

# **ICT CENTRE PORT HARCOURT**

## **B.Sc (ARCH) PROJECT**

**By**

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**TITLE PAGE**

**I C T CENTRE PORT HARCOURT**

## **CERTIFICATION**

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## **DEDICATION**

To God the Father in Heaven-Who has brought me thus far

And

To my Mother and Siblings

## **ACKNOWLEDGEMENT**

I thank God for thus far he has led me; it was not by my own effort but through his divine mercies. He has used a lot of people to push me up to this height and it is worthy to give them credit even though they cannot be exhausted.

However, I wish to say a big thank you to my mom; Evang Mrs. Dorcas Columbus for her immense support throughout my programme.

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Columbus Kenton.O.

## **ABSTRACT**

Information and Information Communication Technology (ICT) is on the lips of every nation of earth because it brings innovation into information seeking and knowledge acquisition. ICT has become a potent force for transforming social, economic and political life globally. In an attempt to bridge the “digital divide”, ICT training centres ought to have a conducive working environment in addition to the machines and equipment necessary for learning and training purposes.

Adequate natural ventilation and lighting should be provided in ICT centres, mechanical means of energy supply should serve as a support facility and not the main and only source of energy in ICT centres in the country. This natural means of energy supply will in turn affect the running cost of the ICT centres. Also ICT centres lack architectural expression to depict the technological advancements of the era.

It is on this premise that this study is embarked upon to identify the role architecture can be used to enhance the efficiency of the information and communication technology (ICT) sector in Nigeria.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

CAD	-Computer aided design.
CAI	-Computer aided instruction.
CPU	-Central processing unit.
CRT	- cathode-ray display terminal.
DIY	-Do it yourself.
DOS	- Microsoft Disc Operating System.
GSM	-Global System Of Mobile Communications.
GUI	-Graphic user interface.
IBM	- International Business machine
ICT	- Information and communications technology.
ISPS	- Internet Service Providers.
IT	- Information technology.
LAN	-Local Area Network):
MITS	- Micro Instrumentation Telemetry Systems.
NCC	- Nigerian Communications Commission.
NEEDS.	-National Economic Empowerment Development Programme .
NIIB	- National Information Infrastructure Backbone.
NITDA	-National It Development Agency.
NITEL	- Nigerian Telecommunications Limited.
PERSONAL COMPUTER	- Personal computer.
R & D	- Research And Development.

**RAM** -Random access memory.

**SEEDS.** -State Economic Empowerment And Development Strategy.

**SII** - state information infrastructure.

**U.K** -United Kingdom.

**U.S** -United State.

**UPS** -Uninterrupted power supply.

**VDU** - visual display unit.

**VSAT** -Very Small Aperture Satellite System.

**WWW** -World wide web.

## **LIST OF UNITS**

M	meter
$M^2$	meter squared
mm	millimetre
GB	gigabytes
Mb	megabytes
mbps	mega bytes per second(data transfer rate)

# **CHAPTER ONE**

## **1.0 BACKGROUND TO THE STUDY.**

Over the years, Nigeria has continued to witness a phenomenal increase and advancements in the information and communication technologies. Computing and telecommunications is Nigeria's fastest growing sector with the advent of global system of mobile communication (GSM), the springing up of cybercafés and the increasing awareness of information and communications technologies (ICT) is on the rise in Nigeria.

Information and communication technologies (ICT) will become crucially important for sustainable development in developing countries. Around the world, new information and communication technologies (ICTs) are creating or supporting innovative systems and networks that are increasingly affecting societies and their governments, industries, communities, and individuals. It is vital that these technologies, and the opportunities that they create, be used to help close the gap between North and South, between the "included" and the "excluded," so that everyone has equitable access to sustainable development and growth.

Developing countries need to develop their own ICT strategies by drawing creatively on available experience to configure their technical and human resources. A developing country like Nigeria needs to prepare itself to make maximum use of the new opportunities created by ICT innovations.

Nigeria with a population of over 140 million people is indeed the giant of Africa, regarded as the most likely black power in the 21<sup>st</sup> century but yet to be empowered technologically. The saddening fact remains that there is a big gap between the average Nigerians' computer skills and the skills of citizens in developed countries around the world. The vast majority of

Nigerians do not have basic computer skills. Computers are generally acknowledged as facilitators of modern civilization. Today, there is no field of activity that is not being made easier with the use of computers. From the highest industrial and commercial activities, to the kitchen at home, the influence of the computer is, but pervasive. Computers, no doubt, have become an indispensable tool to all and sundry. Little wonder it is being held that within the next few years, any person that is not computer literate will be cut off guide.

Information and communications are integral to human society. The information age has made technology, particularly information and communications technology, indispensable. In African societies that existed before colonial rule, people communicated using various instruments and codes such as talking drums, flutes, gongs, town crier and village square meetings. Many historical records are still recorded on the walls of caves, and especially through oral tradition.

The use of writing and the invention of printing transformed the type and content of recorded history. Communications on a universal scale became possible through the use of books, newspapers, magazines and radio.

“More recent technological innovations increased further the reach and speed of communications, culminating, for now, with digital technology”.

The advancements in technology have created so many ICT tools that are necessary and useful in the development process. These new technologies have become central to contemporary societies.

A basic classification of these modern technologies is as follows:

- **Information Technology** uses computers, which have become indispensable in modern societies to process data and save time. The use of computers is so pervasive to modern development in commerce, education and governance amongst others.

- **Telecommunication Technologies** includes telephones-mobile, fixed (with fax), and broadcasting of radio and television, often through satellites;
- **Networking Technologies**, of which the best known is the internet, but which has extended to mobile phone technology, Voice over IP telephony, satellite communications and other forms of communications that are still in their infancy.

These all have come to dominate modern society and become the basis for the survival of the modern man, thus defining what is now called the information society. This is the information age!

ICT applications provide new tools to improve access to information and for sharing knowledge.

The industrial sectors in developing countries depend on the quality of their science and technology research and their ability to transform the results of research into marketable products.

The primary purpose of this thesis is to provide an enabling working environment that will encourage the development of information technology expertise in Nigeria. There is a need to develop human capacity in areas such as: technical support, management, research and development. Human development in ICT can be encouraged through increased awareness of opportunities and capabilities in ICT. The environment will encourage ICT education, research, development, training, software/hardware and other creative efforts. The knowledge that will be acquired will bridge the digital divide and enhance the quality of infrastructure, the quality of access, the quality of usage, and the quality of growth.

ICTs have been identified as major tools in achieving the Millennium Development Goals and other global development agenda. Nigeria can't afford the luxury of ignoring the multiplier effects of access to ICT. Nigeria has certainly done well so far in improving infrastructure capacity in "record time", now it's time to start focusing on quality.

## **1.2 STATEMENT OF ARCHITECTURE PROBLEM**

Existing ICT training centers' make use of makeshift structures to accommodate their learning/educative functions. Buildings such as halls, shops, residential houses, ware-houses are converted to ICT training centres.

This has given rise to ICT training centres where spaces are not well designed and well articulated for the purpose of learning.

Poor architectural planning in some ICT centres has led to technical problems such as poor acoustics, natural ventilation and day lighting. Poor natural ventilation and lighting results in increase in energy consumption, this increases the running cost of most ICT training centres.

There is no proper analysis and understanding of the various processes which will take place in the ICT centre, this result to the provision of inadequate spaces which lack functionality, this in turn causes congestion. Circulation routes within and between all the various inter-related activities and spaces lack efficiency, this jeopardizes productivity and security.

An ICT training facility is expected to accommodate a high volume of human traffic, office and learning equipment and as such should be designed to ensure strength, stability and safety.

As a result of the various activities to be accommodated within, the structure will be a large one and as such problems will arise as to the massing of the form. Utmost care ought to be taken so as to ensure balance and aesthetics of the form without compromising design efficiency.

## **1.3.0 MOTIVATION**

The main driving force behind the production of this thesis is the urge to actively participate in any study or project aimed at bridging the digital divide between Nigeria and the developed nations of the world.

To this end, the study undertakes a project that will ensure the training of individuals in the awareness and skills acquisition necessary for personal computer usage and ICT capability. This is also geared towards a sustainable development thereby reducing the amount and level at which ICT expertise and products are imported into the country.

### **1.3.1.0 INTRODUCTION OF THE NATIONAL INFORMATION TECHNOLOGY DEVELOPMENT AGENCY (NITDA).**

The Federal Executive Council approved a national IT policy in March 2001 and the implementation started in April with the establishment of the National Information Technology Development Agency act 2007. This Act establishes the National Information Technology Development Agency (NITDA) to plan, develop and promote the use of information technology in Nigeria.

NITDA is to enter into strategic alliance, collaboration and joint venture with the private sector for the actualization of the IT vision, which is to make Nigeria an information technology capable country as well as using IT as an engine for sustainable development and global competitiveness.

It is also to be used for education, job creation, wealth creation, poverty eradication and global competitiveness.

Emphasis is to be laid on development of National Information Infrastructure Backbone (NIIB) as well as the Human Resources Development. In addition, Information Technology Parts are to be developed in Abuja and in each of the six geo-political zones.

### **1.3.1.1 VISION STATEMENT**

To make Nigeria an information technology capable country in Africa, and a key player in the Information society, using IT as the engine for sustainable development and global competitiveness.

### **1.3.1.2 MISSION STATEMENT**

To use it for:

Education;

Creation of Wealth;

Poverty Eradication;

Job Creation;

Global Competitiveness.

## **1.4 AIMS AND OBJECTIVES.**

The overriding aim in the design and construction of this facility is to provide an aesthetic, conducive, safe and proper environment and structure for both men and machines involved in various activities in order to achieve the ultimate, corporate and training goals of the centre.

Thus the specific objectives of this project are geared towards the provision of a facility that:

- Is globally competitive in terms of working environment standards and use to update research technology while maintaining its local relevance.
- Will provide employment for the people of the region by equipping them with computer skills.
- Is the primary and preferred choice for ICT services and training of the public within the region and as such improve their productive skills in the national workforce.

- Incorporates an architectural character that adequately reflects a structure which symbolizes the technology of this age.
- Sets an example and encourages investment in the Nigerian private sector and consequently improves the Nigerian economy.

Hence, in view of the above, the project shall take special considerations aimed at achieving a structure that would among others:

- Provide office spaces to accommodate the administrative and corporate activities of the ICT centre.
- Provide conducive classroom environments, workshops and media rooms with efficient computer workstations to facilitate ICT learning.

## **1.5 PROJECT SIGNIFICANCE**

This project among many other things is geared to examine the prevailing situation in the ICT sector in Nigerian, What needs to be done to boost computer literacy and IT diffusion in all sectors of the country, What can be done to encourage production and manufacture of IT components in a competitive manner, To stimulate the local ICT industry, What the country should do to unleash the full potential of ICTs as an enabler of economic and social development.

In addition to NITDA, the Rivers State government is to establish an ICT academy to offer specialized training and research work with view to generating skilled professionals to service the needs of both public and private sectors. Its specific functions include:

- To provide ICT training, leading to professional certification.
- To publish ICT educational materials on ICT.

- To conduct research in ICT related areas in order to promote rapid development of Rivers State as an ICT leader.
- To encourage and conduct seminars, workshops and conferences in order to promote effective deployment of ICT.
- To provide short-term ICT certificate courses.

Critical to the policy is the establishment of the state information infrastructure (SII) in the form of an Internet backbone needed to support ICT production capacity as well as for government and citizens' uses. It is envisaged to design and implement the SII to achieve a minimum capacity of 8 mbps, using a combination of fiber optic, cables, satellite and wireless technology. This is to be done in partnership with the private sector.

The Public/Private Sector partnership Policy defines the partnership framework. The Policy proposes that government shall provide an enabling environment for investment in collaboration with the private sector. Three of the key strategies of the Policy with respect to public/private sector partnership are:

- Using favourable fiscal policies to make local ICT products and services globally competitive.
- Establishing joint government/private sector institutional framework for developing advisory standards and quality control.
- Patronising local ICT companies by providing guaranteed markets in specialized and strategic ICT sectors.

These strategies embody the regime of incentives that are to be developed to encourage the setting up of local ICT businesses as well as attract foreign companies to the state.

### **1.5.1 THE OBJECTIVES OF THE ICT CENTRE**

The centre is to achieve the following objectives:

- Generate revenue for the state.
- Create employment opportunities in the region.
- Attract foreign investment in ICT sector.
- Develop highly-skilled ICT manpower in the region.

The ICT centre will bring the following ICT businesses to the region:

- **Software development:** the design, development and testing of software packages for industry and general purpose
- **Outsourcing services:** data entry, software coding, code testing, and many types of online jobs
- **R and D in ICT:** research and development of new applications, systems and software.
- **Content creation and development:** the development of local websites, databases, archival services, translation services, etc. Website design and hosting services, including co-location services
- **Manpower training and development:** the production of various categories of ICT professionals
- **Telecommunications solutions:** network design, routing solutions, etc.

### **1.5.2 PROJECTING THE BENEFITS OF THE ICT CENTRE**

Under this section, a projection of the various types of benefits that would come to the state on account of the ICT centre is undertaken.

### **1.5.2.1 TRAINING**

Globally there is shortage of ICT personnel. This is worse in developing countries like Nigeria. The production of ICT personnel is thus a major priority for most countries.

Export of such manpower has also become a source of revenue for many countries, because of the excellent ICT and other infrastructure in ICT centres, they are used to produce ICT personnel to meet both national and international needs, and thus a number of the organizations in ICT centres provide high-level training in ICT. In the Malaysian MSC, 39 out of the 1137 companies are institutions of higher learning, providing ICT training. The ICT centre Port Harcourt will not be an exception. The projected total number of ICT professionals yearly is 4,400 as shown in table 1. At a constant yearly rate by the end of 10 years, 220,000 ICT professionals will be trained.

Serial No.	Professional cadres	Projected yearly output	Projected out in 5 years	Projected out in 10 years
1	Software engineers/developers	300	1,500	15,000
2	System engineers	300	1,500	15,000
3	Telecommunications Engineers	300	1,500	15,000
5	Professional certification	1,000	5,000	25,000
6	ICT Business Managers	500	2,500	25,000
7	Website Developers	1,000	5,000	50,000
8	Technicians (various types)	1,000	5,000	50,000
	Total	4,400	22,000	220,000

*Table. 1.1 Table showing the breakdown of projected professionals to be trained*

*Source: The author*

Some of these would be retained by various employers in the centre. Many will be available to meet the demands of ICT personnel by Rivers State while some may decide to go to other parts of the country, or even outside the country to work.

### **1.5.3.2 EMPLOYMENT CREATION**

For many countries, one of the key objectives of IT sector is to create jobs. Table 1.2 shows the projected jobs to be created by cadre.

Serial No.	Cadre	Number of jobs to be created
1	Managerial cadre	7
2	Mid-level professionals	19
3	Technicians	6
4	Others	20
	Total	52

*Table. 1.2 Table showing the breakdown of projected jobs to be created by cadre*

*Source: The author*

It is expected that about 70% will be indigenes of the state, this is in line with government initiatives to find a long lasting solution to the problems of youth restiveness in the Niger delta region.

In addition to the above direct jobs created in the centre, there would be many more created both outside and at the interface between the centre and the larger community.

### **1.5.3.3 REVENUE GENERATION**

As an economic sector, ICT is expected to generate revenue to the State. There are at least four sources of revenue accruable to the State from the direct business activities of companies in the ICT centre.

These are company income tax, personnel income tax, income from the use of national investment in infrastructure and value-added tax (VAT).

#### **1.5.3.4 ASSIST IN THE OTHER DEVELOPMENT PROGRAMMES**

The development programmes for the Niger delta region is on a fast track, Government is highly committed to the development of education, human resources and infrastructure. It is also committed to re-engineering social values as well as in promoting good governance. It has recognized that ICT can be used in these and many other development programmes in the State. However, in order to do this, there is a need to develop a critical mass of IT literate citizens as well as enhance the general level of accessibility of ICT in the region. While the activities at the centre will generally make ICT services more available and accessible in the region, the training aspects in the centre will generate a mass of ICT manpower. The State will be able to utilize this manpower in both manning critical sectors and in mounting aggressive IT literacy acquisition schemes.

#### **1.5.3.5 REDUCE SOCIAL VICES**

The ICT centre project will impact positively in reducing social vices in two major ways:

- By creating training and job opportunities, youth unemployment can be reduced. This will reduce the prevalence of youth idleness which makes them susceptible to vices and violent engagements.
- ICT provides effective mechanism for public enlightenment programmes.

The research will highlight the problems, standards, requirements and pre-requisites in the design of a model ICT centre, It will give policy makers and Nigeria information technology development agency (NITDA) an opportunity to compare the prevailing situations in other developed countries, and available options for amendments, rehabilitations, and upgrading, of future developments to engender a new Nigeria empowered by information technology.

## **1.6 SCOPE OF PROJECT.**

The scope of the project is limited to realizing a structure which would accommodate an ICT training centre expected to provide extensive training facility for personal computer components and ICT skills acquisition. Hence, efforts were geared towards achieving an architecturally sound environment as such the design would incorporate the following:

- An exhibition and marketing department for the display and sale of personal computers as well as other personal computer and computer peripheral.
- An after sale, maintenance and repair department to cater for personal computer related problems.
- ICT training centre for formal ICT training with classroom environments and media rooms fitted with personal computer workstations.
- Presentation, training and media rooms to facilitate retraining of staff as well as showcase technological advancements.
- Spaces for corporate administrative activities, meetings and conferences.
- Dining spaces for lunch-breaks.

## **1.7 DEFINATION OF TERMS.**

Key terms used in the research of ICT training centre are:

- **Information:** is the communication or reception of knowledge or intelligence (Britannica 2008), is the communication or reception of knowledge or intelligence; knowledge obtained from investigation, study, or instruction; news, data, or factual information (as measurements or statistics) used as a basis for reasoning, discussion,

or calculation information in numerical form that can be digitally transmitted or processed.

- **Information age:** period of widespread access to information, a period characterized by widespread electronic access to information through the use of computer technology (Encarta 2008).
- **Information Technology (IT):** is the processing of data via computer, the use of technologies from computing, electronics, and telecommunications to process and distribute information in digital and other forms (Encarta 2008).

Also it is the branch of technology devoted to the study and application of data and the processing thereof; i.e. the automatic acquisition, storage, manipulation (including transformation), management, movement, control, display, switching, interchange, transmission or reception of data; the development and use of the hardware, software, firmware, and procedures associated with this processing. (Gage, 1999).

- **Technology** is the practical application of knowledge especially in a particular area; a capability given by the practical application of knowledge (Britannica 2008); a manner of accomplishing a task especially using technical processes, methods, or knowledge; a common but inappropriate reference to the more specific term, Information Technology.
- **Communication** is the exchange of information between people, for example by means of speaking writing, or using a common system of signs of behavior (Microsoft Encarta 2008).

## **1.8 RESEARCH METHODOLOGY**

The deductive method of research involving the collection of data from both primary and secondary sources was employed in the course of this work. The primary sources include personal interviews on general planning principles and visits to ICT centres and training centres.

The answers received from the learners and tutors provided some necessary information required for this report. Site visit was also done. This gave the writer an idea of the present situation of the site and will also help in location facilities to their most suitable positions. The secondary sources of collection include existing literature materials and publications on the subject in the form textbooks, magazines, journals, articles, broachers etc. the internet was skilled for foreign cases studies.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

This chapter will research and document development of an approach to the study of information technology, its constituents and its evolution in Nigeria.

### **2.1.0 HISTORICAL DEVELOPMENT OF INFORMATION TECHNOLOGY IN NIGERIA.**

Information has always played a very important part in human life. However, in the mid-20<sup>th</sup> century, the role of information increased immeasurably as a result of social progress and the vigorous development in science and technology. In addition, as Trostnikov (1970) has pointed out, rapid expansion of a mass of diversified information is occurring, which has received the name “information explosion”. As a result, the need has arisen for a scientific approach to information and for elucidation of its most characteristic properties which has led to two principal changes in interpretation of the concept of information.

First, it was broadened to include information exchange not only between man and man but also between machine and machine, as well as the exchange of signals in the animal and plant worlds.

The pace of change brought by new technologies has had a significant effect on the way people live, work, and play worldwide.

Information technology, while an important area of study in its own right, is having a major impact across all curriculum areas. Easy worldwide communication provides access to a vast array of data, challenging assimilation and assessment skills.

Rapid communication, plus increased access to IT in the home, at work, and in educational establishments, could mean that learning becomes a truly lifelong activity- an activity in

which the pace of technological change forces constant evaluation of the learning process itself. Communication can be described as the process of transmitting and receiving ideas, information, and messages.

In keeping with their complex nature and multiple applications, Information and Communication Technologies (ICTs) may be viewed in different ways.

The World Bank defines ICTs as “the set of activities which facilitate by electronic means the processing, transmission and display of information” (Rodriguez and Wilson, 2000). ICTs “refers to technologies people use to share, distribute, gather information and to communicate through computers and computer networks” (ESCAP, 2000). , ICTs are defined by Stevenson in his 1997 report to the UK government and promoted by the new National Curriculum documents for the UK in 2000 as: "The study of the technology used to handle information and aid communication".

ICTs can be described as a complex varied set of goods, applications and services used for producing, distributing, processing, transforming information including telecoms, TV and radio broadcasting, hardware and software, computer services and electronic media” (Marcelle, 2000).

ICTs represent a cluster of associated technologies defined by their functional usage in information access and communication, of which one embodiment is the Internet.

Hargittai (1999) defines the Internet technically and functionally as follows: “the Internet is a worldwide network of computers, but sociologically it is also important to consider it as a network of people using computers that make vast amounts of information available. Given the two (basic) services of the system communication and information retrieval the multitude of services allowed is unprecedented.” ICTs, represented by the Internet, deliver “at once a worldwide broadcasting capacity, a mechanism for information dissemination, a medium for interaction between individuals and a marketplace for goods and services (Kiiski and Pohjole,

2000). As pointed out by Capron (2000), mails, telephone, TV and radio, books newspapers and periodicals are the traditional ways users send and receive information. However, data communications computer system that transmits data over communications lines such as telephone lines or cables have been evolving since the mid-1960s.

One of the most dramatic advances in communication potential data communications is found in the field computer technology.

Since the first development of the modern electronic digital computers in the 1940s, computerization has infiltrated almost every area of society in nations with advanced technology.

Computers are available in many formats for use in industries, businesses, hospitals, schools, universities, transport networks and individual homes.

Small or large, a computer network exists to provide computer users with the means of communicating and transferring information electronically.

The use of Internet has revolutionized access to information for the business world, libraries, education and individuals. A few of the most popular include E-mail (electronic mail), World Wide Web, FTP (File Transfer Protocol), Usenet, and Telnet.

The Internet and its technology continues to have a profound effect in promoting the sharing of information especially in academic world, making possible rapid transactions among businesses, and supporting global collaboration among individuals and organizations. Learning resource centres now often contain learning materials published on CD-ROM and most colleges are connected to the Internet.

These technologies have the potential to develop “virtual campuses” and thus increase student access and participation. Information technology provides access to mainstream materials and enables students to express their thoughts in words, designs and activities despite their disabilities.

World Wide Web can be described as a library of resources available to computer users through the global Internet. It enables users to view a wide variety of information, including magazine, archives, public and college library resources, and current world and business news. Using IT, learners can absorb more information and take less time to do so.

It is the objective of this paper to highlight the growth and the importance of ICTs in Nigeria.

Attempt is made to trace the development of IT and the growing popularity of IT devices in both the educational and economic development of Nigeria as a whole. The paper presents an overview of the general level of development of information technology in Nigeria, and then examines the extent to which it is being used in support of information delivery and communication in science and technology.

## **2.2.0 HISTORICAL DEVELOPMENT OF THE PERSONAL COMPUTER**

Personal computers, microcomputers were made possible by two technical innovations in the field of microelectronics; the integrated circuit, or IC, which was developed in 1959; and the microprocessor, which first appeared in 1971.

The IC permitted the miniaturization of computer memory circuit, and the microprocessor reduced the size of a computer's CPU to the size of a single silicon chip.

The invention of the microprocessor, a machine, which combines the equivalent of thousands of transistors on a single, tiny silicon chip, was developed by Ted Hoff at Intel Corporation in the Santa Clara Valley south of San Francisco, California, an area that was destined to become known to the world as silicon Valley because of the microprocessor and computer industry that grew up there. Because a CPU calculates, performs logical operations, contains

operating instructions and manages data flows, the potential existed for developing a separate system that could function as a complete microcomputer.

The first such desktop-size system specifically designed for personal use appeared in 1974; it was offered by Micro Instrumentation Telemetry Systems (MITS). The owners of the system were then encouraged by the editor of a popular technology magazine to create and sell a mail order computer kit through the magazine.

The computer, which was called Altair 8800, was thus retailed to individuals at fairly affordable prices.

The demand for the microcomputer kit was immediate, unexpected, and totally overwhelming. Scores of small entrepreneurial companies responded to this demand by producing computers for the new market. The first major electronics firm to manufacture and sell personal computers, Tandy Corporation (Radio Shack), introduced its model in 1977.

It quickly dominated the field, because of the combination of two attractive features; a keyboard and a cathode-ray display terminal (CRT).

It was also popular because it could be programmed and the user was able to store information by means of cassette tape.

Soon after Tandy's new model was introduced, two American engineer-programmers – Stephen Wazniak and Steven Jobs – started a new computer manufacturing company named Apple Computers.

In 1976, in what is now the Silicon Valley, Steve Jobs and Steve Wozniak created a homemade microprocessor computer board called Apple I.

Working from Job's parents' garage, the two men began to manufacture and market the Apple I to local hobbyists and electronics enthusiasts.

Early in 1977, Jobs and Wozniak founded Apple Computer, Inc., and in April of that year introduced the Apple II, the world's first personal computer.

Based on a board of their design, the Apple II was complete with a keyboard and color graphics capability.

