COMMUNITY CENTRE
YENAGOA, BAYELSA STATE
(A STUDY OF MULTIFUNCTIONAL ADAPTABLE SPACES)

BY

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PG/M.SC/10/54573

DEPARTMENT OF ARCHITECTURE,

FACULTY OF ENVIRONMENTAL STUDIES,

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A Thesis Submitted to the Department of Architecture, University of Nigeria, Enugu Campus in Partial Fulfillment of the Requirements for the Award of the Master of Science Degree in Architecture

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CERTIFICATION

IKIRIGO, KELVIN NENIBEBH CHARLES, a postgraduate student in the **DEPARTMENT OF ARCHITECTURE, UNIVERSITY OF NIGERIA, ENUGU CAMPUS** with registration number **PG/M.SC/10/54573** has satisfactory completed the requirement for course and research work for the degree of Master of Science (M.SC) in Architecture.

The work embodied in this thesis report is original and has not been submitted in part or full for any other diploma or degree of this or any other university.

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DEDICATION

I dedicate this entire thesis to Almighty God, My late father: Chief Charles Daguopu Ikirigo, and the rest of my family.

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ABSTRACT

The environmental contribution of the built environment to man cannot be treated with a lames leg as the total man is a sum total of his environment; this is so because the environment moulds man, just as man moulds his environment. The spaces man creates to serve a particular function must be adaptable and sustainable since there is a chronological and a continuous order in life. Space adaptability is one of the germane principle if we are to achieve a sustainable architecture which tend to provide one of mans basic necessities of life. Therefore, or so, adaptability and flexibility cannot be overemphasized because of the present need for sustainability in our time.

This overture is geared towards obtaining adaptable spaces within a community centre, which will in turn be a machinery and aid in the study and understanding of the nitty-gritty in the design of this particular project. Nothing can have value without being an object of utility. The stereotypical method of spatial design is to develop a space for its effective utilization for the primary purpose. Sometimes, a simple adjustment of spatial configuration allows for a change in use for the same space. These adjustments define the adaptability of such space. **Chapter one** of this thesis report presents an introduction into the subject, stating the motivation and purpose, statement of architectural problems, defining scope etc. **Chapter two** presents the theoretical framework backing up adaptable spaces and space syntax, historical background of both the study and the design structure. The **third chapter** sited relevant cases which were also evaluated for study. **Chapter four** talks about general planning principles and design considerations for the design. **chapter five** dwells on analyses of required spaces also throws more light on the design criteria, the chosen site and its implications on the design. The final

chapter (six) rounds up this project as a design, the design synthesis and philosophy behind it discussed and recommendations and conclusions made.

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CHAPTER ONE

1.0 INTRODUCTION

A community centre is a place that promotes communal living and brings about good neighbourliness between the citizens/residents of an area, both the autochthonous and visitors alike. It is a place where people within the community and other neighboring communities come together for participation in such activities as recreation, social, cultural and educational purposes.

Community centre tends to reflect and focus on the life of the people whom it is built for, by providing a functional configuration that will house their recreational, cultural, social and civic life of the community.

A community centre is a cynosure and a place that promotes peaceful co-existence between individuals of different stereotype, and also the centre serves as a panacea for belligerent communities located within its proximity

It is pertinent to note that most of the activities which take place in a community centre are informal in nature and that most of the participation in the centre are carried out by informal community members.

The centre should be suitable for casual and everyday situations rather than being stiff and restrictive with witty allocation of facility and functions to permit efficient communications and smooth operation of the centre. Assiduity should be employed so as to avoid conflicts of functional interest like not placing games area next to a conference rooms, or a library facility to a sports arena, just to mention only but a few of these incompatible space syntax

The architectural character of the buildings within the centre must as a matter of necessity house efficiently the facilities while suggesting its purpose by its appearance and design, serving as a mirror of their cultural heritage. The spaces to be provided must blend and romance the people whom the design is made for, there is also the need to extirpate incongruous activities, thereby creating rooms for more functional adaptable spaces within the centre, so as to meet futuristic activities of the people which accumulates in the community over time, as the efficient use of spaces is cardinal.

1.1 BACKGROUND OF STUDY

Every piece of architecture entails a process and a product culminating through a vast range of activities at different phases which are all geared for human habitation and co-habitation with other life support sources.

The understanding of space is the key to the understanding of architecture since space affects man and controls his spirit within the environment on which he carries out his daily activities. The environment we live-in exist as a space factor, of which space is an infinite material which the architect modifies by enclosing some aspect of it to suit a purpose and serve a function which could be for cultural, social, education, recreational or commercial activities. Man recreates the natural environment to form a man made environment.

This great variety of possible types of space makes any definition of space in planning and design difficult. Generally speaking, however, space is the three-dimensional extension of the world around us, the intervals, distances and relationships between people and things. Pultar (1999). In this research paper, architectural space and its adaptability is what our

concern will anchoring on. In that light, “Space is, quite simply, what we use in buildings‖. Hillier (2007 p.19)

This research work is on a proposed community centre and a study of multifunctional adaptable spaces, the term space will be used to mean architectural space, so it requires articulate space planning as a deliberate point of call. Planning of space in this contextual framework refers to the allocation of land use plan that will be adaptable for human activities that should occur on land, and determines the level of those activities of varying stereotypes functioning in harmony and adaptable to its users. It is the resulting combination of many of the spatial elements drawn and outlined to be provided within a community center to foster peaceful co-existence and neighborliness. The society is dynamic and evolving so there is a need for a paradigm shift to balance the capricious nature of the environment, man has the inherent ability to adapt, so the need to create adaptable spaces. Every space within this purview will be planned to suit their social organization which involves the conversion of a spatial configuration (architecture) into a social – cultural objective to curb the spate of restiveness, insurgence and other negative societal vices bedeviling the region Moreover, as the social activities of people accumulate in the community, the efficient use of the spaces is needed, and a fixed rule for locating high-profit activities in each fixed area is being applied. In order to apply this rule, although considering the characteristics and efficiency of every use, location, and scale is important, considering the accessibility of the land is also an important factor.

It is according to how both forms and spaces are elaborated into patterns – spatial layout - that the socio-cultural function may occur. The spatial layout embodies the social nature of the building through which it localizes people and modulates their interaction as well their experience of the place. Hence, the spatial ‘component’ must not be disregarded but

considered as a significant factor of how the socio-functional processes are (or not) generated (Hillier, 1996: 24). Thus, it is how the spatial layout is defined – structured and organized - and, consequently, how it relates to some kind of social expression.

Community centre is a particularly specialized type of public/institutional buildings. They are designed to make use of space as a tool for socialization, recreation, education, cultural integration and economic consolidation. They represent the physical place where to meet, search for information, and study. A place where children and youth can get together with other age groups, associate with each other, and take part in things together — a place of vital importance for their social growth.

When dividing the concept of land use into categories of activities in an institution as a community centre, its effect, activity can be represented by function and effect can be represented by physical space. The functional factors of land use in this context - refer to the type and amount of activity occurring on the land and express their preference in complimentary activities. The competitiveness of location increases as usage becomes higher along with space usefulness. In the process of competition between the uses, space usefulness, location characteristics, and scale are determined, and the use in which these three factors are predominant obtains the land in question. Location, a physical factor of land use, can be represented by accessibility. Accessibility is a scale that evaluates the degree of ease with which contact between similar activities in one area can be made.

