FACULTY OF ENVIRONMENTAL SCIENCE

KADUNA STATE UNIVERSITY

TOWARDS ENHANCEMENT OF STUDENT'S INTERACTION THROUGH INTEGRATION OF FACILITIES

BY

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DEPARTMENT OF ARCHITECTURE
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DECEMBER, 2006

DECLARATION

I hereby declare that this thesis has been composed by me and that it is a record of my own research work. It has not been accepted in any previous application for a higher degree. All sources of information are specifically acknowledged by means of references.

SALIU OZOVEHE HASSAN.

CERTIFICATION

This thesis entitled "FACULTY OF ENVIRONMENTAL SCIENCE KADUNA STATE UNIVERSITY (Towards Enhancement of Students Interaction through integration of facilities)" Meets the requirements governing the award of the degree of Master of Science in Architecture (M.Sc Arch) of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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   Dean of Postgraduate School Date

DEDICATION

This thesis is whole heartedly dedicated to:

- Almighty Allah for sustaining my life and giving me the ability to carry out this work
- My parents and all my family members for their love and support.

ACKNOWLEDGEMENT

My sincere gratitude to Almighty Allah, who despite my weaknesses and short-comings, never ceases to bless me. Thank you.

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ABSTRACT.

Student's interaction can be defined as a reciprocal event that requires at least two students and two actions. This interaction occurs when these students and event mutually influence one another. While on the other hand, integration is the act or process of combining two or more things so that they may work together. This thesis seeks to systematically address the problem of interaction between students in faculty of Environmental Science and integration of the facilities in the faculty. The thesis examines the role of interaction in the training of students in faculty of Environmental Science, discusses the various courses obtainable in each department and established the relationship between them, while highlighting the common areas that enhance interaction amongst the students. The thesis raises questions and suggests some ways of integrating the commonly used facilities, which will enhance the interaction between students and also lecturers too.

CHAPTER ONE

1.1 INTRODUCTION

Education can be referred to as a process of teaching, training and learning to improve knowledge and develop skills. This normally happens in the schools or colleges.

The planning and design of higher education faculties covers a wide rang of activities from the drawing up of a policy to its implementation.

Education as a systematic process of training and instructions, require certain spaces and equipments for proper learning condition. Education curriculum is dynamic and not static. Due to the changes in school curriculum and student enrolment, school building have always being subjected to changes not only within the envelope but also in form of additions and annexes. Unfortunately, because the changes have not been planned for in the beginning, haphazard layout of the building which is not only expensive, but also unsatisfactory results.

In view of future changing demands, the main consideration in the planning of educational building must therefore be the provision for flexible and adaptable spaces, which are properly integrated.

> *"Flexible and adaptable spaces, is valuable in giving the school curriculum a chance to grow in response to the changing students population". (Yoloye, 1990)*

This thesis is aimed at designing a faculty of environmental science where maximum interaction and flexibility with minimum dislocation and cost for future expansion will be achieved so as to be able to accommodate the constantly changing demand of a dynamic system of education in Nigeria.

Environmental science as defined by the National University Commission deals with planning, design, construction and management of the manmade and natural environment. As much as this is the basic idea of environmental science, these disciplines that constitute or

make up the environmental science which are varied but nevertheless important and interrelated.

Responsible design decisions which is a result of a design process is not just a matter of shaping the appearance of things around us but also of shaping the way we live. In modern times where technology and science are major factors in design decision, large areas of our environment can be shaped, determining not only the way we live but also the pattern of life for thousands of other peoples as well. These people may or may not share similar cultural values but nevertheless will have to adapt their pattern of life to suit that designed for them.

1.2 PROBLEM STATEMENT

Closer assessments of our educational buildings in the country with the faculty of Environmental Science in focus show that the much desired interaction in a faculty that train professionals is lacking. These are lacking because most of the commonly used facilities are either not available or are not integrated into the whole. The grouping of these facilities will go a long way to reduce cost of providing for individual departments. It will also help in building an interactive environment for both the students and lectures.

This thesis hopes to proffer a solution to this problem of interaction so as to enhance the training of the students.

1.3 MOTIVATION

The Motivating factor of this thesis is the desire to see a faculty of environmental science where facilities are effectively integrated and enhance the interaction between students and lecturers within the faculty.

It is expected that for these functions to be achieved, there must be a proper coordination and interaction among the professionals that form the building industry. This

interaction and coordination is better built while in school. This can be achieved by effective integration of facilities and the spaces in which they carry out their learning.

1.4 AIMS AND OBJECTIVES

The ultimate goal of this thesis is to design effectively integrated spaces in an academic environment for the purpose of enhancing learning and interaction amongst students and staff of different departments within the faculty.

To achieve this aim, the following objectives have been set out.

I. Incorporation of interior and exterior learning spaces.
II. To create an enabling interactive learning environment.
III. To design a more flexible and adaptable learning space.

1.5 SCOPE AND LIMITATIONS

It is necessary to define the scope of this thesis so as to make the boundary of the work very clear. The proposed faculty building will be made up of four distinct wings for the departments namely Architecture, Building, and Estate Management, Urban and Regional Planning. It is the aim of this research to design a faculty that the departments will be effectively integrated.

In the course of this study, constraints that stood in the way of this research were primarily limitations in finance, limited and time.

According to Nigerian University Commission N.U.C minimum academic standards, there should be provision for specific space requirements and that would include

- Studio spaces.
- Classrooms.
- Workshops.

- Conference/Lecture theatres.
- Office accommodation for staff etc.

1.6 RESEARCH METHODOLOGY

The research process involved the study and review of existing data, literature or documentations on or related to the subject matter, the site and the design proposal.

An in-depth study and appraisal of selected existing and related facilities for interaction and integration of faculties (faculties with similar themes) to highlight possible strengths, weaknesses and to recognize new trends in faculty design constitute the case studies. These are documented; the inferences drawn from their study include the basis for the design and planning decisions.

All information were sourced from: primary sources, which include personal field study of the site, case studies, interpersonal interactions; and from secondary sources made up of graphic and photographic representations, review of existing literature on the subject matter and related issues. However, for the purpose of reliability and viability, all data collected are subjected to intellectual analysis, consultation and personal but informed decisions.

1.7 ARCHITECTURAL SIGNIFICANCE

This thesis has a major significance of providing educational facility which possess an architectural environment suitable for educating and training individuals of the environmental science profession.

The spatial organization and its integration will be geared towards enabling the students and lecturer effectively interact and so respond to their surroundings.

CHAPTER TWO

2.1 INTRODUCTION

The study of the environmental sciences as they are viewed in the academic society comprises basically of the study of Architecture, Building, Urban and Regional Planning, Land/Quantity Survey and Estate Management.

These various disciplines constitute the very core of the environmental sciences which deals with the planning, design, construction and management of the Built and Natural environment.

2.2 FORMAL TRAINING IN THE ENVIRONMENTAL SCIENCES

The basic philosophy of environmental sciences is basically to do with the physical 'manipulation' of the man-made and natural environment. This manipulation would include its planning, design, construction and management.

As a field of study and research, there are usually the various disciplines which enable these various activities or actions take place and they are expressed in the disciplines of architecture, urban planning, surveying even in the fine arts which are all interrelated and depend on one another.

2.3 THE ROLE OF ENVIRONMENTAL SCIENCES

The very definition of the Environmental Science allows us an insight into its very essence and its responsibility to the environment whether man-made or natural as the various disciplines are concerned with ordering the surface of the earth with a view to achieving functionally, aesthetics, economy with cultural relevance.

The process of this design, planning, and construction is the very core of its relevance in an ever changing world where science and technology continues to make and shape the

way people live. The man's effort to satisfy his material wants by working on physical objects is what is fundamental to his survival, technology makes that possible. The role of the environmental science is therefore to make use or take in to cognizance the immense contribution of science and technology in helping to shape the environment. Therefore the urban and rural look of cities and villages with a special emphasis on infrastructural development is one way in which the environmental designers whether planners, architects and surveyors, tackles practical problems.

The looks of macro environment (dwellings) architecture in the larger macro environment (cities, towns) are all considered important to the designer. As this immediate surrounding are what impact on the individual psychologically and otherwise as earlier noted, we as people are insensitive to the visual appearance and subsequent effect upon us of our surroundings. Urban areas are frequently chaotic jumbles which we tolerate, suffer or take for granted. This stems from the disorder or lack of articulated planning of the micro environment (architecture) as it pertains to dwellings either for commercial or residential purposes.

The environment science through its various disciplines whether architecture, quantity survey, planning, estate management, the shape environment which include not only buildings and man-made objects but also the natural surrounding.

The process of achieving this, looked at as a design process are, that include careful planning to articulate a problem in order to find solutions, appropriate solutions, this solutions or design is not about imposing predetermined solutions based on some empirical standards but proffered answers to well researched and articulated problems. Thus, it is a well developed and informed system of thought which address a wide range of issues as they concerned, man, his immediate environment and the natural environment.

2.4 CURRICULA AND STRUCTURES OF TRAINING

The structure of learning which include the different programmes which a student in the various disciplines would have to undergo to become a skilled professional are in line with guidelines provided by the Nigerian Universities Commission (N.U.C). Although they may vary in content from university to university but the basic components are the same.

The disciplines include:

2.4.1 Architecture

The discipline of architecture in the environmental science is concerned with understanding and solving the environmental design problems of the immediate surrounding. The emphasis is a developing scheme on the ever changing needs arising from the social economic, psychological and technological environment.

A student of architecture is expected to undergo a training period of 6 years to obtain Bachelors of Architecture. (B.Arch) or 4 years for a Bachelors of Science (B.Sc Arch) and a Master of Science in Architecture (M.Sc Arch).

The student takes various courses in areas of study or instruction which include.

a. Architectural Design
b. Fine and Applied Arts
c. History and Theoretical Studies
d. Building Systems Technology
e. Humanities and Social Studies
f. Environmental Control Systems
g. Physical Sciences

Each of these modules consists of a number of related courses offered either within the school of architecture, within the parent faulty or elsewhere in the university, which the students of architecture take during the course of their education.

Below are tables of instruction modules and list of courses with distribution of courses by semester.

Table 1. TABLE OF SUMMARY OF COURSE REQUIREMENTS FOR BACHELOR OF SCIENCE ARCHITECTURE

Course	Year of study					
`	1	2	3	4	5	6
General Mathematics						
Introduction to Architecture						
Architectural Graphics and Lettering						
Free hand sketching						
Nature of environmental sciences						
Basic Element of Planning						
Architectural Design						
Building Components and methods						
Descriptive geometry						
History of Arch						
Building Structures						
Land Surveying						
General Studies (Logic and Philosophy)						
Computer Applications						

Urban Design						
Environmental Science						
Building Services						
Landscape Design						
Interior Design						
Theory of Architecture						
Rural Development and Planning						
Quantities and Estimating						
Research Methods						
Building Economics						
Building Contract and Arbitration						
Advanced Architectural Structures						
Project Planning and Control						
Advanced Landscape Design						
Architectural Design						
Advanced urban Design						
Advanced Building Components and Methods						
Specification Writing						
Professional Practice and Procedure						
Architectural Design project						
Seminars						

2.4.2 Building

The discipline of building of the Environmental Science deals with the science and practice of building technology and construction management, students of this discipline undergo a period of training for 5 years after which they acquire a bachelor of science in building (B.Sc. Building).

The areas of study include

1. Building and construction Technology
2. Building Materials
3. Building services, Equipment and infrastructure
4. Building structures
5. Construction Management
6. Tendering
7. Building Maintenance
8. Professional Practice and
9. Foundation courses and General studies.

Table2. TABLE OF SUMMARY OF COURSE REQUIREMENTS FOR BACHELOR OF SCIENCE BUILDING

COURSE	YEAR OF STUDY				
	1	2	3	4	5
Nature of Environmental Science					
Building Construction and Material					
Structural Mechanic					
General Chemistry					
Mathematical methods					
Principles of Econs. For Building					
Physics					

Introduction to Valuation					
Structural Theory and Design					
Building and Architectural Science					
Principles of Measurements & description					
Land Surveying					
Introduction to Quantity Surveying					
General Studies					
Building Construction and Material					
Soil Mechanics and Foundation					
Basic Elements of Planning					
Construction Technology					
Building Maintenance					
Building Services and Equipment					
Structural Analysis					
Engineering Thermodynamics					
Materials Science					
Computer Applications					
Projects Planning and Control					
Building Structures					
Building Contracts Law and Arbitration					
Production Management					
Building economics and Measurement					
Integrated Studio Work					
Principles of Construction Management					

Design Economic and Cost Planning					
Operations Research					
Advanced Construction Technology					
Advanced project Management					
Professional Practices					
Project Reports					
Management of Building Projects					
Design of Steel Structure					

2.4.3 URBAN AND REGIONAL PLANNING

The discipline of Urban and Regional planning deals with the formulation, design, implementation and monitoring of land use plans and policies at the local and regional levels, it is broad based and requires a comprehensive education and training in the planning, design and management of the total environment.

The length of the degree programme is five years after which the students acquire the Bachelor of Science urban and Regional Planning.

The areas of study or instruction include:

1. Planning Theory
2. Land use Studies
3. Planning Techniques
4. Planning Design
5. Planning Studies
6. Professional Practice
7. Planning Research and Seminars
8. Applied Sciences and Humanities

Table 3 TABLE OF THE COURSE REQUIREMENT FOR BACHELOR OF SCIENCE URBAN AND REGIONAL PLANNING

COURSE	YEAR OF STUDY				
Course	**1**	**2**	**3**	**4**	5
Nature of Environmental Sciences					
Principles of Economics					
History of Planning					
Introduction of Sociology					
Fundamental of Geography					
Populations and Urbanization Studies					
Architectural Design					
Urban Development Planning					
Building Construction and Materials					
Planning Studio					
Site Selection and Planning					
Land Economics					
Statistical Method/Sources					
Land Surveying					
General Studies					
Regional development Planning					
Planning Theory					
Natural Resources and Environmental Planning					
Quantitative Techniques and Research in Planning					
Planning Laws and Procedures					
Computer Application					
Traffic and Transportation Planning					

Principles of Valuation					
Land Use and Resources Management Theory					
Industrial Development Planning					
Landscape Design					
Project Planning and Evaluation					
Urban Design					
Management and Planning					
Law of Contract and Tort					
Public Utilities and Services					
Urban renewal Techniques					
Environmental Impact Assessment					
Recreation planning					
Planning Control and Settlement of Disputes					

2.4.4 ESTATE MANAGEMENT

Estate Management as a discipline in the Environmental Science deals with the optimization of land use among competing claims having regards to public good, their share by owners of interests and economic development.

The length of Degree programme is five years with the award of Bachelor of Science (B.Sc).

The principal course components in the area of study include Property valuation, Feasibility and Viability studies, property Management, Building Technology, Law, economic, Land economics and Town Planning.

Table 4 TABLE OF SUMMARY OF COURSE REQUIREMENTS FOR BACHELOR OF SCIENCE ESTATE MANAGEMENT

COURSE	YEAR OF STUDY				
	1	**2**	**3**	**4**	**5**
Introduction to Estate Management					
General Mathematic					
Architectural Graphics					
Principles of Economics					
Basic Elements of Planning					
Principles of Accounting					
Nature of Environmental Sciences					
Basic Statistics					
Introduction to Valuation					
Land Surveying					
Principles of Agric Production					
Economics of Agriculture					
Land economic					
Building Construction and Materials					
Elements of law of Contracts and Torts					
Statistical Methods					
General Studies					
Principles of Valuation					
Elements of Land Law					
Principles of Town & Country Planning					
National and Rating Taxation					

Building Services					
Computer Application					
Economic Theory					
Principles of Property Management					
Estate and Development Finance					
Comparative Land Policies					
Research Methodology					
Project Planning Control					
Advanced Valuation					
Land Use and Resources					
Applied property Management					
Feasibility and Viability Studies					
Project Dissertation					
Professional Practice					

2.5 STRUCTURE OF TRAINING

The training structure of the various disciplines is one that takes into consideration the peculiar nature of the field of environmental sciences. The various areas of study which are concerned with manmade and natural environments is one that require a great level of interaction between the various disciplines to achieve the anticipated result from the design solutions proffered in any given problem.