Some of the new features they introduced into their own microcomputers were expanded memory, inexpensive disk-drive programs and data storage, and color graphics, Apple Computers went on to become the fastest-growing company in U.S. business history. Its rapid growth inspired a large number of similar microcomputer manufacturers to enter the field. Before the end of the decade, the market for personal computers had become clearly defined. In 1981, IBM introduced its own microcomputer model, the IBM personal computer. Although it did not make use of the most recent computer technology, the personal computer was a milestone in this burgeoning field.

It proved that the microcomputer industry was more than a current fad, and that the microcomputer was in fact a necessary tool for the business community. The personal computer's use of a 16-bit microprocessor initiated the development of faster and more powerful micros, and its use of an operating system, Ms-DOS (Microsoft Disc Operating System), that was available to all other computer makers led to a de facto standardization of the industry.

Another innovation was the introduction of simpler, "user-friendly" methods for controlling the operations of microcomputers.

By substituting a graphical user interface (GUI) for the conventional operating system, computers such as the Apple Macintosh allowed the user to select icons – graphic symbols of computer functions – from a display screen instead of requiring typed commands. Douglas Engelbart, invented an "X-Y Position Indicator for a Display System", the prototype of the computer "mouse" whose convenience has revolutionized personal computing.

In 1983 Apple introduced the Lisa, a personal computer designed for business use that incorporated a handheld mouse to select commands and control an on-screen cursor.

The Lisa, the Macintosh incorporated personal computer, based on the 68000 microprocessor manufactured by Motorola. Like the Lisa, the Macintosh incorporated a graphical user interface, which made the computer easy to operate for the novice user.

In 1984, IBM introduced the IBM Personal Computer/AT (more often called the personal computer /AT or AT) built around the Intel 80286 microprocessor. This chip was much faster, and could address a lot more internal storage memory than previous models but only in a mode which largely broke compatibility with the earlier models.

In particular, the popular Ms-DOS operating system was not able to take advantage of this capability.

Eventually the personal computer became the dominant “Personal Computer” architecture, especially in the small business market. This did not happen overnight – for many years personal computer’s and other home computers competed for the money and attention of the home user.

For business use, though, the IBM personal computer and its clones quickly became the standard, only to be challenged by the Apple Macintosh.

In the mid-1980s, a number of other developments were especially important for the growth of microcomputers. One of these was the introduction of a powerful 32-bit computer capable of running advanced multi-user operating systems at high speeds. This has dulled the distinction between microcomputers and minicomputers, placing enough computing power on an office desktop to serve all small businesses and most medium size businesses.

The transition from a personal computer -compatible market being driven by IBM to one where it was driven primarily by a broader market began to become clear in 1986 and 1987; in 1986, the 32-bit Intel 8086 microprocessor was released, and the first ‘386-based personal computer /compatible was the Compaq Deskpro 386.

IBM's response was nearly a year later, part of the general release of the IBM Personal System/2 series of computers, which were a closed architecture and a significant departure from the standard architecture of the personal computer, and in the long run it has been the standard architecture (as evolved significantly) which has persisted in the market.

Today, the personal computer continues to evolve rapidly as a result of creation of faster microprocessors, the incorporation of multiple microprocessor designs and the development of new storage technologies.

### **2.2.1 HARDWARE/PARTS OF A PERSONAL COMPUTER.**

Personal computers comprise of all the parts discussed in 2.2 above, however, the differing factor lies in their hardware architecture. In the laptop computer, all the parts are miniaturized into a single compact unit. However, in the desktop computer which is the main focus of this project, the parts are compartmentalized into distinct hardware units which must be connected together to make up the functionally complete personal computer.

These units are as follows:

- Monitor
- Tower or Desktop
- Mouse
- Speaker
- Uninterruptible Power Supply (UPS)

### **2.2.1.1 THE MONITOR**

This is the visual display unit (VDU) of the personal computer looks like television set. It is the main output device of the desktop personal computer, through which its operations are communicated to the user and also through which the user is able view and hence manage instructions and data input in the personal computer.

### **2.2.1.2 THE TOWER/DESKTOP.**

Simply called the CPU in everyday language, this unit handles all the operations carried out by the personal computer. It is brain-box of the personal computer which processes, manages and stores all numerical, alphabetical and graphical data fed into the personal computer by the user.

It is comprised of the following components whose configurations determine the speed and efficiency of the personal computer:

- **Motherboard:** The motherboard is the primary circuit board for a personal computer. most other personal computer components plug directly into the motherboard to allow them to exchange information. They are available in varying specifications.
- **Central Processing Unit (CPU):** Which performs most of the calculations that make programs or operating systems run. The CPU plugs directly into the motherboard by one of many different types of sockets. CPUs are produced in varying speeds of processing power. The higher the processor of a computer, the faster and more powerful the system.
- **RAM Memory:** Which is the “short-term memory” of the personal computer, is much faster than the mass storage devices like Hard disk or CD-ROM, but its contents are lost when the Power is turned off. Standardized RAM memory sizes currently

include 128MB (Megabytes), 256MB, 512MB and 1GB (Gigabyte). Generally, the higher the memory size, the faster the personal computer will run.

■ **Hard Disk Drive:** This is the long term memory of the Personal computer, provides reliable storage of data which remain in the system even when the power is turned off.

They are manufactured with various memory capacities measured in gigabytes.

■ **Power Supply Unit (PSU):** This provides steady DC supply from a domestic AC source. Power supply units of recent are fitted with voltage regulators that will shut down the personal computer if the power supply is under strain.

■ **Video/Graphics Adapter:** This processes and renders the graphics output from the personal computer to the VDU or monitor and is an essential part of the modern computer. This component also creates all the visual effects on the personal computer necessary for playing games.

Other components which may be assembled within the personal computer's tower/desktop or connected externally are floppy drives, zip drives, CD ROM drives, CD Writer drives, DVD ROM or DVD x CD Writer combo drives, DVD Writer drives, etc. External Hard disk drives for more storage memory space may also be attached.

### 2.2.1.3 THE KEYBOARD

The keyboard is the primary input device of the personal computer. It is a type-writer like input device through which alpha-numerical instructions and data are fed into the computer for operation.

Among others, it can be used extensively and effectively for word processing applications. A keyboard may be connected to a personal computer via a connector cable (wired) or may be wireless.

#### **2.2.1.4 THE MOUSE**

This is a hand-held secondary input device which makes for easier input and manipulation of instructions and data fed into the personal computer. So called “mouse” because of its peculiar mouse-like shape, its use simplifies certain tasks which may prove difficult or time consuming to achieve with a keyboard as a result of its pointer-like application. Different types of mouse may be used with a personal computer e.g. wired, wireless, roller, optical, etc.

#### **2.2.1.5 THE SPEAKER(S)**

This is the unit through which the sounds produced within or translated by the personal computer are heard.

Audible sounds from digital audio, music and video files as well as games and other applications stored in or played via the personal computer are relayed to the user through the speakers.

The quality of these sounds may be enhanced using a sound adapter/card with the personal computer. personal computer speakers are available in varying number-sets, shapes, sizes and audio output capabilities.

#### **2.2.1.6 THE UNINTERRUPTIBLE POWER SUPPLY (UPS)**

This is an important personal computer part/accessory which enables the Personal computer to remain usable for several minutes after a power failure.

When connected in – between the personal computer and the AC power supply, the UPS continually stores electrical energy which is automatically utilized in the event of a sudden power failure, hence the name “UPS”.

This, depending on the electric power storage capacity of the UPS, allows the user to continue working on the personal computer minutes after the power failure, or to save/close documents and applications and safely turn off the personal computer. This protects vital data which may be lost in such events as well as the delicate electronic components of the personal computer. Power saving capabilities of different Ups range from a few minutes to several hours.

### **2.3.0 THE PERSONAL COMPUTER (PERSONAL COMPUTER), INFORMATION AND COMMUNICATION TECHNOLOGY AND THE SOCIETY.**

The uses and importance of the personal computer and ICT in society today cannot be over-emphasized. Both have become a global phenomenon of great importance and concern in all spheres of human Endeavour, spanning across education, governance, business, market share, labor, productivity, agriculture, trade, commerce and others. The use of these technologies is now accepted to be at the heart of development in the industrialized nations throughout the world. For example, the efficient use of these technologies enables countries like America, Britain, Canada, Japan, Germany, France, Italy, Russia and Sweden to cope with continuous social, political and technological change.

In the last quarter of the 20th century, the world witnessed an info-technological revolution. Propelled by advances in information and communications technology, this revolution ushered in a world of greater dataflow, computer inter-connectivity and the shrinking of national boundaries.

The force fuelling this rapid transformation of remote and isolated information units into global inter-connected superhighways is information and Communication Technology (ICT). Relying on advances in the development of the microchip and the computer, this revolution has completely re-structured the global socio-economic equations and led to the transformation of the world into a global, knowledge based society referred to as the “Global Villages”.

The origin of information and communication Technology can be traced to the growth and development of computers and ultimately the introduction of the internet, which in its own right, greatly expanded the possibilities achievable with the personal computer. The introduction and application of the internet exposed the user of a personal computer to a vast array of information sources and networks as well as communication feats with little or no effort. The internet and related information technologies have increased the capacity of individuals to generate and manipulate knowledge, and to communicate ideas and values quickly, irrespective of geographic distance and this capacity is still on the increase with new and ongoing development in the field of computing and communication gadgetry.

Personal computers have revolutionized entertainment, science, the media, art, medicine, education, and business because they provide computational abilities at low cost to people with no extensive programming experience.

Personal computers enable artists to envision and manipulate images. Musicians use them for learning, creating, and recording music. Businesses track finances and forecast company performance using personal computers. News reporters can compose news stories on portable personal computers and laptops, and electronically submit these stories from remote locations. Many people work at home and communicate with fellow workers via their personal computers in a practice known as telecommuting. Because personal computers are also able to interface with worldwide communication networks such as the internet and the

graphics-based information database known as the World Wide Web, users are able to find and send information on any subject. Personal computers are now commonly used in everyday life. They can be used to send electronic mail, to write school reports or fiction, to balance cheque-books and keep financial data, or to track news stories and visit Web sites.

They also simplify word processing and other related applications through the use of special voice recognition systems which allow users to dictate their documents instead of typing them.

In education personal computers have so simplified methods of data collection, processing and storage.

Student populations, records and grades in schools and institutions can now be compiled with little effort on personal computers, from which they can always be updated and referred at any time. This provides convenience as well saves time and space expended with conventional filing systems. Computer Aided Instructions (CAI) makes learning much more fun and easier to achieve and impart to students. CAI has also ensured that with personal computers and the right software programs, learning in almost any field becomes a do-it-yourself (DIY) affair. This is especially beneficial to people with very busy work schedules and/or cannot afford to physically enroll for institutionalized personal computers and ICT have made crime fighting and law enforcement easier for law crime fighting and enforcement agencies alike. Criminal records, profiles (complete with photographs) and investigations can be filed and stored into large databases which can be accessed from anywhere within the authorities' network.

Also, personal computer and ICT capability and usage is becoming increasingly popular in government and policy marking. For example in the developed countries of the world, voting and population census exercises can be carried out electronically using computers.

Population and demographic figures and data can likewise be easily obtained and utilized. International relationship and correspondence have become much easier to deal with as a result of the “global village” made possible by ICT application.

Business management and administration has also benefited greatly from ICT application. Banks operate on networks which cover their entire branch outreach. Thus, people can check their account balance, withdraw, deposit and transfer funds at any of the bank branches within the networks. This is also possible in inter-bank relationships. Business and large corporations effectively keep track of their finances, operations, assets and personnel. Also shopping and purchases can now be completed electronically via the internet, thereby eliminating traveling and its attendant expenses.

In the humanities and other professions, ICT application is gaining widespread acceptance. Computer Aided Designs (CAD) is fast becoming the norm in engineering and architectural practices. Computer aided diagnosis in medicine is also becoming popular. Research development in the sciences and medical professions is growing rapidly, thanks to real-life simulations made possible by personal computer and general computer usage. Entertainment has been given a new meaning through the use of various multimedia applications available on personal computers. Personal computer owners can watch movies as well as create their own movies and special effects on personal computers. Computer games and other conventional games such as chess can equally be enjoyed when played on personal computers. Musicians can “cook up” beats and rhythms directly from personal computers

without musical instruments or any prior knowledge of how to play them. In the same manner, other artistes can also development their ideas and trades.

The list is endless and possibilities are still expanding as a result of rapid technological developments in computer engineering.

Communications between personal computer users and networks will benefit from new technologies such as broadband communication systems that can carry significantly more data faster or more conveniently to and from the vast interconnected databases that continue to grow in number and type.

These technological advances, coupled with new methods for interconnecting computers, such as the proposed internet, an advanced internet under development by universities, industry, and the government, promise to make personal computers even more powerful useful.

## **CHAPTER THREE**

### **3.0 CASE STUDIES**

#### **3.1.0 CRITERIA FOR CASE STUDIES**

In order to gain full insight as to what a project of this magnitude entails, case studies were carried out on a number of existing establishments and institutions engaged in ICT training. These were carried out with a view to understanding their workings, taking note of the merits and demerits of the architectural designs on their functional processes and subsequently utilizing the findings to aid the design of the information and communication centre, local Nigerian examples were visited, while a study was carried out on a foreign example. The ICT training centres will be discussed with regards to

- Training capacity
- Space organization
- Construction/materials and
- Critical appraisal.

Photographs and illustrations were also obtained/produced to provide greater clarity of study.

### **3.2.0 NIIT ICT TRAINING CENTRE, IKEJA, LAGOS STATE**



**Plate 18:** Approach façade of the NIIT ICT training centre ikeja Lagos state from the access road   Source: Author

This ICT training centre is one of two ICT training facilities run by NIIT within the Lagos state metropolis. Located on Oba Afran Avenue, a commercial hub in the Ikeja area of Lagos, the building housing the centre is two storied with the middle floor occupied by NIIT and the rest let out as office spaces. A help centre also operated by NIIT is located on the ground floor, but in a temporary structure.

Access to the site is by one main gate leading to a small parking area for the staff, while the visitor's parking is located outside (in front of) the premises. Public access to the training centre floor and the top floor is by a flight of stairs on the exterior of the approach façade which terminates on the middle floor,

With another flight of stairs on the entrance lobby which links the three floor levels.

### **3.2.1 TRAINING CAPACITY**

The NIIT training centre on Oba Afran Avenue, Ikeja is fully equipped with computer classes/studios, fitted with personal computers, lecture boards and overhead projectors. At full capacity, it is capable of accommodating 86 students, each occupying a personal computer workstation.

### **3.2.2 SPACE ORGANISATION**

On the entrance lobby of the training centre floor, two access doors distribute the incoming traffic. The one to the left leads to the administrative offices while the one to the right leads to the general public reception lobby.

Upon entrance into the reception lobby, a help desk is immediately sighted on the far left side of the room while the seated waiting area is to the right.

One both sides and immediately facing the reception lobby. Walking across the reception lobby leads to a strategic security cubicle which also doubles as an information distribution and software sales/display area. To the right of this space is the counseling room which is demarcated into two cubicles by aluminum and glass partitions. Onwards from this area takes one into a long corridor. On the right side of this corridor are lined various offices for supervisors, heads of department, ICT instructors. A private crèche for nursing staff, a store and a server room are also located along this line of offices. The toilets are at the far end of the line of offices. To the right of the same corridor are 4 computer classes/studios. The first two accommodate 30 students each. The third accommodates 16 students while the last accommodates 20 students.

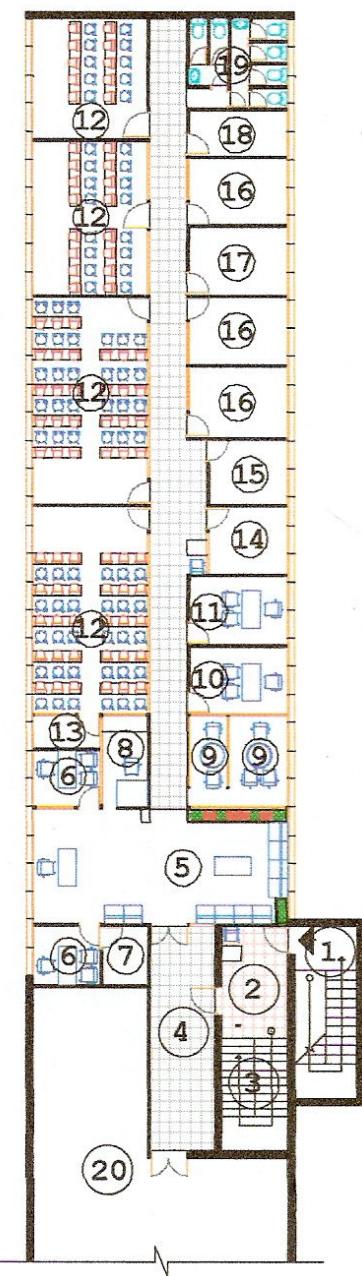
### **3.2.3 CONSTRUCTION AND MATERIALS**

The general construction of the NIIT training centre building consists of an open layout. The partitioning of the interior spaces and individual rooms was however done with the extensive use of (NIIT trademark colored) aluminum and reflective glass partitions.

### **3.2.4 CRITICAL APPRAISAL**

The general composition of the NIIT training centre, Ikeja spaces was well organized with the rooms following the organized and orderly sequence of circulation patterns functionally utilized by both visitors and students. The extensive use of aluminum and glass partitions provided a measure of visual accessibility between the spaces and functions, giving the centre a general feeling of openness. This also promoted security within the facility. Lighting and ventilation is also adequate. One major drawback however was the narrow width of the long corridor between the offices and the computer studios. As a result of this, the corridor is usually very crowded during peak periods and shifts between training sessions.

The effect of this is nonetheless reduced as a result of absence of extra features which may attract and keep students within the facility after training sessions, thus the crowds disperse quickly. The long corridor depends greatly on artificial source of lighting and ventilation. Another drawback of this facility is the insufficiency of parking spaces and inadequate security features for visitors cars parked outside the premises.



#### LEGEND

- |    |                                |
|----|--------------------------------|
| 1  | EXTERIOR ACCESS STAIRS         |
| 2  | SECURITY LOBBY                 |
| 3  | INTERNAL STAIRS                |
| 4  | ENTRANCE LOBBY                 |
| 5  | RECEPTION LOBBY / WAITING AREA |
| 6  | PAYING ROOM                    |
| 7  | FILE / RECORDS ROOM            |
| 8  | DISPLAY AREA                   |
| 9  | COUNSELLING CUBICLE            |
| 10 | PUBLIC RELATIONS OFFICE        |
| 11 | HUMAN RESOURCES OFFICE         |
| 12 | COMPUTER STUDIO / CLASS        |
| 13 | PROJECTOR ROOM                 |
| 14 | STORE                          |
| 15 | CRECHE                         |
| 16 | OFFICE                         |
| 17 | SERVER ROOM                    |
| 18 | CLEANERS' STORE                |
| 19 | TOILETS                        |
| 20 | ADMINISTRATIVE OFFICES         |

Fig 3.1 The floor layout of NIIT training centre ikeja Lagos state.

Source: Author



**Plate 19:** *View of the reception lobby from the entrance lobby.*

Source: Author



**Plate 20:** *View of the help desk of the reception lobby from the waiting area.*

Source: Author



**Plate 21:** View of the info/display area.

Source: Author



**Plate 22:** view within a counseling cubicle.

Source: Author



**Plate 23:** *View of the corridor.*

*Source: Author*



**Plate 24:** *View from outside a computer studio.*

*Source: Author*



**Plate 25:** *Close up view showing the NIIT trademark colored aluminum and glass partitions taken from within a counseling cubicle.*

*Source: Author*

### **3.3.0 NIIT; ICT TRAINING CENTRE, SURULERE, LAGOS STATE**

This training centre is the second of two ICT training facilities operated by NIIT in the Lagos state metropolis. It is housed on the ground floor of a former office building acquired by NIIT and located in the Iponri area of Surulere. Access to the site is strictly for pedestrians as a result of lack of vehicular space within the site. Staff and visitors' parking spaces are located in the underground basement of the four storey structure.

#### **3.3.1 TRAINING CAPACITY**

As with other NIIT training centres, this facility is fully equipped with computer studios fitted with personal computer workstations and accommodates 55 students at full capacity with each manning a personal computer workstation.

#### **3.3.2 SPACE ORGANISATION**

The space organization of the facility is very simple and free flowing. The entrance is by a manned security lobby at the right hand corner of the approach façade, which precedes the reception lobby. This reception lobby is spacious with ample seats provided in waiting areas. The reception/help desk is located at a conspicuous corner of the reception lobby. Immediately behind the reception/help desk are the two computer studios of the facility which are accessed from a large central lobby from which the counseling offices, paying room, instructors' office, server room, store and conveniences are also accessible. This lobby and the counseling offices are visually and physically accessible from the reception lobby.

### 3.3.3 CONSTRUCTION AND MATERIALS

The layouts of the building's floors are all open, and like the Ikeja facility, the individual spaces are partitioned using the same types of NIIT trademark colored aluminum and reflective glass partitions.

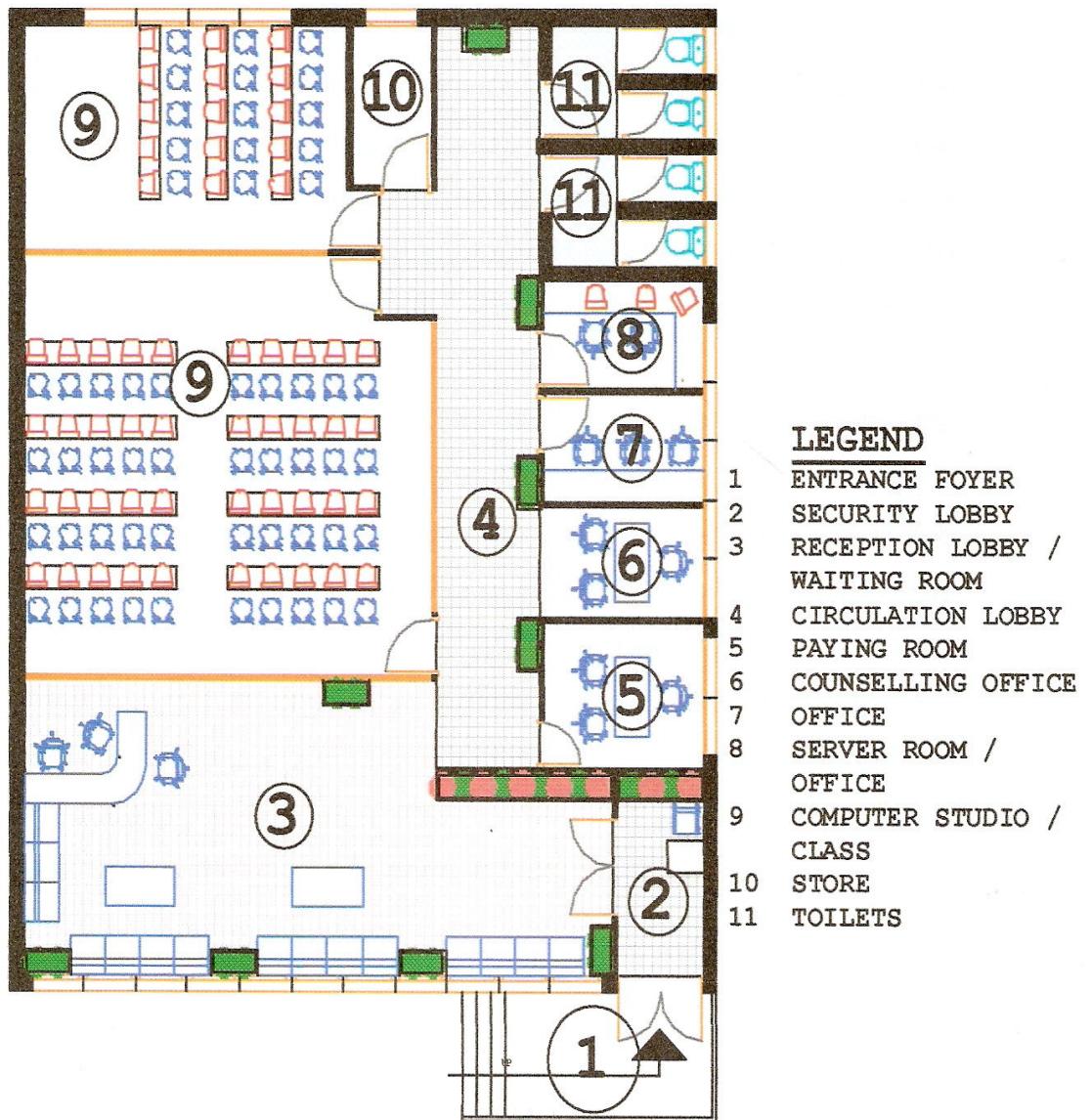


Fig 3.2 The floor layout of the NIIT training centre surulere Lagos state.

Source: Author

### **3.3.4 CRITICAL APPRAISAL**

The layout of the spaces in the NIIT Surulere training centre is indeed very commendable. It ensures a free flowing and unhindered movement within and between spaces. Visual accessibility and security are also strong points of the layout of the facility. The computer studios/classes have ample circulation aisles separating groups of personal computer workstations. In addition, the reception lobby and waiting areas are large enough to accommodate crowds on busy days. However, natural lighting and ventilation of the facility is poor as a result of neighboring multi-storied buildings on either side of the training centre building. The facility relies heavily on artificial lighting fixtures and air conditioning.

Parking is another problem faced by staff and visitors to the facility. The gradient of the ramp descending to the underground basement parking space is very steep and as such, one has to descend very slowly and carefully or risk crashing with the floor at the base of the ramp. Furthermore, lighting and ventilation of this parking area is nonexistent as there is total absence of features and elements facilitating them. Artificial lighting is also absent in this area.

In addition, the spacing of the columns carrying the structure in the basement is rather narrow. Thus parking vehicles in the basement is a strenuous and indeed frightening exercise.

Interior photos of the NIIT ICT training centre surelere Lagos state.



**Plate 26:** *View of the reception lobby from the waiting area showing the help desk.*

*Source: Author.*



**Plate 27:** *View of the central lobby and counseling offices from the waiting area.*

*Source: Author.*



**Plate 28:** Close up view of the reception/help desk from the waiting area showing the enclosing partition of one of the computer studios/classes.