The position and mobility expenses are mutually exclusive and location is determined when these two are in a balanced state. These influences of mobility are otherwise expressed as land value. These functional factors and physical factors are mutually related, and for land use, both factors exert influence at the same time. For example, land use efficiency is higher

when it is closer to the heart of the community, where space usefulness is higher and the extent of integration is larger. This level of efficiency is explained with land use intensity.

The ideology of creating parks and recreational centres is evanescing and it needs revamping because its importance cannot be overemphasized. Rest and leisure is part of our everyday life which should not be ignored. Even God Almighty rested after his creation as evinced in the holy book.

1.2 STATEMENT OF ARCHITECTURAL PROBLEM

Inadequate functional space relationship of activities is identified as the bane of disorderly flow of movement and under-utilisation of spaces in community centres. In essence, the identification of spaces which are not necessary in the design of a community centre however, enhances full utilization of spaces and good flow of functional spaces with regards to the activities in which the envisaged spaces are created. Also, Buildings are generally not designed and constructed to absorb change easily, at the same time, change is accelerating but the spaces we create are largely static and unresponsive. Greden (2005). In an attempt to address this issue, the concepts of flexibility and adaptable spaces are employed in the planning process of spaces and design of structures. Just like every other approach, flexibility comes with its own lapses where the architectural problem lies. According to Butin (2000).

The architectural problem that this thesis attempts to address is the adaptable use of spaces in an a Community Centre. The area of study focuses on adaptable spaces which will provide a guide for the provision of spaces for some facilities such as multipurpose hall and

recreational areas that are flexible enough to adapt to changes in use i.e. efficiency in switching between one purpose and another in a given space

The ability to design a multi functional adaptable space within a metropolis that would be functional in terms of usage is tasking and demanding because of the heterogeneous lifestyle of city dwellers which necessitates space integration of activities for optimal use. Developed countries having experienced the numerous advantages of careful utilization of such spaces, now maximize its use. The research would be faced with developing ways of utilizing all facilities within spaces the architectural design would be faced with the challenge of transforming the research data and models into a workable design configuration suitable for usage, but also for spaces that promote harmony and peaceful co-existence.

In Nigeria, observantly at the three tiers of government there is a lack of maintenance culture for facilities which are provided for public consumption and also adequate monitoring. This is an ill-fated attitude plaguing the nation which if not addressed lingers from generation to generation which results in recurrent expenditure, profligacy of tax payers money, because those in governance are benighted, they prefer the issuance of new contracts for self aggrandizement rather than maintaining what is already on ground (built structures). Some community centres (open parks) are seldom converted to other uses like we have in some urban centres

1.3 AIM OF THE STUDY

The study aims at achieving a flexible and adaptable multifunctional environment that accommodates the respective spatial requirements and activities in form and in character; with a view of enhancing the effective and efficient flow of movement. The spaces provided for are to be flexible enough for change when the need arises.

1.4 OBJECTIVES OF THE STUDY

In accordance with the architectural problem attached, its objective entails

- To create an environment flexible enough to accommodate the specified purposes efficiently making sure the separate needs of the purposes are properly met. Study the nature and type of activities relative to the space of accommodation
- To establish the viability, adaptability and compatibility of such purposes in relation to each other and to the environment. Establish the flow pattern of the spaces, relative to the spaces
- To establish the climatic compact of activities in terms of spaces
- To examine principles and methods of applying adaptable space concept in designs.
- To develope spaces to share resources, ideas, information.
- To examine and understand various ways of improving the psyche of her indigenes through public interaction

1.5 MOTIVATION

According to Marie Wernham (2007), any child that grows up in isolation or with insufficient love, not having the opportunity of free association and interaction with other children of the same ages tends to develop undesirable personality patterns of behavior seeming to lack both a conscience and the ability to feel strong affection for other people.

The incentive for this centre is to create a place within a space that would bring different groups of people irrespective of social stratification, age or gender, cultural gap and lag for social, economic, educational, entertainment and recreational activities which would invariably foster peaceful communal living of the people

1.6 SIGNIFICANCE OF THE STUDY

Mans curiosity for knowledge is insatiable. Everyday, man is looking for solutions that will solve design albatross in the built environment and spaces that will be sustainable. For this purpose, the importance of adaptable spaces cannot be overemphasized. A floor plan with enclosed, single-purpose rooms is far less adaptable to changing needs, sizes and functions than open-space plans. intellectual culmination of every and any means of providing harmony and peaceful co-existence is cultivated to serve as a silver lining to the adversities bedeviling our nation by streamlining every possible design solution within a confine.

Using a library with adaptable spaces as case study, one may say, however, that in the majority of cases where library facilities have shared space or buildings with other activities in this manner, the primary objective has been explicitly social, cultural or educative, aiming to enhance the attractiveness, relevance and accessibility of the library service by co-locating or merging it with similar social and cultural activities, meeting places and spaces where

communities come together. (Robinson 2006). From this, one can say that making a space more adaptable for other activities makes it more attractive than it would have naturally been if it were for single use. Economy-wise, it could be advantageous if the facilities are turn-over and profit oriented.

It is therefore germane to make spaces multi-use oriented in developing countries like Nigeria, which Bayelsa state is part of, to arrest the ill maintenance culture of sustaining built structures. In the light of this, an adaptable space created, is synonymous with using a single stone to kill three birds.

The project would also increase the level of infrastructural development in the state and would attract more development to the local government area, promoting rural development, and boosting the tourism potentials thereby increasing her revenue base as well as promote the social-cultural, physical well-being of the people.

1.7 SCOPE OF THE PROJECT

The scope of this project is to study underlying ideas about spatial configuration and bring together these ideas and facilities which should be easily and readily accessed by the people within a community. These ideas would be applied within the frame work of developing the centre..

The Yenagoa L.G.A Community Centre is intended to create a conducive ambient environment active Social Centre Network, which aims to link “up the growing number of autonomous spaces. The centre would also play a complimentary role for the government’s

strides in boosting the welfare of her citizens. The centre would go a long way in creating such environment and the project would cover the following areas: A defined spatial layout of the structures with built units, traffics (vehicular and pedestrian movement) and beautiful lawns, that emerges into a serene environment with enabling command.

The scope will therefore be limited to site planning and the detailed development of the aforementioned spaces. The minimum requirements for adaptable spaces are to be satisfied in this discourse.

1.8 LIMITATIONS OF THE PROJECT

Want of time to invest on the study and some important undocumented information's orally gotten in the process.

1.9 RESEARCH METHODOLOGY

The **Descriptive Research Methodology** approach will be adopted for this project. This is because the approach in methodology is aimed at: Identifying current or existing problems; Collection of information or data with a view to describing existing conditions, characteristics or phenomena; Making comparative analysis of these features or character as relevant; and providing good insights to the subject matter and enough guides for decision-making or for further investigation.

Procedure for data collection:

Data collections applicable under descriptive methodology are from two sources, namely:

Primary sources and secondary sources.

There will be primary source of information; these are first hand information obtained from direct sources.

- Personal experience/observations and information about the subject matter.
- Oral interviews where necessary.
- Case studies (visiting and studying of existing community centers)

Secondary source of information: such data are recorded information obtained from other sources.