The proposal for an educational system that tends to provide an integrated curriculum in the environmental science is not the focus of this thesis work but in the same spirit, the theme for integration is one that must be looked at carefully.

The implications of such a thought school of Environmental Science where the various interrelated disciplines will be taught to students who will eventually have to work together upon graduation in the larger society as Architects, Planners, Surveyors, Estate managers are one that necessitates a serious look at the impact that the early working together of these professionals during the period of their training will make on the rapid development of our society and nation.

The development needs of our Nation make it necessary for the bringing together of the various disciplines of environmental designers in an environment that allows the students to realize their social responsibility, where the concern is the total built environment,

This could enhance a team responsibility, calling for a wide range of skills whose practitioners should for the mutual benefit of mankind if they acquire a common set of values in the course of their training.

The implication of such an action would mean a conducive and enabling environment expressed as a built environment, one in which the integration of the disciplines are encouraged. Such an environment for learning belongs to conception of the environment as a field of learning.

Paul Ritter in his book "Education" defines field of learning as:

"That aspect of any relationships of which we are born, or through which we are developed"

The need is therefore for a man-environment interaction where the active participation of the individual in his various contacts with the environment is an involvement of the learning process and the use of the built environment not of the parts in them but of their relationships and how they constitute a field of learning.

The interaction which must exist not only between the students of the disciplines but also between their teachers or lecturers of the various disciplines and the students of

disciplines must be approached through a spatial organization which reveals and emphasizes the importance of the different parts of the built environment.

A spatial organization which is seen to be of humanizing space, flexible as to giving it qualities conducive to the execution of not only the various activities anticipated in the spaces but also enhancing the interaction between the various students. The utilization of the architectural space, one that is dynamic, flexible conducive makes for that integration

CHAPTER THREE

3.0 TOWARDS ENHANCEMENT OF STUDENT'S INTERACTION

Interaction can be defined as reciprocal events that require at least two objects and two actions. Interaction occurs when these objects and events mutually influence one another. An instructional interaction is an event that takes place between a learner and the learner's environment. Its purpose is to respond to the learner in a way intended to change his or her behaviour towards and educational goal.(Wagner 1994)

3.1 FLEXIBLE SPACE AS INTEGRATIVE TOOLS IN DESIGN EDUCATION

The proposed learning environment for the students of the environmental science if it must be one that enhances integration between the various disciplines must basically take into consideration the very unique nature of spatial requirements of the disciplines.

To this end, there must be a thorough analysis of the various spaces in which the learning process will take place, this is discussed extensively later in the chapter but the end is to fully understand the peculiar nature of the training structure in the environmental sciences. Consequently, an environment for this educational process should provide architecture with characteristics of the strength of form; inter space relation, movement, size, rhythm, conception of distance and which are further enhanced by light, shade, colour and texture.

Ultimately, the choice of spatial character as it relates to form, scale, texture et al is the main thrust of this thesis work.

3.2 FLEXIBLE SPACES

The concept of flexible spaces, its relevance and its purpose in achieving flexibility in school design is one that has been implied in many situations but the use of flexible spaces as interactive tools in the design educational process is one that is relatively new.

Having examined the training structure of the various disciplines in the environmental sciences, there is no doubt that there are related subjects of study among most if not all of the disciplines. To this end, the adaptation of a built environment, one that places emphasis on the integration of these disciplines is a welcome idea.

The spatial forms and their relationships will be used as a tool for creating an inspiring environment- an environment that is both educative and an aid to the educational process in the school.

Flexible spaces are not a new concept as earlier stated in environmental design, as they have been used in a number of areas – urban planning for cities, parks etc; Home designs and Institutional complexes, office planning to achieve dynamism, flexibility, cost effectiveness .

Flexibility spaces are not totally isolated in any design, they work with other parts of the building to achieve that very unique spatial assemble that defines the aim of such a design. The design of the Harvard Graduate school of Design comes to mind with a unique approach to achieving spatial interaction for the design students of the school, flexible spaces in the form of a Design workshop and students which also double as exhibition spaces.

The designs of a varied number of building types with different functional requirements, from factories, theatres to residential, reflect a move towards the use of flexible spaces to achieve flexibility, liquidity and openness in plan as well as circulation; in the Royal Theatre (Haworth Tompkins) in London, is the use of flexible and folding partitions to achieve multi-functional spaces for a varied number of activities.

The design of the Haus Ziegelberg by Helmut Dippold located in Bavaria, Germany is also a typical example of the use of flexible spaces to achieve flexibility in residential planning, with there is the use of modular flexible and rotating Partitions. The use of a "liquid space" in this design runs through the house, which allows for a flexible organism in design.

In another design in the Hey Gooi,the Netherlands,by Van Berkel and Bos, the approach to the use of flexible spaces, is through a play between folding and overlapping planes of concrete and glass, creating a skewed angular formality that creates a complicated but confusing plan that is flexible and open.

In the Gira production building, in Radevormwald Germany, there is a move to integrate the production area with work and habitation, through an open plan that adopts modular steel frames to achieve a high level of flexibility and at the same time, a blend of the work area and the production units.

The concept of flexible spaces as interactive tools in the design education of the disciplines of environmental sciences must be one seen through the edges of a designer trying to reach out to all professions for that unity in purpose as a scholar put it "it is by working together that mountains are moved"

The environment of learning for would be professionals should be able to enable the student to think and appreciate values such as beauty, balance harmony and freedom, which the carefully application of flexible spaces achieves. According to P. Rudolph,

"We desperately need to relearn the act of disposing of buildings to create different kinds of space, the quiet enclosed, isolated spaces, the hustling space pungent with vitality… the transition space which defines separates and yet joins juxtaposed spaces of contrasting character."

Flexible spaces, no matter their application are predisposed to achieving this many attributes but care must be taken not to think of it as only a means to achieving the obvious i.e. as already stated but to using the very nature of the design educational process to achieving flexible spaces that compliment and aid the process at the same time serves as a tool for interaction and intermingling of the various disciplines in order to strengthen the focus of the environmental science in tackling the problems that are encountered in the environment.

Consequently, flexible spaces will create that environment that accommodates the basic needs of the student that allow him/her a feeling of belonging to the work group or field in the school and on the other hand provide working aid in terms of specialized spaces like workshops, studios, exhibition pavilions, courageous etc with a proper blend of the inter and exterior which can be summed up as aid to inspiration which is the very quality of an environment for education.

3.3 SPACE IN ARCHITECTURE

The appreciation of architecture can be achieved only through the understanding of the basic ingredients in the architectural expression of a building envelope.

The expression is the communication to an observer of quality and meaning of the architecture which may be dependent on style, cultural antecedent or philosophy of design of the architect.

The components of expression which communicates the values of styles are content and form. These are interrelated since the content can only be communicated only through the form.

The function of a building or architecture expressed through the technique of construction based on an idea or philosophy can be said to be made up of basically integral part or qualities that are expressed through the form adopted. They include space and mass, the raw material of architectural form expressed physically, light, a powerful through the use of materials to achieve visual variety and rhythm; colour, the silent but yet obvious form of expression with psychological qualities in the architecture and also scale and proportion which play a role in visual / mental expression of architecture.

These qualities of form would of course be ultimately dependent on the immediate environment in which the architecture will exist. In this regard, it would seen that the creation of a meaningful form rest on the basic formal elements of architecture which are space and mass. The process of organizing these basic raw materials into an ordered form is the composition, while the principal means by which they are given expressive quality are scale, light, texture and colour.

3.4 SPACE

This quality of architectural expression regarded as one of the main raw ingredients of form is generally viewed as immaterial or abstract; that it can have a quality other than emptiness is usually difficult to grasp, but it has being described as the very essence that the architecture enveloped thus creating that which is wholly human and finite environment.

When a building is entered, floors, support, walls and ceiling are seen, thus, space in that sense is that we are accustomed to think of it to be, void, the absence of mass filled by air.

But spatial expressions is that which expresses something that is common to everyone, though they are not always consciously grasped for example, one feels insecure in a low

cave, exhilarated and powerful on a hill top, infinite varieties of sensations can be created by the architect because he controls the limits above, below and on all sides of the observer.

The architect's space is measured on the possibility of the degree of free movement, thus, the physical placement of the structural elements determine the sensation the observer will have in the space.

In architecture, the free organization of space sequences demands mobility, technology has made it possible to remove the heavy walls and supports of the past reducing the sense of compression, walls become membranes to be arranged at will for spatial experiences and some are transparent and so extend one's potential for movement into the limitless out-of-doors.

Spatial experiences are not restricted to the interiors of buildings. The sensation one has in natures open spaces can be recreated through spatial manipulation usually expressed in the building form.

The aesthetics of masses can also help to achieve that spatial experience although limited in applications.

A skilled architect can achieve the ultimate spatial experience by aiming for flexibility in design. The fluidity of space is achieved by making large spaces seem larger and large unfriendly spaces appear small and intimate. With the introduction of free standing screens at just the right spots, he creates the laments of curiosity caused by the space, which flows around such screen. In modern designs, with the employment of standard planning modules, openness in plan is achieved.

3.5 QUALITIES OF SPACE

In design consideration, space as a quality, architectural expression has four qualities namely fluidity, versatility convertibility and expandability.

3.5.1 FLUIDITY OF SPACE

In appreciating space as they affect our senses, this quality is usually paramount in the architect's mind as the continuous and fluid quality of space is such that it aims at giving no feeling of conferment whatsoever.

A plan building of the open plan concept differ from the traditional plan, whereas the open plan concept is free flowing the traditional plan cuts up the main space into boxlike rooms.

The open plan considers elements as parts of a compound volume and provides integration of the space elements while the traditional plan chops up the space into so many isolated cubicles, the pleasant feeling of expressive openness afforded to occupants of these open plan building is an uplifting experience when one feels liberated and energized at the sometime.

Fluidity of space can be achieved through the use of standard planning modules, openness in plan and use of large glass areas.

3.5.2 VERSATILITY OF SPACE

The quality of versatility of space which is viewed by architect and or planner as a product of necessity, are necessary for multiple uses in building learning spaces are becoming more versatile i.e. classrooms must be seen to have multiple uses.

Problems of dearth of infrastructure or purpose made spaces necessitate these considerations as many designs do not leading to unnecessary cost in remodelling or expansion.

3.5.3 CONVERTIBILITY OF SPACE

The convertibility of space means the ability of space to be converted in use. In the case of learning spaces, this is necessary because of continually changing demands of a dynamic system of education, if convertibility of space is planned for from the beginning, it

would save the school complex a tremendous expensive space change. It would have made this result in changes in space expensive if convertibility had not been planned for.

All building types need convertible spaces and can be achieved by the use of wide span structure and demountable partitions.

3.5.4 EXPANSIBILITY OF SPACE

Expandability of space means ability of space change, in most cases to be larger, in educational buildings, changes occur not only within the envelope but also in the form of additions and annexes. Education makes changes continuous and therefore the school complex is never finished. Increased enrolment and sometimes curricula changes demand these additions, whatever the cause, it is inevitable.

Buildings whatever the type should be designed with flexibility in mind so that it grows without too much pain of cost since additions are expensive. Building space must be seen to have quality of space which must be planned for, from the beginning for continuous growth. This can be achieved by the use of modular structure or repetitive units.

3.6 FLEXIBILITY IN ARCHITECTURE

The concept of flexibility in architecture means simply that the design should be adaptable in case of any form of changes, such as future expansion, addition and alteration, which might occur due to change in needs. It can also be viewed as the ability of a design to much more than it was intended for either functionally or otherwise.

In many designs, the architect or creator of the space tries not only to meet standard requirements of the client and/or users but also to communicate his philosophy of design as it affects the user or observer of the space.

There are of course technically ways in which the architect attempts to accomplish this; which could be either through the Open plan approach or the use of adaptable and flexible form.

Open plan principle of flexibility is most times achieved by adopting this approach whereby there is easy and economical partition of functional floor space without causing any destruction to the main structural elements. LeCorbusier, who is one of the fathers of the modern architecture, was the first to evolve the open plan system when he initiated the domino principle.

They are based five cardinal points.

- The use of pilots (a large column) to raise the building off the ground. The created space can be used for other purposes.
- The use of roof top for park and gardens, this is recapturing the lost ground.
- Open plan by the use of widely spaced columns and concrete slaps, this allow the use of large space without interruption and the large space can be partitioned further into smaller functional space.
- Ribbon window that will allow uniform light into rooms or spaces.
- He advocated for free façade, this will allow for opening of the exterior walls at will to satisfy functions and aesthetics, this is possible because the exterior walls are no longer load bearing walls.

The open plan approach can be applied through structural system namely

3.6.1 FLAT AND CURVED MONOLITHIC GRID

This structural system has based on geometric and constructional methods; triangular grid system, diagram system, square structural system, hexagonal grid system, circular system and isostatic system.

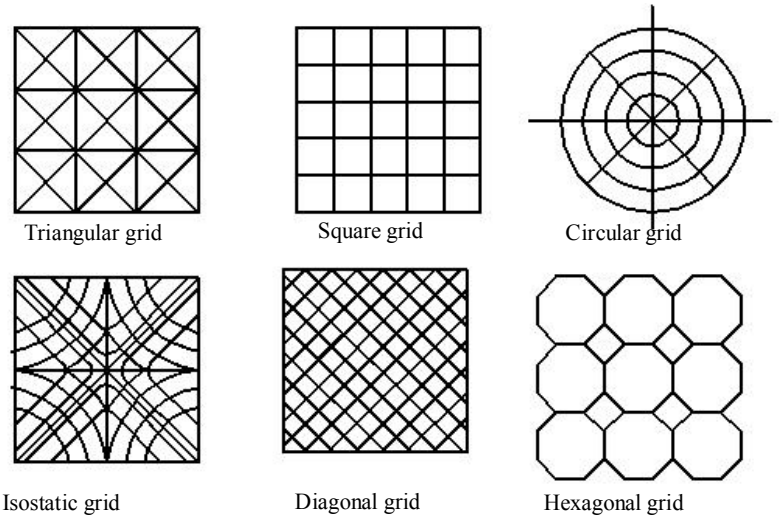


Fig 3.1 ***Structural Systems*** (Source: J.S Gniadzik 1984)

3.6.2 MULTI STOREY FRAMES

It is a system whereby vertical frame structures are positioned parallel to each other and connected by horizontal beam forming a cage structure that allows free movement within the building. It is employed mostly in high rise buildings.

The open plan approach to flexibility can be applied through the constructional technology available either by reinforce concrete in site structure, precast concrete structure (post tensioned and pre-stressed) or by steel sections.

Advantages of open plan system are simple and yet far reaching; there is considerable reduction in structural depth. There is rigidity of the structure, with the connection of beams and columns to ensure that the structure is rigid. While this rigidity may be in terms structural integrity, the difference in materials and pattern which the structure forms brings good interior aesthetics.

The open plan system allows flexibility in the use of functional spaces. That is a functional space can be easily converted to other uses. It also allows possible coverage of large areas without interruption since it is only columns and beams that are used.

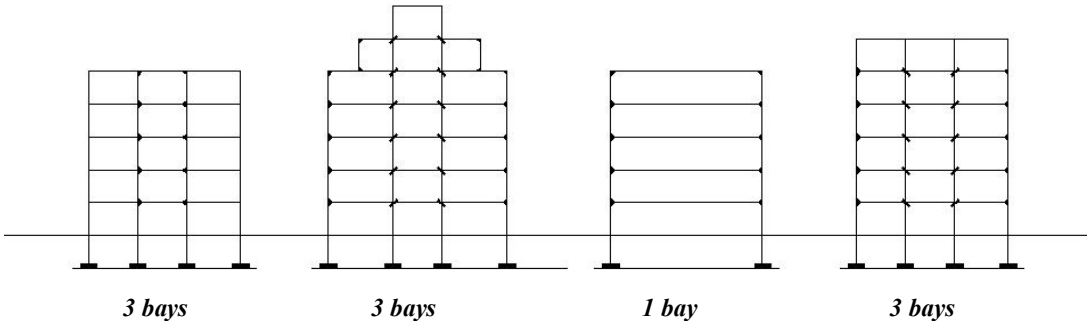


Fig 3.2 ***Multi-storey Frames*** (Source: J.S Gniadzik 1984)

3.6.3 THE USE OF ADAPTABLE AND FLEXIBLE FORMS

Adaptability of a functional space is the possibility of changing the use of that space to other purpose or activities other than what it was originally meant to serve. Its flexible form of design is method of design which allows easy change, the use of functional space to another one without destruction to the main structural components of the building.