Source: Author.

### **3.3.0 CALIT2, UNIVERSITY OF CALIFORNIA SAN DIEGO**

**Project:**

California Institute of Telecommunications and Information Technology (Calit2), University of California San Diego

**Location:**

La Jolla, Calif.

**Owner:**

University of California, San Diego

**Architect:**

NBBJ

As part of a statewide initiative to keep California at the forefront of technological innovation, the University of California envisioned a network of four institutes that would use collaboration to address large-scale societal issues. It established the second of these institutes, Calit2, in San Diego. This Institute houses some of the most advanced communications research facilities in the nation including, clean rooms, micro-electro-mechanical labs, immersive virtual reality, and an ultra-high-definition digital cinema.

#### **3.3.1 CONSTRUCTION MATERIALS**

The building is a framed structure comprised of large concrete column anchored to concrete pads at regular intervals. The framework is enclosed with corrugated sheet metal and glazed. Orthogonal form, contains mechanical functions and responds to man-made site conditions.

NBBJ discovered that ordinary metal and glass both weaken wireless signal transmission.

Thus, the design team developed an innovative composite façade that minimizes electromagnetic interference, as well as a steel structural system that makes it easier for researchers to map interference points. Features such as these ensure that as wireless communications continue to transform the world around them, this makes Calit2 and its technological research to continue to evolve and meet new needs.

### **3.3.2 ARCHITECTURAL EXPRESSION**

Technology, embraced as a unifying element, informs the building's character and appearance. A series of large, clear-glazed windows along this façade define interior circulation pathways. The architectural expression of the calit2 is purely institutional, and depicts its technological advancements.

### **3.3.3 CRITICAL APPRAISAL**

The layout of the spaces in the calit2 is basically an open design. It ensures a free flowing and unhindered movement within and between spaces. Security is also strong point of the layout of the facility taking notice of the entrance hall way which narrows towards the stair.

The open research spaces have ample circulation aisles separating groups of personal computer workstations. However, natural lighting and ventilation of the facility is poor in the enclosed research offices as a result of poor zoning. The facility relies heavily on artificial lighting fixtures and air conditioning.



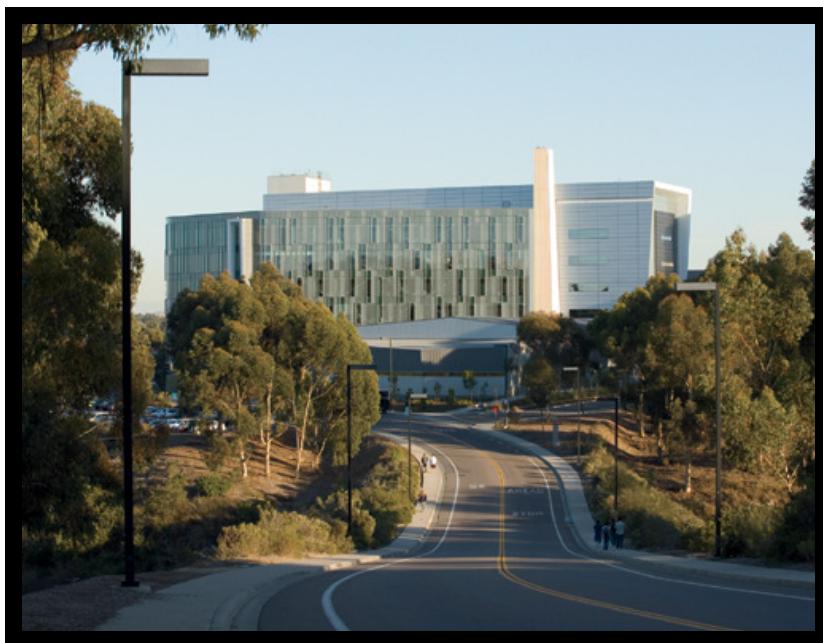
Fig 3.3 The floor layouts of the calit2.

Source: Building type study, architectural records.



**Plate 29: Perspective view of calit2.**

*Source: Building type study, architectural records.*



**Plate 30: Perspective view of calit2 showing access road.**

*Source: Building type study, architectural records.*



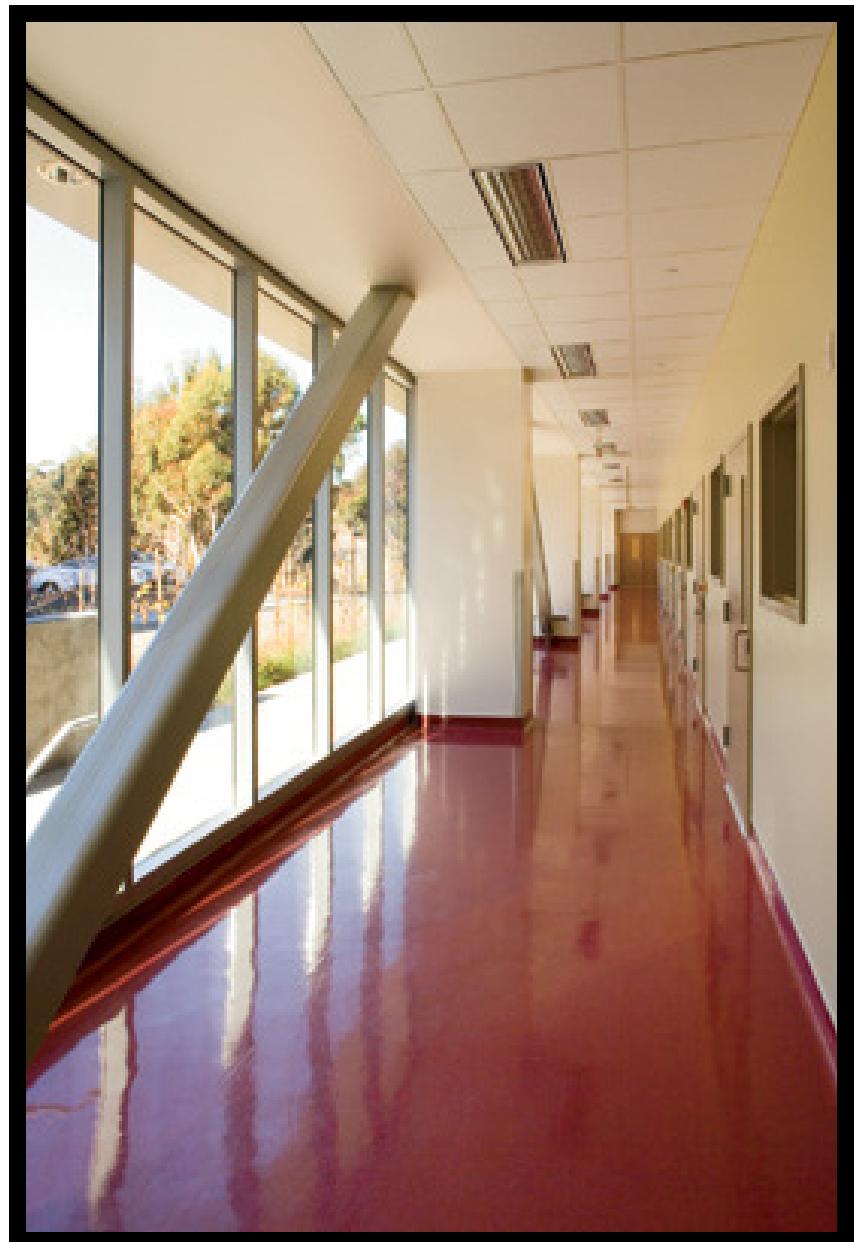
**Plate 31: Perspective view of calit2.**

*Source: Building type study, architectural records.*



**Plate 32: view of the entrance hall way.**

*Source: Building type study, architectural records.*



**Plate 33: View of the corridor leading the enclosed research offices.**

*Source: Building type study, architectural records.*



**Plate 34: interior view of the open research office.**

*Source: Building type study, architectural records.*

## CHAPTER FOUR

### 4.0 PROJECT SITE SELECTION AND LOCATION STUDY

This chapter deals with the location of the project, its physical features, economic features and other related matters. It also talks about the chosen site for the project. The project is to be located in Port Harcourt, the capital of Rivers State, a state at the southern tail of the country, Nigeria (fig. 4.1). Port Harcourt lies on latitude  $4^{\circ}$  north and longitude  $7^{\circ}$  east of the equator. It covers approximately 700 square hectares and had a present population of 750,673, with a population density of  $2789.24\text{km}^2$ . It has remained an important city for a long time because of its position as a port, and as one of the railway terminal in southern Nigerian.

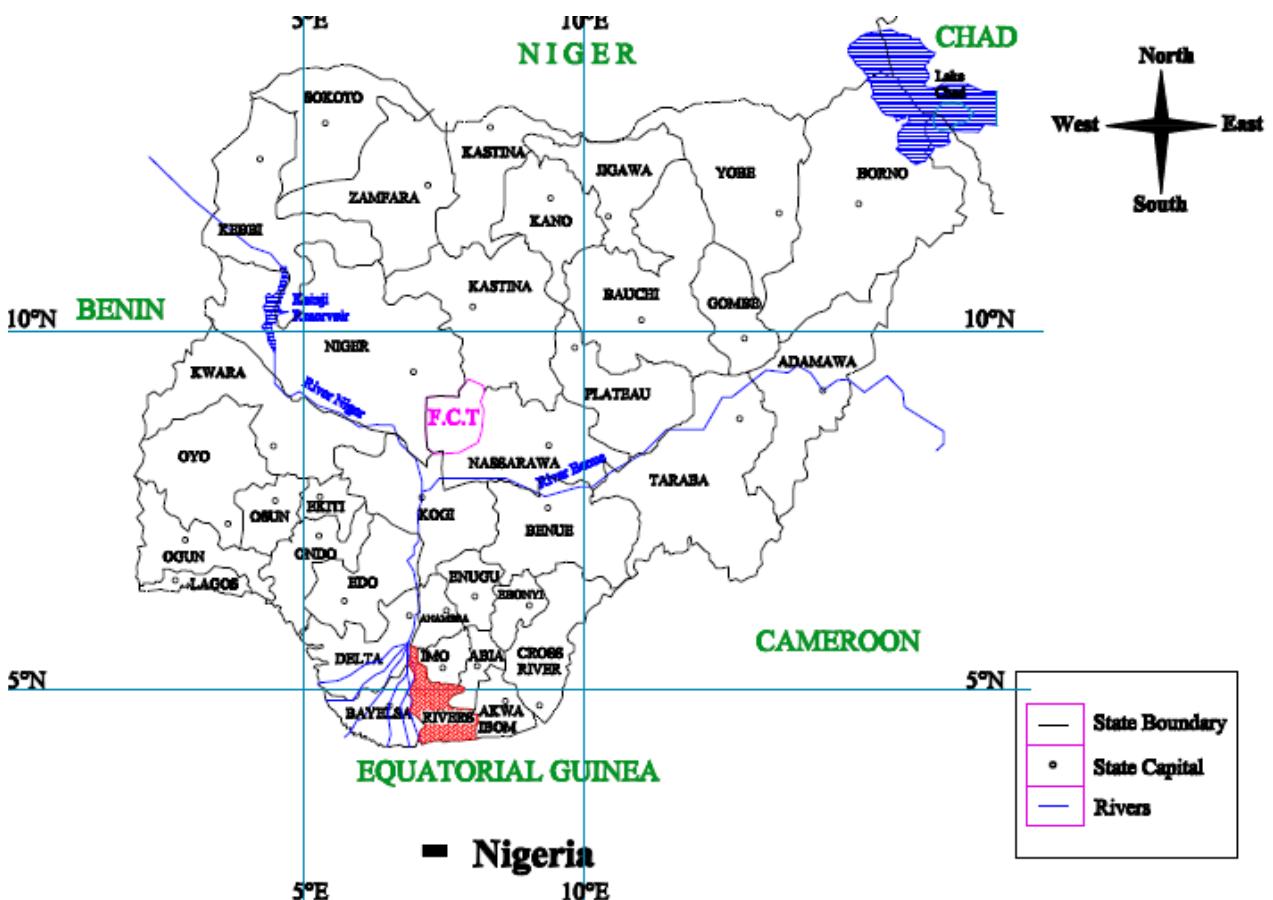
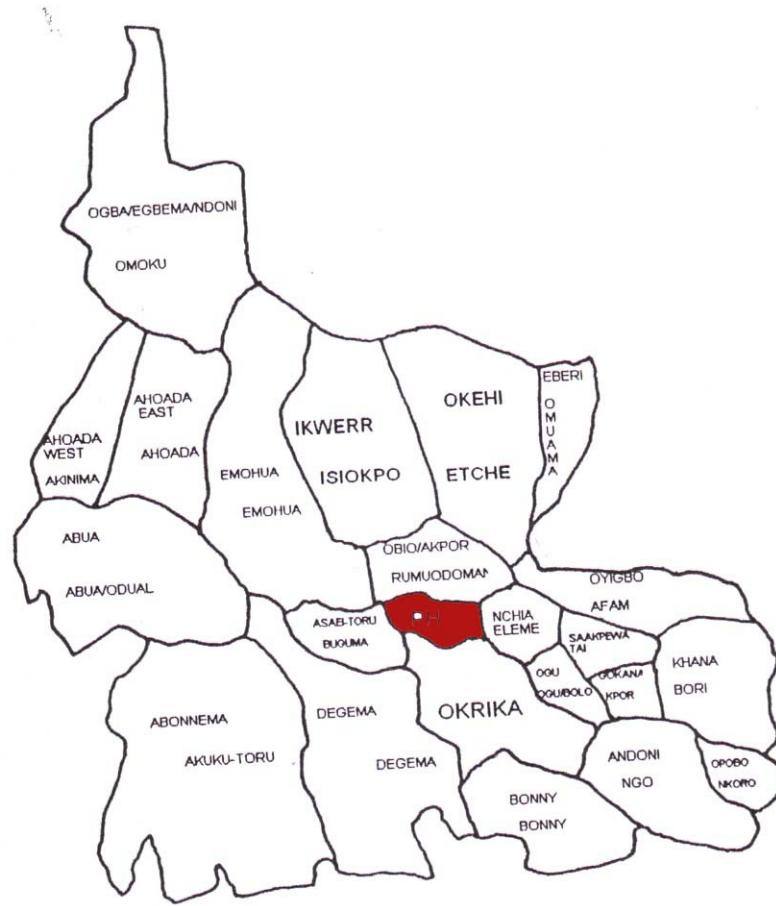


fig. 4.1. Map Of Nigeria.

Source: Author.



*fig. 4.2. Map Of Rivers State.*

*Source: Port Harcourt Local government area.*

#### **4.1.0 BRIEF HISTORY OF RIVERS STATE**

Rivers State (fig. 4.2) is one of Nigeria's 36 States and was created by Decree No. of 1967. The state is the heart of the hydrocarbon industry and is responsible for a huge chunk of the nation's foreign exchange earnings. The status of Rivers State in terms of its strategic importance and significance to the nation's economy earned it the name, Treasure Base of the Nation. And Port Harcourt, the State capital, is known throughout Nigeria as the Garden City, because of its beautiful layout and topography.

The area comprising the municipality of Port Harcourt shows from records that prior to 1918, it was largely farmlands and secondary forests known to their Ikwerre owners as “Obomotu”, the area adjoining the creeks were however occupied mainly by Okirika fishermen, a fact, recorded in the names of city words such as Borokiri (corrupted to Borokiri or Gborokiri) meaning “Fishing village” and Amadi layout which bears the name of the Okrika village of Amadi.

The region of Port Harcourt municipality was a meeting place for the agricultural Ikwerre man, and the fishing and trading communities of the neighbouring delta such as the Okrika, kalabari and Ibani (Bonny).

The Ikwerre sold yams, live stock and other farm products in exchange for fish, salt and a variety of European goods. As a result of this commercial exchange between the Ikwerre and Delta neighbours, the municipal area became a place for cultural interaction.

Many linguistic elements, fashions in dress, styles of music, songs and dances were exchanged along the trading routes. The municipality was created by the British colonial administration of Nigeria between 1912 and 1914. Lord Lugard, the first governor General, was then planning the best ways of exploiting the resources of the country and saw the need for a modern port to serve in the evacuation of the agricultural produce of south-east Nigeria. The need for such a port became even more important when coal was discovered in the Udi Hills and a system of railways was planned.

The city Port Harcourt was chosen as the location of the port. Lord Lugard named the city Port Harcourt after the then British secretary of state for the colonies, Lenis Harcourt. By May 1913 an agreement, the Hargrove agreement, was reached where a piece of land measuring about 30,000 acres of which only 13,000 acres were suitable for development was

required from representatives of Diobu, Rumeume, Rumuomasi, Rumuobiakani and Oguniba communities and those of twenty-five Okirika Villages.

The effect of the creation of the new port was to attract government installations, foreign business enterprises, as well as workers and businessmen from many parts of foreign business enterprises, as well as workers and businessmen form many parts of the country and West Africa. Port Harcourt gradually acquired a cosmopolitan status contrasting with the pre-colonial situation when the only non-rivers elements to be found in the area were a number of Aro and Ibo traders form the Hinterlands.

This new development resulted in the movement of several activities into the new areas. Such movements included several European trading firms formerly operating at delta ports as well as government installation's foreign business enterprises, parts of Nigerian in particular and the world at large. Port Harcourt, the new big city, thus gradually became the nerve centre of activities in the eastern part of the country and one of the nerve centres in the country as a whole.

For instance, it became the seaport for the export of coal, groundnuts, palm oil and kernel and later crude oil and natural gas. The discovery of crude oil and natural gas. The discovery of crude oil in large quantities in the Niger Delta by the 1950s enhanced the fortunes of Port Harcourt.

This discovery and exploitation also had it socio-economic consequences on the city. One of these was the high rate of migration of persons and business from all over the world into the area and the establishment of new businesses in the city.

From that time on Port Harcourt has been growing tremendously in commercial activities especially along the line of industrial products, and this has attracted many foreign investors. It is therefore, regarded as one of the nation's leading commercial cities. Port Harcourt has;

also distinguished itself as a city where commercial enterprise is promising and it would comfortably support activities along any budding commercial venture.

It has also extended beyond its original boundaries mainly towards the north. This direction can be explained by the fact that Port Harcourt lies on a peninsular within the vast Niger Delta environment of Rivers State. The direction of development has been towards the north where there is available dry land. In the last 1980s, the metropolitan area had grown to over four hundred and seventy square kilometres (470sq.km). This growth has not only been due to its expanding functions as an economic and commercial centre, but also as an administrative and industrial centre which attracted a great number of people and activities. Today, Port Harcourt is the capital of Rivers state and one of the most developing urban, industrial areas in Nigeria.



*fig. 4.3. Map Of Port Harcourt.*

*Source: Port Harcourt Local Government area.*

#### **4.1.2 THE PEOPLE**

The state has a population of about five million people who have a rich and unique cultural heritage. Usually known to be friendly and hospitable, these people come from various ethnic groups.

It consists of 22 local government area namely, Abua, Andoni, Ekpeye, engenni, Etche, Ibani, Ikwerre, Kalabari, Ndoni, Ogoni, and Okrika, etc. These ethnic groups have existed together for centuries, long before the creation of state and are currently distributed in twenty-three local governments.

The people, because of their diverse ethnicity operate a sierra Leonean Franca know as “pidgin English”.

#### **4.1.3 CLIMATIC CONDITIONS**

Weather is defined as the day-to-day changes in the atmospheric conditions of a place. Therefore climatic condition is the average condition of weather changes within a region over long period of time. There are two major seasons in Nigeria as rightly stated before and also four main climatic zones namely; the sub-equatorial, the tropical hinterland, the high altitude and the tropical continental zone.

The project site falls within the sub-equatorial zone, which is characterised by high temperatures and humilities and is influenced by sea breezes especially at the coastal margins. This causes high precipitation or rainfall.

#### **4.1.4 RAINFALL**

Nigeria has two distinct climatic zones. Along the coast the equatorial maritime air mass influences the climate, which is characterised by high humidity and heavy rainfall. To the north the tropical continental air mass brings dry, dusty winds (harmattan) form the Sahara; the temperature varies considerably with the season, so does rainfall, which is far less than in

the south. The average rainfall ranges from 249.7cm (100 in) at Port Harcourt on the Nigeria Delta to 86.9cm (35 in) at Kano in the north (fig 4.4). The periods of greatest rainfall are within the months of April and October.

During the wet seasons the sun moves toward the north of the equator and thereby reduces the pressure around the areas near the equator. This at the same time causes an increased atmospheric pressure around the Atlantic Ocean, which enables the flow of breeze or wind into the land at a low pressure and is very moist. This condenses and causes the humidity of the area to rise and thus results to rainfall.

The zone has an annual rainfall total of 231cm and is characterised by a wet season of two peak periods. It is said to have a “double maxima” rainfall pattern.

The average humidity is very high and is evident in the soil and environmental wetness (fig.4.5).

Due to this heavy rainfall pattern, humans and buildings need to be protected from the adverse effects. The buildings in particular need to be protected if it is required to fulfil its functions and stand the taste of time. This can be done by having adequate roof overhangs or by having a high-pitched roof for easy run off of rainwater, also the use of water repellent paints and water roofers for the block work and plasters should be encouraged. Ground floor heights should be high enough to avoid the back-flow of rain or surface water. During the dry season, rainfall does not exceed 50cm except along the coastal areas of the delta and the southeast. Rainfall decreases as one proceeds from the coast to the inland. The southern two third of the country have double peak or maxima rainfall pattern while the northern has a single peak rainfall.

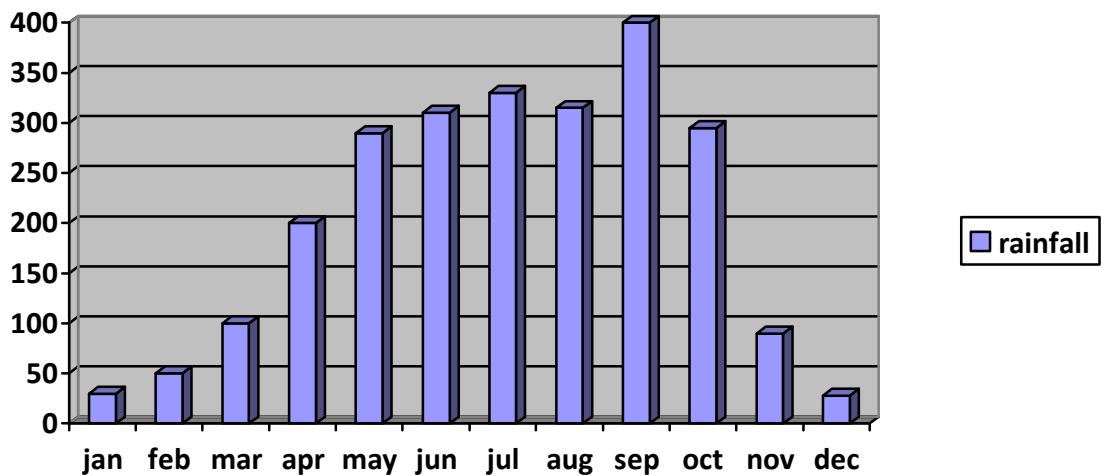


fig 4.4. Mean monthly rainfall chart.

Source: Comprehensive atlas Macmillan press.

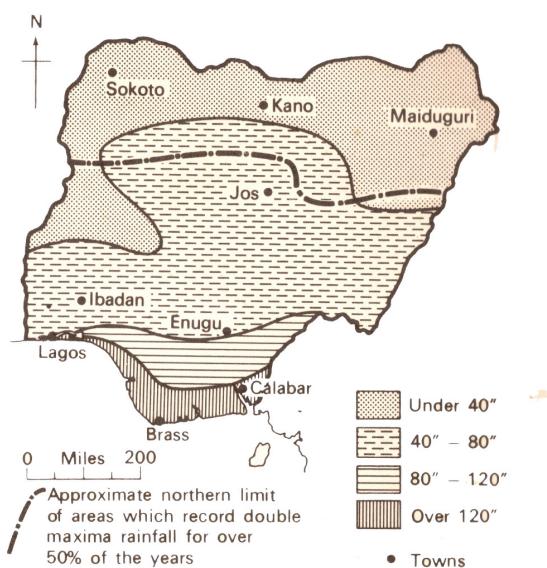


fig 4.5. Rainfall during the wet season.

Source : Comprehensive atlas Macmillan press.

#### 4.1.5 TEMPERATURE

This is the measurement of, or the degree of heat as an inherent quality of objects expressed as hotness or coldness relative to something else. Its knowledge helps to provide conditions of comfort for the occupants of any enclosure. There are considerable contrasts between the coastal areas and the interior, as well as between the high plateaux and the lowlands. Equable temperatures are also found on high plateaux temperature.

In March, the sun shines directly over the equator while in its apparent transaction towards the North Pole or hemisphere. As the sun journeys northwards from the equator to the tropic of cancer successive latitudes of the region are transverse. This is when the region in question has its highest temperatures because the sun is overhead at noon at that time. This is area architecture come into focus as regards its relationship to natural environment. That is, taking into consideration devices such as air conditioners can be used to provide desired conditions of temperature and humidity for various spaces such as the rooms, auditorium, restaurants, dining etc. The temperature level of Port Harcourt is 25 degrees centigrade. As illustrated in figure 4.6 and 4.7 below.