Sources of secondary data include:

- Getting information from architectural books, journals, periodicals, and related thesis and dissertation reports.
- The Internet on issues as it relates to the design, personal interview, site visitation and investigation and case studies review.

The information obtained will culminate into analyses of collected data, deduction from analysis, postulations of solution and design proposals

Personal experiences and observations

this is an individualistic approach through which priori and posteriori knowledge are merged and used in the research work by the person carrying out the research through his personal experience and observation. It may be knowledge gained through previous visit to such buildings or projects he has participated in designing

Library research

Obtaining general information and data about the project, as well as, standards and principles of planning the various components of the design.

Knowledge about the project were also available as the use of library afforded me access to foreign case studies as well as local case studies, about the way relevant facilities are designed both in advance countries and within Nigeria. All the ideas obtained through the library will helped me through the actual design and planning process.

Oral interview

This entails conducting interviews with people who are knowledgeable in community buildings in architecture and also those who make use of the provided facilities.

Case studies

Consulting similar projects of both local and foreign perspectives documented in books, magazines, journals, on the internet and other gazettes in order to obtain first hand information on factors that influenced their design and furthermore an appraisal of their performance in use.

Field visit and analysis

Firstly; site visitation to obtain cogent information about the site, its limitation and potential for the project.

Secondly; personal visitation of some existing similar or relevant establishments for the design and planning of the project.

CHAPTER TWO

REVIEW OF LITERATURE

2.0 HISTORICAL BACKGROUND OF COMMUNITY CENTRES

2.1 DEFINITIONS OF COMMUNITY CENTRE

The word "community" is derived from the Old French *communité* which is derived from the Latin *communitas* (*cum*, "with/together" + *munus*, "gift"), a broad term for fellowship or organized society.

A community centre according to the Encyclopedia of social sciences is a meeting place where people living nearby come together to participate in social, recreation and cultural activities and build up a democratic organization that will minister to the needs of the community.

A community centre is a meeting place where people of a community and those from Neighbouring communities come together for communal participation.

Community centre has to do with stimulating, maintaining and deepening a “sense of community” the loss o which is so universally lamented. It is also characterized by its unique role in creative use of leisure time and for a variety of activities.

A community centre is a centre where people of villages that make up the community can exchange views and perform activities together. It is the nerve center of the community a place to encourage deliberations, free and informal encounters among all members of the community.

The encyclopedia of social science defines a community centre as "a meeting place 'where people living nearby come together to participate in social, recreational, cultural and educational activities and build a democratic organization that will minister to the needs of the community".

The community is defined by T. Parton in "the social system" as a collectivity of actors sharing a limited territorial area as the base for carrying out the greatest share of their daily activities.

W.J. Goode (1972) in "community within a community" used community synonymously with society or social-system, he also feels that integration or a "sense of belonging" characterizes a community.

E.C. Hughes (1974) describes community in the contrast to society in terms of competition, symbiosis and the division of labor by which it gains substance from its environment.

Every community, which is itself made up of smaller units or parts, is a part of the next larger community in the series of expanding communities. This is as it is in the world book encyclopedia viz:-

- The family community – the school community
- The neighborhood community-the local community
- The country community – the metropolitan community
- The state community – the region or state or province
- The National community – the international community
- The world community.

From the foregoing and aforementioned definitions of a community, we have a clear idea whom the community centre is designed to serve.

2.2 DEFINITIONS OF ADAPTABLE SPACES

Definitions put an adaptable space in architecture as a space that is flexible enough to be used for more than one activity. One condition that must be met for a space to qualify to be tagged adaptable is that those subject activities have to be mutually exclusive and the functionality of those spaces efficient. There are a lot of terms associated with adaptable spaces like:

a) **Adaptive reuse** of buildings where a building or a space can be used and adapted for other purposes. This is just about the same as the subject under study in this paper in the sense that the purposes for which the spaces are provided can be changed from time to time in an efficient manner. Greden (2005) A clear example of adaptive reuse of building can be cited in the Hagia Sophia in Istanbul, Turkey that served as a church for 916 years, a mosque for 481 years and a museum since 1935. Greden (2005)

b) **Flexibility**, according to Encarta dictionaries, is the ability to bend or be bent repeatedly without damage or injury, ability to change or be changed according to circumstances or being able to be persuaded or influenced. But for the purpose of this study and the context, flexibility is the ability to change within existing main structure. There are usually some built-in possibilities to rearrange, take away, or add elements and systems. Blakstad (2002). It is normally associated with terms like modular, mobile and re-arrangeable.

2.3. BRIEF HISTORY OF COMMUNITY CENTRES

The concept of a community centre as we have and know today promulgated and became corroborative in the year 1929 through the efforts of American National Council of Social Services. This concerted effort made the government to incorporate community centre's in rural development plans to address the demands, spontaneously arising from residents of large new housing estates for social recreation and educational activities. As at this earlier era of a community centre, many activities as we have today were not included in the plan, so as the awareness gained more significance, the concept snowballed and disseminated other facilities and infrastructure. Special designs that portrayed the tradition of the people sprouted and the facilities this time took care of the educational needs of the aged, multipurpose halls, lodging rooms for strangers were added.

The term “community centre”, came into general use in the year 1915 as a thesaurus for social centre. It has attained considerable popularity during the period before the Second World War.

In the year 1916, a body with the appellation - The National Community Centre Association was organized by a group concerned with the promotion of social centre. The movement afterwards decided to rename the social centre, the community centre although maintained the status quo without a modification of their activities.

Community centres were used as unwinding spots which provided men and women with first class music, drama, exhibition of pictorial arts, opera et cetera. During the Second World War

2.3.1 THE BRITISH PERSPECTIVE

In the 1880's the liberals and the church created settlements where they lived with the poor. Classes, libraries and playgrounds were later built, this gave the poor the opportunity to see cultural events. Most of these settlements were for the immigrant population, English language, custom and norms were thought with occasional accommodation provided for migrant workers.

In 1929 the community building concept became popular in Britain through the concerted efforts of The National Council of Social Services, which made government put community building in rural development plans.

In 1936, a housing act was enacted, making it mandatory for housing authorities to provide centers on their estates and charge the cost to the housing revenue development.

In 1973, the physical training and recreational act gave all authorities power to provide capital cost out of rates and also gave them and voluntary organizations power to apply to the government for grants. This increased their number and entrenched the concept of community buildings to the life of the people.

2.3.2 THE NIGERIAN PERSPECTIVE

In Nigeria, community centre's have always been of great significance and important as it addresses the need for family and community rendezvous, which begot the concept of courtyards and village squares in our orthodox architectural practice. David Aradeen, (1989) formerly put, "the courtyard turning in on itself is as much a social study and an entity of the

extended family as it is a physical unit of the structure. In the courtyard dance ceremonies connected with marriage and death are performed".

The advent of the colonial master in Nigeria, rebranded our ideology of meeting places and recreational grounds. The colonial authorities according to Aradeen, introduced the town hall and administrative offices which were alien to us. They influence the village town hall both as a symbol of communal unity and a place where a large number of people can meet in a single building. Schools were also provided as well as worship places and so the community center emanated. The increase in the educational standard and population size of the people created awareness for the need of community buildings.