Among the patterns used for the design are

- Square grid pattern
- Rectangle grid pattern
- Triangular grid pattern
- Regular polygon grid pattern
- Circular grid pattern
- Free form.

Generally in architectural design, the grid pattern and the free form are commonly used in design. An analysis of the patterns shows that the square grid pattern is the most adequate

form to be used for an adaptable and flexible space. Though other form could be used, but it has to be with modifications, each of the patterns will be examined so as to establish the type that will be most suitable for a particular type of design.

3.6.4 SQUARE GRID PATTERN

The square grid pattern is the moist widely utilized of the grid patterns in architectural design. Changes in circulation is minimal after partitioning, this is because the circulatory system has been taken into consideration right from the planning stage. Also, uniformity in circulatory system is maintained with little changes.

The grid pattern minimizes wastage of partitioning materials it is economical to make use of this pattern in framed structure where cost is an important factor in the design. This pattern allows the use of modular co-ordination since modular grid is based on square grid.

3.6.5 RECTANGLE GRID PATTERN

The rectangle grid patterns are used in architectural design but it has a less advantage to the square type.

3.6.6 TRIANGLE GRID PATTERN

The triangular grid pattern is of the patterns used in architectural design, but is seldom used in public buildings; this is due to the sharp building angles that normally resulted from the angles. When partitions are used in frames structures in these patterns, more sharp angles are created.

This pattern encourages waste of partition materials. Hence, the use of the pattern is uneconomical. Also, it changes the circulatory system considerably when partitioned. A triangular pattern is not used as a modular grid.

3.6.7 REGULAR POLYGON

Aesthetically, the regular polygon pattern is used in the public building for it is used in theatre designed as a fan shape when this is partitioned, it does not affect the pattern of circulation greatly but it could create sharp angles and could be also waste of materials, thereby increasing the cost of the project this type of grid is not used as a modular grid.

3.6.8 CIRCULAR GRID PATTERN

The circular grid pattern is next in architectural use of the square grid pattern; this is predominant in African traditional houses. Partitioning in this pattern creates sharp angles except when there are some modifications by introduction of a smaller central circle. The module unit based on the square could be applied to circular partition.

3.6.9 FREE FORM

The free form pattern of design is commonly used in architectural design, but it is seldom used in public building, this is because it does not allow repetitiveness, which is common to most institutional building. There are lots of difficulties encountered in the partitioning of free form pattern.

It wastes a lot of partitioning materials. This irregular shape must have affected the circulatory system, which has not been very straight because of the free form.

3.8 PARTITIONS.

In open plan approach to flexible spaces, partitions, which are demountable in nature, are used; there are basically internal walls which are used to divide a functional space into rooms or two separate stalls. They are usually non-load-bearing walls.

There are different types of partitioning when classified on the type of materials used; they are the solid thin walls, the demountable and flexible partitions.

Demountable partitions are the types of partitions, which can be dismantled at the point of installation and reassembled in another place. They are assembled as solid, multilayered with dead air space or solid sound proofing cores of mineral wool, fibreboard, or other materials between the layers.

Flexible or folding partitions are fixed at two ends and folded to join two separate spaces. It is also possible to dismantle them for assembly elsewhere.

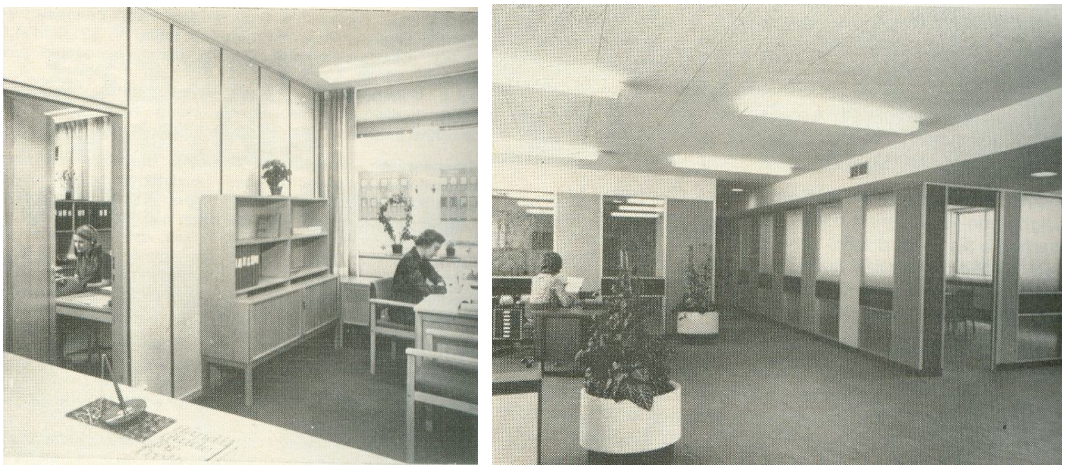


Plate 3.1 ***flexible partition*** (Source: Specification: Building Methods & Products 1980)

3.7.1 DEMOUNTABLE PARTITIONS

The demountable partitions are carried out in two ways the wet and dry construction, in the wet construction which is the least easily demountable system; the materials are not usually recoverable when they are to be moved from one location to the other, so the use of this method is very minimal.

The demountability of dry partition depends basically on individual method of construction and erection. It is established that the greater the number of the sections of which the partition is made up, the less difficult it is to demount and move.

Partitions are such that they must have certain qualities in order to function appropriately and these also have certain factors that determine their quality in function and construction.

A partition must be demountable i.e. easy to dismember the components or parts and re-assemble whatever the case. Most partition will be erected between structural softy and floor or between floor and ceiling (suspended or not).

In construction, in order to achieve certain qualities or meet certain standards, the architect must be aware the acoustic properties of the partitions, as they respond to transmission of sound in the building envelope or around it. Through airborne insulation, vibrations or unwanted sound can be insulated against.

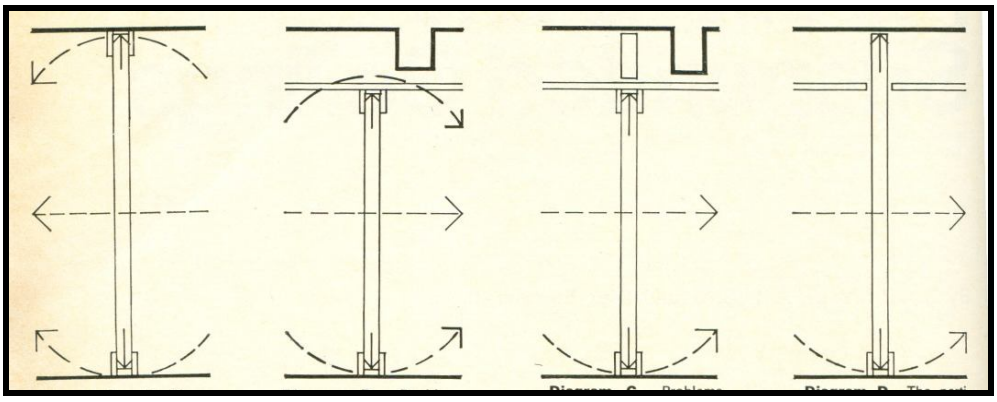


Fig 3.3 ***method of fixing partition*** (Source: Specification: Building Methods & Products 1980)

The mass of particular materials to be used in partitions can also be examined, as non-porous homogeneous partitions are determined almost entirely by their mass. When the

weight of a partition is known, its sound insulation can be presented. This is usually applied in theatres, classrooms etc.

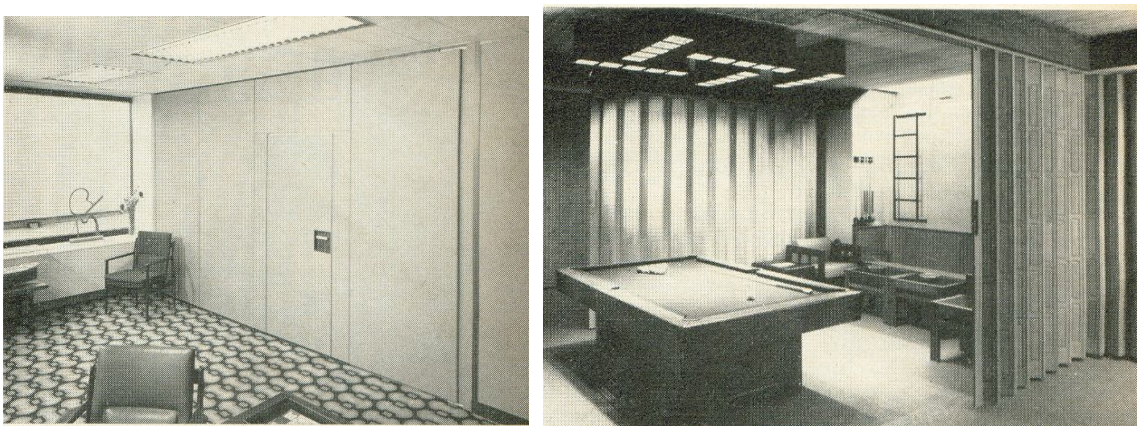


Plate 3.2 ***Demountable partitions*** (Source: Specification: Building Methods & Products 1980)

Another acoustic property which also determine to a degree the choice of partition material is uniformity in that the tendency of direct air path through weak point in the material due to its not being air tight reduces its sound insulation. The issue of impact insulation are also considered i.e if the partitions will experience heavy-impacts due to constant movement or vibrations due to the nature of connection.

In the use of partitions, the provision of services must be considered as the routing and laying of services outlets can be a trickily one especially, in flexible spaces.

Most demountable partitions always have some provisions for servicing, though this may be inadequate where highly service areas is involved. Servicing ducts are often incorporated within the partitions themselves, in which case they can be within plasters, skirting or incorporated, usually by prior arrangement, in and part of the core. They may have skirting, carrying services and if alterations are to be made during the life of the partitions, then ducts are covered and can be removable.

Partitions should be fire resistant, as the ability of the material to resist fire, support their structural loads during fire, curtain the spread of smoke and fire gases and prevent excessive heat flow.

Materials like gypsum plaster, mineral wool membrane, gypsum board membrane are spread on the surface of the partitioning materials to prevent fire from consuming the construction materials and spread to other parts.

Partitions must have good finish, which will satisfy future requirements and will not result in inconsistencies in a new layout. They could be also redecorated after the re-erection.

Partitions where demountable or flexible if to be used efficiently and appropriately then cost must be considered among others to ensure performance specification i.e. the cost of replacement for each reassembling must be looked at, to ensure that it makes economical sense; otherwise other methods must be applied.

3.7.1 FLEXIBLE OR FOLDING PARTITIONS

Flexible partitions are generally folding partitions, which are used to divide functional space such as wall into rooms, when it is folded; the two spaces become a large one. It is also used o divide offices into smaller spaces they are not rigid like the demountable, they are easily movable.



Plate 3.3 ***Demountable & Flexible partitions*** (Source: Specification: Building Methods & Products 1980)

The materials used can be solid, core or fibre. The fibre may have tract at the top and the bottom along where it can fold and slide. They are easily adjusted, removed and relocated in other places.

Their ability to enhance flexibility and adaptability in the utilization of functional spaces, coupled with ease of installation is usually the most important. Also there is economy of materials used, since there will be no wastage because the material used in one location can be used in another.

There is less time spent on installation since they are installed internally where there is no delay in the installation, the cost is reduced as compared to solid wall construction.

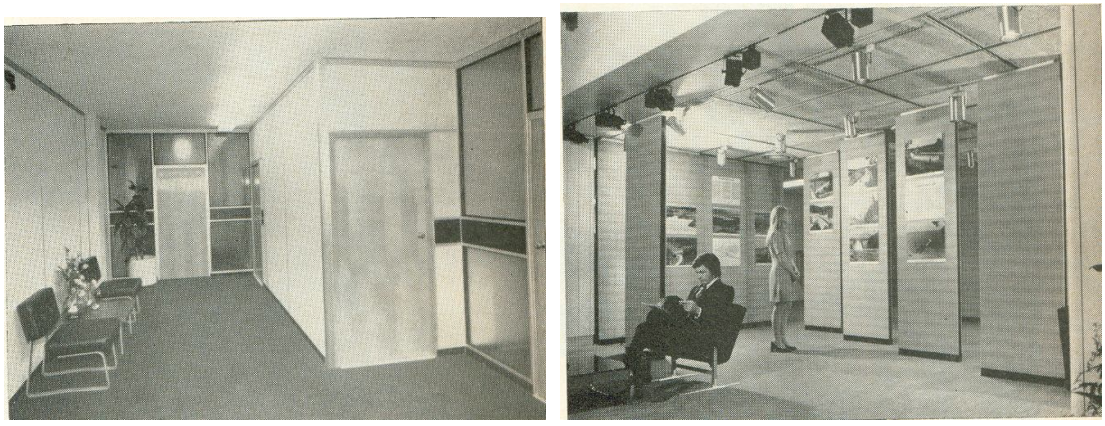


Plate 4.4 ***flexible & foldable partition*** (Source: Specification: Building Methods & Products 1980)

3.8.3 PARTITION MATERIALS

Partition materials are generally of lighter construction in the form of panels, fixed to framework. They are wood wool slab partition, gypsum panels, plywood panel and framed partitions. The wood-wool slab partition can be erected as blocks to form partitions. They are manufactured in large sizes, often consisting of long, tangled, wood fibres, uncomplicated, coated and bounded together with cement of plaster and with a rough open surface which provide a good key for plaster.

Wood-wool slabs have sufficient strength and have very good sound absorption property, they also when plastered on both sides have high fire resistance.

Gypsum panels are made of a core of gypsum plaster encased in a strong paper on both sides. They are in different sizes and thickness, gypsum wallboard panels are designed either to be plastered or decorated directly.

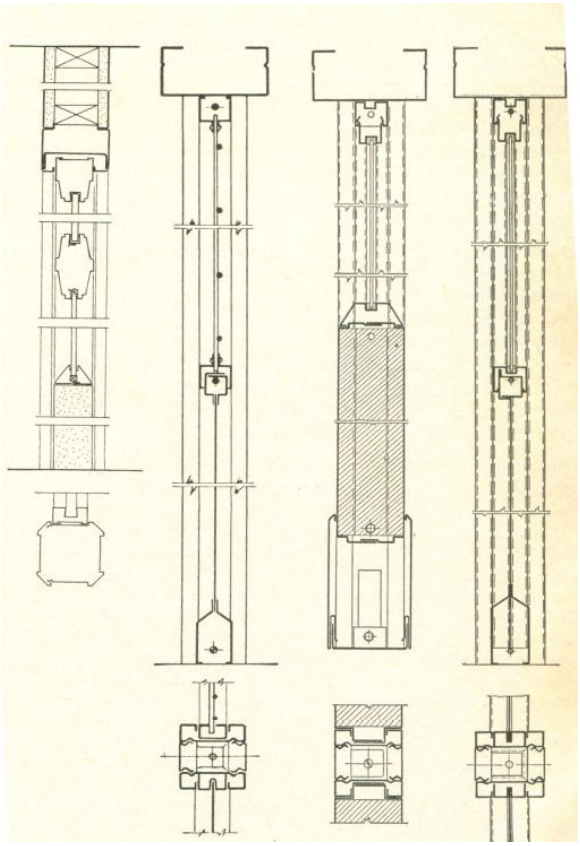


Fig 3.4 ***Types of Partition Materials in Detail*** (Source: Specification: Building Methods & Products 1980)

It has very high fire resistance quality, but moderate insulation quality which can be improved by plastering plywood panels are built up from a number of veneers glued together, with the grain of each at right angles to the next, the greater the thickness due to the number of piles the greater the strength. Plywood is used where decorative partition finish is required, and in order to obtain it, a special veneer may be applied.

