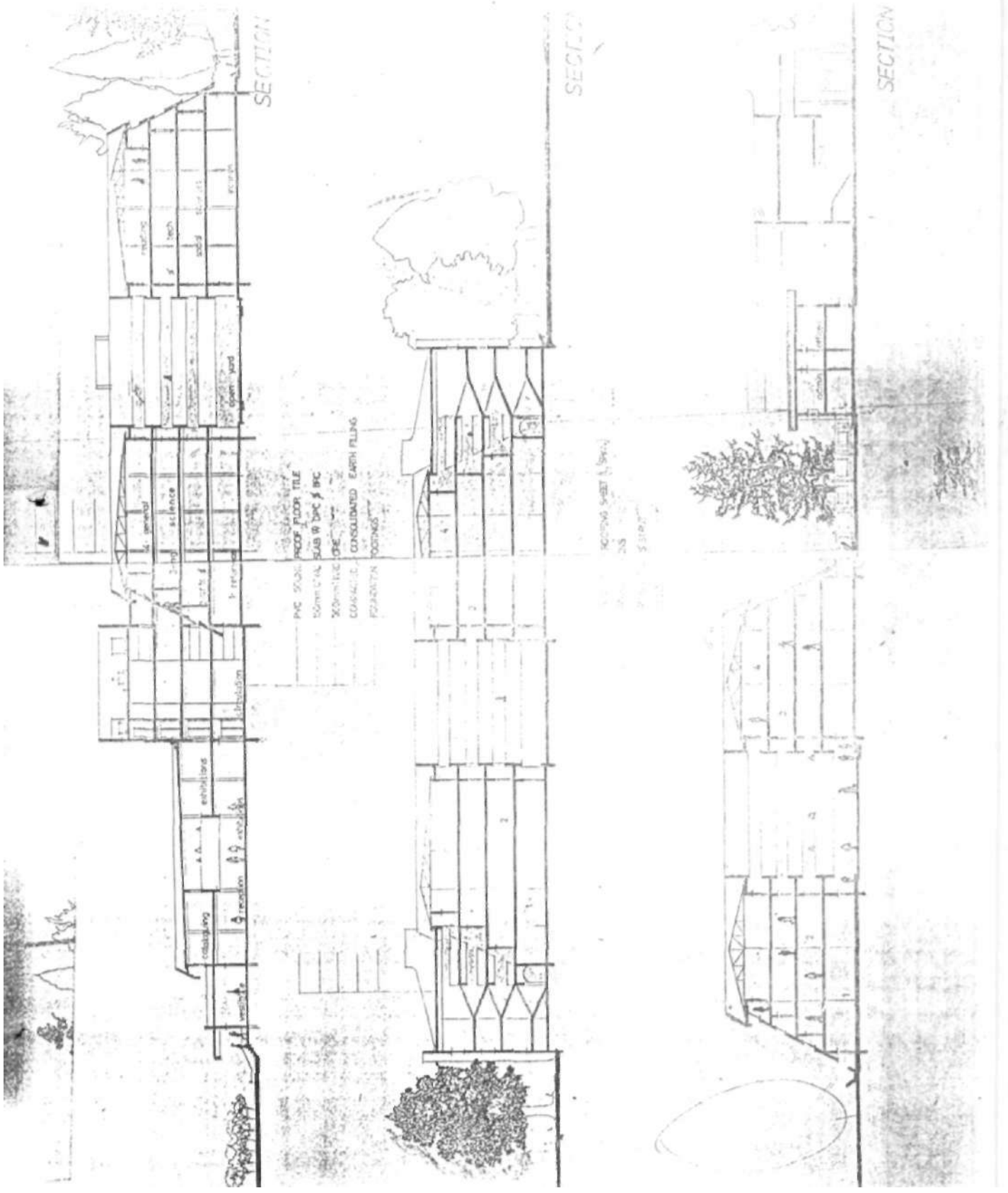
RESERVED BOOKS

group study

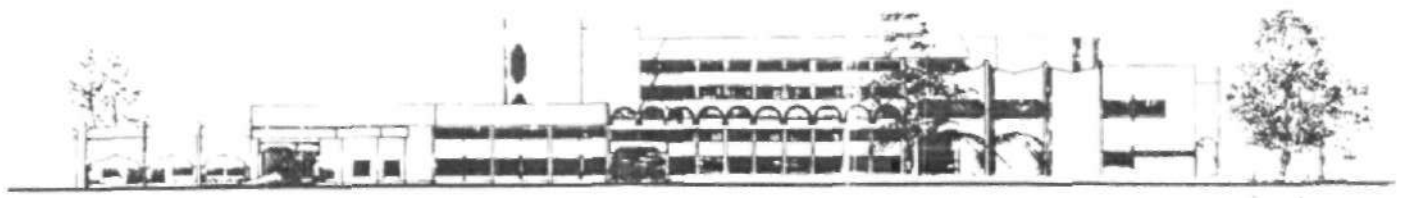
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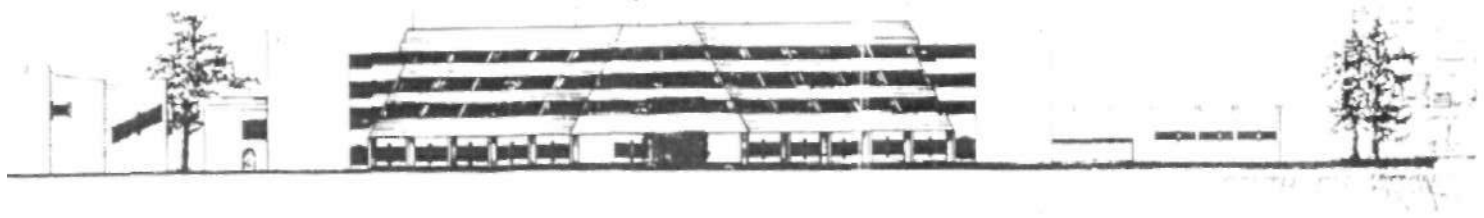
C


D
B
C
D
B


SECTION
SECTION
SECTION
PROOF FLOOR TILE
SLAB W DPC & BIC
CONSOLIDATED EARTH FILLING
exhibition
exhibition
exhibition
cataloguing







BIBLIOGRAPHY

1. Aaron Cohen and Elaine Cohen: Designing and space planning for Libraries - A behavioral guide, R.R. Bowker Co., New York (1979)

2. Allan Konya: Design Primer for Hot Climates, Architectural Press Ltd, London 1980.

3. Ernst Neufert: Architects Data, Second (International) English Ed. @ 1980. Granada Pub. London.

4. Godfrey Thomas: Planning and Design of Library Buildings, The Architectural Press Ltd. Second Ed. London (1977).

5. J.S. Gnidzik: Structural Systems in Architecture A.B.U. Press Zaria 1984.

6. J. DeChiara and J. Callender: Time-Saver Standards for Building Type, Second Ed, @ 1980, New York.

7. Metcalf, K. D: Planning Academic and Research Library Buildings, McGraw Hill Book Comp. New York @ 1965.

8. Micheal Brawne: Libraries - Architecture and equipment, Praeger Pub. Inc. New York 1970.

9. Max Lock Group Nig: Maiduguri Surveys and Planning Reports for the North Eastern State Government of Nigeria 1973 - '76.

10. Nolan Lushington and Wills N. Mills Jr. AIA: Libraries designed for Users -A planning handbook, Handen connection library proffessional pub. 1980.

11. OLGYAY, V.: Design with Climate. Princeton University Press, 1963.

12. Oliver, J.E: Climate and Man's Environment John Wiley and Son; Inc. New York 1973.