In 1967 these buildings and premises were used as activity zones following the outburst of the Nigerian civil War for the distribution of relief materials to the people and dissemination of government programs and plans happening mostly in the war torn Eastern Nigeria. Nonetheless, these buildings still served the peoples recreational, social, educational and cultural needs. At the end of the civil war, there was a great quest by the people for the continuation of the activities of the building and this led to the construction of town halls, age-grade buildings, own club houses where their members satisfied their social needs. All these centers provided community service. These rural efforts prompted the government to construction of these facilities in rural settlement as a panacea for rural-urban migration which some rural dwellers seek for in urban centres.

2.3.4 RECENT TREND IN EXISTING COMMUNITY CENTRES

Most communities have subnormal community centers, which in most cases is as a result of providing these facilities through community self help programs solely financed by the residents of the community to meet their social requirements, the center may consist of:-

- town hall building – for community meetings
- town square – these serves for outdoor activities burial ceremonies like masquerade performances, festivals, traditional marriage ceremonies and other title giving ceremonies.
- Football pitch – for most outdoor games

All these and many more activities thus take place in the present day community center in Nigeria.

The design of the centre would take a standard format and ensuring its viability by incorporating recent trends of the present day community centre, making the center the cynosure of the community with a beehive of activities that would affect the overall wellbeing of the entire community - socially, economically, educationally et cetera.

2.4 ACTIVITIES TAKING PLACE IN A COMMUNITY CENTRE

The proposed community centre for the Yenagoa Local Government Area of Bayelsa State, would provide all the facilities imperative for the smooth running of the activities taking place at the centrr which will also address the following needs of the people viz:-

- Cultural activities
- Social activites
- Commercial activites
- Recreational activities
- Educational activities

2.4.1 Cultural activities

Herein, an appraisal of the cultural aspect of life of the citizens of Yenagoa and its environs are properly planned and integrated into the design to cater for the cultural needs of the people like cultural display of artifacts around the fabrics of the facilities, statues and monuments at strategic locations, musical and dancing renditions during festivals which of course do take place in the amphitheatre or the multipurpose hall of the proposed design or any other facility deemed most suitable within the centre.

No society can exist without culture nor can culture exist without a society. Every society possesses a culture that defines required modes of thinking, acting and feeling.

2.4.2. Social activities

There are copious activities within the center that promotes socialization. The center promotes secondary setting for the transformation of one's social life through interaction from the various agents of socialization. Such activities as political rallies, associations and clubs (like the table tennis clubs) within the center, drama group for performing arts and so on.

2.4.3 Commercial activities

The proposed center is commercialized to generate a revenue base for the area, which also improves their industriousness and also gratify the purchasing power of

Its users and their day to day needs. Such facilities include rented shops, lodging and accommodation, restaurants, cyber café et cetera.

If the community centre is well managed and the funds generated are well appropriated and accounted for it would be channeled into the management and smooth running of the center as respectively.

2.4.4 Recreational activities

An activity which enhance and welcomes good life, as well as promotes inner peace are imperative and as such should be handled with assiduity because it refreshes and relaxes the body and mind after work, especially by engaging in enjoyable and pleasurable ones

The centre is designed to provide such facilities like Sporting activities both “indoor and outdoor games” such as tennis, squash, table tennis, scrabble. Other activity areas for relaxation include parks, bars, outdoor relaxation, and children’s playground.

2.4.5 Educational activities

As evince within the scope of the proposed community center, there are educational activities taking place within the centre to improve the educational standard of the people as a means of self emancipation and eviscerating illiteracy. Such facilities include libraries, cyber café, lecture

rooms for seminars and workshops where resource persons are invited to deliver seminars, exhibition of educative materials around the facility.

2.5 THE ROLE AND FUNCTION OF PUBLIC FACILITIES

Public facilities are defined as those basic services which cannot be supplied directly to the individual dwelling unit and as a result are utilized away from the individual residential dwelling unit within the public environment. Public facilities satisfy specific individual or community needs - including safety and security, communication, recreation, sport, education, health, public administration, religious, cultural and social. Public facilities, as the name implies, are generally regarded as the responsibility of government, whether central, regional or local, and more often than not are provided by government institutions. However, public facilities are also provided privately, when the government-provided services are perceived to be inadequate.

2.5.1 TYPES OF PUBLIC FACILITIES

Public facilities can be classed as higher-order, middle order, lower-order and mobile, depending on the size of the area that they serve.

1. Higher-order public facilities:

These facilities generally serve the entire region, metropolitan area or city (e.g. hospitals, universities) and are not provided for in the layout planning process for single residential settlements. The location of these public facilities is determined by analyzing the most

suitable and accessible location for the greatest number of people. Essentially, these facilities are planned in terms of an overall development Framework.

2. Middle-order public facilities:

These are facilities which serve a number of diverse and different communities (e.g. high schools, clinics). These facilities are essential to individual residential settlements, but the facilities serve a threshold population which exceeds an individual settlement, and therefore are supported by a number of settlements.

3. Lower-order public facilities:

These are facilities which are utilised by a single or a limited number of residential communities (e.g. a crèche or pre-primary school) and which are generally provided for in the design and layout of residential settlements.

4. Mobile public facilities:

These are facilities which move from one location to another, serving a large number of communities. Many problems with regard to the spatial location of public facilities are increasingly being solved(especially in less mobile communities) through the use of mobile public facilities - such as clinics, post offices and public telephones. Through mobile facilities the ideal of allocating scarce resources, whilst at the same time serving the greatestnumber of people, can be achieved.

2.6 HISTORICAL BACKGROUND: ADAPTABLE SPACES

As early as 1849, a proposed school design called for the grouping of four classrooms around a central hall "in which the infant school is taught and where the school is assembled for other general exercises." CRS archives document, (1996) pp.4. The hall was not divisible, but the principle of multipurpose space for assembly and instructional purposes clearly had been established. The records do not indicate just when the first architect or educator thought of such a hall with operable partitions. But, by the turn of the century, New York City was including in virtually all its elementary schools an assembly room that can be divided, by means of wooden partitions that moved on metal tracks, into four classrooms of equal size.

According to Malofiy (1998); the origin of movable interior partitions can be traced to the Japanese "fusuma". These sliding panels were constructed with a wooden frame strengthened by cross battens to which several layers of paper were glued. A layer of decorative paper was then fixed over the whole and the faces were typically painted to depict a story. The "fusuma" allowed the house to change with the day and season. Their dynamic nature was sharply contrasted by the static condition of the heavy timber posts and beams which brought order to the whole. (See plate. 2.1a and 2.1b)

Plate 2.1a and 2.1b. Interior (1300‟s Daikakuji Palace of Emperor Saga Kyoto City) with fusuma closed (left) and same interior with fusuma open (right).

Source: order and flexibility (1998)

The New York City attempt at divisibility in the late 19th century proved hugely unsuccessful (although a number of the divisible assembly rooms are still in use). The halls are inadequate for both assembly and instruction. The wooden partitions were acoustic sieves, permitting noises from one classroom space to intrude in the others. The assembly hall worked poorly: because of its flat floor, it was difficult for the pupils in the rear to see what was occurring up front. CRS archives document, (1996). To a large extent, this was considered a bold step towards achieving Adaptability and flexibility in the use of spaces in as much as there were shortcomings.