Plywood panels have little resistance to fire, but can be improved when impregnated in the solution of mono or di-ammonium phosphate to cause delay in flame spread. It is also has poor sound insulation property which can be solved with the placement of insulating material between panels.

Framed partitions are basically framed construction using panels which can be timber, metal and aluminium sections employed for the frame. They are usually very light design for easy dismounting and re-erection, therefore employed where freedom to re-arrange the internal spaces in building is necessary.

They are less effective as barriers to sound and fire than solid partitions of equal thickness. Coverings for framed partitions could be fibre building board gypsum, plasterboard or plywood. Other partition materials include asbestos cement sheets and non-load bearing clay partition blocks.

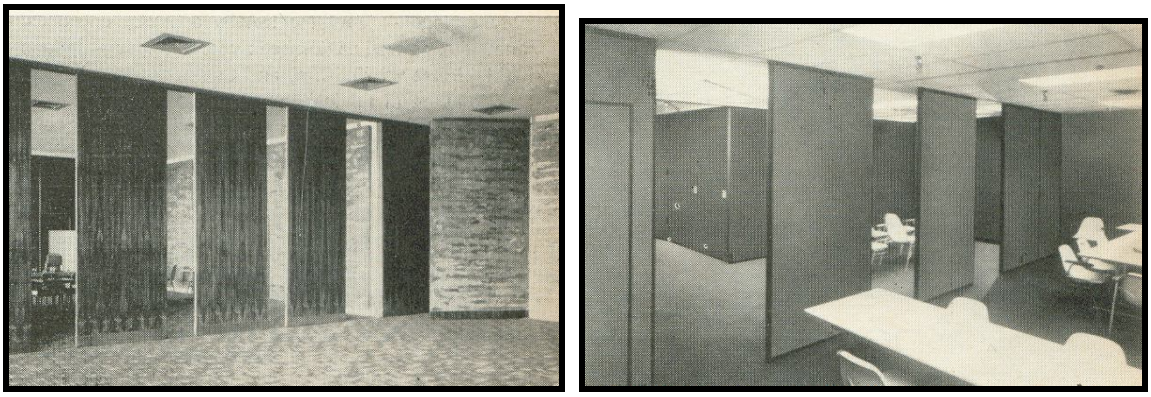


Plate 3.5 ***sliding and demountable partition*** (Source: Specification: Building Methods & Products 1980)

CHAPTER FOUR

KADUNA STATE UNIVERISTY:

4.1 ITS ESTABLISHMENT

Kaduna state university was established by the Kaduna State Government. Its establishment followed the request by the people of Kaduna and its environs.

Kaduna deserved such an institution, being a centre of excellence. Statistics have shown that the amount of students that applies to the Ahmadu Bello University is becoming more than what the university can cater for. Also the awareness of education has increased such that Kaduna state indigenes now want to have a better quality education hence the quest for a state university.

4.2 OBJECTIVES OF ITS ESTABLISHMENT

The objectives of the establishment of the State University are:-

i. To encourage the advancement of learning and to hold out to all persons without distinctions of tribe, creed, sex or political conviction the opportunity of acquiring a higher and liberal education.

ii. To develop and offer academic courses and other facilities for the pursuit of learning in all its branches and to make those facilities available on proper terms to make those facilities available on proper terms to such persons as are equipped to benefit from them.

iii. To relate its activities to the social, cultural and economic, scientific and technological needs of the people of Nigeria and to provide innovative educational programmes of high standard regardless of the nature of the degree being pursued as long as this has importance and relevance for national development.

iv. To encourage and promote scholarship and conduct sound research in all fields of learning and human endeavour, particularly the most relevant to a balanced National Development.

v. To provide education for self reliance.

4.3 SITE LOCATION

The university has two campuses one is located within Kaduna metropolis and the other is located at Kafanchan in Jemm'a local government. This thesis is limited to the kafanchan Campus which has a land of approximately 32 hectares.



Pates.4.1 *view of the access road to the site*



Pates.4.2 a *view of the site*

4.4 ORGANIZATION OF ADMINISTRATIVE AND ACADEMIC UNITS

The administrative and academic units of the university are organized along the same line as other conventional Universities. The organisational chart is as follows.

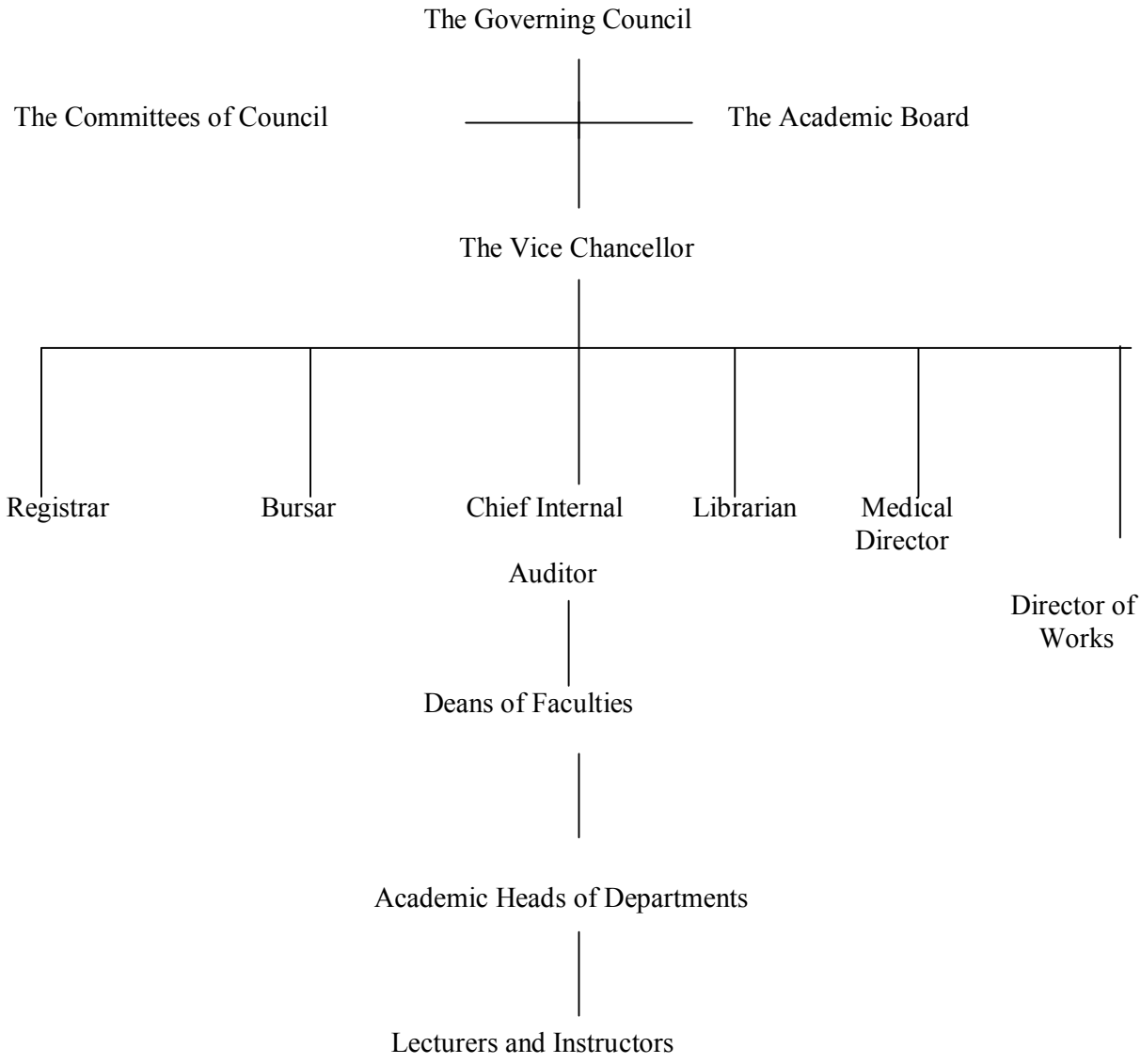


Fig. 4.1: Organisation chart

4.4.1 THE GOVERNING COUNCIL

The University Council, headed by the Chairman of Council is the supreme governing body of the university. The Council is responsible for the non-academic management and general financial policy of the university. It has power to manage all matters not otherwise provided for by law of the university. The Council also makes appointments of some principal officers.

4.4.2 THE SCHOOL BOARDS

Each faculty in the university is governed by a faculty board – faculty boards broadly control the academic programme of the faculties subject to the academic board approval. The boards discuss curriculum, examinations and other academic issues. Statutorily, the Vice Chancellor and the deputy are members of each faculty board and the dean of the faculty is chairman.

4.5 ACCREDITATION REQUIREMENTS

The National University Commission (N.U.C) is responsible for accrediting all programmes in the universities in Nigeria. The accreditation requirements are as follows:

4.5.1 GOALS AND OBJECTIVES

There shall be evidence that all the programmes to be accredited have defined goals and objectives.

4.5.2 CURRICULUM

The curriculum of the programme to be accredited should be adequate to prepare practitioners at an appropriate level in the particular field.

4.5.3 TEACHING STAFF (QUALITY AND NUMBER)

They determine the adequacy of the programme, as instructional goals and objectives are achieved, only to the level of competence and vision of teaching staff.

4.5.4 ADMISSION, RETENTION AND GRADUATION OF STUDENTS

The institution should have policies on the admission, retention, withdrawals, expulsion and graduation of students spelt out in one of its publications.

4.5.5 FINANCIAL REPORT

There should be adequate financial support to the institution and to the department where the programme to be accredited is offered, as a measure of dedication to the goals and objectives of the programme.

4.5.6 PHYSICAL FACILITIES

There shall be adequate physical i.e. classrooms, studios, workshops, and tools, laboratories, instruments, machines for up-dating the physical facilities and for expandable supplies to give students proper learning experiences essential to achieving their own goals and objectives.

4.5.7 Administration of Department

Administrators must perform their leadership role with mutual concern with policies that affect teaching and support staff and students of the Department. The Head of Department must be a professional in that field.

CHAPTER FIVE

5.0 CASE STUDIES

This chapter of the thesis work will focus on the through examination of existing buildings of similar type in order o identify relevant design characteristics in areas of functional requirements, structures, facilities and building materials.

A total appraisal is necessary to compare with the different case studies in order to arrive at certain conclusion on the spatial organization and functional requirements to be used in the design scheme.

The following school complexes as case studies have been selected and they include:-

5.1 FACULTY OF ENVIRONMENTAL DESIGN, AHMADU BELLO UNIVERSITY, ZARIA

Introduction: The faculty of environmental design, Ahmadu Bello University, Zaria which moved from the University of Ibadan in 1956, initially a school of science technology and was by 1978, having 80% of the faculty complex complete.

The faculty complex which is as old as the university itself was built originally to house the department of Architecture and Urban and Regional Planning, while later, the department of Building.

The main faculty complex is divided into 2 main wings but of 3 distinct buildings which house the departments of architecture, U.R.P and Building as well as the faculty administrative unit. The other faculty complex, comprising of a single building unit, accommodates the departments of Fine Arts and Industrial Design.

The main faculty complex was designed by in house staff of the Project Office (Department of Architecture).



Plate 5.1 ***Views of the departments of architecture and building***

5.1.1 Appraisal: The planning of the faculty complex is such that it was not planned to show the interdisciplinary relationship between the various departments. Although, the students of the various departments have course of interaction, the departments of U.R.P and Building, are housed in the same wing while the department of architecture is accommodated by one half of the other wing.

These departments, although they share the same site location due to proximity, there is not a complete presence of interaction.

The departments of the different disciplines have spaces which although not intended for interaction nevertheless achieve such, one of which is the sculpture garden which is the constant source of attraction of students and visitors.

The department of Fine Arts and Industrial Design although separate from the main faculty complex is easily accessible by a well planned pedestrian system. These departments share the same building unit which has studios, exhibition spaces, a lecture theatre, workshops, libraries and offices.

The main faculty complex which has in one half of a wing, the administrative unit of the faculty with the deans office, secretary to the dean, etc, and shares the building unit with 2 floors of studios for the department of Architecture.

The departments of Building and U.R.P also have distinct and separate facilities such as studios, classrooms, exhibition spaces, critique/ seminar room sand offices.



Plate 5.2. ***Views of the departments of Fine arts and U.R.P***

The department of Fine Arts and Industrial Design building is constructed of reinforced concrete, the floor are of peasant concrete rib floor elements. The columns of the main building structure are flared. Towards the ground while it taper towards the upper floors. The roof is of the same precast flooring elements due to the fact that the main painting studio is on the rooftop of the building. The studio does not cover the whole expanse of the floor area in order to enable painting student's good scenery for painting lessons.

The faculty also has 2 distinct lecture theatres, which are used by students of the faculty.

The building structure of both the departments of building and U.R.P is that of a double cantilever frame structure of reinforced concrete. The floor is also of reinforced concrete spanning one way between the cantilever frames. The roof structure is of steel angles roofed with aluminium sheets.

The department of Architecture has similar planning as that of the other wing, although it is one half of a wing. It houses, the library (department), classrooms, offices, exhibition concourse, conference room, workshop and laboratory, computer room, printing room,

project room and the post graduate studios, all on the 3 floors including the rooftop (which houses the post graduate studios).

The other half of the wing, which houses the administrative unit and studios also, has a roof top structure, which is used as a restaurant and a bookshop.

The buildings have similar structural details except for the studios, which are of waffle grid of reinforced concrete and the roof top studios, which are roofed with space frames.

The parking facilities are at different parts of the faculty complex catering for the various departments although not intentionally designed for nevertheless, provides adequate parking for the department staff students and visitors.

5.2.2 FACULTIES

- Departmental Libraries
- Studios (Per Department)
- Seminar/Exhibition Spaces
- Workshops
- Laboratories
- offices
- Project Rooms
- Printing rooms
- 2 Lecture theatres
- Conference rooms etc.



Plates 5.3. ***Views of the theatres and parking spaces***

A. Merits:

1. Presence of Landscape and outdoors sit out areas which encourage interaction between students of the various disciplines.
2. The presence of adequate parking spaces in the faulty complex.
3. The proper site planning which allows the easy circulation of students, staff and visitors.
4. The provision of spaces for other multifunctional activities eg business centers for photocopying, Internet cafe restaurants, bookshops etc.

B. Demerits:

1. The poor state of the building which is in need of renovation and refurbishment.
2. The inadequate studio space and classroom for students due to the ever increasing number of student population.
3. The lack of proper spatial planning in the design of most offices and workstations due to the fact that they were not purpose built for the environmental sciences.
4. The very rigid spatial planning typical of the educational complexes.