13. P. Tutt and David Adlev: New Metric Handbook, New Ed. The Architectural Press Ltd., London 1979.

14. R.F. Reekie: Design in the built environment, Edward Arnold Publishers, London. 1972.

15. Roderick Ham: Theatre Planning, The architectural Press Ltd. London 1974.

16. S. Gidado: M.Sc. Thesis, State Library Complex Bauchi, ABU 1981

17. T.A. Markus and: E.N. Morris Buildings, Climate and Energy, Pitman Publishers @ 1980.

18. T.M. Stell and: G.I. Evstrator Building in Hot Climate Mir. Publishers, Moscow 1974.

19. K.S.L.S. B. Kano: Kano State Library Service Board Annual Report 1987, Kano Press Ltd. Kano 1988.

20. B.S.L.S. B. Maiduguri: Borno State Library Service Board Annual Report 1987 Borno Press. Maiduguri 1988.

21. Diplomatic and: Consular Year Book Ltd. London. The Architectural Association Annual Review, London 1980.

22. Local Authorities Management Services and Computer Committee: The Staffing of Public Libraries Vol. I - III, Library Information Series No. 7, 1980

23. Architect's Journal Information Library 28 August 1968.

24. Architect's Journal Information Library 23 July 1980.

Appendix U = Questionnaire for research only

Name:- Alhaji Mohammed Usman.

Class:- M.Sc Arch

Project Topic:- Borno State Library Service Complex, Maiduguri.

Attendance and use of Public Library.

This particular project is aimed at researching into the problems of Library Services in the State, analyse them and finally proposing an up-to-date solutions or proposals in line with the present day Library standards, government policies and the rate of population and educational growth.