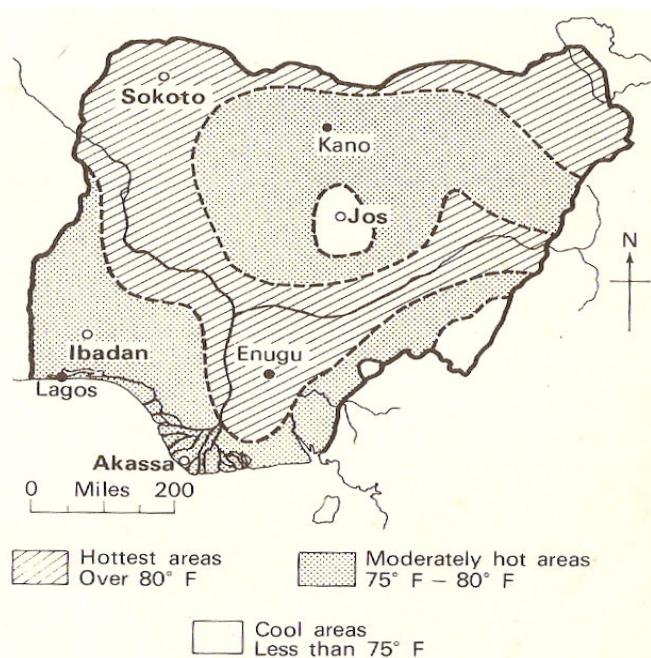


Fig. 4.6 Mean Annual Temperature Distribution.

Source : Comprehensive atlas Macmillan press.

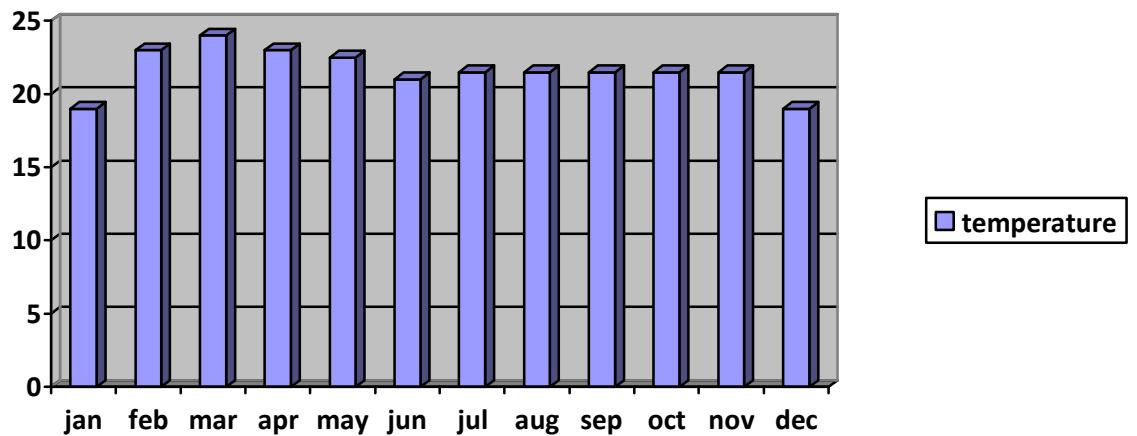


Fig 4.7. Mean monthly temprature chart.

Source : Comprehensive atlas Macmillan press.

#### 4.1.6 RELATIVE HUMIDITY

The ratio of the amount of water vapour in the air at a given temperature to the maximum amount air can hold at the same temperature, expressed as a percentage. The atmosphere always contains some moisture in the form of water vapour, the maximum amount depending on the temperature. The amount of vapour that will saturate the air increases with a rise in temperature. The annual average relative humidity varies between 55% and 84% with the highest humidity level (84%) occurring in the month of exception of the south coast, the relative humidity is considerably low in January when south registers the highest humidity because of the constant winds from the south and high, because the warm wet air mass prevails. The humidity level is over 80% in the south [fig 4.9].

A theoretical analysis shows that relative humidity falls within certain degrees; it therefore stands that thermally acceptable conditions can be achieved at certain temperatures and relative humidity.

Artificial means of air conditioning may be used where the external climate is such that no architectural design of the buildings could provide a thermally acceptable environment or atmosphere within the building.

The relative humidity for Port Harcourt is particularly high at 80%-100% throughout the year.

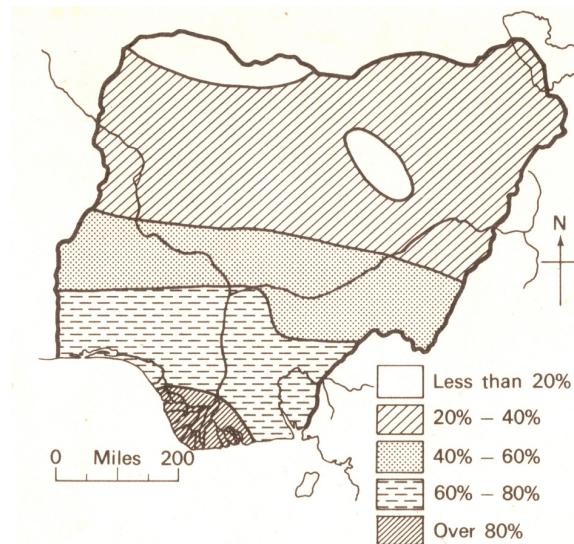


fig 4.8. Relative humidity in January.

Source : Comprehensive atlas Macmillan press.

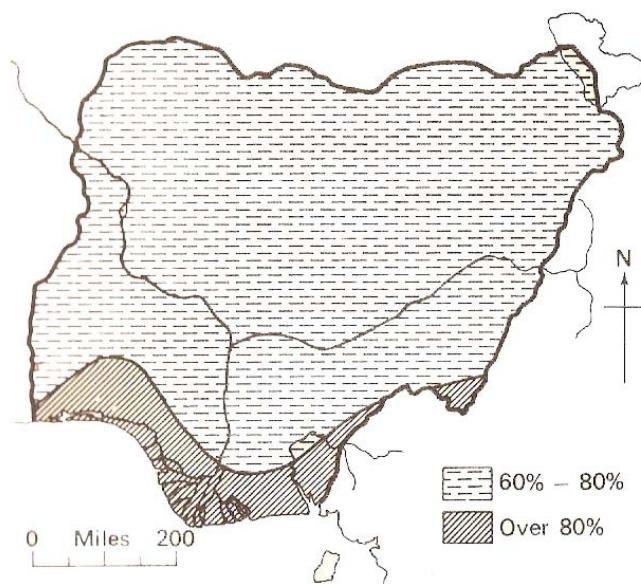


fig 4.9. Relative humidity in July.

Source : Comprehensive atlas Macmillan press.

#### 4.1.7 WIND PRESSURE

There are two major winds patterns that blow over the proposed site namely; the south-western monsoon wind that blows from the Atlantic Ocean and the north-eastern trade winds that blows across the Sahara into the country.

The tropical continental air mass (harmattan) wind picks up little or no moisture en route and is there dry [fig 4.10].

This north-east wind lasts longer in the north than in the south and near the coast it may last only a very short time. The tropical maritime air mass is restricted to the southern coastlands.

This influences the whole country during the wet season because it comes from the south and drops its moisture progressively northwards; rainfall diminishes from the south to the north [fig 4.11]. The orientation of the buildings has a very strong impact on the comfort of the users. This is because it determines the degree of natural ventilation of the interior spaces. A good orientation is that which allows the larger part of the building at least to be circulated by the prevalent winds. Cross ventilation is very artificial means can be inculcated. Port Harcourt shows the influence of the south west tropical maritime air masses throughout most of the year, and the harmattan falls to break through as a strong feature.

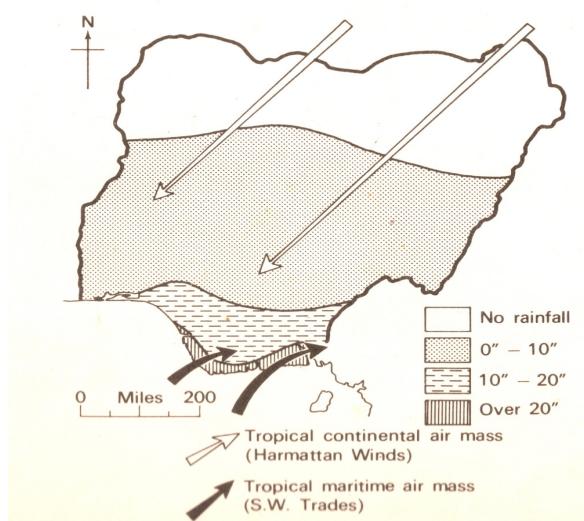
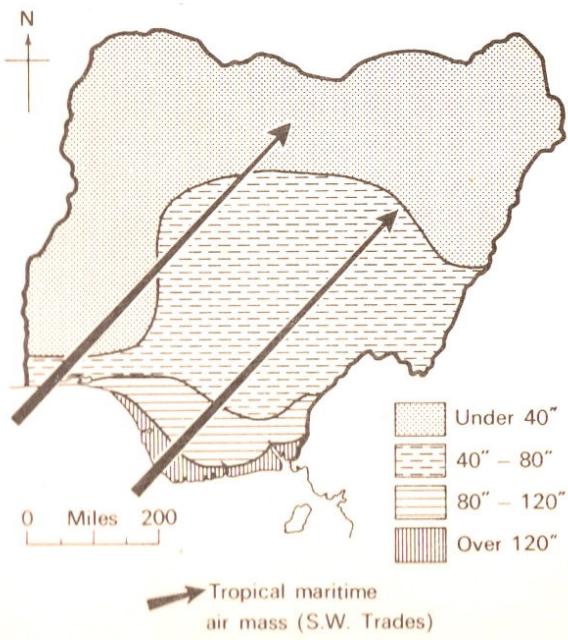


fig 4.10 Dry season wind.

Source : Comprehensive atlas Macmillan press.



*fig 4.11 Wet season wind.*

*Source : Comprehensive atlas Macmillan press.*

#### **4.2.0 GEOGRAPHY AND TOPOGRAPHICAL FEATURES**

The state is bounded on the south by the Atlantic Ocean, on the north by Anambra, Imo and Abia state, the East by Akwa Ibom state and the West by Bayelsa and Delta states.

Rivers State covers a net area of about 10,000 square kilometres; much of the State is covered by mangrove forest with marshy areas. Rivers state is in the Niger delta, has topography of flat plains with a network of rivers and tributaries. These include new Calabar, Orashi, Bonny, Sombreiro and Bartholomew River. With a tropical climate, numerous rivers and vast areas of arable land, the people of Rivers state have lived up to their tradition of agriculture, especially fishing and farming, commerce and industries. Beside oil and gas Rivers state is blessed with many other natural resources including timber, white and beaches, clay for ceramic, (ash, yellow and red) etc, all yearning for exploitation.

#### **4.2.1 SOILS AND VEGETATION**

Port Harcourt is located in a zone of alluvial soils. These are clayey and sandy and have good bearing value. Geologically, Port Harcourt can be divided into two divisions of terrain.

They are the Lower Delta Plain Terrain in the South and the Coastal Plain Terrain in the North.

The soil of the lower delta region consists mainly of very soft mud with high organic content. The thickness of the mud layer varies from up to several meters. The greatest thickness is at Elechi creek near Bonny River, which is up to 5m. The mud is generally underlain by sand. This constitutes an important medium for filling and reclamation purposes. The coastal plain terrain consists of soils mainly of slit and sandy loam (laterite). In the erosion problems are not experienced even though there are heavy rain falls.

The fresh water swamp vegetation characterizes the vegetation. The Riverine depressions are typically skirted high forests. There are occasional patches of heavily wooded areas.

#### **4.2.2 VEGETATION**

It is a collective name for the plant life of an area. The concept refers to the form of the plants, without reference to the plant species that are present. Such concepts as forest, grassland, wetland, or scrub relate to types of vegetation. This is largely influenced by rain, temperature and soil components.

Because these elements vary in their influences from place to place, so does vegetation too.

The vegetation of Nigeria changes from swamps and forests at the south to savannahs or grasslands in the middle belt to desert in the extreme north. These zones are dotted by montane vegetation, especially on the high plateau like Jos. This change is rather gradual than abrupt. The line is not easily defined as they grow each other and thins out gradually. The broad belts of plant groups that can be found within this area are;

- salt water swamp

 fresh water swamp

 high forest

Port Harcourt falls within the high forest vegetation zone which is full of varieties of plants and trees. Today only little true natural rain forest is found in Nigeria. The extent to which man has interfered with the nature of rain forest is greatest in the area of the former east-central states [fig 4.12].

#### 4.2.3 SOIL COMPOSITION

The soil of Nigeria can be broadly grouped into four zones namely;

 Northern zone of sand soil,

 Interior zone of laterite soil,

 Southern belt of forest soil,

 Zone of alluvial soil.

Port Harcourt is situated in the southern belt of forest soil, this coincides with the high forest belt it is predominantly an area of deposition of tertiary sands and clays. Geologically, Port Harcourt has two broad division and these are the lower Delta plain terrace in the South and the Coastal plain terrace in the North. The soil of the lower Delta region consists mainly of very soft mud with high organic content. The thickness of the mud layer varies for up to several meters, the greatest thickness measured, being up to five meters in Elechi Creek near Bonny River.

The mud is generally underlain by sand which constitutes an important medium for filling and reclamation purpose. The coastal plain terrace consists of soil of mainly silt and sand of

loam (laterite). In the valley however, the soil is sometimes covered with a thin layer of mud [fig 4.13].

### **4.3.0 INFRASTRUCTURAL FACILITIES AND SERVICES**

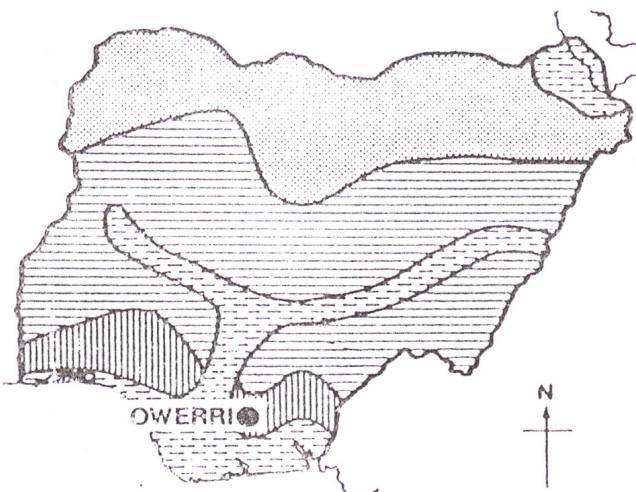
Port Harcourt is a city with adequate infrastructural facilities. These facilities serve virtually all-building services in almost every part of the city. These facilities available include the following:

- Road Network
- Water Supply
- Storm Water Drainage
- Refuse and Solid Waste Disposal
- Energy
- Telephone Services
- Postal Services
- Transport Services
- Road services
- Sea services
- Rail services
- Airport services



*Fig 4.12. Vegetation belts of Nigeria.*

*Source : Comprehensive atlas Macmillan press.*



- Northern zone of sandy soils
- Southern belt of forest soils
- Interior zone of laterite soils
- Zone of alluvial soils

Fig 4.13. Soil zones of Nigeria.

Source: Comprehensive atlas Macmillan press.

#### 4.3.1 ROAD NETWORK

Anywhere in the world the road transport has emerged the most important because of its several peculiar advantages. It is the most flexible and most accessible mode.

Right from the time Port Harcourt was founded; the city has always generated activities, which demand the use of transport facilities. The whole road network in Port Harcourt has a length of approximately 150km, of which 70%-80% is paved.

Generally there are few curbs or sidewalks. The layout of the major road network is greatly influenced by the geographic position of the city.

Any transport network must involve three elements. These elements are the mode, the route and the terminal. The terminal for road transport is the motor part. Although road transport modes can do without elaborate terminals, adequate facilities are required. In Port Harcourt metropolis, there are two modern motor parks. These are Mile three Motor Park actually known as Nkpolu – Orowurukwu Motor Park (located at the mile three area of Ikwere road), and an ultra-modern park called Abali Park though, most times called Leventis park or Isaac Boro park. It is located almost at the beginning of Port Harcourt. The motor parks are owned by Port Harcourt city council. In spite of the above-mentioned motor parks, there are other small motor parks. They provide complementary services to different parts of the neighbouring states.

Considering the continued growth of the metropolis and the unpleasant traffic jam on the city roads, a lot of roads have been constructed. Also flyovers are constructed at high traffic junctions such as UTC junction, Rumuola junction and Air force base . These constructions open many areas in the metropolis.

#### **4.3.2 WATER SUPPLY**

The ground water table in Port Harcourt is very high. It however, can be easily reached thereby providing an abundant source of water supply for the city.

There are about 5 ground level water reservoirs and about 11 elevated water reservoirs evenly distributed throughout the entire city.

### 4.3.3 STORM WATER DRAINAGE

The Port Harcourt urban areas are divided into six major drainage areas determined by the topography of the city. Rain water from the main town area is discharged into the creek, while the central business district is drained into Bonny River. Other areas, except Diobu, have storm water drainage systems consisting of channels of earth dikes in fairly good conditions [fig 4.14].

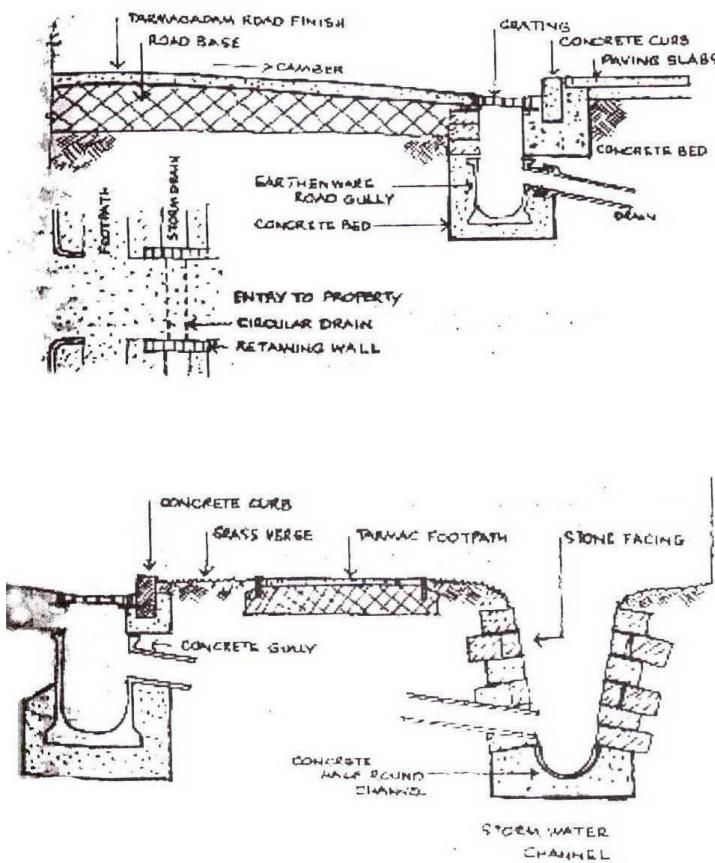


Fig 4.14 Diagrams showing drainage system.

Source: Author.

### 4.3.4 REFUSE AND SOLID WASTE DISPOSAL

Port Harcourt popularly called “the garden city” is in the terms of cleanliness, one of the best in the country.

The streets and express way are swept on a daily basis and the refuse is well disposed. This is presently organized by REFCOL.

The following four methods of disposal have been adopted by the city:

- Collection – this involves the development of two-step functional system i.e. on-site handling storage and processing system and a coordinated collection system to transport collected solid waste to a central disposal area.
- Transportation – this involves the transportation of solid waste to disposal system with refuses disposal vehicles.
- Processing – this serves as a resource recovery of portions of the solid waste.
- Disposal – this is the destination of all un-recovered solid waste. The disposal method used is sanitary landfills designed to confine materials to the smallest possible area and volume.

#### **4.3.5 ENERGY**

Most of the energy such as transportation fuel, cooking fuel and gas, etc, is obtained from the Port Harcourt refinery.

Power supply for all preservative activities would come from the Afam Power Station in Abia State. This is connected from PHCN mains.

#### **4.3.6 TELEPHONE SERVICES**

Telephone services are available to Port Harcourt and its areas. The Nigerian Tele-Communication Limited (NITEL) mostly handles these facilities.

#### **4.3.7 POSTAL SERVICES**

The city has the State Central Post Office at the Secretariat area and has other sub-offices in the various districts.

#### **4.3.8 TRANSPORT SERVICES**

The major modes of transport in Port Harcourt metropolis are road, rail, water (sea and inland waterways) and air transport.

Road services – this is the major transport system operating in the city. It is very important in spite of the fact that some parts of the metropolis border the lagoons and swamps. The services available are bus, taxi and motorcycle services.

Basically, there are some road transportation problems, which manifest in most cities in a developing world.

These problems range from inadequacy of good motorable roads, lack of maintenance of the existing roads, incessant traffic hold-ups; through lack of drainages, unavailable traffic light control and off-street parking facilities; to inadequate mass transit services.

The above problems notwithstanding, puts Port Harcourt metropolis in a peculiar state. This arises from the fact that the central part of the city is situated on a peninsula.

#### **4.4.0 SITE SELECTION CRITERIA**

The following are criteria for selecting site for educational buildings, as specified by the Time Savers Standard Building Types:

- Present and future environment, Economic, social and housing make up of the community.
- Integration with community planning. Potential housing expansion relative to size, need and location. Zoning requirements limitations and restrictions.
- Site characteristics-site location-urban, sub-urban or rural (Determines demand for minimum and maximum space required) percentage of usability of site for building,

recreation and play fields, parking, roads and services; soil conditions-water table flood plan, adjacent water shed and suitable materials for structural applications services utilities – availability and cost of electrical services, sanitary service (if none, feasibility of sewage, treatment plant or septic tank); initial cost of land versus cost of improvements.

In addition to these criteria listed above the architect must know the community he serves by considering as part of his total responsibility the following;

- The character of the neighbourhood surrounding the site of high density, multifamily, single family, mixed uses, obsolete, declining stable or growing and the presence of significant environmental influences such as air and noise pollution.
- The projected growth rate; that is if the project is developing as an indication of phased construction of the school.

#### **4.5.0 SITE LOCATION**

The site [fig 4.15] is located at Diobu (along Kaduna street, off the Aba-Port Harcourt express way), it is located within the south-western quadrant of Port Harcourt. There are presently no particular special features existing on the site. The soil is dry and will not produce any constraint to development.

Many residential neighbourhoods and commercial ventures surround the site. Access to the site is wide and flat and is easy to locate. Essential services such as electricity, water supply, sewage disposal etc shall be extended to this site from the built-up residential neighbourhood. The characteristics of the area combine with other factors to produce the various characteristics of the proposed site, which include the climatic conditions for which a thorough knowledge of it is essential for the architect for an effective execution of the project.

Port Harcourt falls within the warm humid tropical zones with one dry and wet season annually. The climatic factors to be considered are temperature, vegetation soil composition, wind, rainfall, and relative humidity.

#### **4.5.1 FACTORS AFFECTING THE SITE**

Site analysis is basically the separation of something into components or into its constituents in order to find out what it contains, to examine individual parts, or to study the structure of the whole. It also means the assessment, description, or explanation of something, usually based on careful consideration or investigation.

These considerations and investigations are usually done on the particular physical attributes on ground on the site. These can be; topography, sun paths, wind direction, orientation, noise, drainage, access, vegetation, existing infrastructure etc. before any design is done, the architect should carry out a thorough analysis of the site and should be conversant with the results during the actual design process. The factors are further explained below.

##### **4.5.1.1 ACCESS**

The site is accessible through Kaduna Street off Aba-Port Harcourt in Diobu residential neighbourhood, for vehicular traffic, various pedestrian routes shall be from minor streets from the neighbourhood [fig 4.15].

##### **4.5.1.2 SOURCE OF POLLUTION**

Pollution can be categorized according to the medium in which it occurs; atmospheric pollution (Air Pollution), fresh water and sea pollution (water pollution), or land pollution (Solid Waste Disposal). However, transfers can occur in both directions between the atmosphere, water, and the land, with consequences for both the spread of pollution and its effects.

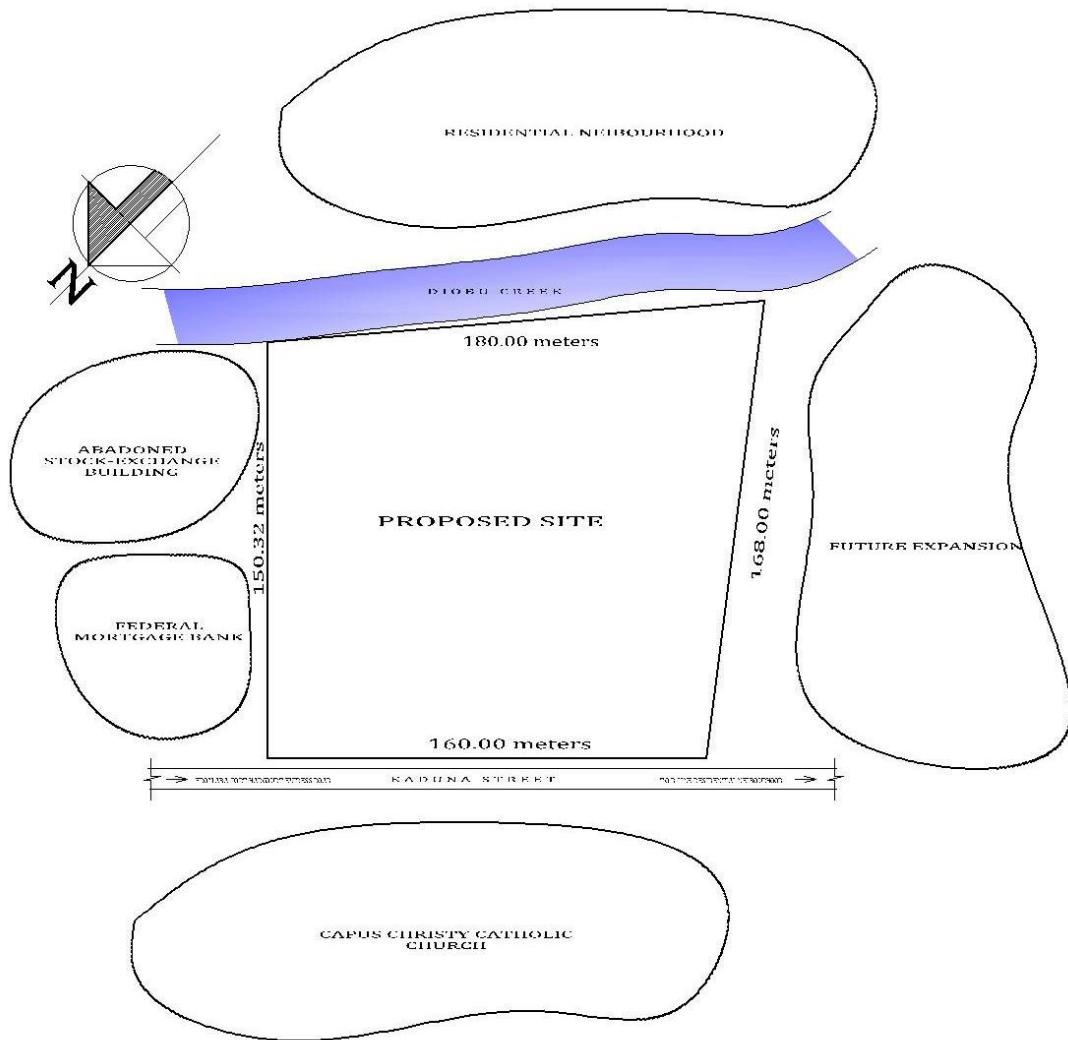
The major source of pollution is from the exhaust fumes from the traffics. The noise from the cars, the other source of pollution is from refuse dumps around the site due to waste from other construction sites.