There appeared across the nation such hybrids as the cafeteria-auditoriums (the “cafetorium” of recent jargon), the auditorium-gymnasium, and, in extreme cases, the auditorium-cum-gymnasium-cum-cafeteria. CRS archives document, (1996). A recent study, for example, foundthat over half of Virginia‘s schools had a "cafetorium," a combination cafeteria and auditorium.Butin, (2000). As far as educational facilities in New York were concerned, the multipurposeroom was more successful than the hall-classroom combinations, largely because sound transmission was not a problem. But flat-floored, they still did not serve as good assembly or theatrical space. And they were costly at janitorial time: chairs and equipment had to be shifted virtually from hour to hour as the room changed function. Despite these problems, the multipurpose room remains a popular solution and many are still being built into new schools. CRS archives document, (1996) In 1924, on the other hand, was a residential home called _Schroder House‘(plate. 2a and 2b) designed by Gerrit Rietveld with the concept of flexibility, which paved way for future flexible designs. Inside the living room of Schroder House is a changeable open zone, which can be subdivided by

sliding or revolving partitions. The concept of movable partitions, inspired by the sliding Shoji screens and doors of traditional Japanese architecture, is an idea employed by both early-modern and contemporary architects to achieve flexibility

Plate 2.2a and 2.2b: Upper floor of the Schroder house with partitions partially closed (left) and with partitions open (right)

Source: order and flexibility (1998)

This method became particularly popular in the Industrial Age as advancements in engineering technology minimized the need for structural elements in building interiors and allowed for larger open spaces. Shifting Paradigms, (2008). Another was ‗the learning studio' inspired by an artisan's studio. The Learning Studio evolved from a design pattern for learning spaces first

by Eliel Saarinen at the Crow Island School in Winnetka, Illinois, in 1939. This design pattern used an L-shaped model for classrooms. The result is an adaptable space designed to meet the needs of students and faculty who learn and teach in the space. This has prompted exploration of new types of spaces. The goal is to understand the role of adaptable spaces in supporting the learning experience. Miller (2009) Multipurpose spaces became popular in the 1950s to accommodate the population surge of today's schools. Butin, (2000). Beginning at the middle 1950's, however, there were a series of developments that prompted a new

look at the old New York combination of assembly and instructional space. And, unlike the New York educators of 1900, they found that industry had gained the know-how to produce operable partitions that would act as an effective sound barrier and thus permit divisibility in instructional space. CRS archives document, (1996). At the same time, it was realized that good spaces for large-group lectures should have sloped or stepped floors. In effect, that auditorium-type space would make good space for lectures. In this way, the educators could have their assembly space and justify it on both educational and economic grounds. CRS archives document, (1996).

The design of work places started getting attention much later after this knowledge in adaptable spaces. In fact, as at 1960s, workspaces were fixed, requiring demolition to accommodate changes. In the 1970s, companies realized their space needs changed over time, so movable cubicles and partitions became prevalent in a style known as flexible workspace, which was easily reconfigured using the same physical elements. Feingold (2008). By the 1990s, workers began meeting and collaborating in what is called a fluid workspace. When something is fluid, it

responds by users reconfiguring it to meet their needs while they are working. It allows people to move from individual to collaborative work on the fly by giving more control of space configuration in real time to users. Fluid space allows for collaboration without workers needing to arrange meetings in advance. Feingold (2008) In the 1980s and 1990s, Peter Eisenman experimented with another form of flexible architecture. Adapting Jacques Derrida‘s notion of an _arbitrary text,‘ Eisenman formulated a _Blurred Zone‘ through randomly dislocating the conventional architectural texts of function, site, program, and tectonics, ultimately creating a space that is not finalized but rather in the state of constant change, and hence metaphysically flexible. Shifting Paradigms, (2008). Fresh and new

knowledge in flexibility has continued to guide architectural designs in the present and one can say with certainty that in the future, adaptable spaces will have a lot of influence in architecture.

2.7 THEORETICAL FRAMEWORK

For knowledge to be useful it must be theoretical in the sense that it must allow one to predict scientific theories and scientific knowledge have just this property

It is a characteristic of most fields of study that deal with human and social systems that practice runs well ahead of theory.

In 1958, Kevin Lynch listed several means to achieve spatial flexibility. These included zoning and concentration of structure at a few widely separated points, leaving wide spans where future changes will not affect the fabric of the whole; use of modular or lattice structures whose peripheral growth does not affect the structure at the center; use of low-intensity buffer zone between spaces to allow their programs to expand and contract without running over other uses; avoidance of narrow adaptation of forms to specialized functions; over-supply of space to provide generous room for future expansion of programs; use of temporary structures; and a well-networked communication system, so that program and interaction changes can be analyzed and accommodated efficiently. Shifting Paradigms (2008)

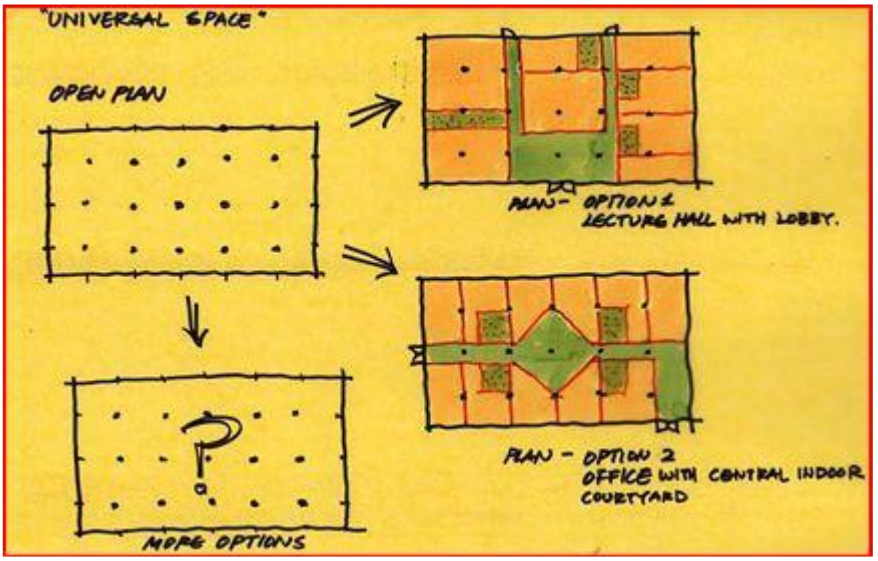


Fig 2.3: The universal space concept

source : shifting paradigms

Architects have conceptually addressed the subject of flexibility in many ways. Some examples are Gerrit Rietveld‘s Schroder House, Mies van der Rohe‘s “Universal space‘, Louis Kahn‘s “The Served and the Servant Spaces‘ (fig 2.4), Carnegie Mellon University‘s “Intelligent Workplace‘ (fig 2.6), and Peter Eisenman‘s _Blurred Zone.‘ (fig 2.5) Shifting Paradigms (2008)