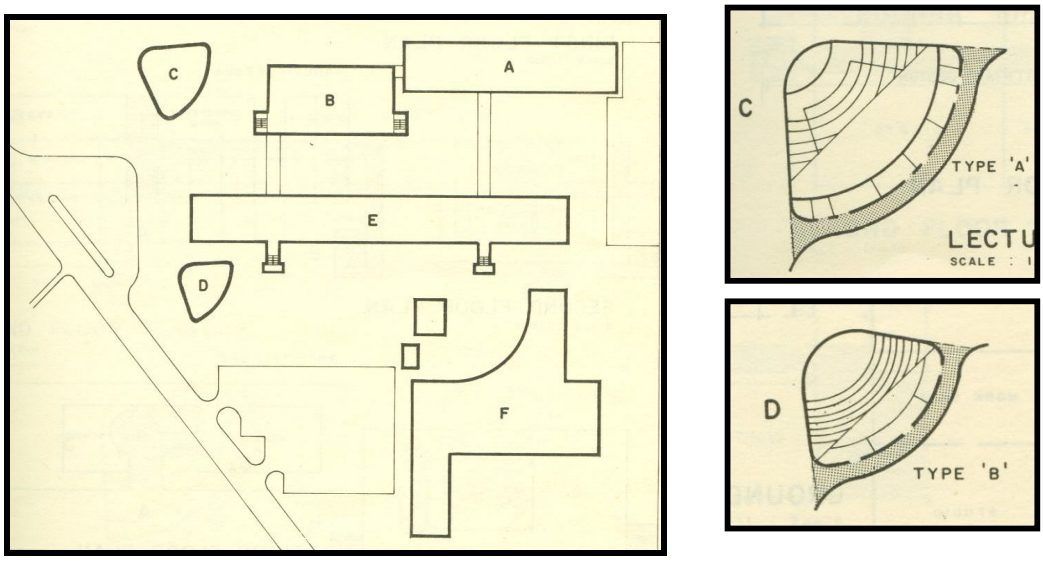


Fig 5.1 ***plans of faculty of environmental design, A.B.U Zaria***

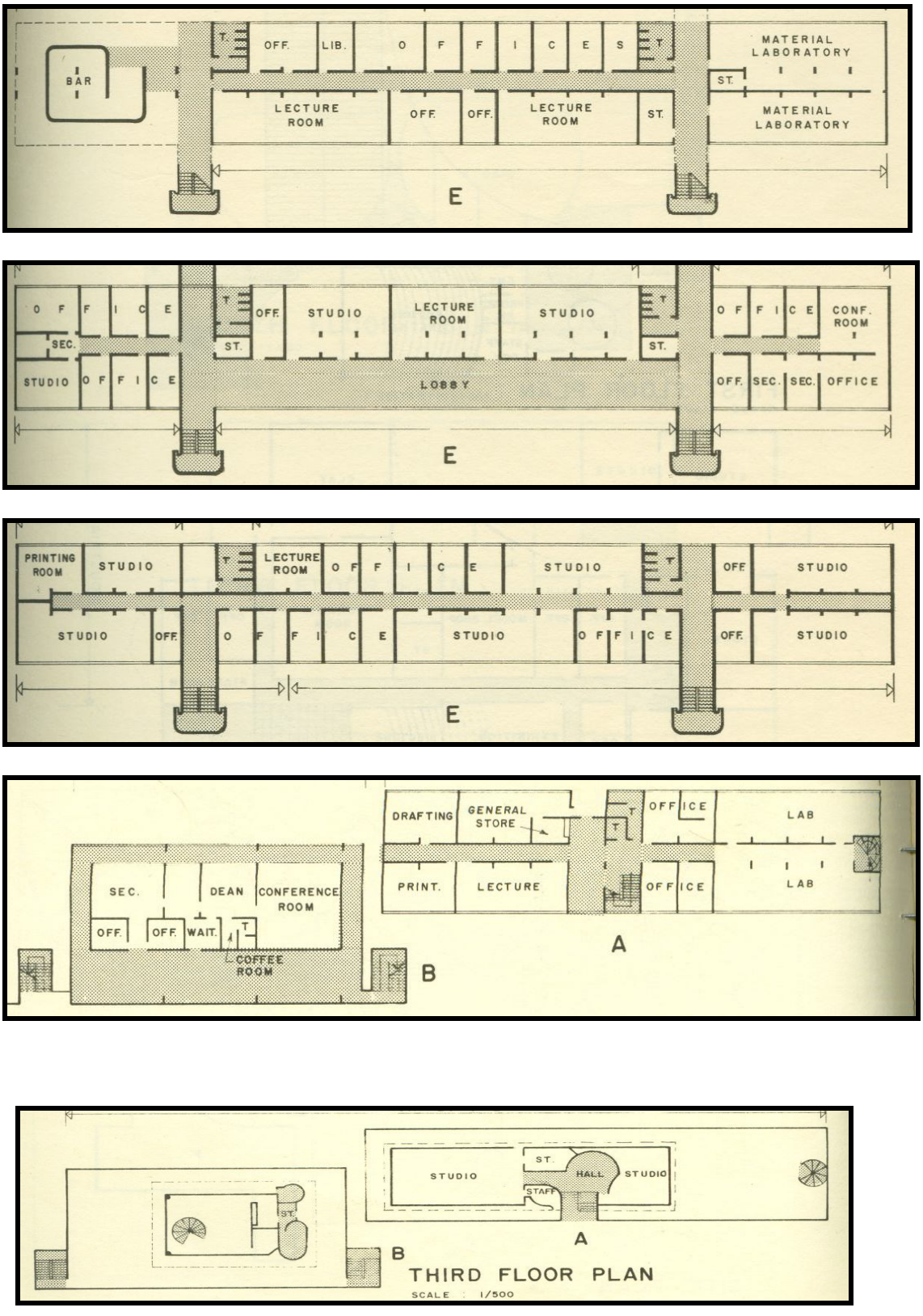
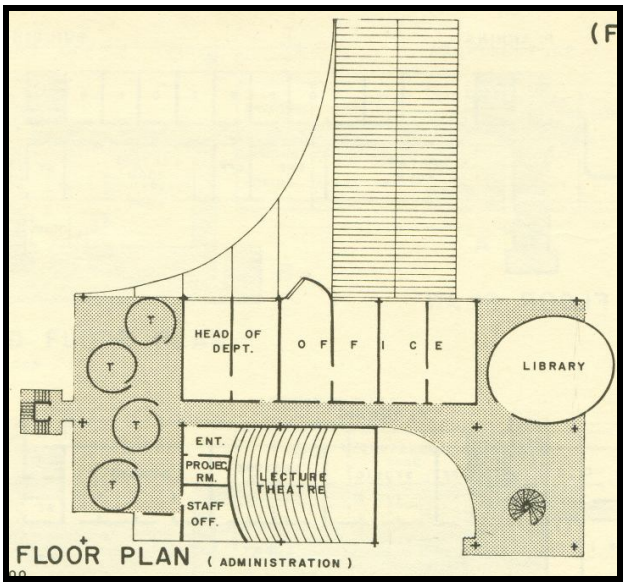
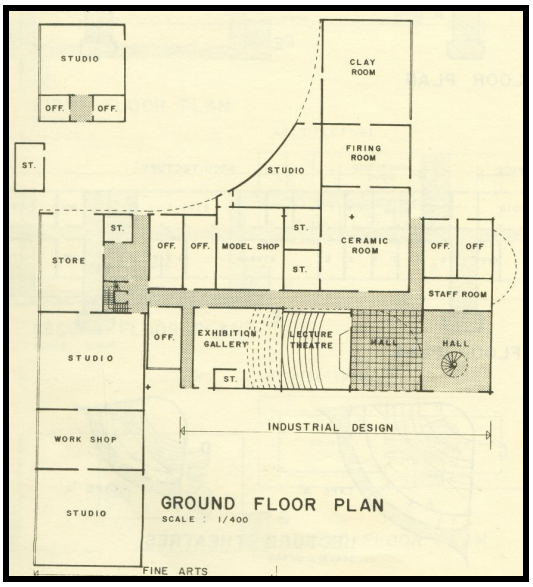
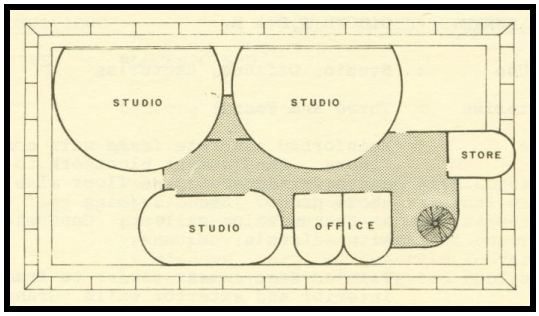


Fig 5.1 ***plans of faculty of environmental design, A.B.U Zaria***







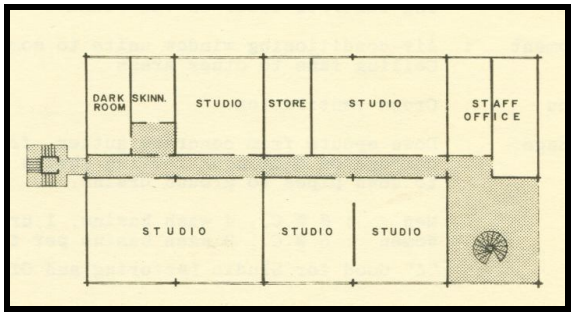


Fig 5.2 ***plans of faculty of environmental design, A.B.U Zaria***

5.2. THE SCHOOL OF ENVIRONMENTAL SCIENCE, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Introduction: The school of environmental science, federal university of technology located in Minna, Niger state was built to houses the department of Architecture, Quantity Survey, Land survey and Estate Management, Building and Urban and Regional Planning.

The building structure which is as old as the university is a single building complex accommodating all the six distinct departments, although there are plans to move to the new site of a much larger complex, the building is still very much in use.

The main school complex has a unique form which allows the peculiar spatial planning and organization which distinguishes if from other complexes in the university.

5.2.1 APPRAISAL

The 2 floor structure with its peculiar shape houses the four different departments with department of Architecture with a larger space allocation. The building facilities include offices, studios, classrooms, workshops, conference room in each department which occupy the various part of the building complex.

The spatial planning of the complex is a single courtyard system with different useable spaces arranged around it. This allows for a proper ventilation and lighting.

The first floor houses the classrooms and offices while, on the ground floor, the studio and more offices, library and other auxiliary facilities are located.

The building structure is constructed of reinforced concrete floor with column support at courtyard and the structure is roofed with simple pitched roof systems of corrugated roofing sheets with parapet for aesthetic value.

The walls are sand crete blocks, finished externally with text coat and internally with paint. The windows are built of aluminium glass frame with wind panes.



Plates 5.4 ***Views of the faculty of environmental science ,F.U.T Minna***

The floors are finished with terrazzo flooring and have interior landscaping in the courtyard area.

5.2.2 FACILITIES

- Studios
- Offices
- Workshops
- Library
- Classrooms
- Conference room
- Project rooms
- Exhibition/critique room



Plates 5.4. ***Views of the theatre and the faculty complex, F.U.T Minna***

A. Merits:

1. The use of courtyard which allow fore good circulation.

2. The spatial arrangement of the spaces around the courtyard complied with unique shape of the complex unit allows for flexibility in design.
3. The use of interior landscape which acts as an interactive tool in which case, the design achieves.
4. The presence of proper lighting and ventilation also as a result of the use of courtyard.

B. Demerits:

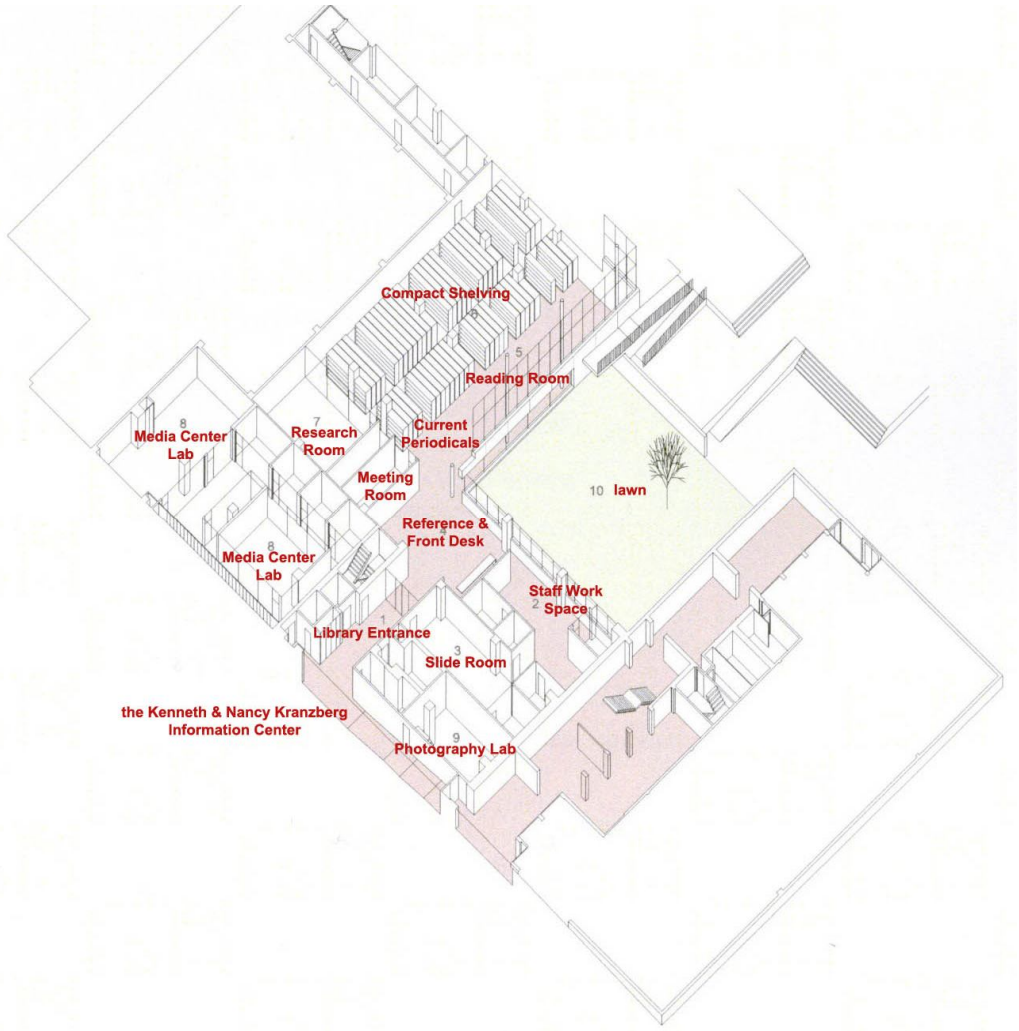
1. The absence of clearly defined parking spaces for staff, student and visitors alike.
2. The lack of tutor expansion in the design consideration due to ever increasing student intake.
3. The absence of clear planned landscape around the building structure although there exist a defined pedestrian circulation.
4. The lack of consideration to the flexible nature of some of the spaces especially in the offices and workshops.

5.3 THE SAM FOX ART CENTRE SCHOOL OF ART AND ARCHITECTURE, WASHINGTON UNIVERSITY, ST LOUIS MISSOURI U. S. A.

The Sam Fox Art Centre (school of Art and Architecture) is located in one of the oldest universities in the USA; Washington University has been hailed as a striking architectural landmark at the gateway of the university.

The building complex was designed to integrate the activities of the various disciplines in Art and Architecture and was a result of years of planning, designing and discussion. The building complex was designed by the Japanese Architect Fumihiko Maki. It houses the school of Art, school of Architecture, department of Art History and Archaeology in Arts and Sciences, Gallery of Art and Architecture Library in five academic units on the Hilltop campus.

The units accommodate the Museum building, which include Gallery spaces, the Steinberg Hall the Givens and Bixby Halls, homes of the Architecture school and Fine Arts school, and the Kenneth and Nancy Kranzberg information centre.



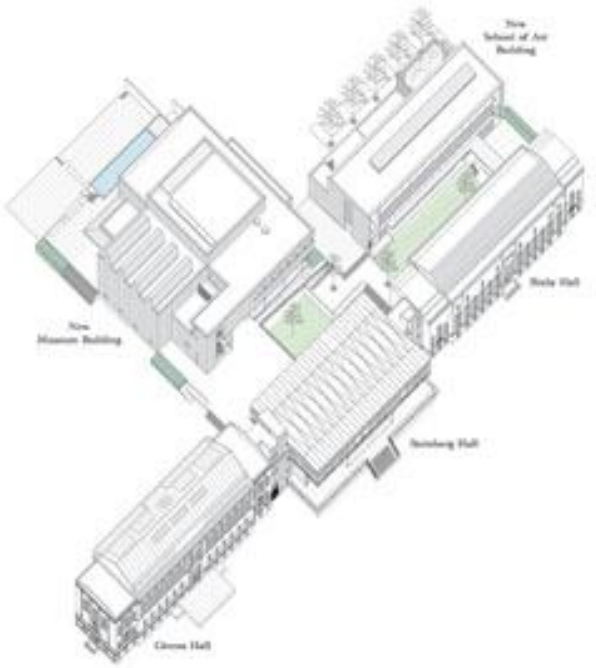


Fig 5.3 ***axonometric views of the sam fox centre***



Fig 5.1 ***view of the sam fox centre***

5.3.1 APPRAISAL

The complex designed with the objectives of creating a sense of shared purpose among students and faculty have the 65,000sq ft museum, library and classroom building and a 38,000 sq ft building for the school of Art. The Steinberg Hall which sits between Givens and Bixby Halls, Homes of the architecture school and the fine arts school, has folded roof, broad parches and generous expanses of glass.