- █ kaduna street
- █ Aba- Port Harcourt Express way
- █ proposed site boundaries

Fig 4.15. The Site.

Source: Earth Google satellite image.



*Fig 4.16. The Site layout.*

*Source: The author.*

#### **4.5.1.3 ORIENTATION**

The site has no particular restriction to the orientation of the building. In other words, the wind direction and solar radiation would, thereby influence the orientation of the building.

The building will be affected by factors of orientation in the aspect of lighting, ventilation, solar radiation and heat.

For proper ventilation, the proposed building should be placed in the south-west/north-east orientation as much as possible. To reduce solar radiation effect, the complex should have shorter side facing the east-west direction as much as possible.

Also shading devices could be used to reduce any possible solar radiation problem.

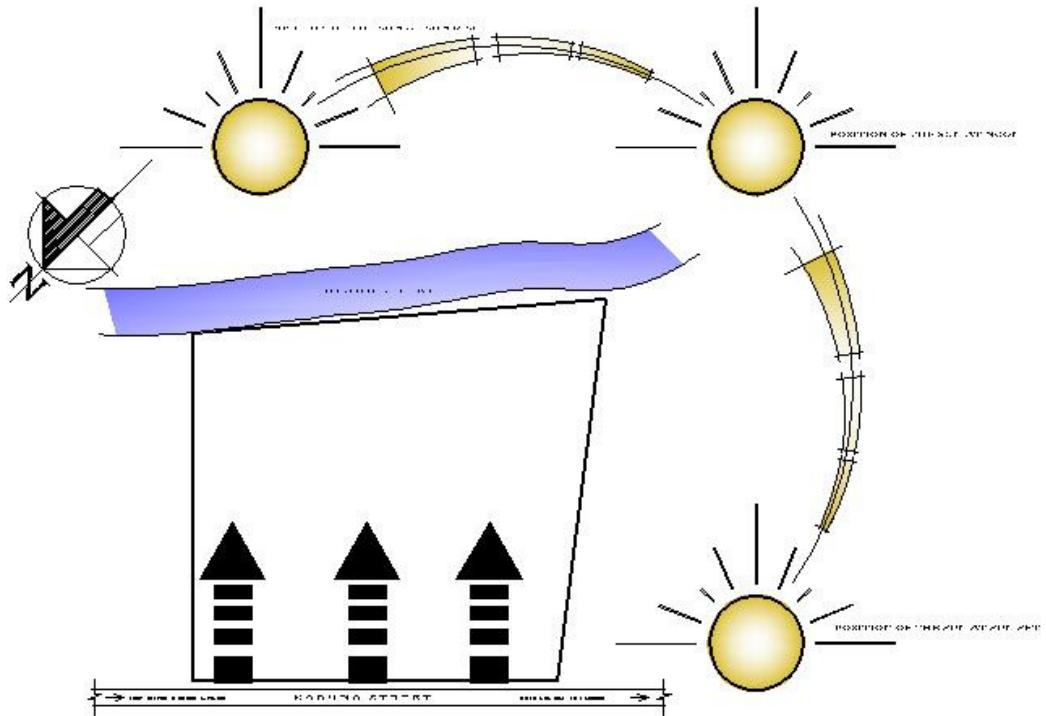
#### **4.5.1.4 SUN PATH**

The sun path is a natural phenomenon and goes from the east to the west. The sun rises from the east the morning hour and sets in the west towards evening. The setting sun is more intense than the rising sun. The sun path [fig 4.17] is one critical factor that should be observed during the actual design process. The proposed structures should be positioned to allow minimal but efficient sunlight to enter the spaces.

The effect of sun on buildings and the environment can cause excessive sun rays through openings in the building fabrics e.g. walls, roofs, doors, windows etc. or sun rays reflected through paved areas. Heat is conducted through metal sheets e.g. roof coverings or through glass materials.

The basic means of solving this is by orientation of the building according to the correct cardinal points.

Also, through the introduction of sun-breakers or shading devices, this comes in different shapes and sizes and also methods of manufacturing and installation. It can be solved by the use of blinds or drapes in covering the openings in the different internal spaces. The introduction of vegetative areas and trees can also help in reducing the reflection of the sun's rays.



*Fig 4.17. Site showing access and sun path.*

*Source : Author.*

#### 4.5.1.5 WIND PATH

The prevailing winds are the southwest wind, which blows from the Atlantic Ocean and is moist and the northeast wind, which comes from the northern part of the country and is dry. It brings along the harmattan.

The northeast wind is active during the harmattan season while the southwest wind is prevalent during the rainy season.

The wind direction aids in the ventilation of spaces within the structure and aids in the exchange of air and cooling of the internal spaces. During the design, considerations should be given to the design of openings and placement of the building on site to obtain the maximum and efficient flow of air [fig 4.18].

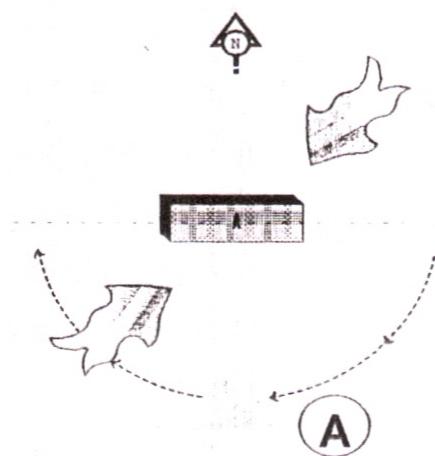


Fig 4.18. Building orientation option A(excess solar radiation).

Source: Author.

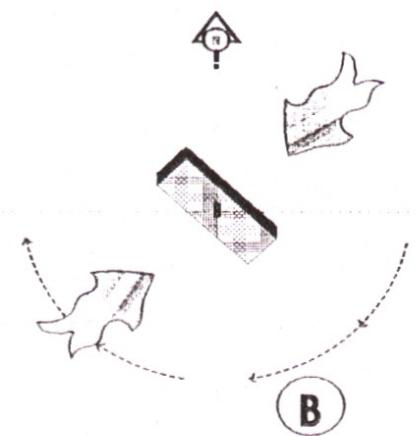


Fig 4.19. Building orientation option B(best for optimum solar use and natural ventilation).

Source: Author.

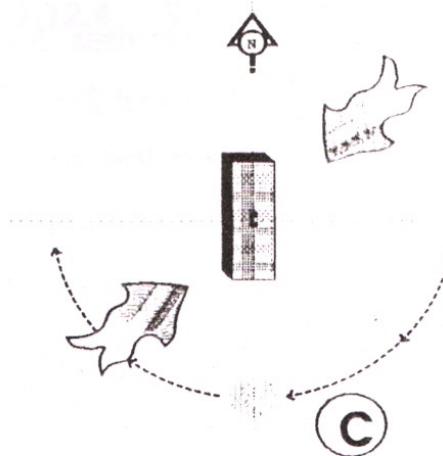
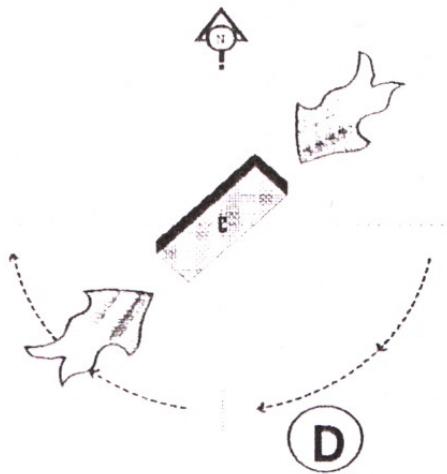


Fig 4.20. Building orientation option C(fair solar radiation and natural ventilation).

Source: Author.



*Fig 4.21. Building orientation option D(high solar radiation and poor natural ventilation).*

*Source: Author.*

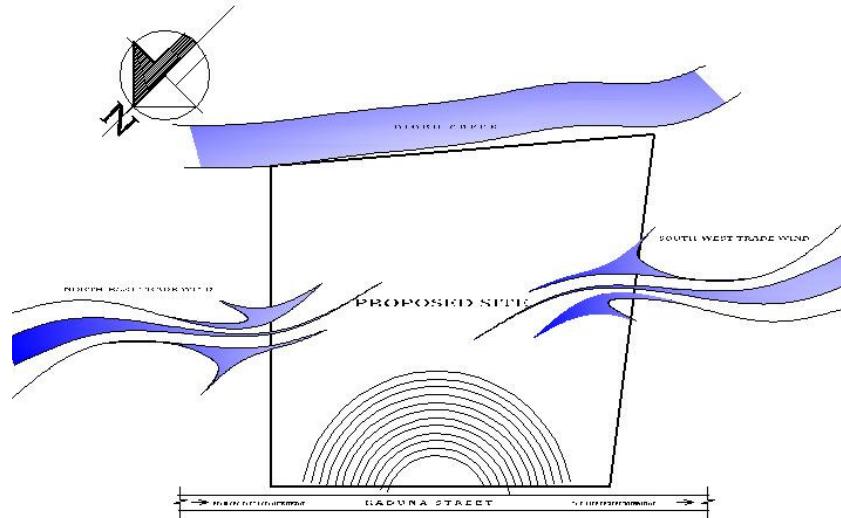
#### **4.5.1.6 TOPOGRAPHY**

The topography of the site slopes gently from the northern part to the south, this aid in the natural drainage of surface water off the site to the Diobu creek. There are no natural or artificial obstacles such as hills, boulders, roads or structures that may impede the construction process.

#### **4.5.1.7 VEGETATION**

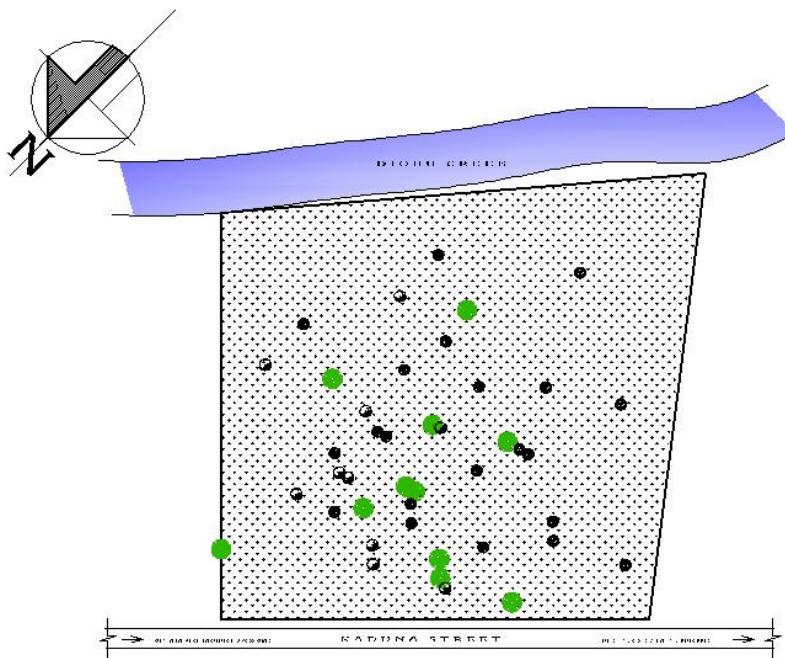
Vegetation, offers a useful guide, particularly in special cases, such as the selva, hot with tropical rain much of the year; the savannah, warm-hot, with strong seasonality; and the tundra, cold with strong seasonality.

The site has a natural vegetative system and can be said to be virgin (no man – made activities). This aids in construction due to the soil compactness and solidity. The plant root holds the soil together and reduces the effect of erosion [fig 4.23].



*Fig 4.22. Site showing wind flow and noise.*

*Source: Author.*



*Fig 4.23. The site showing vegetation.*

*Source: Author.*

## **CHAPTER FIVE**

### **5.0 PLANNING DATA AND SPACE PROGRAMMING**

#### **5.1.0 PLANNING CRITERIA**

In planning for the information and communication technology centre, a wide variety of spaces and facilities need to be provided. It should be borne in mind that the structure is expected to accommodate support facility for ICT training and hence their require functional spaces for effective operation. As such, planning and space programming should be carried out accordingly for all processes. It is however important to note that the ICT training facility will attract a substantially large volume of external human traffic (visitors and customers) that will be involved in different kinds of activities such as ICT training, research, purchase of ICT products (software, literature, etc). For this reason, it would be best practice to separate public activities from administrative and training functions early in the design process for the structure. This is especially necessary so as to control circulation and hence improve/maintain effective security within the building.

With these in mind among others, this chapter explains the different functional spaces required and which will be provided in the design for effective daily operation of the ICT centre.

#### **5.2.0 ICT TRAINING CENTRE SPACES**

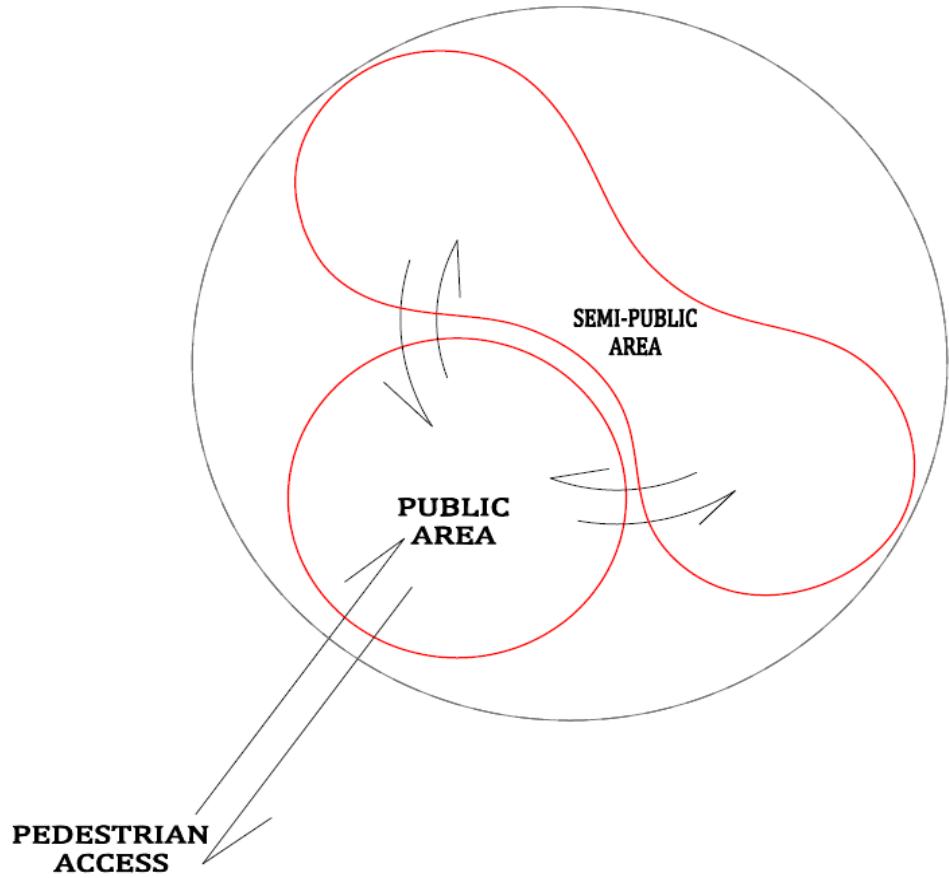
The main planning consideration for ICT training centre spaces has to do with circulation of clients, visitors and students.

Like the traditional school environment, ICT training centres during peak periods are characterized by large crowds moving in and out of the facility for varying reasons. Daily routines and classes are structured into sets such that during a certain period of training classes, a particular set of students occupy the classes. At the end of the period, another set of students come into the facility at the same time the previous set is leaving. Simultaneously, visitors and software customers are being attended to by other respective departments. These processes are continuous all through the working hours of the ICT training centre. Planning and circulation therefore has to ensure that, at all times there is a free flow of sets through the facility without crowding spaces, wasting time and also disturbing other functions.

Also the need for clear distinction and identification of different spaces and zones has to be duly considered to further aid circulation, security and eliminate disturbance of administrative functions as a result of the noise generated by moving and transient crowds alike.

The spaces to be provided for the efficient functioning of this facility shall hence be grouped into two broad zones discussed as follows;

- Public area
- Semi-public area



*fig. 5.1. Functional relationship diagram of public and semi-public areas.*

*Source: Author.*

#### **5.2.1.0 PUBLIC AREA**

The public area of the ICT training facility shall include the following spaces;

- Parking
- Entrance foyer/lobby
- Reception lobby
- Display and sales room
- Business centre
- Cash/paying offices

- Counseling offices
- Conveniences
- Auditorium
- Digital library
- Cyber café
- Technical support/personal computer repair centre

### **5.2.1.2.0 PARKING**

The ICT centre shall have different parking for staff, visitors, students/participants and services.

**Minimal Visual Impact of parking lot:** The parking lot should not dominate the building site. The visual impact of parking lot on the surrounding street and developments can be minimized through a combination of planning of landscaping elements. For example, the parking area can be to the rear or side of the building and away from the street or street intersections, while providing direct pedestrian access to the buildings. Also textures, patterns, and colors can be used in the design of parking area in order to provide breaks in large monolithic areas of pavement and distinguish between pedestrian and vehicular movement within the parking area.

## Parking space arrangement:

parking space arrangement	area/space (inc. open doors)	possible no. of spaces/100m <sup>2</sup> area	possible no. of spaces/100m of road (one side only)
· ① 0° - parallel to road. Entry and exit to parking bay difficult - suitable for narrow roads	2	4.4	17
· ② 30° -angle to access road. Easy entry to parking bay and exit. Uses a large area.	26.3	3.8	21
· ③ 45° -angle to access road. Good entry to parking bay and exit. Relatively small area/parking space. Normal type of layout	20.3	4.9	31
· ④ 60° -angle to access road. Relatively good entry and exit to parking bay; small area/parking space. Arrangement often used	19.2	5.2	37
· ⑤ Right-angles to road (parking spaces 2.50m wide). Sharp turn needed for entry and exit	19.4	5.1	40
· ⑥ Right-angles to road (parking spaces 2.30m wide. Small area needed/parking space. Ideal for compact parking layouts, used frequently	19.2	5.2	37

Table. 5.1. Table showing the different parking options

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf

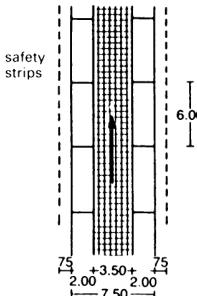


fig. 5.2. Parking parallel to the road

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf

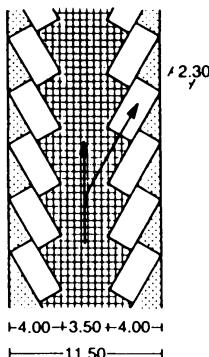
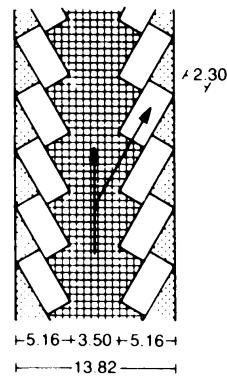


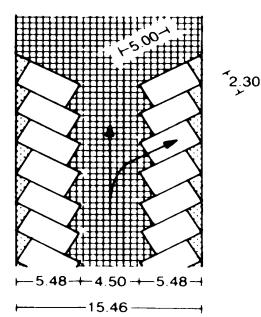
fig. 5.3. 30° oblique spaces, easy entry and exit, but for use only with one-way traffic

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf



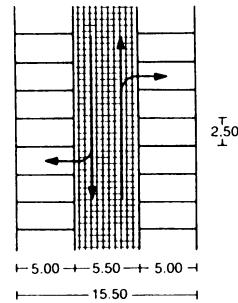
*fig. 5.4. 45° oblique parking, for use only with one-way traffic*

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf



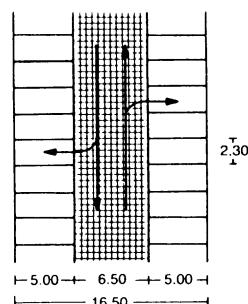
*fig. 5.5. 60° oblique parking, for use only with one-way traffic*

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf



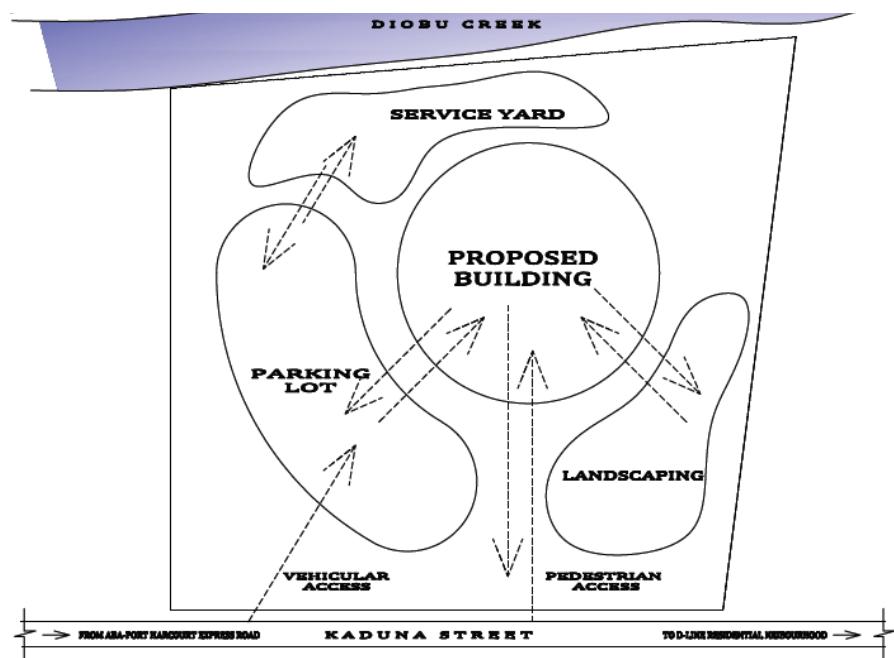
*fig. 5.6. 90° entry/exit to parking spaces for two-way traffic parking space 2.50m wide*

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf



*fig. 5.7. 90° entry/exit to parking spaces, for two-way traffic parking space 2.30m wide*

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf



*fig. 5.8. Showing the functional relationship of the different zones on the site*

Source: Author

### 5.2.1.2 RECEPTION LOBBY

The reception is the first point of contact between the clients, students and visitors and the ICT centre facility. A reception desk/counter should be provided here to take care of all enquiries. In large training centres, this area is usually very busy as a result of the human traffic flowing through it and as such adequate security measures must be put in place. It should also be designed to effectively distribute traffic to all other areas.

Waiting areas should be provided within this space for visitor. Access to display areas should be visually and physically accessible from this room.

### **5.2.1.3 DISPLAY AND SALES ROOM**

This space shall be provided for the display and sales of software packages and ICT literature materials. It shall be visually and physically accessible from the reception lobby with adequate security measures put in place in the design against theft, pilfering or damage to items.

### **5.2.1.4 CASH/PAYING OFFICES**

These shall be provided with waiting areas to serve public payment for all goods and services rendered within the facility and shall be located close to the reception lobby.

### **5.2.1.5 COUNSELLING OFFICES**

These are very vital to the running of any ICT training centre as they provide spaces for counseling staff to deal with public specifics with regards to requirements and recommendations and solutions for training. They shall be located close to the reception lobby to facilitate quick referrals between both areas.

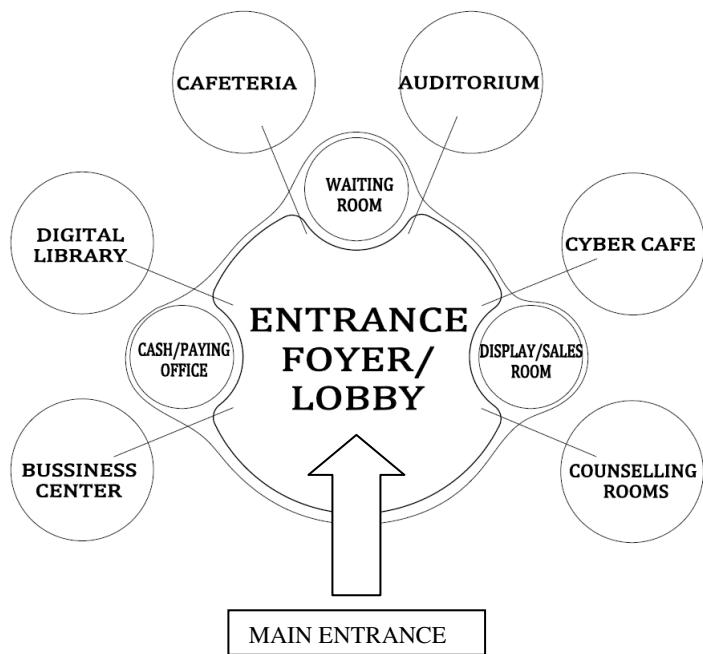
### **5.2.1.6 CONVENIENCES**

Sanitary facilities shall be provided in the public area to cater for the needs of visitors and staff in the public area. They shall be easily accessible from the reception lobby.