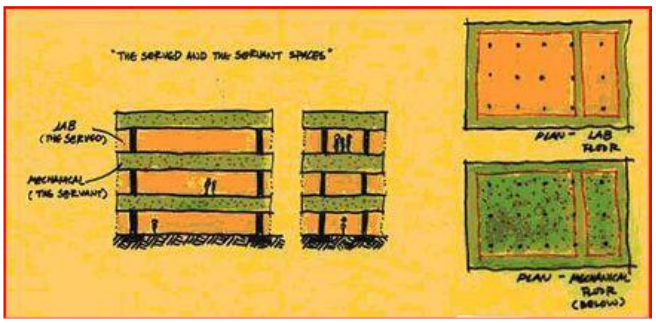


Fig 2.4: “The served and the servant spaces” space concept

Source: shifting paradigms

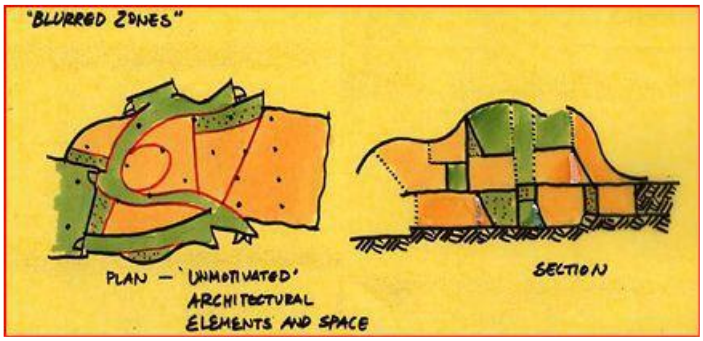


Fig 2.5: The „blurred zone" concept

Source: shifting paradigms

For example, the S.R. Crown Hall embodies Ludwig Mies van der Rohe's concept of universal space. Rather than designing narrowly for a specific purpose, Mies sought to create a structure that could be adapted to different uses as needs changed over time (fig 2.5). He realized this goal by moving all structural supports to the building's exterior wall, thus creating a large clear span structure with 120 x 220 x 18 feet of unencumbered interior space.

Fig 2.6: The Intelligent Workspace

Source: shifting paradigms

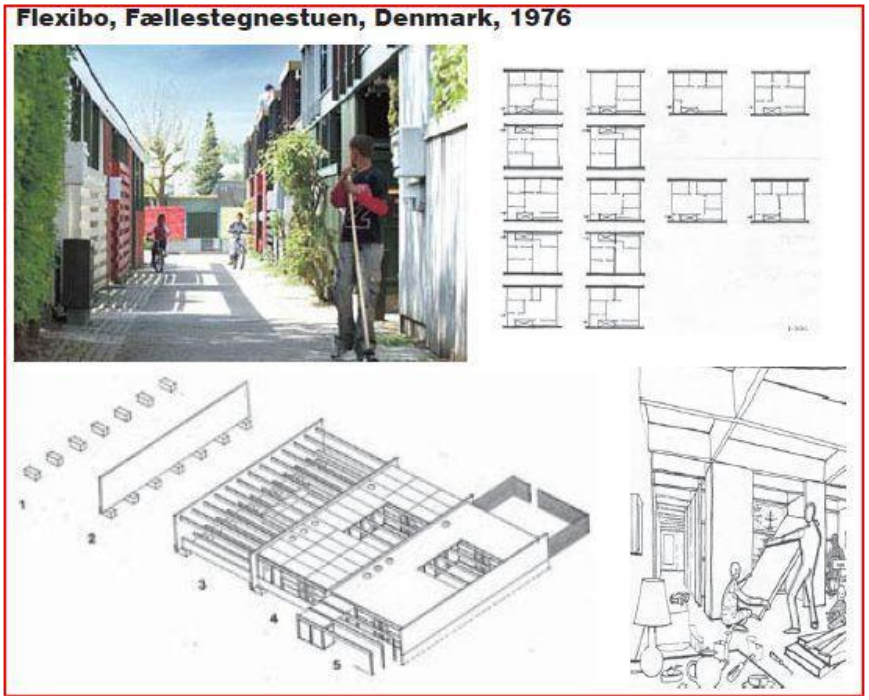


Fig 2.7: Flexibo Housing

Source: Next Gen Building

In practice for instance, the sixty-eight one- and two-storey dwellings, designed by Fællestegnestuen for Copenhagen‘s Public Housing Association (KAB), were partially designed and often also partially built by the residents. Whilst the basic frame of the building, which consists of prefabricated components of concrete and laminated timber, cannot be altered (apart from adding smaller parts such as a pergola), the interior is based on a modular wall system, which can be changed, adjusted or reconfigured by a building‘s inhabitants. (see fig 2.7) The construction system allows walls to be moved around very easily, so any layout can be adapted to different needs and requirements at any point in time. A study after 3 years of completion showed that various residents had changed the position of doors, added additional rooms and altered room sizes. Hartany J. and Le A. (2010)

2.7.1 Adaptable : Adaptable structures features repositionable partitions or are changeable per user/occupant (Case Studies: Rietveld Schroeder House, Japanese Housing. Fig 2.8).

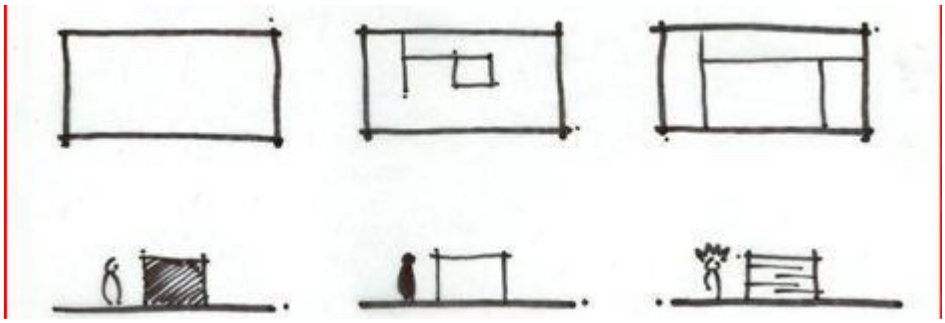


Fig 2.8: Adaptable Options

Source: flexibility in architecture

2.7.2 Universal. What typifies a universally flexible building is its ease of adaptation per use. These buildings are often characterized by open floor plans and typology free design (case studies: S.R. Crown Hall, Eames house. Fig 2.9).

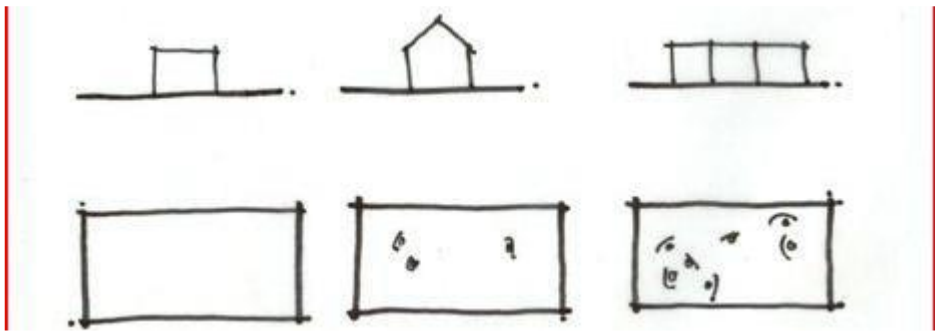


Fig 2.9. Universal Options

(source : flexibility in architecture)

2.8 EMPIRICAL FRAMEWORK

2.8.1 SPATIAL CONFIGURATION

Spatial configuration is the use of spatial relationships and rules for product configuration. Spatial configuration allows the layout and assembly of multiple products to arrive at integrated solutions. Spatial relationships can involve how components combine to make a single assembly, or how items such as furniture or equipment can be placed next to each other.