This Steinberg and the museum work as a single unit. The building complex which has characteristics of both traditional and contemporary Japanese architectural and ultimately the international style of the West reveal space unornamented structures of limestone and glass. With interior exhibition spaces, although grand in their proportions, appear in renderings to be warm and hospitable.

The museum building has skylights which form interesting and dynamic exterior roof line, and it and other operators' ultimate exhibition spaces. An elevated plaza channels the museum building to the north porch of Steinberg Hall.

East of this plaza is a lawn. The Kenneth and Nancy Kranzberg information is housed on the lower level of the museum building and has windows which open to the lawn.

The information center houses the Art-architecture library, slides (soon to be digitized) and a computer lab. The Art school building is east of the museum and directly north across a courtyard from the Bixby Hall. It houses graduate students, the Nancy sprites Kranzberg centre for the illustrated book and studio for painting, sculpture and ceramics.

The museum and art school buildings are designed to be on three levels. A sculpture garden is on the north side of the museum building

The school complex design un-like many school of specialized studies like the arts and architecture provides opportunities for interdisciplinary studies by creating an atmosphere for academic interaction and communication by use of carefully designed spaces and the incorporation of landscape open spaces.

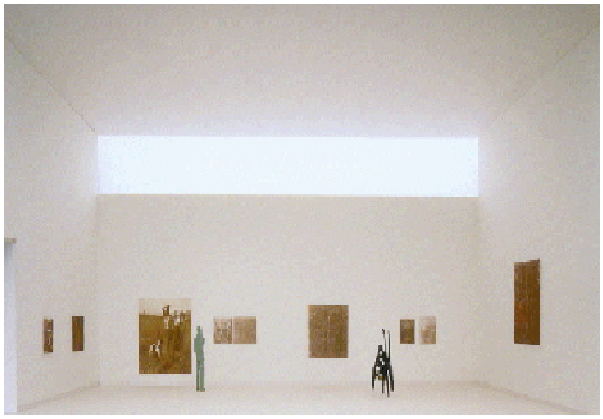


Plate 5.5 ***interior view of the museum, Sam fox centre***

5.3.2 FACILITIES

1) Gallery spaces
2) Studios
3) Workshops
4) Laboratories

5) Auditorium
6) Libraries
7) Museum
8) Classrooms
9) Offices

Roof sculpture Garde

A. Merits:

1. The complex is unified by carefully designed and landscaped open spaces that encourage communications and interaction.
2. A carefully planned complex which produces a synergy of creative energy and innovation.
3. The use of building materials which reflect integration of international style, contemporary traditional Japan architecture to create aesthetics that is warm and hospitable.

B. Demerits:

1. The complex has 3 old buildings which require minor renovations but conflict with the 2 new buildings
2. The location of some of the complex's units in an academic setting dating back to the 1940s.

5.4 HARVARD GRADUATE SCHOOL OF DESIGN, HARVARD UNIVERSITY, CAMBRIDGE, MASSACHUSETTS. U.S.A

The Harvard Graduate School of Design complex is a single unit structure was designed in the 1970s by. The building complex design attempts to create its own expression of graduation, material, symbol and historical context through manipulation of its design scheme, shown in its façade. The slight circulation changes in position of a viewer bring sudden changes in proportions and a glass roof is unfamiliar as an Architectural material. The other exterior surfaces are exposed reinforced concrete and a grey tinted glass. The concrete columns along the front façade are a clear announcement of the entrance, all point to its unique approach to spatial integration.

The complex houses the Gund Hall, the Francis Loeb Library, the Piper auditorium and the studios.





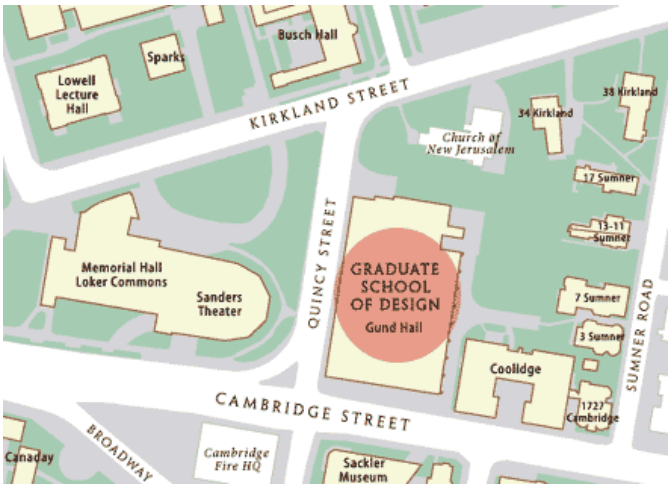


Fig 5.4 ***site plan Graduate school of design, Harvard University***

5.4.1 APPRAISAL

The Loeb library and the auditorium occupy most of the ground floor, with the largest portion of the library in the basement. The building may be expanded if necessary from the point of the stair tower at the end of a shorter office wing.

The Gund Hall contains over 150,000 sq ft of floor space with space for 500 students, about 80 faculty and 50 administration including library and workshop staff.

The studios are located on the first floor and occupy four levels of the building complex, it design allows its configuration to allow maximum inter floor contract both physically and visually on three levels, half of the studio floor space was arranged under the level above to allow students have the choice of working within the large open space or in the more intimate space under the overhanging level above.

The major campus circulation route passes under the building adjacent to an exterior area, which has the potential of being used as an outdoor exhibition area. The

formal main entrance was replaced by several points of entry into a general circulation exhibition area from which access is open to the main elements of the building and the courtyard.

The circulation from studio to studio takes place on an open central space of the stepped roof. Each studio space is immediately adjacent to a range of faculty offices and seminar rooms to provide for spontaneous slide shows and group discussions.

A lounge with an adjacent outdoor terrace on each studio is used as a connecting point between student and faculty areas. Offices and research spaces were designed to expand to the east as required by the program.

The stepped overhead windows of the truss system at the studio space allow direct sunlight and a view to the ground and surrounding environment from the upper studios through windows nearer the same level. Also, there are views from the rear areas of the studio to the courtyards under the studio.

The building is basically of reinforced concrete with flat slab construction, the primary structure of the free spanning roof is a system of tubular steel trusses.

The building complex is directly divided into several defined cones and allows for greater efficiency in planning.

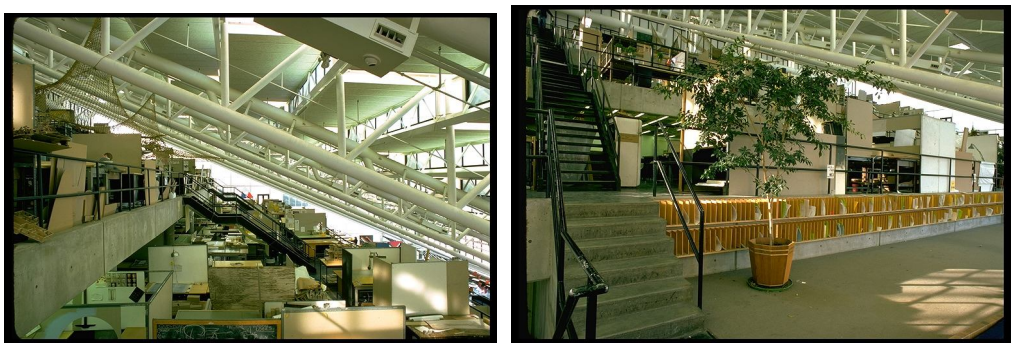


Plate 5.7 ***Views of the studio***

5.4.2 FACILITIES

- Studios
- Exhibition Spaces

- Library
- Bar
- Workshop
- Seminar Rooms
- Lecture Halls
- Audio Visual Rooms
- Auditorium
- Storage
- Lounges
- Terraces

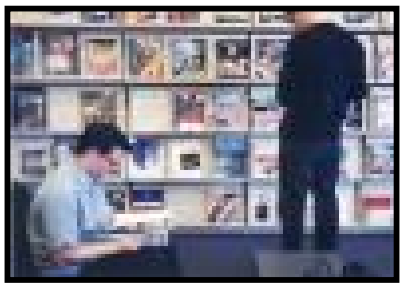




Fig 5 &6 library and exhibition hall

A. Merits:

1. The use of Glass and steel to create an open flexible learning space with interactive qualities.
2. The presence of a unique façade arrangement which highlights a blend of the materials and historical antecedence to achieve an architectural statement.
3. The presence of well planned interior spaces which emphasizes the use of open planning to achieve efficiency and flexibility.

B. Demerits:

1. The rigid spatial planning which defeats the attempt to some degree at achieving efficiency and flexibility.
2. The use of columns in the front façade (entrance) which create high overhangs but little protection from rains or strong winds.

CHAPTER SIX

6.0 STUDY AREA

HISTORICAL DEVELOVEPMENT OF KAFANCHAN

Kafanchan is the headquarter of Jama'a Localn Government Area of Kaduna State. The Local Government comprises of Moroa, Kagor, Kwoi, Gwantu, Funtowan, Nok, Ninzam, Godo and part of Kaje land.

The town is located approximately on latitude 9^0 35^1 North and Longitude East. It is located in the central part of Nigeria and near the new Federal Capital Abuja, and at the southern most part of Kaduna State close to the western boundary of Plateau state. In the local setting, it lies on the great plain that drops gently westward from the Kagoro hill which forms part of the Jos plateau.

As a strategic railway junction, situated 25kms from Kaduna, less than 110kms from Jos, and located, mainly in a completely rural environment, Kafanchan is emerging as a typical urban centre, providing its environs with needed goods and services.

6.1 THE EVOLUTION AND GROWTH OF KAFANCHAN

Some towns in Nigeria took their origin during colonial time. They were created on the basis that they be beneficial not only to the colonial masters themselves but to their metropolis as well. The development of Kafanchan therefore, was one of Europeans priority notable in the in the history of development of the area.

Kafanchan was built in 1972, when the railway line extended northward to Jos and Kaduna from the southern part city of Port Harcourt. Before this time there existed a small dust of settlements of Katab, Kagoro, Funtwan ethnic communities – spread all over the plain. Most of these communities lived in closely knitted clans until the late 19^{th} century when organized leadership took root and settlements coalesced.

The name Kafanchan is a Hausa word meaning "build there". 'Kafa' (build) and 'chan' (there). The town is colonial one and hence, has no pre-colonial history unlike many towns in Nigeria such as Katsina, Zaria, Ibadan and Kano.

The construction of the railway line brought a large labour force with diverse ethnicity but mostly from eastern and northern part of the country that came to seek for employment and a few coming mainly to trade. The arrival of these immigrants also meant that the colonial administrators were faced with the problem of providing basic services and amenities to satisfy the demands of the people. This was so since it had made it a priority to develop the metropolis which would be of great benefit to them. Resident quarters were therefore built in 1929 for the first immigrant's workers to settle.

A hospital was constructed in the early 1930s to cater for the general welfare of the people. Shops were opened and a market for sale of manufactured goods and local foods items produced by the surrounding rural communities.

By 1939, a new market was established and located more centrally in the town. It was much bigger than the old one along Dan Haya street, and occupying a larger space. The need to relocate this market was to meet the demand of the increasing population.

This market is still the centre of business activities in Kafanchan today. The relocation of the market provided the first index of growth in Kafancchan.

The coming of the missionaries to the town provided another impetus to its growth and development early missionaries had a policy of religions indoctrination by way of educating the people. Church and elementary schools were therefore built along side each other. This is common to almost every town with early missionary influence in Nigeria, to educate converts only. In the years between 1935 – 40, six Christian denomination had established Churches and schools in Kafanchan, most of them concentrated along Hospital road, and were easily accessible to the European and African government reservation area.

The establishment of Christian institution on virgin land means that more land opened for development, for where theses institutions existed, Christian families came to settle close to them so as to be within easy reach of their churches and also the need to move away from the predominantly Muslim areas. This horizontal expansion mainly to the North-west serves to increase the size of the town. The increase in the size of the town, provided another increase of growth. The establishment of Churches and schools increased employment opportunities and thereby encouraged the influx of people to the town mostly form the South – coming as teachers, priests etc. these development helped to increase commercial activities because of the increase in purchasing power of the people.

In another development, there was the amalgamation of the Kaje and Kagoro tribes to from the Jama'a federation with the headquarter in Kafanchan, thus assuming the role of a small regional capital.

In 1939, a planned migration was made in Nigeria due to constant unrest of Ibos in the East because of population pressure on land. The remedy therefore was to device a means for a planned migration to areas where land is more plentiful. Voluntary migration was therefore encouraged to the Northern provinces subject to the native Authority concerned. As a result of this, the population of kafanchan increase from 2,214 in 1936 to about 3,205 in 1943. (Tanko, 1981).

After the Second World War in 1945, aspects of development in Kafanchan by the colonial admmininst4ration and missionaries were for the improvement of drainage and water supply, construction of roads and bridges. A plan for electricity was also made.

Rising commercial activities, the provision of social services and amenities, gave rise to the origin of sub-urban villages of Adwan (I) and Garaje all located along kagoro road. Their origin has been as a result of surrounding rural communities moving away from the hinter land to settle near the town and also qalong kagoro road where there was early

access to social amenities, easy transportation and marketing services. The provision of social amenities had been a general colonial government policy. Therefore, such services were mandated to every colonial town.

Lugard in Urguhart 1977, p.27 had this to say that "it is well worth the while of the government to encourage clubs at every centre by providing round and financial support for their"… inception. They should become self supporting under the management of a local committee. Polo, Tennis, Cricket, and even football have their volunteers.

He went on to point out that:-

"A club room, with a library, newspaper and a billiards table would add much to the amenities of life and promotion of healthy intercourse between officials and non-officials.

Most of these social amenities sere provided for in Kafanchan, e.g. the railway club, tennis court, football stadium, etc. all located at close proximity to the European and government reservation areas (G.R.A). the amenities listed above are a reflection of the social class of people eligible to participate in them. This went in line with the colonial government policy of segregation and separation of residential areas to reflect socio – economic status. This brought about the different location of land-use for residential purposes.

In 1963, the population of Kafanchan has reached 10,643, an increase of over 35% in less than 10 years. The 1966 crises led to mass exodus of Ibos and other southerners who when added together had consisted 43% of the total urban population. This posed serious consequences on the socio-economic growth of the town. Most of the southerners, who had come to kafanchan, were mostly traders, government employed and skilled craftsmen. Therefore their absence meant a declined in the population of the town and the consequent decline in its rate of physical development.

It is important to note that the physical growth of any town is determined by the socio-economic development of the area.

However, population did not decline in such a way ass to pose serious thereat to the survival of the town because by 1966, missionaries had trained the local people to become teachers, clerks, etc. these groups of people quickly filled in vacant spaces in jobs left behind by the Ibos and Yorubas mostly.

The creation of 12 states in 1967 added much to the growth and development of Kafanchan. State government established their own administrative machineries with branches in all district headquarters. Kafanchan was one of these headquarters. A catering rest house was built in 1971 to cater for visitors and the town provided with pipe borne water. This improved the welfare of the people.

The establishment of financial houses helped to promote commercial activities. Bank of the North Nigeria Limited was established to provide banking services in the form of loans, credits, etc. much insurance houses were also built for example,: the life and fire insurance, lead way insurance, brokers limited, to provide services in all aspects of insurance.

The tarring of the Kagoro – Kwoi road which dissected the town into two made kafanchan easily accessible for its surrounding rural areas. Movement of goods between the town and its environs become faster. With the improvement of this road, the town took the role of being a regional supplying goods and services and educational facilities to its surrounding areas.

A electricity power station was built in 1974 to provide electricity for domestic and industrial uses. By 1977, the population of Kafanchan stood at an estimated 14,180. with such rapid growth in population and development, physical development especially as it relates to housing could not keep pace with demand.

The return of the southerners to the town after 1970 increased both population and commercial activities many small scale industries had also sprang up to meet the demand for jobs, for instance, industries like plumbing, brick industries, furniture making, etc. had been established. In the area of housing demand, the state and local government built low cost houses. Although more effort had to be made because of the fast growing population

6.2 POPULATION TREND

The 1965 national population census estimated the population of Kafanchan and its environs to be 17,707 persons and that of Jema'a local Government as a whole to be 220,300 persons.