No part of this questionnaire is designed for any other purpose. The questionnaire is purposely designed as a case study to acquire the relevant knowledge to enable me serve you better.

Please be precise and frank. Your guidance is a guidance for all.

Thank you for the cooperation.

Note:-

1. Please answer all questions.
2. Answer with a tick [✓] as appropriate.
3. Please leave the completed questionnaire on the table.

SECTION A - GENERAL INFORMATION

1. Tick ☐ your sex

   (i) Male ——————————————————————

   (ii) Female ——————————————————————

2. Tick your age range

   (i) Less than 15 years ——————————————————————

   (ii) 15 - 19 years ——————————————————————

   (iii) 20 - 24 years ——————————————————————

   (iv) 25 - 29 years ——————————————————————

   (v) 30 - 34 years ——————————————————————

   (vi) 35 - 39 years ——————————————————————

   (vii) 40 - 44 years ——————————————————————

   (viii) above 44 years ——————————————————————

3. Tick ☐ your marital status

   (i) Single ——————————————————————

   (ii) Married ——————————————————————

   (iii) Divorced ——————————————————————

   (iv) Separated ——————————————————————

   (v) Spouse Deceased ——————————————————————

4. Tick ☐ your educational background

   (i) Less than primary six ——————————————————————

   (ii) Completed primary six ——————————————————————

   (iii) Unable to complete W.A.S.C. or equivalent ——————————————————————

   (iv) Completed W.A.S.C. or equivalent ——————————————————————

   (v) My education is higher than all the above other specify

   ——————————————————————

5. Please tick ☐ your dad's educational background

   (i) No formal schooling ——————————————————————

   (ii) Less than primary six ——————————————————————

(iii) Completed primary six ——————————————————

(iv) Unable to complete W.A.S.C. or equivalent ——————————

(v) Completed W.A.S.C. or equivalent ——————————————

(vi) His education is higher than all the above ——————————

(vii) Others (please specify) ——————————————————

——————————————————————————————

6. Please tick [ ] mum's educational background

(i) No formal schooling ——————————————————

(ii) Less than primary six ——————————————————

(iii) Completed primary six ——————————————

(iv) Unable to complete W.A.S.C. or equivalent ——————————

(v) Completed W.A.S.C. or equivalent ——————————————

(vi) Her education is higher than all the above ——————————

(vii) Other (please specify) ——————————————————

7. Tick [ ] your occupation

(i) Full time student —— ——————————————————

(ii) Teaching ——————————————————————————

(iii) Civil Servant ——————————————————————

(iv) Company worker ——————————————————————

(v) Unemployed ——————————————————————

(vi) Others (please specify) ——————————————————

——————————————————————————————

SECTION B LIBRARY ATTENDANCE

8. Tick ☐ your reasons for coming to the library today.

Tick as many reasons as applicable.

(i) To study, using your own book ——————

(ii) To study, using library book ——————

(iii) To borrow library books ——————

(iv) To read news papers ——————

(v) To read magazine ——————

(vi) To obtain book or information on a subject for research (please indicate subject) ——————

(vii) To study for examination only (please indicate exams) ——————

(viii) Others (please specify) ——————

9. Tick ☐ what do you want the book, newspaper or information for (tick as many reasons as applicable)

(i) Your personal reading ——————

(ii) Your job ——————

(iii) Your school work ——————

(iv) For another person ——————

(v) For exams (specify) ——————

(vi) For another reason (please specify) ——————

10. Tick ☐ use made of the library while you were here today (tick as many reasons as applicable).

(i) Reference books ——————

(ii) Look through books on shelves ——————

(iii) Read magazines ——————

(iv) Read newspapers ——————

(v) Library catalogues ——————

(vi) Visit a friend (specify reader or staff) ——————

(vii) Others (please specify) ——————————————

11. Tick ☐ your satisfaction with the materials or information you got in the library today.

(i) Completely satisfied ——————————————

(ii) Only partially satisfied ——————————————

(iii) Not satisfied ——————————————

Note: If not completely satisfied please answer question 12.