Spatial rules include applications as diverse as what valves can be placed into what manifolds, how workstation components can be fitted together.

The concentration of econometric models on the `process' aspects of urban function has led them to overlook, or at best simplify, their representation of the spatial and Physical form of cities to the point at which it ceases to be an input to the process. For designers, though, the spatial and physical city is the major concern-what they need to know is` what difference does it make if I design this one way or another?' Conversely, where GIS is concerned, representations of social and economic processes are almost entirely lacking. The description of nearly all aspects of urban form is possible, but without a basis in knowing which aspects are important in urban processes it is all just so much data. What seems to be lacking is an urban theory relating the physical city and the social processes that take place within it.

In the late 70's Bill Hillier began to develop just such a theory. Central to his efforts was the notion that an understanding of urban systems requires a description not just of individual elements of the city -this building or that space -but a description of whole systems of spaces and buildings considered as patterns. Hillier and other groups at UCL have developed

representational and analytic techniques which combine the geographer's concern for located data with the modeller's concerns for processes.

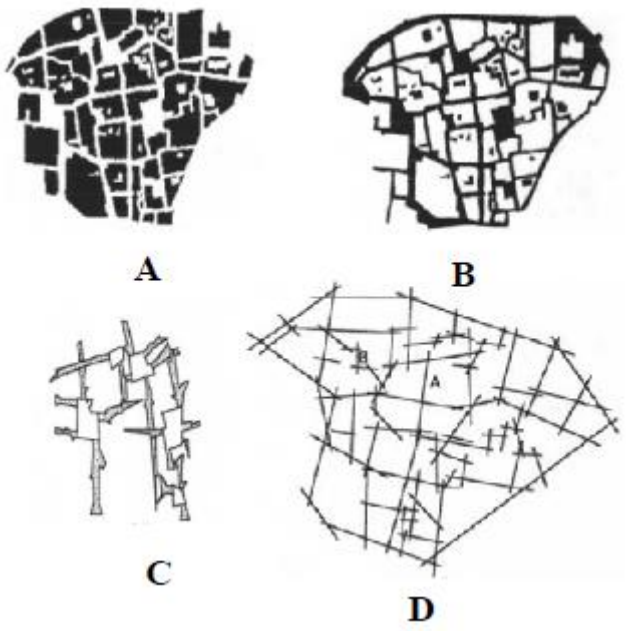


Figure 2.10: syntax representation

Source: Batty, 1989

They are based on a simplified description of space, neither as the geographer's 2D homogeneous plane which is accessible `as the crow flies', nor as the modeller's arbitrary zones and links, but in terms that obey the real physical constraints that built form places on visibility and movement since you can neither see nor move through solid objects, only through open space. See figure 2.10 above. Shows (A) the map of a French market town; (B) shows the pattern of open space in the town coloured 8in black. This pattern of space is the part of the town that people use and move through. It is the object we are interested in studying. We are looking for ways of representing this irregular pattern that carry some social `potential'; (C) picks out the main, `convex 'elements of space in the town, and plots

the field of view –all space that can be seen from those spaces. As can be seen, the open squares are all visually interlinked by more or less linear pieces of space; (D). Then passes the longest lines of sight and access through the open space pattern-it essentially simplifies the plan into a series of linear spaces of the sort that approximate shortest and simplest routes between different parts of the town.

2.8.2 SPACE SYNTAX

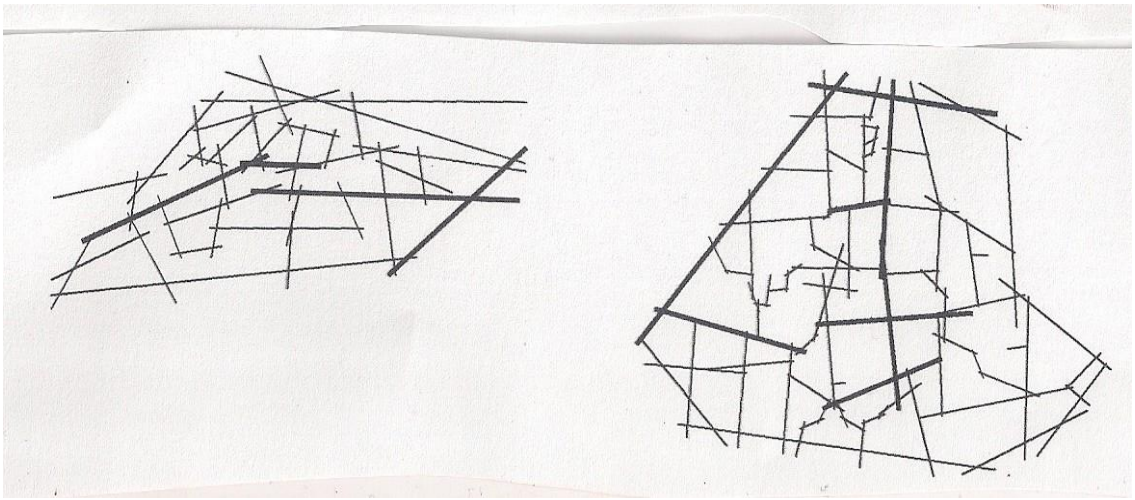
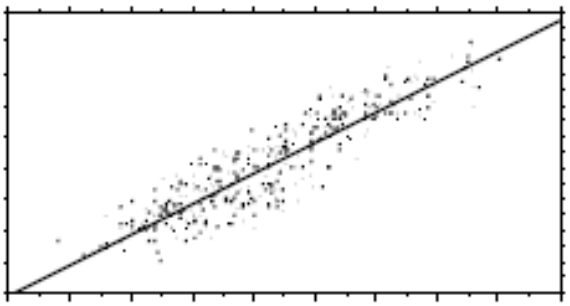


Figure 2.11a and 2.11b: Axial representation of space syntax

Source: Hillier et al. (1983)

Space syntax originated as a research method in the 1970s at the University of London as a way to record movement and interaction within cities and buildings. The set of analytical techniques called “syntactic” were used by Hillier and Hanson in The Social Logic of Space (1984) to explore the impact of space on social behavior and relationships. Since that time, it has developed into a coherent body of literature about human social interaction in the built environment.(Source: www.spacesyntax.com)

Space syntax methods were first developed to compare the similarities and differences between built environments at both building interior and urban neighborhood scale. The plan of an environment is represented as a map in which all longest lines of sight are drawn. This map is then translated into a graph in which a line is represented as a node and intersections between lines are shown as links between nodes. Measures of the graph are made that can then be assigned back as variables associated with the location of each line in the original map (see fig 2.11a) Research using these techniques has found that both pedestrian and vehicular movement rates are strongly correlated with certain measures of the graph of the line map (see Figure 2.11b). Since the representation captures nothing except the geometry of the configuration of space in the environment, its ability to predict movement rates brings into question the degree to which the location and strength of attractors or generators of movement are central to observed movement behavior patterns. Hillier et al. (1987) have argued that the logical view is that configuration leads to a pattern of movement or a 'passing trade', this then attracts shops to locations where they can take advantage of the passing trade, and the shops then attract additional people