### **5.2.1.7 AUDITORIUM**

This shall be provided to cater for the seminars and induction/introduction and valedictory sessions hosted by the facility for its clients and students. The design for the auditorium shall take into consideration acoustic performance, seating arrangements and sightlines, though it shall not be as elaborate as large auditorium spaces specifically designed for public use.

It shall also be equipped for slide shows and multimedia presentations; hence a projector rooms shall be provided for it.



*fig. 5.9. Showing the functional relationship of the public area.*

*Source: The author*

### **5.2.2.0 SEMI-PUBLIC AREA**

The semi-public area of the ICT training facility shall be made up of the following areas;

- Training areas
- Administrative areas

### **5.2.2.1 TRAINING ROOMS**

The training rooms are the heart of the ICT centre and the very essence for its establishment.

They are fitted with all the equipments and workstations facilitating training, which are usually very expensive materials and to which the registered public (students) have access.

For this reason, they ought to be fitted with adequate security devices and manned posts to prevent damage or theft. In planning for these rooms, access shall be from a manned security lobbies adjacent to the reception area and separating them from the main public areas. The design of the individual training rooms shall take into consideration the anthropometric requirements for comfortable personal computer workstation placement and usage, as well as

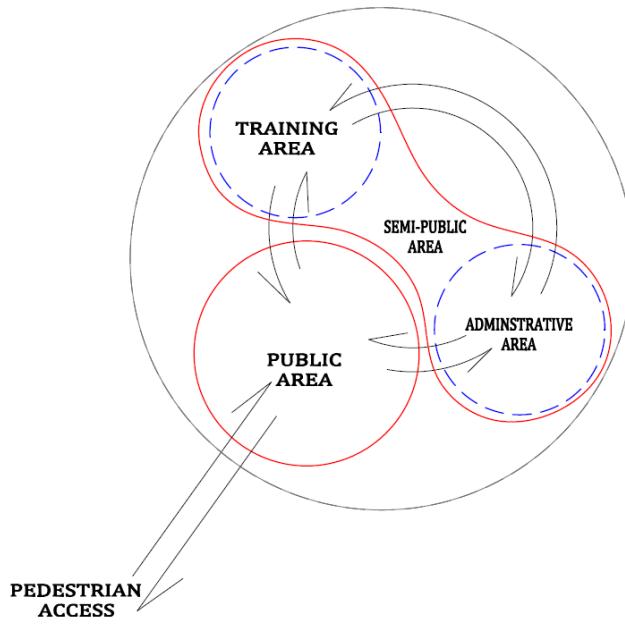
minimum circulation spaces required for movement between and around workstations. The individual training rooms which shall be provided include;

- **Computer studios:** For regular personal computer appreciation, internet related and special ICT classes.
- **Special Studios:** For students and clients requiring special assistance and cannot participate with regular classes (e.g. people with extreme physical handicaps, learning difficulties, sight or hearing problems, etc)
- **DIY (do-it-yourself) studios:** For special CAI (Computer Aided Instruction) classes and practice sessions. These however shall be exclusive to particular students.
- **Library:** For use of in-house ICT literary materials not for sale.
- **Workshops:** For special personal computer hardware appreciation, assembly and troubleshooting classes.

All training rooms shall be designed to take advantage of natural lighting and ventilation.

They shall be fitted with lecture boards and portable projectors.

ICT instructors' offices shall also be located close to the training rooms for quick circulation and also for ease of student instructor references.



*fig. 5.10. Showing the functional relationship of the public and the constituent of the semi-public areas.*

*Source: Author.*

#### **5.2.2.2.0 ADMINISTRATIVE AREA**

Offices shall be provided for all administrative and corporate departments to serve the respective staff. The current trend in designing for corporate and administrative environments is to provide a general office in which the staff will work, with an adjoining smaller office (or offices) for heads of departments and supervisors and a meeting room to serve each department or group of departments. Principal staff offices however are usually preceded by a smaller reception/secretarial office.

This principle shall be employed for the administrative offices of the ICT centre.

#### **5.2.2.2.1 MEETING ROOMS**

Meeting rooms shall be provided for each department or group of departments and shall be accessed from a central lobby linking the offices in the department. They shall however be located close to the offices of the principal staff of each department.

#### **5.2.2.2.2 SERVER ROOM**

This room shall serve as a point for the location of all server personal computers monitoring, backing up and managing the data on all the personal computers used by the facility as well as the peripherals facilitating the internet connections.

server rooms are in most cases raised sub floor or access floor to create a space for the network cable that run in and out of a server room, and to create a space for air distribution.

#### **5.2.2.2.3 SECURITY DEPARTMENT**

This department is charged with the responsibility of safe-guarding the life and properties of both staff and customers within the facility in addition to protecting the components and equipment against theft and damage. The Chief Security Officer is in charge of the functions of this department.

#### **5.2.2.2.4 CONVENIENCES**

Sanitary facilities shall be provided for each group of administrative offices to serve the convenience of the staff. They shall be accessed from the general offices or from the central lobby linking the offices.

## **5.3.0 SPACE SCHEDULE**

The following tables show the minimum space requirements to be provided.

### **5.3.1 PUBLIC AREA**

SPACE	NO OF USERS	NO OF ROOMS	AREA PER ROOM (M <sup>2</sup> )
Entrance lobby/waiting area	15	1	30
Display/sales room	2	1	15
cafeteria/lounge	50	1	65
kitchen		1	35
Store	-	2	15
Scullery		1	12
WCs (cafeteria/lounge)	50	5	4.5
Paying office	2	2	6
Counseling office	2	2	9
Auditorium	250	1	180
Projector room	2	1	5
Office	1	1	9
WCs (trainings room)	50	2	4.5
Digital Library	20	1	18
Technical support/ personal computerrepair centre	7	1	18

*Table. 5.2. Table showing the space schedule of the shared/common area.*

*Source: Author.*

### 5.3.2 TRAINING AREA

SPACE	NO OF USERS	NO OF ROOMS	AREA PER ROOM (M <sup>2</sup> )
Training room	50	1	65
Computer studio	30	3	40
Special computer studio	15	1	25
DIY studio	20	1	26
Workshop	15	1	25
Projector room	2	2	5
Store	-	2	7.5
Instructors' office	5	3	15
WCs		8	4.5
Cleaners' store	-	1	6

Table. 5.3. Table showing the space schedule of the ICT training area.

Source: Author.

### 5.3.3 ADMINISTRATIVE AREA

SPACE	NO OF USERS	NO OF ROOMS	AREA PER ROOM (M <sup>2</sup> )
Reception /waiting area	4	1	9
Administrative office	3	1	18
Human resources office	3	1	15
General office	4	1	18
Secretary's office	1	1	9
Assistant director's office	1	1	12
Directors office	1	1	18
Meeting room	30	1	45
Server room	3	1	12
Stationery store	1	1	9
WCS	21	4	4.5

Table. 5.4. Table showing the space schedule of the Administrative area.

Source: Author.

# **CHAPTER SIX**

## **6.0 TECHNICAL AND ANTHROPOMETRIC DATA**

### **6.1 INTRODUCTION**

In designing for a project such as an ICT centre, several technical and anthropometric data have to be properly considered and implemented in the design of the various spaces and also in the choice arrangement of furniture used in the spaces. This will ensure the efficient and optimized usage of the spaces as well as ensuring human comfort in utilizing the furnishings. This chapter outlines some of these considerations, which will be discussed with illustrations under the following headings;

- personal computer workstation design
- Meeting room requirements
- Auditoriums and training rooms
- Workplace design
- Storage rooms
- Planning for fire control

### **6.2 PERSONAL COMPUTERWORKSTATION DESIGN**

In order to aid the design of the ICT training centre spaces in which a large number of personal computer workstations will be placed and utilized, it is pertinent to have an understanding of the minimum human anthropometric requirements for comfort in using these equipments.

Workstations equipped with a personal computer must accommodate at least a visual display unit (VDU)/Monitor and an alphanumeric keyboard. There is no standard for such workstations because the requirements vary widely depending on individual work processes (e.g. from a simple networked terminal for enquiries to stand-alone systems for data entry and manipulation, which in addition to the VDU and keyboard may also have disk drives, scanners, printers and other peripherals). These workstations should be designed according to national safety requirements and generally accepted technical standards for good practice based on an understanding of ergonomics.

Generally when using personal computer workstations, items that are frequently used should be placed within the preferred field of vision and reach area. The best working position is when the person is seated with the forearm at a  $90^0$  angle. The thighs should be parallel to the floor with the lower leg at a  $90^0$  angle.

The table and chair should be adjustable to allow proper positioning for users of different heights. Two ergonomic systems are generally acceptable as follows;

### **Type 1 Workstation**

Adjustable-height table                    60-78cm

Adjustable – height chair                42-54cm

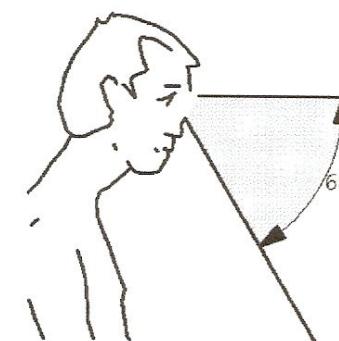
### **Types 2 and 3 workstations**

Fixed-height table                        72cm

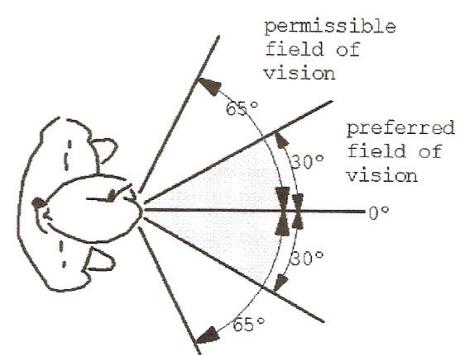
Adjustable-height chair                42-50cm

Sufficient leg clearance should also be provided.

seated



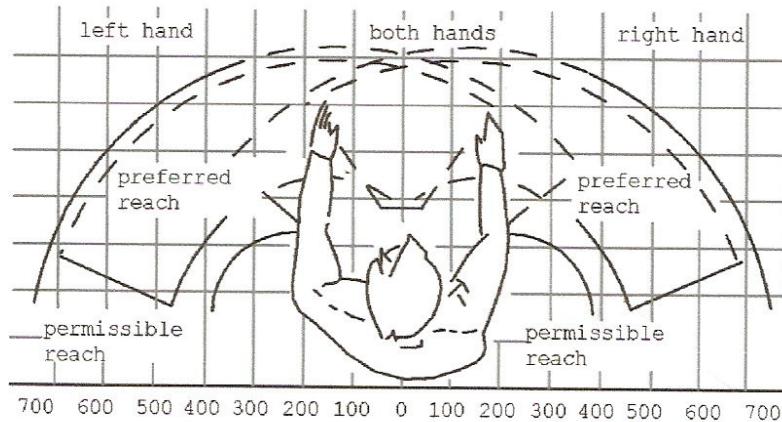
① HORIZONTAL FIELD OF VISION



② VERTICAL FIELD OF VISION

Fig 6.1. horizontal and vertical fields of vision.

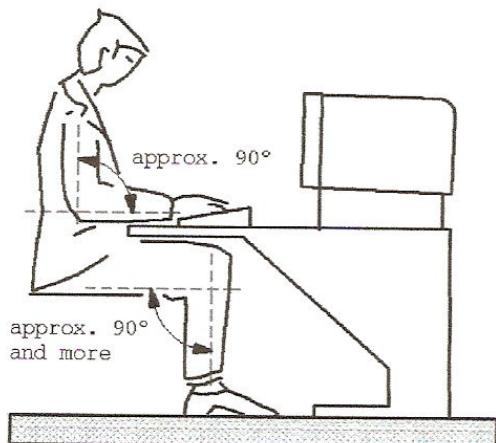
Source: Neufert Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf



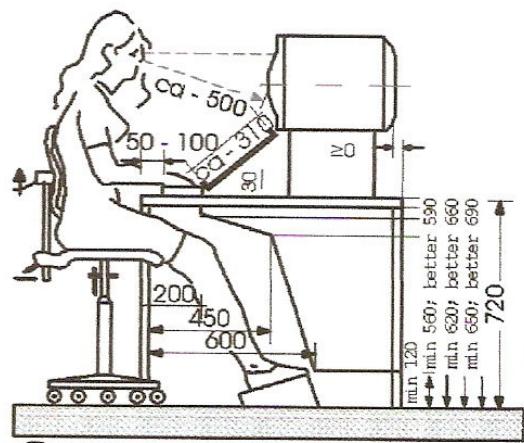
③ PREFERRED AND PERMISSIBLE AREA OF REACH

Fig 6.2. preferred and permissible fields of reach.

Source: Neufert Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.



④ CORRECT ERGONOMIC POSITION



⑤ ERGONOMIC VDU WORKSTATION WITH FIXED-HEIGHT TABLE

Fig 6.2. ergonomic sitting positions.

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.

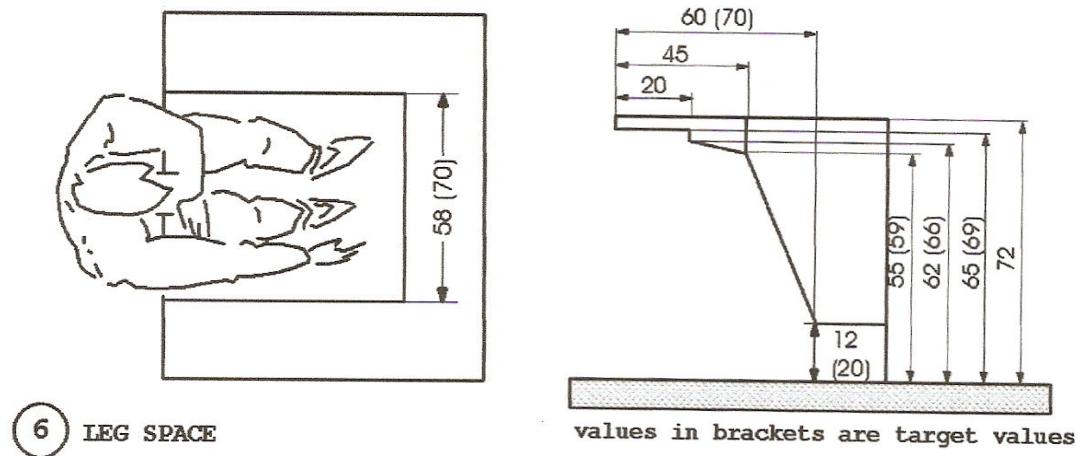
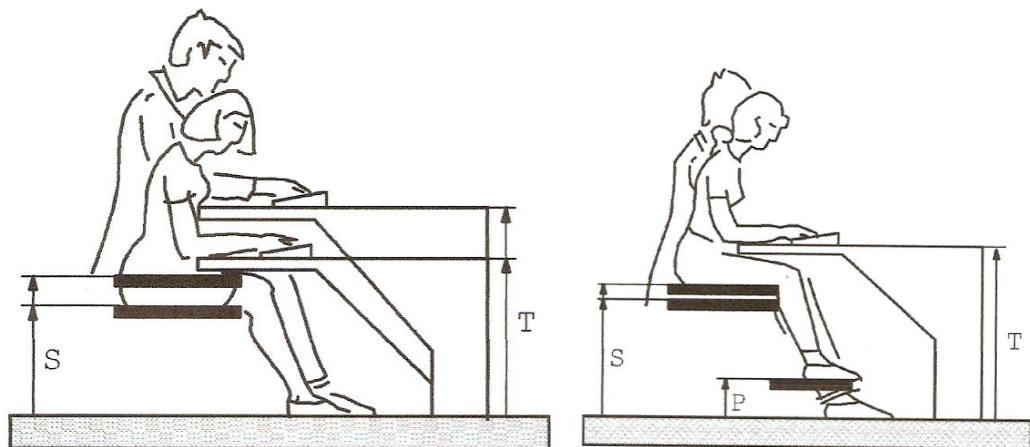
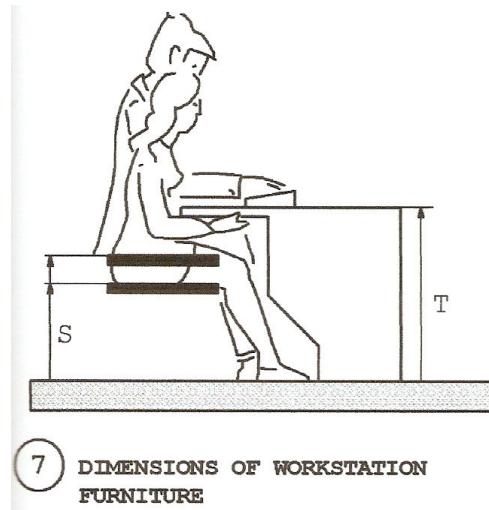


Fig 6.4. leg space and values for arm and foot clearance.

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.





*Fig 6.5. dimensions of workstation furniture.*

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.

<b>Type 1 workstation</b> adjustable-height table adjustable-height seat		
	women                    men and women	
T	(630 - kb) - (730 - kb)	(630 - kb) - (780 - kb)
S	420 - 460	420 - 500
<b>Type 2 workstation</b> fixed-height table adjustable-height seat adjustable-height footrest		
	women                    men and women	
T	(700 - kb) - (730 - kb)	(750 - kb) - (780 - kb)
S	460 - 500	500 - 550
P	0 - 100	0 - 150
<b>Type 3 workstation</b> fixed-height table adjustable-height seat		
	women                    men and women	
T	(640 - kb) - (800 - kb)	(680 - kb) - (800 - kb)
S	420 - 460	420 - 500
T = table height S = seat height P = footrest height kb = height of keyboard above table top		

*table 6.1. table of workstation furniture dimensions.*

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.

In work areas, all items of equipment close to the user (on the desktop, etc) should have a 20-25% reflection factor.

Illumination should be between 300 and 500Lx, and glare from lights must be limited (e.g. by providing specula louvered ceilings above VDU stations). Lighting strips should be arranged parallel to the window.

In addition matt surfaces in the room should have the recommended reflection factors (ceiling approximately 70%, walls approximately 50%, movable partitions approximately 20-25%).

The personal computer user's line of sight to the monitor should be parallel to the window and to any lighting tubes; the monitor should be between these if possible. It is necessary to install blinds to control daylight at visual display workstations.

The design should follow local recommendations for environmental and sound control. Also, personal computer usage generates heat from the workstation, this situation becomes unbearable in rooms that are congested and lack natural ventilation. Adequate window openings should be provided to enhance cross ventilation to maintain a comfortable room temperature.

### **6.3 MEETING ROOM REQUIREMENTS**

In order to cater for meeting room requirements in the ICT centre, furniture arrangements and the consequent implications on spaces should be analyzed. The following figures show different furniture arrangements for meeting rooms and the minimum space requirements for each.

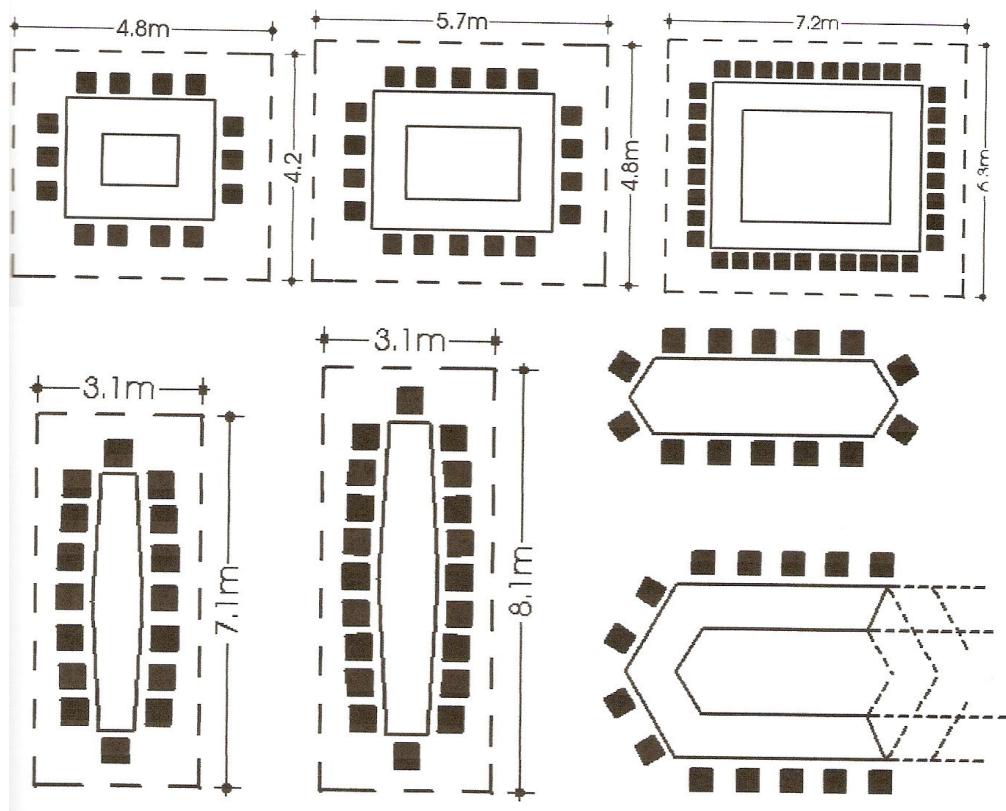


Fig 6.6. meeting room furniture arrangement and room dimensions.

Source : time savers standard.pdf.

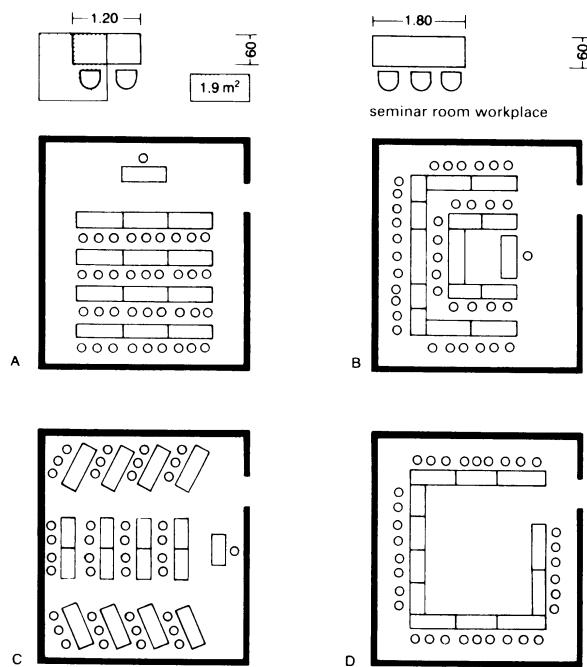


Fig 6.7. seminar room furniture arrangement and furniture dimensions.

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.

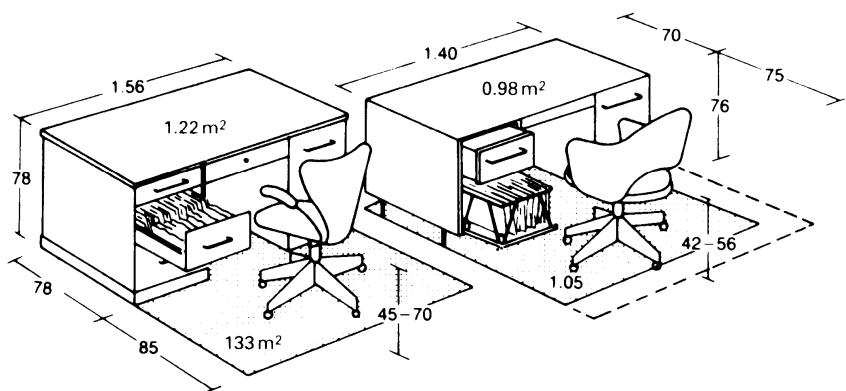
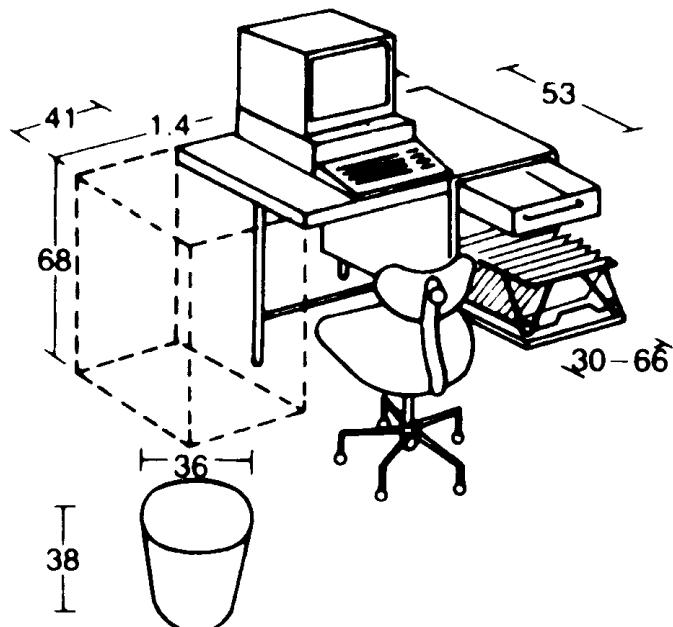


Fig 6.8. office room furniture arrangements and furniture dimensions.

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.

## 6.4 AUDITORIUMS AND TRAINING ROOMS

In planning for the auditoriums and training rooms seating arrangements/ layout should be carefully analyses.

This is in view of the fact that they would be fitted for multimedia presentations and thus equipped with cinema-type view screens and projector rooms.

The main problems associated with this are those of seating and sightlines.

Every auditorium/training room user should clearly see the view screen from wherever he or she may be seated within. Thus these will be discussed as follows;

Seating types and dimensions

Seating arrangements for good sightlines

#### **6.4.1 SEATING TYPES AND DIMENSIONS**

Auditorium/training room chairs may be selected from a wide variety. Among these are individual chairs capable of being linked together, with or without arms, with or without writing tablets, fixed seating of various degrees of comfort with or without tip-up seats, with or without arms. Others include fixed retractable seating systems capable of folding down on to tiered staging (which usually includes aisles), the whole arrangement being capable of being retractable and stored in a relatively small area, thus rendering the (flat floor) auditorium/training room capable of being used for other purposes.