Based on this result, Kaduna state water Board, Hydrometeology, estimated the population of Kafanchan for 1980 to be 26,945 persons with an annual increase of 2.5 percent. On the other hand, the local governments estimated the population of Kafanchan and its environs to be 20,630 persons. Note that the population of V town alone was estimated at 10643 persons (Habila, 1981) in 1980 the local government estimated the population to be 45030 with an annual increase of about 5 percent. This is however accepted generally for urban areas in Nigeria.

Therefore, taking an average growth of 3.75 percent for the period 1963 – 1980, the result of the survey indicate a population of 35988 persons for 1980

Based on the 1963 population census, the estimated population of Jema'a local government for 1980 was 335,210 with a annual increase of 2.5 percent. This figure were regarded as incorrect as the local government had to make its estimate. The average of the two could also be calculated to make projections for future.

6.3 LEVEL OF EDUCATION

About 71 percent of the population in Kafanchan belong to the medium and low income group. This is because of the generally low level of education of the population which directly affects the type of job they are engaged in.

A sample survey of 150 people revealed that 22.0 percent had no formal education; 24 percent had only ordinary primary school education, 24.6 percent had ordinary level (O.L) certificate and teachers grade II. Only 19.4 percent had tertiary education. (Habila, 1981)

6.4 ENVIROMENTAL CONDITIONS

6.4.1 TOPOGRAPHY

Kafanchan is at the adage of Jos Plateau which joins the Kagoro hill. It is fairly flat with an average slope of 4%. The immediate surroundings are marshy and with many small rivers and hills.

6.4.2 GEOLOGY/SOIL

The geology of Kafanchan is of the basement complex consisting of pre-Cambrian igneous rock. The resultant weathering of which gives rise to lit hoses on ferruginous crust having characteristics gum-like texture when wet and becoming hard-pan dry.

The top soil is sandy-loam and fertile on some firm rock strata not too deep from the surfaces. The ground level water is about 8 – 12 metres deep judging from the wells in the area.

6.4.3 VEGETATION

Kafanchan township is on the savannah grass region with tall grasses from 1.5 – 2.5 metres and scattered trees. However, the river banks are fairly forested with most of the trees being locust beans trees, mangoes and teak trees. The top soil is sandy loam and fertile. The ground water level is about 8 – 12m deep.

6.4.4 CLIMATE

I **Rainfall**

Kafanchan is in the moderate humid belt of Nigeria. It has a total monthly rainfall of 345 millimetres in August. The maximum monthly rainfall is 63 millimetres in August.

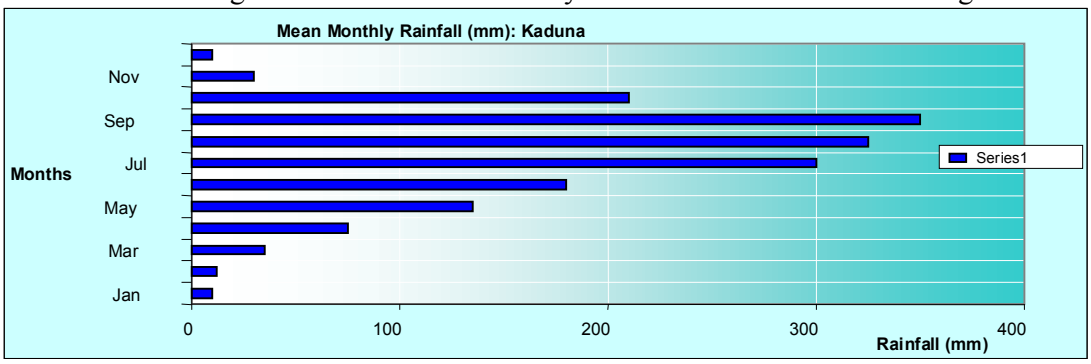


Fig 6.4.1: Mean Monthly Rainfall (mm)
Source: http//: www.kadunaclimate.com

II **Temperature**

The area has a maximum of temperature of 37oc in the months of February to April while the minimum was recorded as 12^{o}C in December. The tropical comfort zone latitude 231/2 0c to 231/2 0N

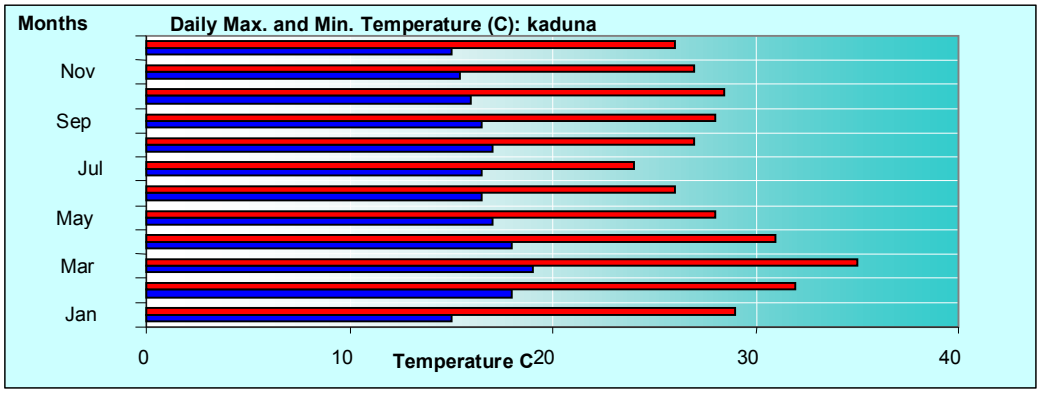


Fig: 6.4.2 Daily Maximum and Minimum Temperature (degree Celsius)

III **Relative Humidity**

The maximum relative humidity in Kafanchan is 100% in the moths of August and September. The minimum is 5% in December during Hamattan. The Normal tropical comfort zone for relative humidity is 30% to 70.

IV **Wind**

The North-east wind during the month of November, December, January, February and March bring hamattan while the South-west wind from April to September bring rainfall. The North –East wind is stronger with an average of 51.5km/day while the south-west wind is slower with about 24km/day.

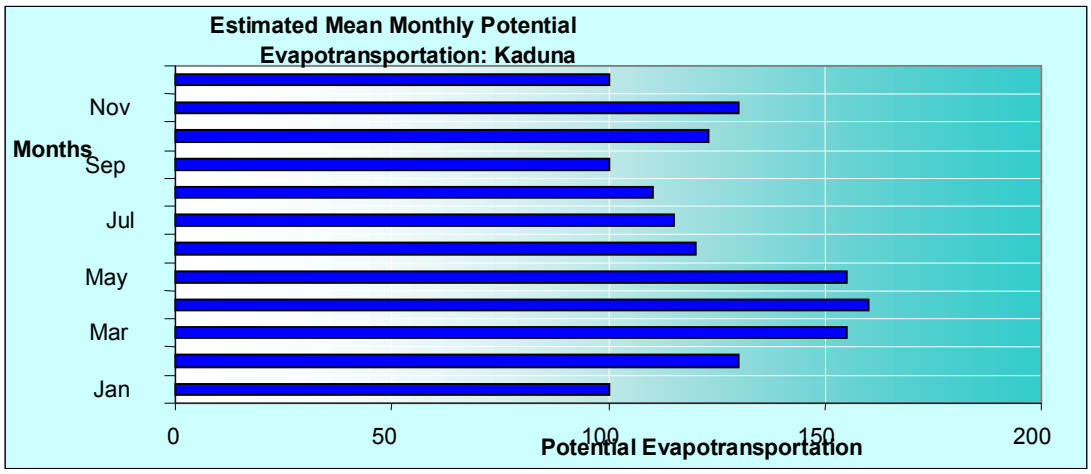


Fig 6.4.4: Estimated Mean Monthly Potential Evaporation transportation
Source: http//: www.kadunaclimate.com

V **Evaporation**

The Maximu8m evaporation is about 306.3 millimetres in the month of March while the minimum was recorded as 128 millimetres in August.

3.5 land-use pattern

The economic, social cultural and political forces are the prime factors that have led to the growth and evolution of Kafanchan as an urban centre. This growth has had to the emergence of efficient role of the town. This spatial ordering of functions has evolved the different land-use pattern seen today.

Land-use gives preface of existing development and their relationships. The are industrial, residential, commercial, recreation. Agricultural and others. There are about seven land-use zone in Kafanchan located at different places.

3.6 services

Kafanchan being a sub-urban centre has got almost all necessary services. Pipe borne water is provided from Kagoro mountain water works. As at 1982, the water works pumped about 1.3 million liters per day. (Source: Kaduna state water Board, 1982) this quantity could be be greater now. The water can easily be tapped to every part of the area Electricity is provided by National Electric Power Authority (N.E.P.A) from Kura falls about 25 kilometers away from the town along Kafanchan – Jos road.

There are telephones and a post office provided by post and telecommunication (P. &T.). one can phone to any part of the country from Kafanchan.

There are two Banks and many insurance houses. There is a big market which serves the entire region, a motor part, catering rest House and few standard hotels. There is also a stadium film house for entertainment. There are also few small scale industries while big ones are under-way. Kafanchan has the biggest railway junction second to Kaduna in the Northern part of Nigeria.

CHAPTER SEVEN

7.0 BRIEF PROPOSAL

7.1 INTRODUCTION

The faculty of Environmental Science complex will be aimed at housing 4 interrelated disciplines of Environmental Science. These are Architecture, Building, Urban and Regional Planning and Estate Management.

The faculty complex which will consist of units for the various disciplines in the Environmental Science which will cater for the needs for the students with the theme of flexibility of spaces in mind, the design will consider the uniqueness of the environmental sciences, and will include studio spaces, libraries, laboratories, workshops, drawing offices, seminar rooms, lecture theatres, computer rooms and exhibition lounges.

Accommodation for the staff of the school is to be made up of lecturer space, offices and lounges. Ancillary accommodation such as library, audio-visual room, computer room and parking are also to be provided with special consideration to services, so as to make the school complex as self contained as possible and be able to keep up with the ever changing trends in environmental development.

7.2 POPULATION OF THE SCHOOL

The population of the school of Environmental Science will be basically made up of staff and students. The number and ratio of one another should show the consideration of student growth and be according the N.U.C stipulated standards.

There are four distinct disciplines in the faculty (school) and thus will have standard enrolment depending on the nature of course.

COURSE	DURATION		STUDENT TOTAL
ARCHITECTURE	6	28	139
BUILDING	5	28	139
ESTATE MANAGEMENT	5	28	141
URBAN + REGIONAL PLANNING	5	28	139

The total students' population of the faculty will be 553 students; however the figure may change according to the various changes in Educational curriculum, societal needs and economic and political conditions.

According to the Nigerian universities commission, the average staff/student ratio is 1:10, while the educational board of the Nigeria Institute of Architect stipulates an average staff/student ratio of 1:20, in trying to arrive at a balance figure to satisfy the educational requirements and standards of the school, the average of 1:15 will be adopted.

Thus, the staff population of this faculty (school) according to this standard would be as follows

DEPARTMENT	STAFF/STUDENT RATIO	STUDENT POPULATION	NO OF STAFF
ARCHITECTURE	1:15	139	9
BUILDING	1:15	139	9
ESTATE MANAGEMENT	1:15	141	10
URBAN + REGIONAL PLANNING	1:15	139	9

The administrative staff of the school would include basically members of the Dean Office, Head of Department's, Staff, Technical staff and Auxiliary staff. This would number about.

7.3 COMPONENTS OF THE SCHOOL

The basic components of the school as indicated by the brief are as follows:

i. STUDIOS:

This would be basically the focal point of any school of Environmental Science as it deals with housing the activity of design. This design will be aimed at achieving one which will encourage students to come and work thus polishes their creative talents. Because of its peculiar nature, the students which require large spaces will be designed to flexible; with the concept of opening planning as the basis of their design.

Attention will give storage of work, display of drawings and work, exhibition space for impromptu critique of work and presentations.

Lighting and layout of the area are very important criteria and adequate consideration of these factors will be noted to achieve an architecture that enhances the creative process of the students.

ii. SEMINAR AND CONFERENCE ROOMS:

The seminar and conference room is the basic element for group discussions on which the educational programme revolves. These rooms which, will hold groups ranging from 15 to 30 students will to be used for seminars and staff meeting of the department, the architecture would be one which is created to be relaxing with consideration for flexibility of space. The room could also be employed for critique and lectures.

iii. LABORATORIES:

The laboratories of the school although not entirely common to all the various disciplines of the faculty, but still the research into proving solutions for the problems initiated during discussions are to take place here.

The laboratories design must therefore conform to basic standards satisfying layout needs, service, structure and environmental conditions. It must also allow for an atmosphere for creative thinking and research in its architecture.

iv. WORKSHOPS:

The school workshops are where the student's carryout practical work on various designs solutions and research results. The workshops to be provided are carpentry, metalwork, concrete technology, plastering, modelling, interior decoration and plumbing.

The basic nature of the workshop which is large spaces will be designed to be flexible learning spaces to create an atmosphere of creative reasoning in achieving practical design solutions.

v. LIBRARY:

The libraries will be designed to house all book, journals and papers relevant to each department. It is to act as the knowledge resource centre of each department where students will carry out their educational development. The libraries will also have photocopying area and other auxiliary facilities.

vi. COMPUTER ROOM:

In the era of computer aided design, it is only reasonable to provide proper accommodation for computers, which the student will need, to carry out design interpretation in design drawings as well as in research and development

vii. STUDENT'S OFFICE:

The new trend in educational philosophy makes this facility a very important part of it the complex. Students, in this facility are able to operate it like main administrative centre providing services that are relevant for the studies.

iii. STAFF AND STUDENT LOUNGES:

Lounges for students and staff are, to provided at a central parts of the school complex. These lounges are the main relaxation centres and to be located near busy design and work centres. The staff lounges are where the staff of the faculty can gather for informal meetings, relaxation and also where the tutors of the school have their work stations.

ix. ADMINISTRATIVE UNIT:

For the proper co-ordination of any institution, an efficient and well organized administrative unit must be provided. In the faculty, this could be made up of the dean's office, the assistant dean, secretary and general administrative staff. It should one with other auxiliary facilities e.g. conference room, lounge, storage etc.

x. OFFICES:

The particular nature of the disciplines of the Environmental Science is such to employ professional who are also lecturer, this will inevitably result in lecturer spaces which are peculiar offices for the environmental sciences. Also the general office work space will be provided to reflect flexibility in office design one which shows an open and creative atmosphere creating the proper interaction between student and lecturer.

xi. DESIGN OFFICE:

The design office is to be utilized to bridge the gap between the theory of design and the actual practice as an environmental designer. It is geared towards providing the students with an environment which orients them towards the proper practice of their disciplines. The design office will also provide consultancy service to government, and private interest alike and will posses a studio space, conference room and storage space.

xii. LECTURE THEATRE:

The lecture theatre will be designed as such to accommodate a maximum of 250 Students. This is of cause to be used where large gathering of students are to be accommodated. The lecture theatre will also house other facilities which would allow its convertibility of its space when the need arises.

xiii. COURTYARDS AND TERRACE:

These are to provide as relaxation spaces and areas. The courtyards will act as visual enhances which relieves the building form and stem boredom by the users of the building complex-from within and around it.

The terraces when provided will be used in relaxing and appreciating the surrounding environment.

xiv. RESTAURANT:

Design can be tedious and energy consuming. The provision of a restaurant to provide food to refresh the body will be achieved and will be located within the complex at a suitable location.

xv. PARKING:

Parking for staff and visitors is to be provided it is assumed that students will also own cars thus consideration will be made for such. The parking spaces would be according to stipulated standards and with adequate landscape to at as canopies.