12. Tick ☐ reasons why you were not satisfied (tick as many reasons as applicable).

(i) Book or books wanted were out. ——————————————

(ii) Books wanted not in library ——————————————

(iii) Books out of date ——————————————

(iv) No new newspapers ——————————————

(v) No new magazines ——————————————

(vi) Books on my subject too elementary on a level ——————————————

(vii) Books on my subject too advanced on a level ——————————————

(viii) Other reasons (please specify) ——————————————

13. Check/difficulties you had in using the library today (tick as many reasons as applicable).

(i) Library too crowded ——————————————

(ii) Library too noisy ——————————————

(iii) Had to figure out library arrangement and materials ——————

(iv) Library staff not friendly ——————————————

(v) Library too hot in the day time ——————————————

(vi) Library space not properly ventilated ——————————————

(vii) Difficult to ease once self (toilet, snacks, relaxation) ——————————————

(viii) Delay in getting magazine/newspaper ——————————————

(ix) Other difficulties (please specify) ——————————————

14. Tick ☐ reasons why you do not use the library daily (tick as many reasons as applicable).

(i) Library is not opened daily ——————————

(ii) Library is too far from house ——————————

(iii) Library does not have all what I want ——————————

(iv) Lack of transport to take me to the library ——————————

(v) Others (Please specify) ——————————

15. Tick ☐ where you start from today?

(i) Home ——————————

(ii) Work ——————————

(iii) School ——————————

(iv) Others (Please specify) ——————————

16. What was your approximate travelling time? ——————————

Minutes ——————————

17. Tick ☐ means by which you come to the library today

(i) Car ——————————

(ii) Bus ——————————

(iii) Bicycle ——————————

(iv) Motor-cycle ——————————

(v) Walking ——————————

(vi) Others (Please specify) ——————————

SECTION C - YOUR COMMENTS AND SUGGESTIONS

18. What services do you most appreciate in this library?

Please be frank; ——————————

——————————

——————————

——————————

19 What do you need libraries for most? Please be frank.

20. How can library services improved? Please be frank.

APPENDIX S = INTERVIEW QUESTIONS FOR STAFF ONLY:

NAME: ALHAJI MOHAMMED USMAN

CLASS: M.SC ARCH. II.

PROJECT TOPIC: BORNO STATE LIBRARY SERVICE COMPLEX MAIDUGURI

NAME: ———————————— PROFESSION ————————

RANK: ———————————— YEARS IN LIBRARY SERVICE ——

————————————

- Notes:

This particular project is aim at researching into the problem of Library development in the State, analysing them, and finally proposing an upto date scluntions or proposals in line with the present day library standards, the government educational policies and the rate of population and educational growth.

No part of this questionnaire is design for any other purpose than the above stated purpose.

The questionnaire is purposefully design as a case study to acquire the relevant knowledge for the execution of the work. Your cooperation and maximum assistance would therefore be highly appreciated with thanks.

1. When was the State library established?
2. How did it started or took off
3. With what facilities did it took off? (Interms of Staff strength and volumes of books).
4. Briefly highlight the history of the library mentioning its growth and developments to date.
5. History has it that libraries are key Instruments to the development and spread of education in the World, How can such statement be related to the aged Educational history of Kano State.
6. What is the present capacity of your library? (Interms of books and users seat).

7. Have you been getting any form of external assistance from organisations and or other governmental agencies?
8. If yes, How often and in what form?
9. How often does the government finance the purchase of books and other library equipments.
10. The menance of theft is a major threat to the development of libraries and your library is no exception; What measures do you take against such acts?
11. Being a public library how do you admit your members? (eligible borrowers).
12. Do you normally encounter problem of getting your books returned?
13. How do you follow-up the books?
14. How do you assist your readers who may wish to print or photocopy part of a book.
15. The goals of the government towards education in nowadays is geared towards mass litracy for all, what will be your direct and indirect contribution towards this goals.
16. Do you operate outside library?
17. How functional are they and what facilities do you provide them wi
18. Do you operate mobile library?
19. How and what facilities do you have for it.
20. How do you see the progress and response of the rural populace to the system.
21. What mode do you adapt in the distribution of your facilities to t outside libraries.
22. Modern library complex nowadays are more than just book keeping and reading rooms, they include such other functions as film shows,

public lectures, museum, instructional materials centres such as workshops, Home economics, commercial activities such binding, photostat film reduction, books sells etc. How do you see to the incoporation of such functions into your board.

23. What are the major problems apart from finance that your board is facing now?
24. Do you thought of any form of generating revenue for your self?
25. What suggestion can you give to the government as regard to the development of a state own modern library complex.
26. What are your official working hours (both professionals and non professionals).
27. When do you normally record the maximum and minimum turn out of User (seasonal and daily).
28. Can you suggest possible reasons for such fluctuations in attendance
29. What can you say about your readership attendance in terms of:-
    (a) Approx number - (full, average, low).
    (b) Period or peak hour of attendance (morning, afternoon).
30. How do you see the characteristic of your readership in terms of educational background.
    (a) Mostly students from schools.
    (b) Workers or researchers from offices, school.
    (c) Members of the public (literate class)
31. What do you do at your end to publicise your functions to the local communities.
32. What measures do you take towards improving the reading habits of your readership.

KASHIM [illegible] LIBRARY
AHMADU [illegible] UNIVERSITY
ZARIA, NIGERIA.