The choice of seats and the arrangements is dependent on the type of auditorium/training room floor and the space available. However all may be considered together during the design stage. The following are the minimum seating dimensions for auditoriums, lecture halls and training rooms;

Back to back distance between rows of seats (with tip up seats) ..... 750mm

Width of seats, linked and without arms.....460mm

Width of seats with arms .....500mm

Unobstructed vertical space between seats .....300mm

##### **6.4.1.1 SEATING ARRANGEMENTS**

In the auditorium/training room, the audience should be able to see and hear the speaker/presenter. Where chalkboards are used, desirable viewing requirements affect the seating plan. Increasing trends towards audience participation implies that the audience

should be as close as possible to the speaker/presenter. This can be achieved by the use of a U-shaped seating arrangement, which reduces the number of rows required and also gives saving in the total area required.

However here presentation screen for projectors is fitted the main consideration becomes sightlines for visual accessibility to the screen to ensure greater audience participation. The following are the criteria for good viewing of presentation screen's;

Maximum horizontal viewing angle..... $30^0$

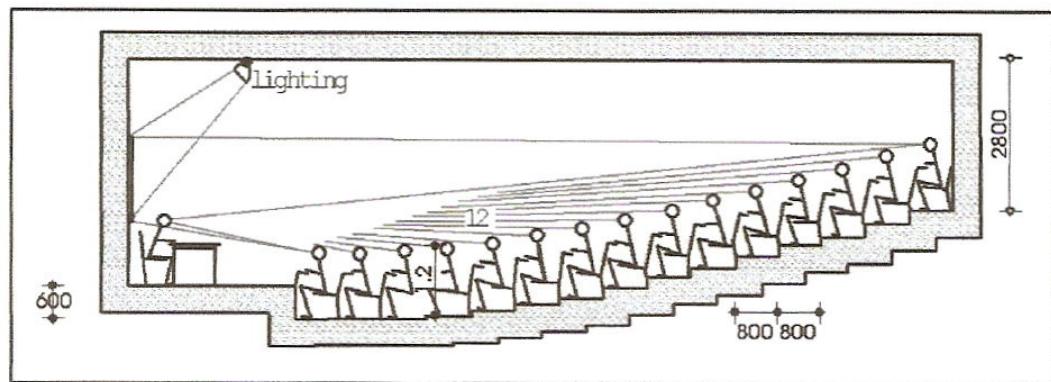
Maximum vertical viewing angle ..... $35^0$

Critical angle of projector ..... $12^0$

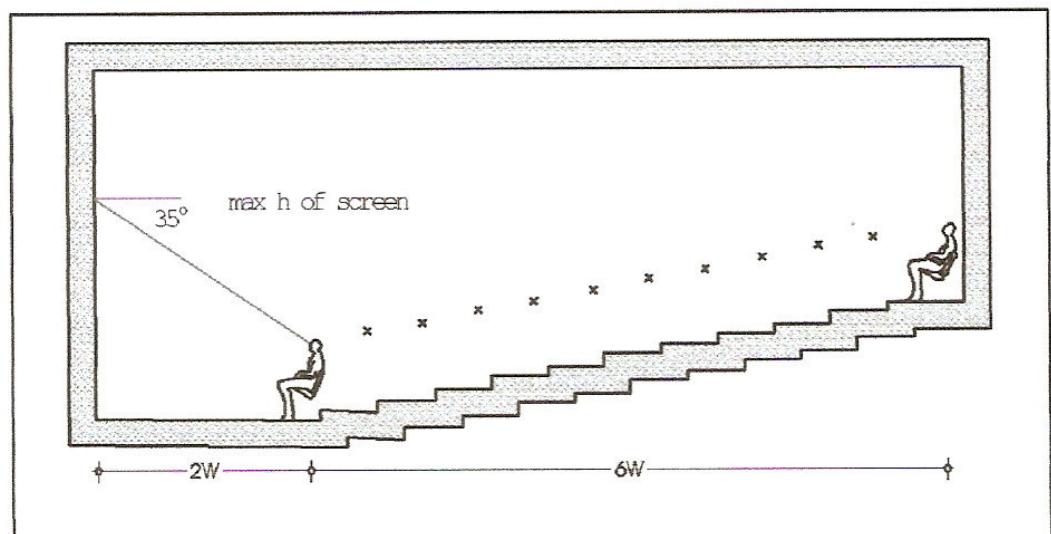
Maximum viewing distance ..... $6 \times$  width of screen

Minimum viewing distance ..... $2 \times$  width of screen.

These are illustrated in the figures below;



SECTION THROUGH ORTHODOX LECTURE THEATRE



PREFERRED VIEWING DISTANCES FOR CINEMA-TYPE PROJECTION

*Fig 6.9. criteria for good presentation screen viewing in auditoriums/training rooms.*

*Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.*

#### 6.4.2 PROJECTOR ROOM REQUIREMENTS

Projector rooms are usually required to service the presentation screens of auditoriums/training rooms. They may be placed directly behind the auditorium/training room.

The figure overleaf illustrates the minimum requirements for such projector rooms located behind the auditorium/training room.

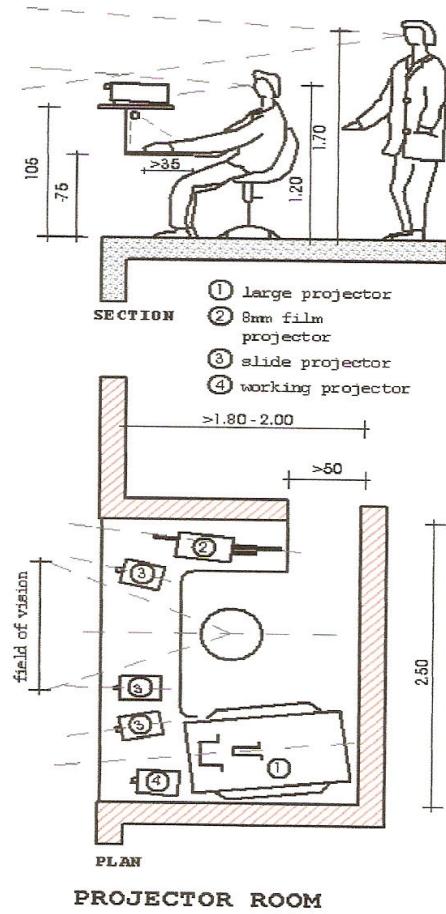


Fig 6.10. projector room minimum space requirements.

Source: Neufert .Ernst and peter-architects data 3<sup>rd</sup> edition 2000 from GFX.pdf.

## 6.5 STORAGE ROOM

Storage spaces should be large enough to accommodate goods and should have a minimum ceiling clearance of 3.8m. Large personal computer units such as towers and monitors should not be stacked more than 3 piles high. Considerations should be given to methods of moving goods (trolleys, etc) to storage areas and their corresponding implications on space.

## **6.6 PLANNING FOR FIRE CONTROL**

Designing for fire control to meet potential fire hazard involves the use implementing design measures to limit the spread of fire within and outside the building by compartmentation, detectors, sprinklers and the choice of materials for structure and cladding. Others include providing readily accessible and identifiable means of fire escape with alternative routes in every direction.

## **CHAPTER SEVEN**

### **7.0 DESIGN SYNTHESIS**

#### **7.1 DESIGN CONCEPT**

The design would be geared towards the realization of a structure that projects an international image that is desired and befitting for the ICT sector of the economy. Hence, the concept for the design would be centered on the international style of Architecture, borrowing elements from the Postmodernism movement in architecture. The concept would be an analogy of the desktop personal computer. It will be distinguish itself from the surrendering structures and stand out as an ICT facility, signifying superiority, portraying a higher level of development and greater opportunities, all of which ICT represents on the Nigerian socio-economic scene.

#### **7.2 DESIGN PHILOSOPHY**

Quoting its vision statement, NITDA desires “.To make Nigeria an information technology capable country in Africa, and a key player in the Information society, using IT as the engine for sustainable development and global competitiveness”. Hence, the keyword underlying and guiding the design process of the building structure would be “Desire”.

By this, the architecture of the structure would be geared towards eliciting genuine feelings of desire from all and sundry experiencing it. In this regard, design would strive towards achieving the following:

Upon sighting the structure, the casual observer/passer-by should desire to experience firsthand, the architecture of the structure.

- Upon entering the structure, experiencing the architecture and observing the layout of the spaces, functions and activities within, the student, visitor should desire to one way or another be associated with the establishment, either as a staff/employee, or as a business partner.
- The doubtful/undecided customer should upon experiencing the architecture of the structure, be immediately convinced as to why he/she ought to be trained or be knowledgeable in ICT application.
- In all, the general architecture of the structure should ignite a genuine desire and yearning to be computer literate, possess the necessary skills to utilize it effectively.

In this writer's humble opinion, if the design of the structure is able to on a large scale, incite genuinely, these feelings in observers, visitors customers, business partners and potential computer literate citizens the centre will ultimately achieve its goals and objectives.

### **7.3 DESIGN CONSIDERATIONS**

In line with achieving all the above mentioned, as well as the design aims and objectives stipulated in section 1.4 of this work, the design would incorporate the following design considerations:

#### **7.3.1 PARKING**

Adequate parking facilities would be provided for all the occupant groups the building is expected to occupy namely staff and employees, customers, clients, students and visitors. Parking spaces would be located close to the structure as to ensure quick access to and from the building in all weather conditions.

### **7.3.2 CIRCULATION**

The design would incorporate short, direct and effective circulation routes within and between the related functions of the building.

These circulation routes would be clearly defined and easily accessible for the various occupant groups utilizing them, thus ensuring security and eliminating confusion.

### **7.3.3 LIGHTING**

The design would make optimum use of natural lighting from the sun for lighting obscured areas and light dependent tasks. The design would, however attempt to reduce the number of spaces obscured from natural lighting to the barest minimum. This will reduce the amount of energy consumed during the day.

### **7.3.4 VENTILATION**

The design would also take advantage of the natural ventilation features presented by the site location. The design would be such that all activities going on in the building will not be affected by the absence of artificial means of ventilation. This would nonetheless be in conjunction with a central mechanical means of ventilation and air conditioning so as to provide sufficient ventilation alternatives in cases of constant power supply.

### **7.3.4 SECURITY**

Inasmuch as security personnel would be available on the site and within the premises, the design would be such as to produce inherent security features, thereby further enabling the security personnel to effectively carryout their duties. This would especially be achieved through proper zoning and circulation.

### **7.3.6 AESTHETICS**

This consideration would be given particular attention. The design would try to incorporate aesthetic and comfort features in all areas. These would include interplay of mixed volumes, floor levels, visual access and clean sightlines.

### **7.3.7 FIRE CONTROL**

As a result of the high volume of human traffic the building is expected to occupy, coupled with the extensive use of electrical equipment, machinery, installations and apparatus within, the design would provide adequate safety and control features against any accidental fire outbreaks.

This would be by way of easily accessible fire escape routes as well as fire control apparatus such as fire alarms and sprinklers.

### **7.3.8 STRENGHT AND SAFETY**

Also, as a result of the high volume of human traffic and various equipment and installations expected within the building, the design would pay attention to structural efficiency and details.

Here, the design would employ sustainable structural systems and methods with a view to ensuring a structurally safe and sound building envelope.

## **7.4 FLEXIBILITY AND FUTURE EXPANSION**

The design would attempt to explore and implement possible potentials for future expansion of the building to accommodate increased activities and functions within. Flexibility of internal spaces to suit changing trends in operational principles and demands would also be given adequate consideration.

## **7.5 CONCLUSION**

In concluding this work, the design would properly implement and execute all the relevant findings of the research in order to achieve an architecturally sound structure which exhibits a thorough and careful interplay of the basic design principles of, unity, balance and harmony in the application of design elements, while respecting the natural conditions of the site.

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<http://www.jidaw.com/itsolutions/qkonproject.html>

<http://www.ncc.gov.ng>

<http://www.nitpa.org>

[www.devnet@devnetnigeria.org](mailto:www.devnet@devnetnigeria.org)

[www.fantsuam.org](http://www.fantsuam.org)

[www.idrc.com](http://www.idrc.com)

[www.jidaw.com](http://www.jidaw.com)

[www.ncc.com.ng](http://www.ncc.com.ng)

[www.nitda.gov.ng](http://www.nitda.gov.ng)

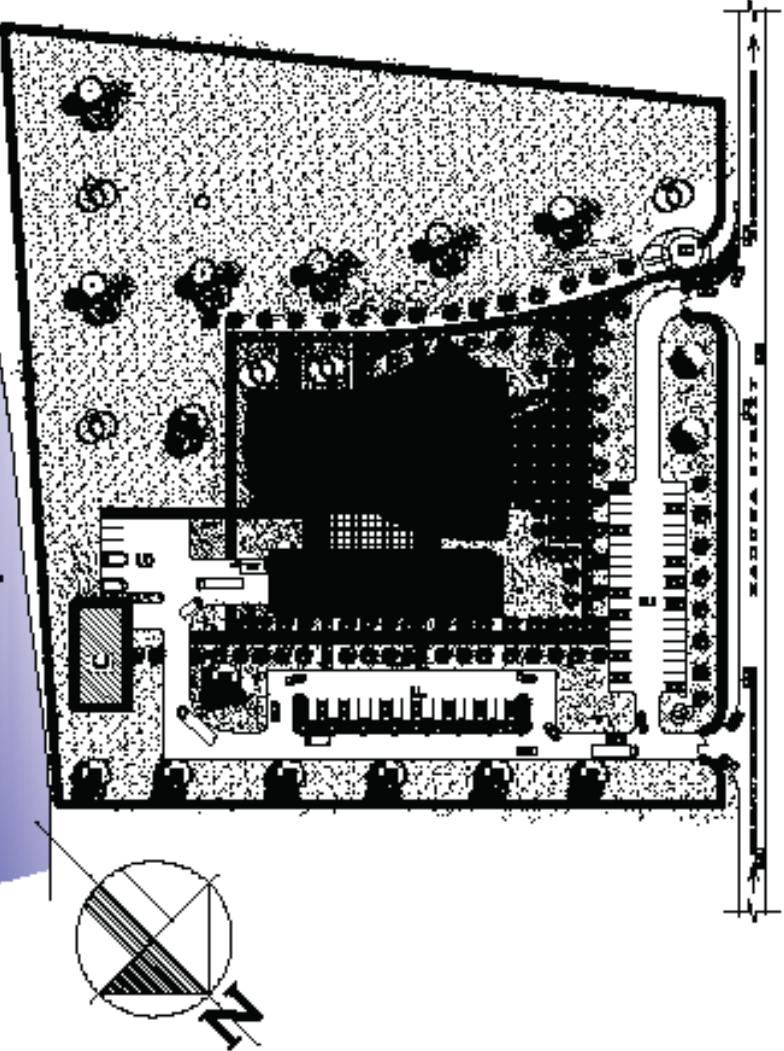
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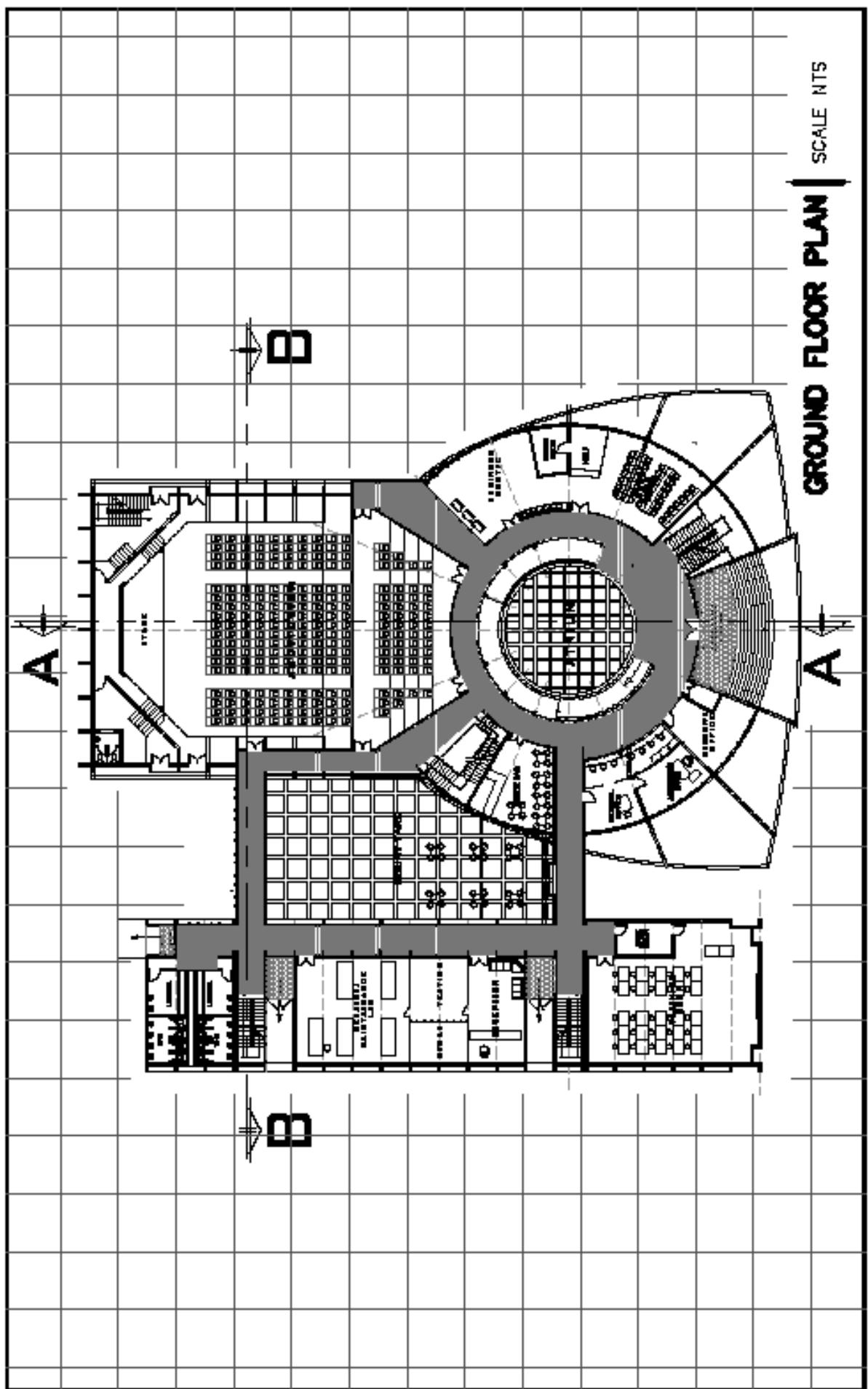
SCALE NTS

SITE PLAN

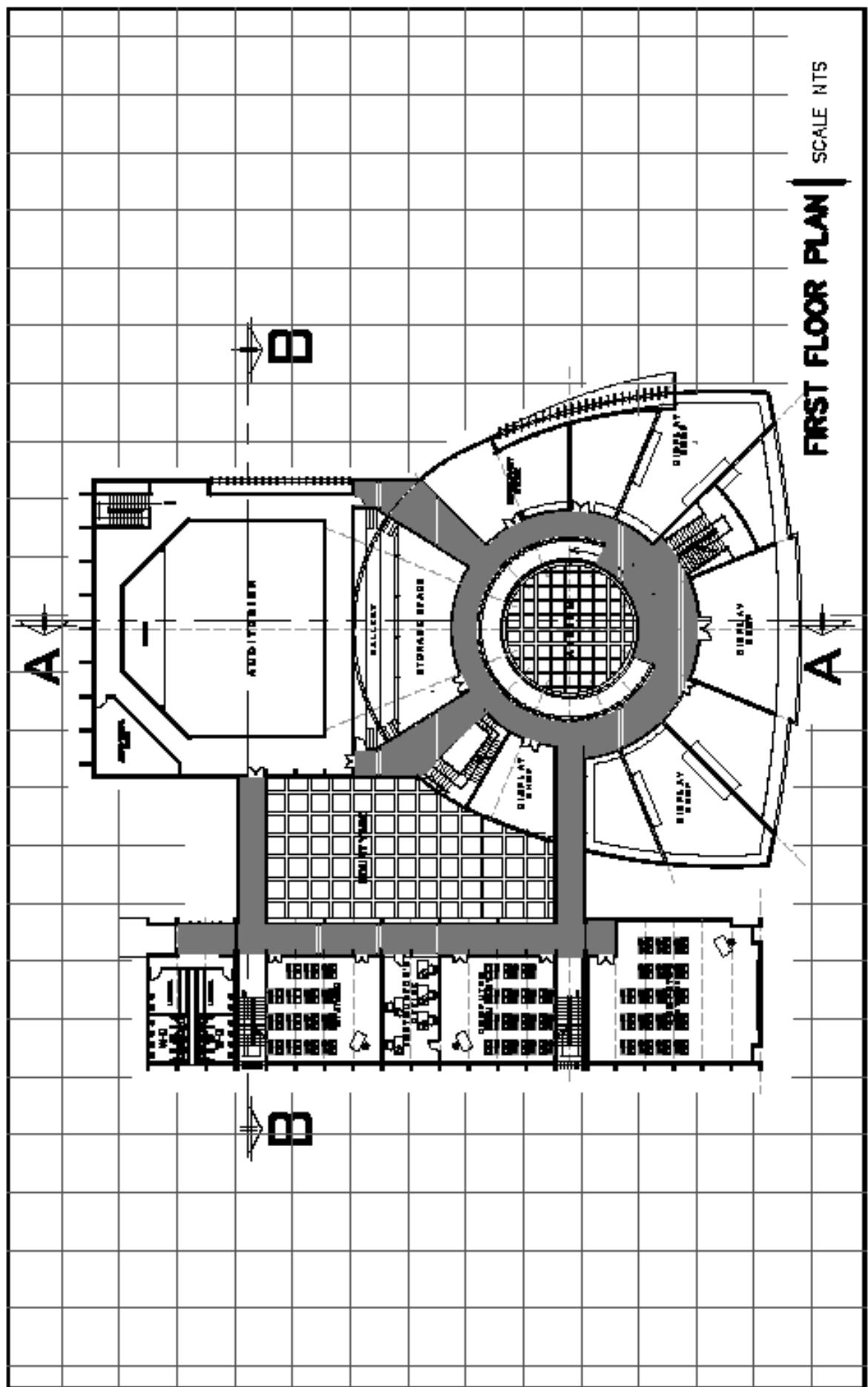
LEGEND	
A	PROPOSED BUILDING
B	GATE HOUSE
C	POWER HOUSE
D	OUT DOOR ACTIVITIES
E	GENERAL PARKING LOT
F	STAFF PARKING LOT
G	SERVICE PARKING LOT
H	PEDESTRIAN WALK-WAY
I	WATER FEATURES
J	COURT YARD
K	MAIN ENTRANCE