7.4 SCHEDULE OF ACCOMMODATION

SPACE	**NO. OF UNITS**	**UNIT AREA**	**TOTAL AREA**
OFFICES			
Head of Department	5	8m x 6m	240m^2
Departmental Secretary	5	4m x 6m	120m^2
Department General office/ store	5	9m x 6m	270m^2
Departmental Toilets	5	3m x 6m	90m^2
DEPARTMENTAL STAFF OFFICES			
Professors	10	7m x 6m	420m^2
Lecturers	20	6m x 6m	702m^2
Consultants	10	6m x 6m	360m^2
Asst Lecturers	10	6m x 6m	360m^2

Conference Rooms

FACULTY OFFICES

Deans office	1	8m x 6m	48m^2
Asst. Dean Office	1	6m x 6m	36m^2
Secretaries	2	4m x 6m	96m^2
General office/ store/ Photocopy	2	9m x 6m	108m^2
Toilets	2	3m x 6m	36m^2
Boardrooms	5	12m x 6m	360m^2
Concourse	1	30m x 30m	990m^2
Exhibition pavilions	4	33m x 10m	1320m^2
Seminar Rooms	6	9m x 6m	324m^2

AUXILLARY FACILITIES

Cartography	1	5m x 6m	30m^2
Photography laboratory/ Workshop	2	5m x 6m	60m^2
Audio Visual Unit	1	12m x 6m	72m^2
Building Material Laboratory	1	18m x 6m	216m^2
Technicians office	4	5m x 6m	120m^2
Asst Technicians office	4	5m x 6m	120m^2
Project office	1	12m x 6m	72m^2
Drawing Room	1	12m x 6m	72m^2
Printing Room / Store	1	5m x 6m	36m^2

STUDIOS

2^{ND} Year + 3^{RD} Year Studio	1	27m x 30m	$810m^2$
4^{th} Year + 5^{th} Year studio	1	27m x 30m	$810m^2$
Postgraduate Studio	1	27m x 33m	$891m^2$

DEPARTMENT WORK ROOMS/ CLASSROOMS.

Basic design + Graphic Comm.	1	9m x 6m	$54m^2$
Urban Design	1	12m x 6m	$72m^2$
Architectural Design	1	24m x 12m	$288m^2$
Modelling	1	24m x 12m	$288m^2$
Building Services	1	24m x 12m	$288m^2$
Building Construction	1	24m x 12m	$288m^2$
Building Drawing	1	18m x 12m	$216m^2$

OTHER SPACES

Student office (student lounge)	1	30m x 33m	$990m^2$
Restaurant	1	24m x 15m	$360m^2$
Kitchenettes	6	3m x 6m	$96m^2$

LECTURE THEATRES

Store	4	5m x 6m	$120m^2$
Changing Rooms	4	5m x 6m	$120m^2$
Parking	100	3m x 6m	$180m^2$
Outdoor area (green)			

CHAPTER EIGHT

8.0 DESIGN ANALYSIS

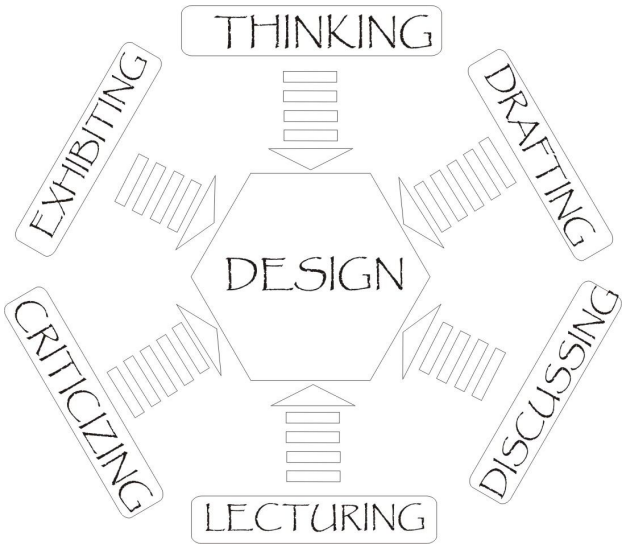
The design process would not be altogether without a proper analysis of the various design considerations and factors in relation to the design goals and objectives of the proposed scheme.

An analysis of these factors gives one a clear idea on how to go about synthesizing these factors with the goal and objectives of the design scheme. These factors are activities, functions, structure, environmental requirements, siting, lighting, landscaping and materials. A brief analysis would show the basic requirements to be met and how this would be synthesized into the design scheme so as to maximize the spatial organization.

8.1 ACTIVITY ANALYSIS

The main activity of the faculty (college) is the creative process (Design) and problem solving. Therefore the design analysis of the activities that place in the faculty departments is necessary. The activities are conceptualizing, discussing, drafting, lecturing, criticizing, and storing.

The spaces to be provided therefore must be such to encourage, enhance or promote these activities since these activities will be carried out in the studio, spaces for these subsidiary activities has to be synthesized into the predetermined studio space, to maximize its utilization.



Problem analysis in design

- Identification
- Definition
- Attributes
- Assessments

Fig 8.1 ***activity analysis***

8.2 FUNCTIONAL ANALYSIS

This sort of analysis is directed toward the through understanding of all the requirements which pertain to a particular activity process or need. In this regard, analyzing the functional requirements of the design scheme in order to determine the functional relationships between spaces and the various factors which govern these relationships such as proximity need for adjacency, total separation and so on. These conclusions would be some of the major factors used in determining the unique spatial organization of the design scheme.

8.3 SITE ANALYSIS

The site analysis of the design scheme's proposed site examines all the environmental factors of the site, which will have an effect on the design scheme. Major environmental factors of the site such as climate, topography, orientation, wind direction, noise direction, attitude, geology and nature of the site, are examined and conclusions drawn.

The conclusions drawn are then used as the guides in generating the site concepts, site zoning and the site structure. The factors of pedestrian ands vehicular circulation routes in and around the site are then synthesized to modulate the original concept and structure diagrams.

The site analysis is directed towards exhaustively examining the climatic and external environmental conditions, which affects the design scheme so as to achieve all the design goals and objectives.

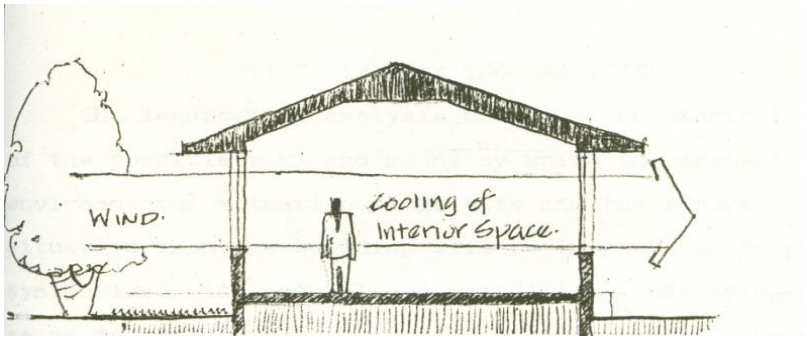


Fig 8.1 ***wind and ventilation***

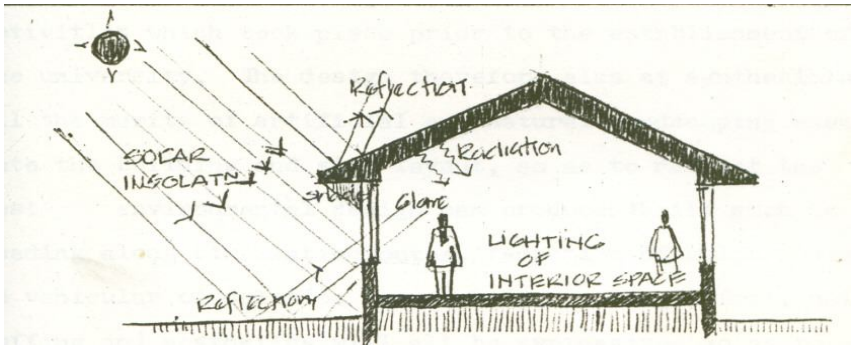


Fig 8.2 ***solar radiation***

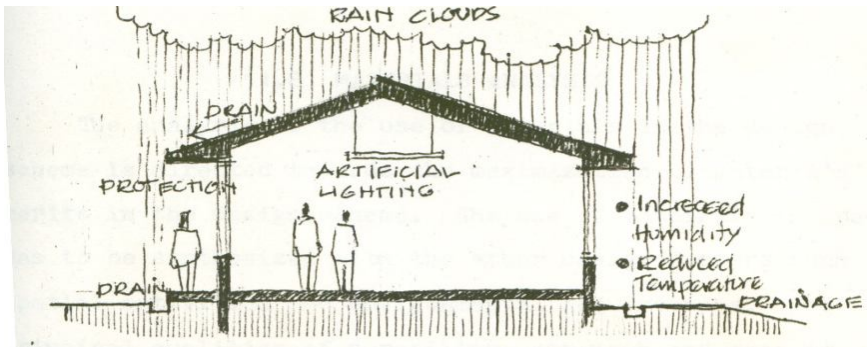


Fig 8.3 ***rainfall and precipitation***

8.4 ENVIRONMENTAL ANALYSIS

The environmental analysis is directed towards examining the climatic and external environmental conditions, which after a thorough analysis enable a proper response to their effect on the design scheme.

The climatic factors come into play and act as guides towards designing the must suitable kind of building structure for the activity of design and as an appropriate transition between the external environment and the required internal environmental conditions.

Important factors involved in guiding the creation of internal building environments are solar radiation, glare, lighting intensity, humidity, ventilation, temperature and shade which are determined by the climate and weather conditions of the site.

8.5 STRUCTURAL ANALYSIS

The structure of a building comprise basically of floors, walls and roofs, therefore, in the proposed design scheme, the analysis of the structural components of floor, walls and roofs is taken with the objective of providing positive responses to the structural requirements of the designed spaces.

Structural requirements need to show adequate response to the external environmental conditions and internal environmental conditions in relation to the building fabric farmed and the activity occurring within it. The building structure also aims at synthesizing such factors as economy, durability construction cost, case of maintenance and aesthetics. These factors are used as guides during the design decisions on choice like building form, structural material and loading requirements.

8.6 LIGHTING ANALYSIS

The lighting analysis is directed towards examining the natural and artificial lighting requirements of the interior spaces. Natural lighting requirements of interior spaces guide design decisions on the external fenestration arrangement of the building fabric. These requirements have to be, at the same tune, synthesized with those of ventilation, solar radiation and shading. The natural lighting requirements also act as a guide in the design of the artificial lighting requirements of the interior spaces. However, it should be noted that in some cases, natural lighting may not provide sufficient illumination for the interior spaces and may have to be supplemented by artificial lighting. This situation will occur predominantly in the rainy season during the year as the rain clouds cut out the sunlight and change the environment from bright and sunny, to dark and gloomy.

8.7 LANDSCAPING ANALYSIS

The landscaping analysis undertook an examination of the possible ways and means by which the present environmental situation of the site and the future intuition when the building will be use can be properly synthesized with natural and artificial landscaping material so as to produce a more symbiotic environment.

The design analysis will be aimed at synthesizing all the merits of artificial and natural landscaping elements into the building and site layout, such merits include shading along circulation routes, reduction of solar radiation on vehicular circulation and parking, cooling effect noise buffing and aesthetics will al be synthesized so as to achieve maximization of use.

8.8 MATERIALS ANALYSIS

The analysis of the use of materials in the design scheme is directed towards the maximization of materials merits in the design scheme. The use of materials in spaces

has to be synthesized with the other design factors such as spatial activities and environmental requirements. The principal qualities of durability, strength and case of maintenance are synthesized into the other functional requirements, which guided the choice. Factors like economy ease of construction and transportation cost are also considered in design decisions taken on the material used in the proposed scheme. New trends in construction technology determined by spatial and functional requirements to which materials could be put, is analyzed to achieve the design objectives.

Diagram

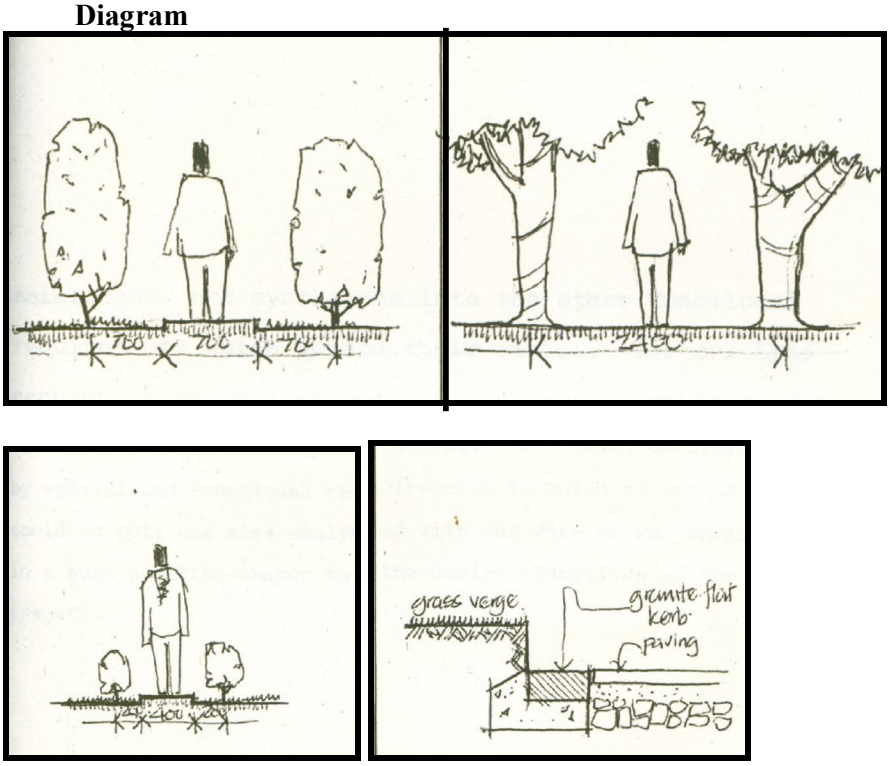


Fig 8.4 ***circulation around hedges and trees***

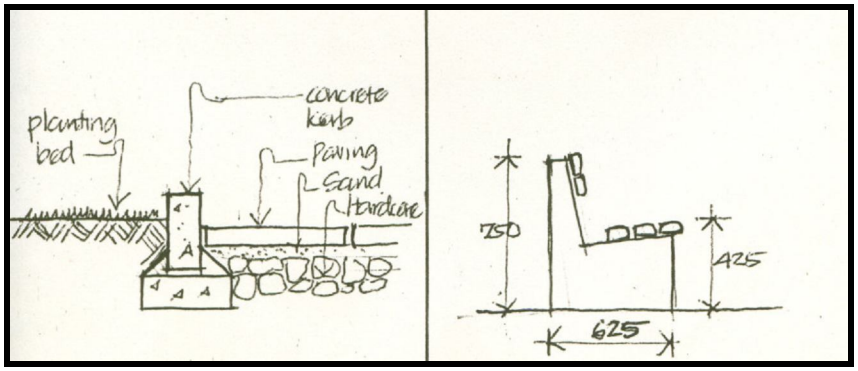


Fig 8.4 ***composition of seats and kerbs***

CHAPTER NINE

9.0 CONCLUSION

The need for a move towards more coherent design educational programmes notwithstanding, the design process is such that requires an atmosphere that not only stimulates the mind of the designers but allows him freedom, to carry out or interprete those inspirations

The complex of the faculty of Environmental Science, which has the sole purpose of training professionals of the Building or Construction industry, professionals who are members, at any time, of a design team, which is responsible for a design project from inception to completion, therefore, there must be a deliberate attempt at creating an environment, through architecture that encourages early interaction amongst these would-be professionals.

Having considered, the nature of the spatial needs of this peculiar discipline, Environmental Science, the provision of certain facilities in a complex design is inevitable. The peculiar nature of the educational activities which take place in the Environmental Science is one that calls for a different but distinct approach to its architectural content.

In this regard, the need for a unique design approach, which is open, free flowing and flexible is appropriate. The main design principle of the project is therefore aimed at achieving a unique architectural ensemble that has a unique spatial organization that encourages interaction between the students of the various disciplines of the Environmental Science.

This interaction between the soon-to-be professionals Architects, Urban Planners, Builders, Estate Managers and the like will go a long way to achieve a sense of harmony and unity in the design industry.

Thus, an architecture of flexible spaces as they relate to the design education by creating workable (useable) spaces through the integration of the various and distinct design activities in a learning environment.

The role of this built environment (architecture) allows an integration of design education to take place in a stimulating and environment responsive structure. Thus an overall and important role of the environmental designer which is not only the shaping and moulding of the natural environment as well as its management but the shaping of the immediate surrounding and thereby, achieving the ultimate goal of creating a better society and environment for all.

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APPENDIX