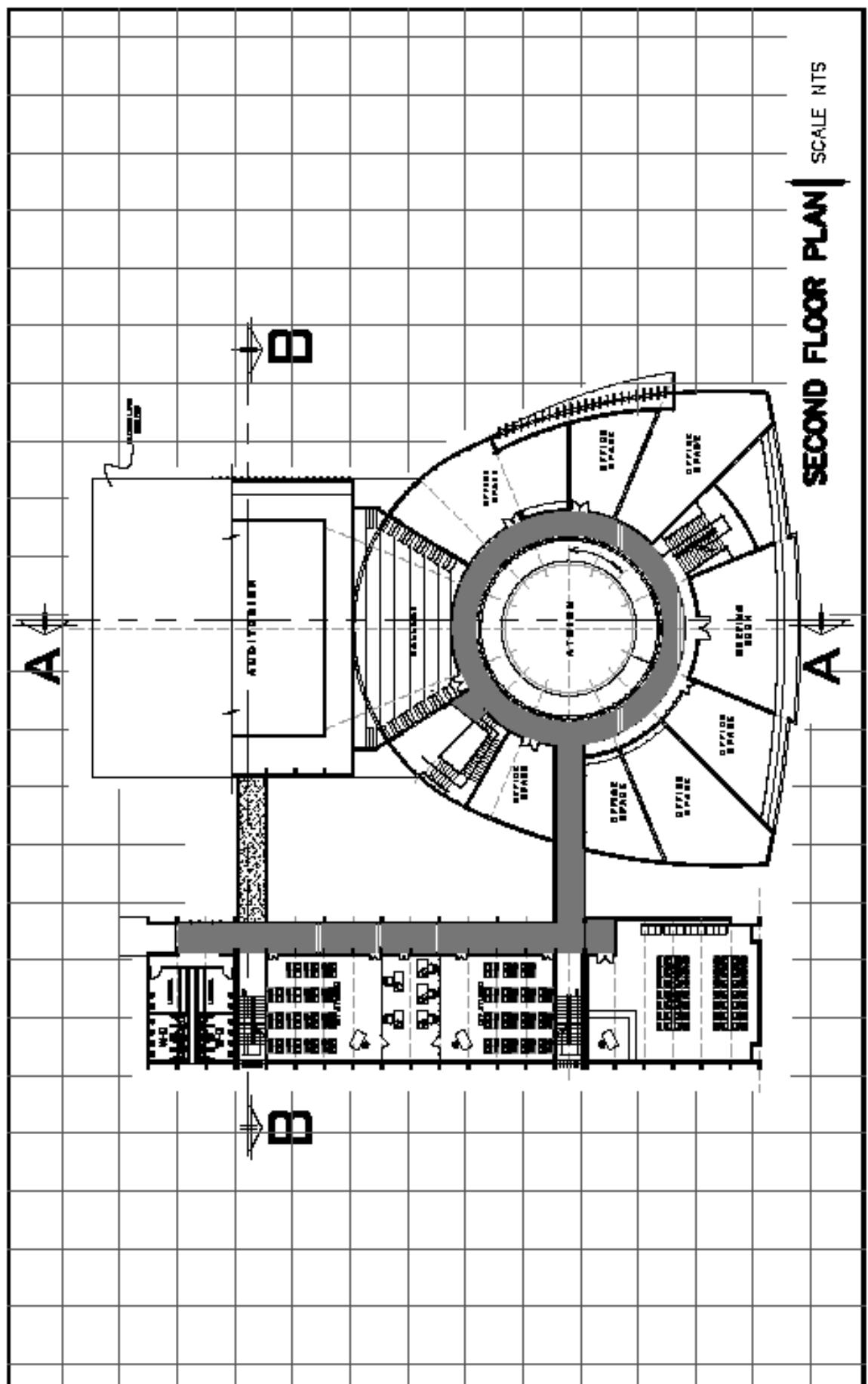
**GROUND FLOOR PLAN | SCALE NTS**



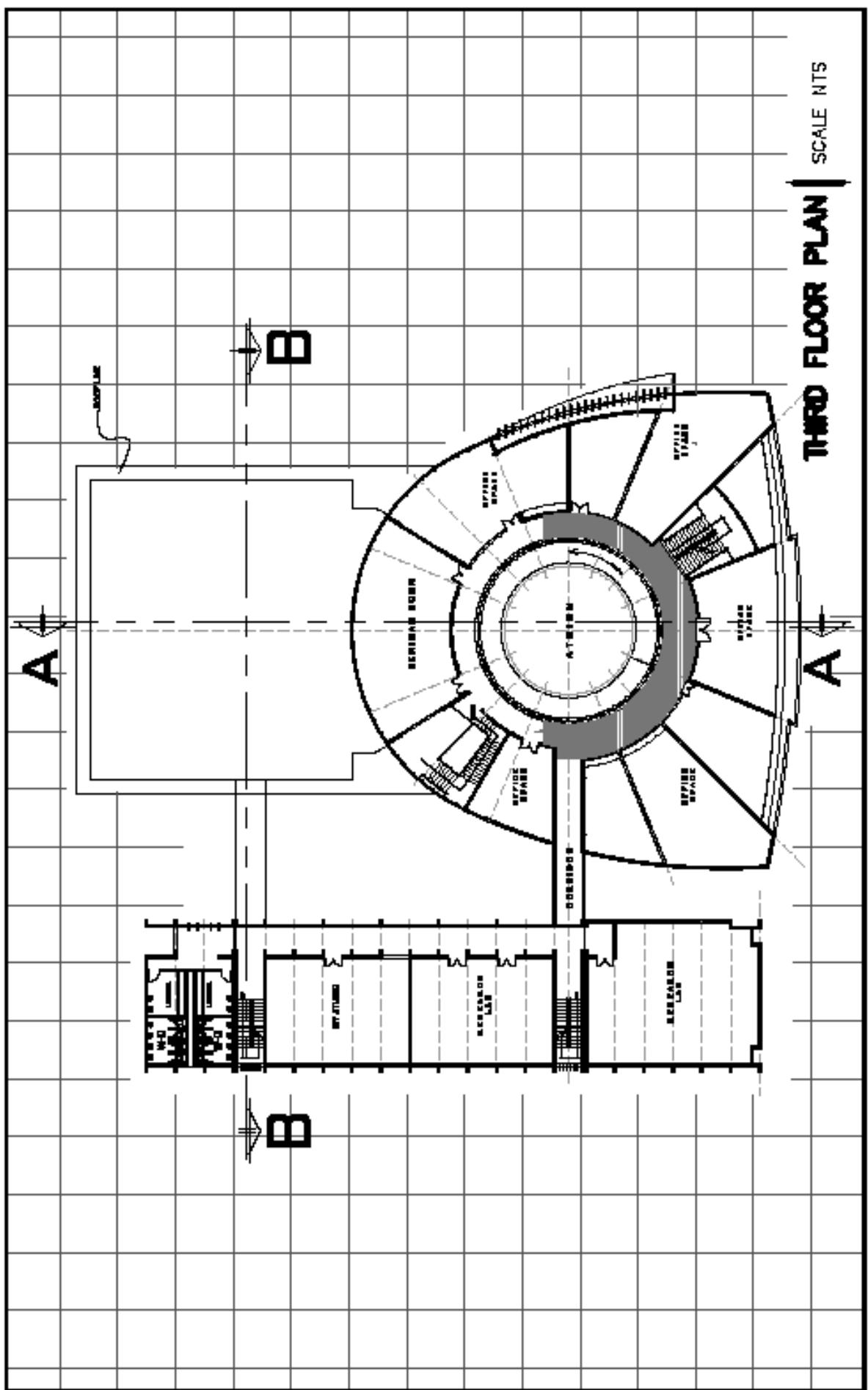
FIRST FLOOR PLAN | SCALE NTS



**SECOND FLOOR PLAN | SCALE NTS**



**THIRD FLOOR PLAN | SCALE NTS**

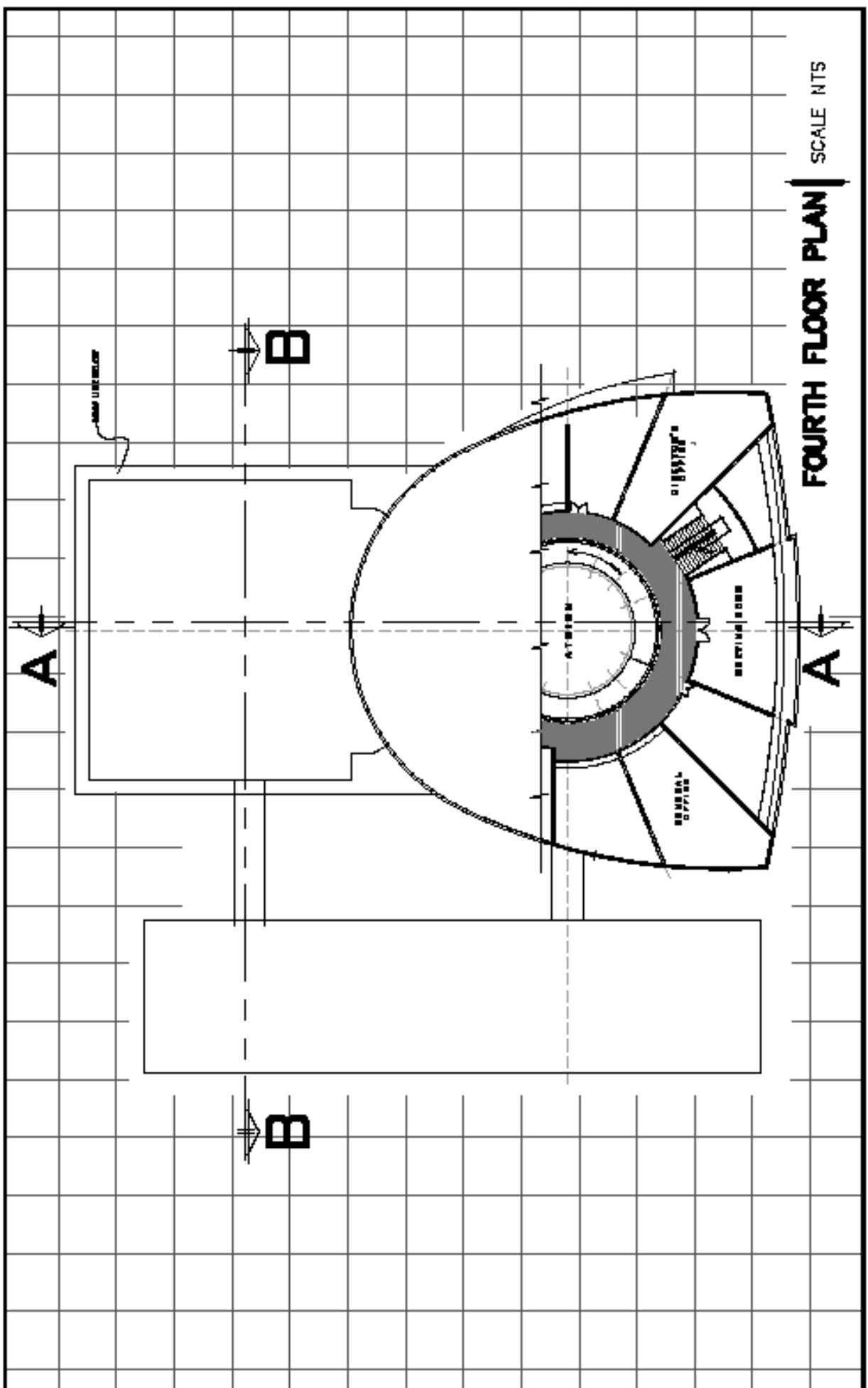


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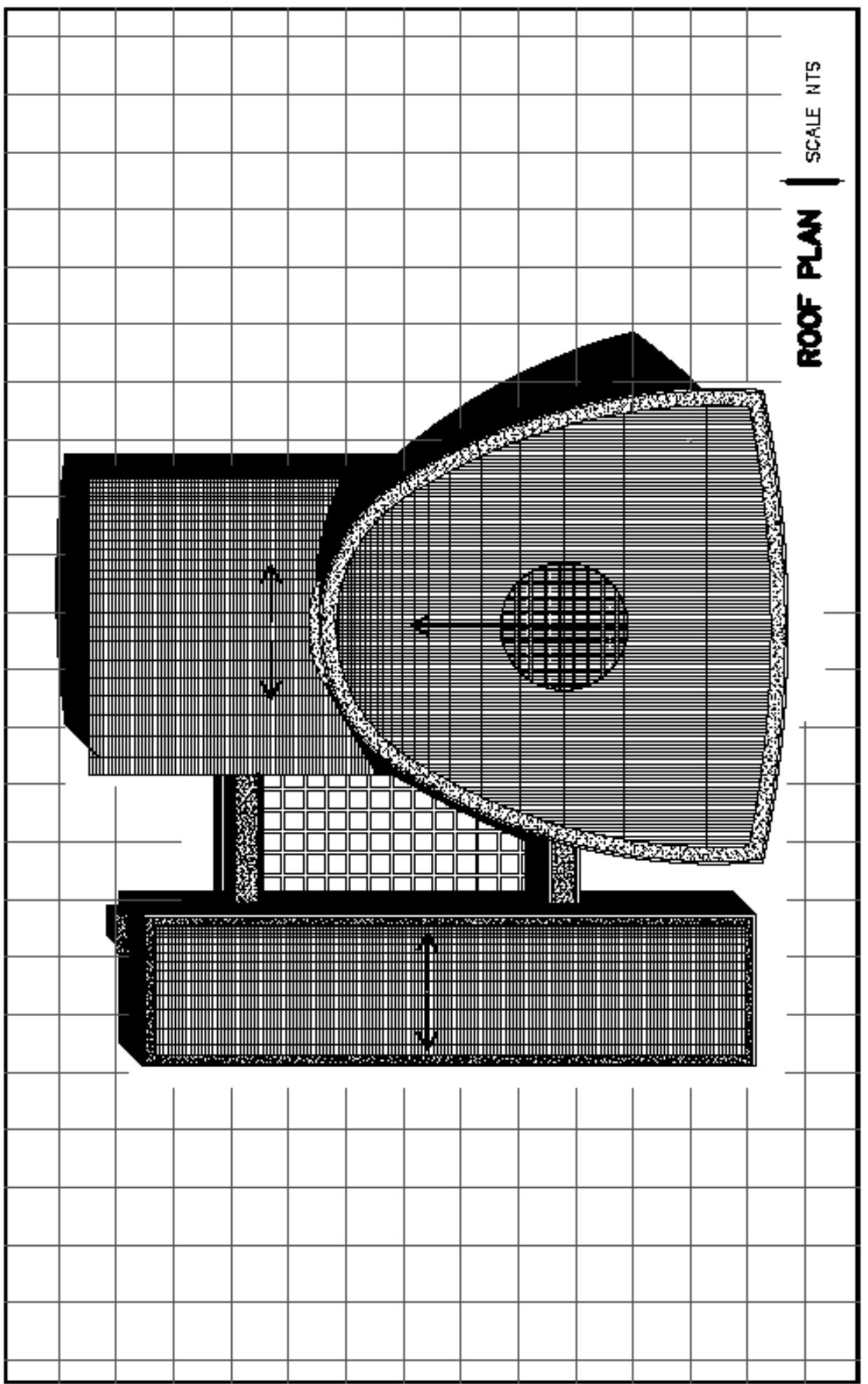
**FOURTH FLOOR PLAN**

A

B

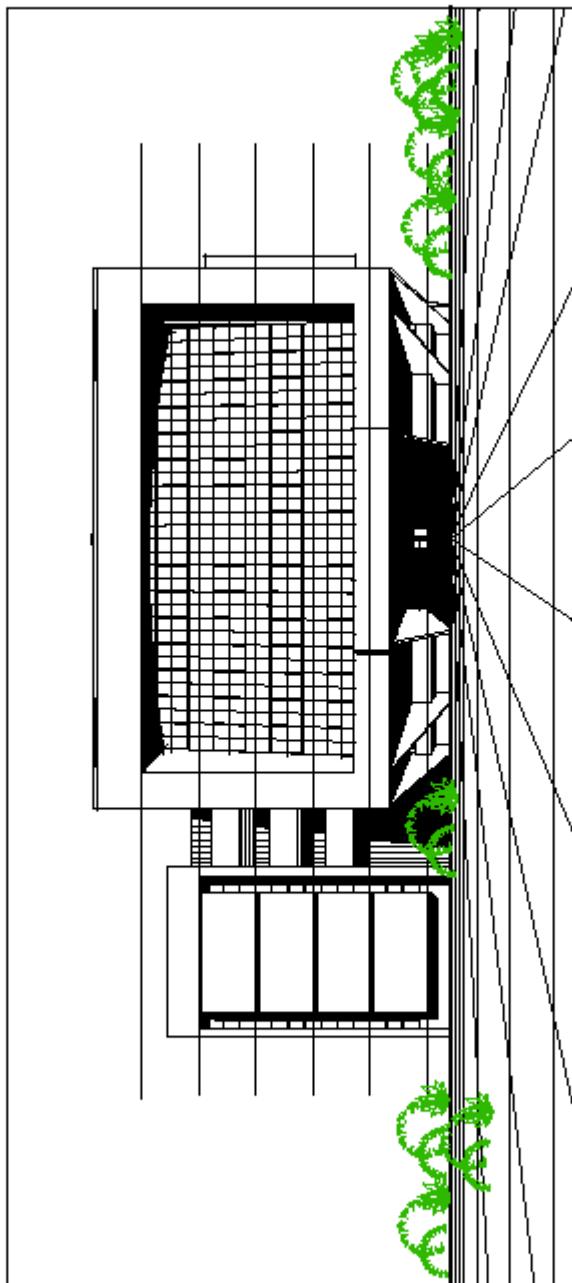


**ROOF PLAN** | SCALE NTS



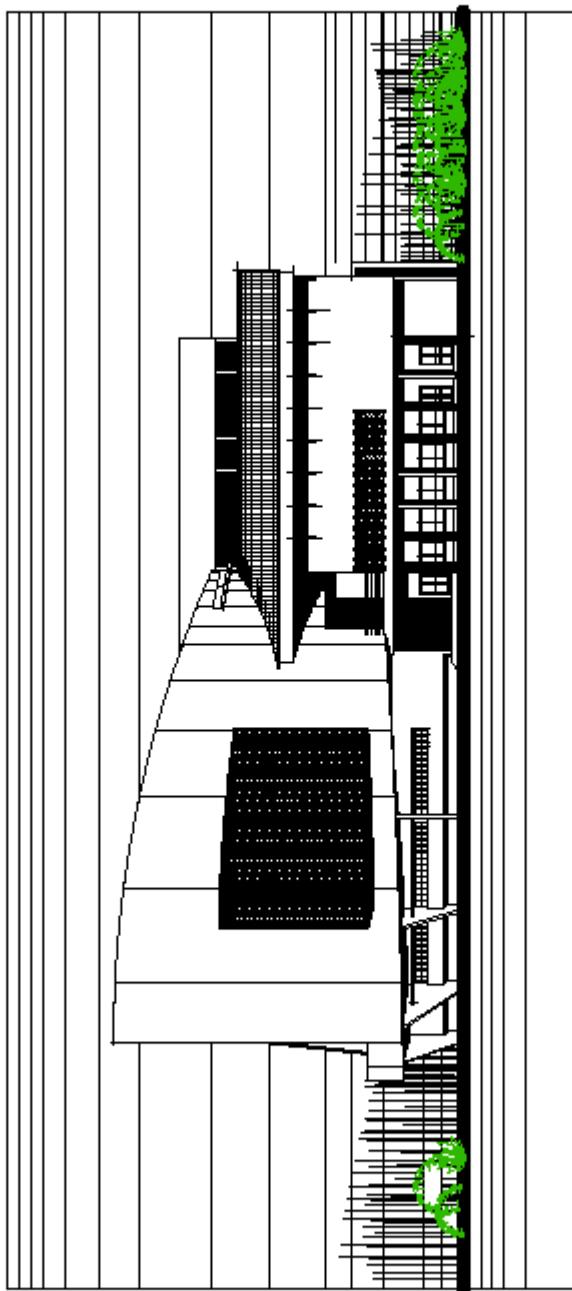
SCALE NTS

NORTH—WEST ELEVATION |



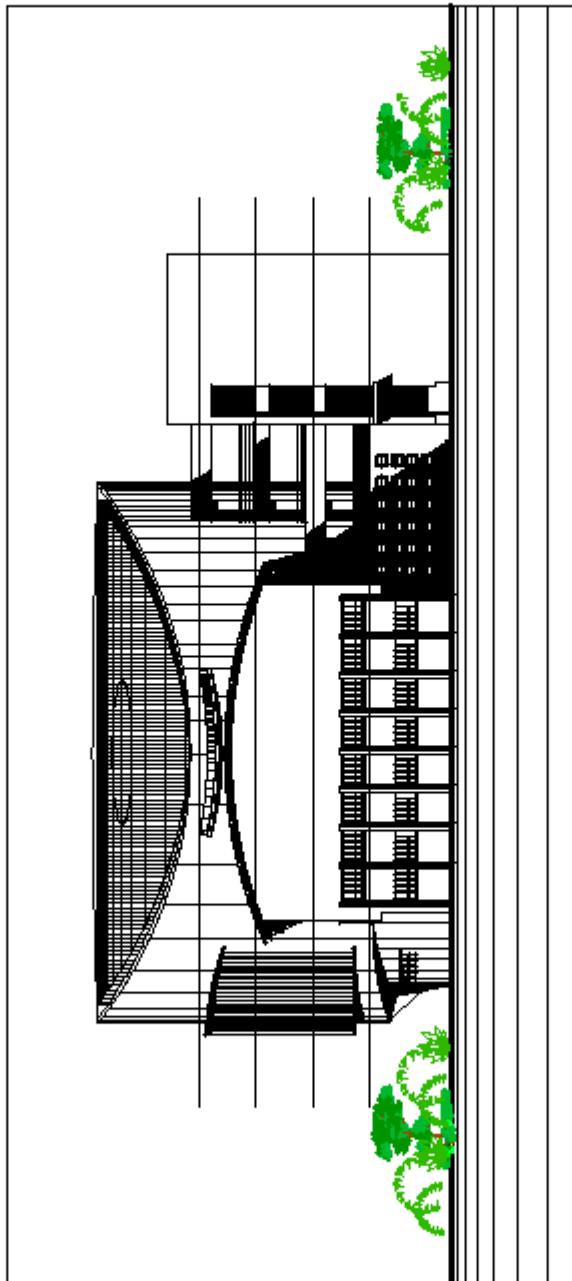
SCALE 1:50

SOUTH-WEST ELEVATION |



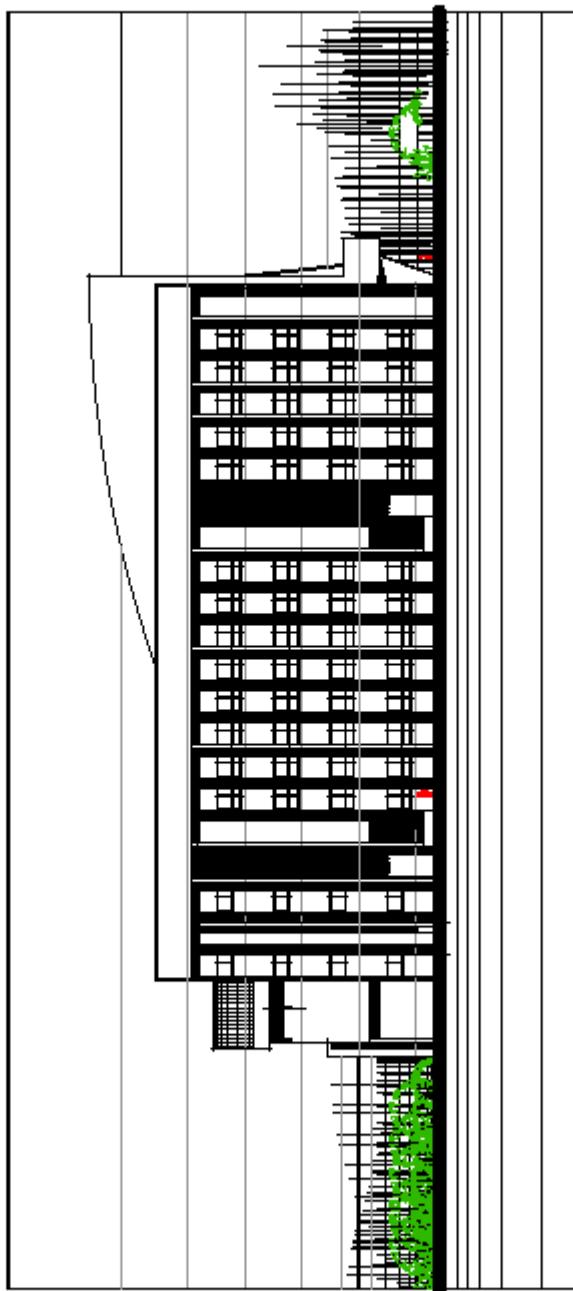
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SOUTH-EAST ELEVATION |

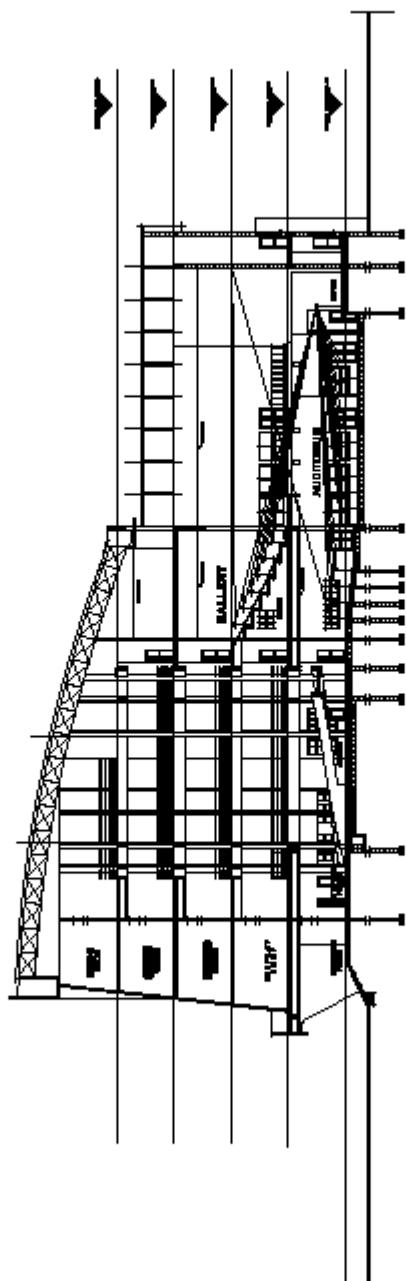


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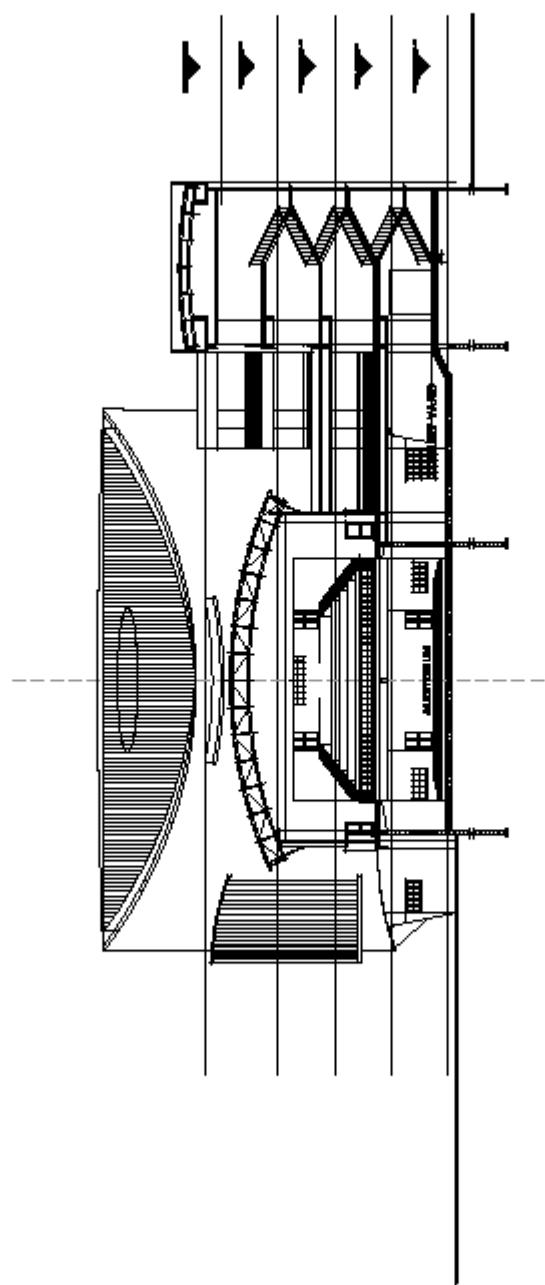
NORTH-EAST ELEVATION |



**SECTION A-A | SCALE NTS**



**SECTION B-B** | SCALE 1:15





PERSPECTIVE VIEW



PERSPECTIVE VIEW