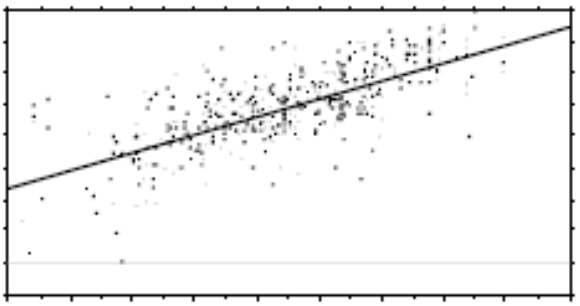


figure 2.12: (left) correlation between vehicular flow rates and a fitted variable consisting of radius 3 mean depth in the graph, and net road width in metres (r2=.83 n=405, p<.0001); (right) correlation between radius 5 mean depth and adult pedestrian movement per hour (r2=.53, n=466, p<.0001), both scatters are for all road segments in five study areas in central london.

source: www.spacesyntax.com

Space syntax methods use shape recognition to generate a topological or theoretic formal model of spatial configuration. ***Spatial configuration*** is simply the space where people can walk and that is always represented in plan. By decomposing the space in plan to its constituent units of analysis and giving these units numeric tags, the method helps identify both patterns and their variations in order to decode spatial ordering and relate these codes to underlying social and economic logic.

It should be kept in mind that space syntax does not reduce to a set of design guidelines nor is it a design method or generator. In this context, it is a way of testing design hypotheses insofar as these take spatial form. Interested readers may refer to Hillier and Hanson (1984) and Hillier (1996) for a full development of the theory, method and applications. An accessible description of space syntax methodology is available in Brown (1984).

Space syntax is used increasingly in anthropology and archaeology (Ferguson, 1996). It has been applied to a wide variety of building and urban spatial types including urban design, health care facilities, housing, factories, neighborhoods, research laboratories, and schools, corporate and professional offices. It has been used to analyze shopping centres (Brown, 1994; and Teklenburg, Aloys, Borgers and Timmermans, 1994), and to analyze configurations in eminent domain (partial takings and access cases), in intellectual property cases and First Amendment (public forum) cases.

"The basic premise of space syntax is that it is possible to identify certain underlying structures of space that are linked to observable patterns of behaviour and that these patterns, in turn, create social function, whether ***generative or reproductive"*** (Peponis and Wineman: 272). The distinctive characteristics of societies are expressed in spatial systems. Knowledge is conveyed through "space itself, and through the organization of spaces (Dursan and Saglamer, 2003). *So spatial configurations not only "generate social interactions in built environments," but they "express a social or cultural meaning*" (Dursun, 2007: 4).

The property of accessibility is critical in space syntax, and suggests the common spatial foundation upon which diverse social effects rest. At the foundation of space syntax are premises concerning how boundaries and connections of built space define the way people behave and relate to one another.

Built space is to be understood as a relational pattern, a pattern of distinctions, separations, interfaces, and connections, a pattern than integrates, segregates, or differentiates its parts in relation to each other." (Peponis and Wineman: 271). Space has a 'social logic' in as much as these relational patterns affect everyday behavior, contributes to structuring social relationships, "and the way in which society and culture become intelligible through their spatial forms." (Peponis and Wineman : 271). Analysis to date suggests that the social meaning of space is carried by topological rather than shape-specific relationships.

The physical layout of rooms, corridors and vertical connections exerts a strong influence over patterns of movement in retail environments, museums and galleries. Understanding the effects of spatial layout on visitor activity allows design proposals to be generated that facilitate access and encourage natural way finding. In practice, space syntax consultants provide appraisals of layouts, investment advice, strategic design and monitoring services, combining detailed observation studies with customer flow models and sales data analysis to

generate schemes that optimize patterns of moving, browsing and buying. They also co-ordinate pedestrian, cycling and vehicle strategies through observation, analysis and forecasting of movement flows.

Space syntax is a growing theoretical interest with many practical design applications. It can reveal hidden design barriers in older spatial layouts (redesign of London's Trafalgar Square); in analysis of new spaces or additions (redesign of the Tate in Britain), and in architectural education (all three projects are reported in Dursun, 2007). It can also help to avoid mistakes in design that deaden urban neighbourhoods and areas within buildings (Hillier et al, 1987).

Space syntax is proved to be a solid tool to describe the spatial properties of urban structure. As Sonit Bafna describes, space syntax is 'best described as a research program that investigates the relationship between human societies and space from the perspective of a general theory of the structure of inhabited space in all its diverse forms: buildings, settlements, cities, or even landscapes' (Bafna, 2003, 17-29). Somehow it is uncanny that there exists no clear category of description of urban forms when the property of urban forms is widely correlated with social phenomenon by researchers. Although it has been discussed in Bill Hillier and Julienne Hanson's early works on the method of clarifying 'grids' and 'trees' within an urban road network (Hillier and Hanson, 1984, 99-105), the usability of this method is relatively low to urban designers without professional training in mathematics and analytical skills. Considering the formulas to compute are probably concluded from empirical data sets, it makes them even harder to apply in design practice by urban practitioner.

Hillier and Hanson defined two basic theories to illustrate how space works socially. The first, which views space as "**generative**" because social rules and practices do not need to be invoked to account for movement according to spatial configuration, deals with linear spaces of circulation and movement. The second theorem describes space as "**reproductive**," and applies to use spaces, component spaces of building types that contribute to on-going reproduction of social relations.

The first theorem states that a building or urban area is a system carrying movement within and between all spaces it contains. Those spaces most directly connected to every other space in the system will have higher density of movement: "put simply, more direct universal accessibility implies a higher probability that a space will be used for movement." (Peponis and Wineman: 271). The first corollary, the theory of "**natural movement**", states that the spatial configuration governs the distribution of movement (Hillier et al, 1993).

The second corollary, the theory of "virtual community," says that movement within a space generates a pattern of co awareness and co presence (Hillier, 1989).

The third corollary suggests that types of space uses will be located according to their relative dependence on social movement (Hillier, B., 1997). Spaces like retail businesses must be located in areas of higher movement, while residential spaces need less movement.

The second theorem applies to common the components of common building types, defined by activity ("dining room"), social rule ("private room"), and function ("reception area"). The theorem suggests that the labels attached to social programs within spaces inform us of their function and "sustains a stable, if abstract, spatial relationship [which] contributes to the reproduction of social schema." (Hillier, B. 1997). The patterns of relationships within these spaces are intuitively known, although they might vary from design to design.

According to social expectations, some labeled spaces, or rooms, would be more accessible than others ("living room" as opposed to "bedroom").

Space syntax is a theory about space and human behaviour, which, together with tools and methods for analyzing human interaction in the built environment.

2.8.2.1 EVIDENCE OF SPACE SYNTAX

Space syntax modeling has been used to understand how existing cities, urban areas and buildings are working, and to simulate the likely effect of new interventions, and help integrate information about other socio-economic factors into the design and planning process. Research using space syntax modeling shows the impact of:

- The street network on urban movement patterns and flows (Hillier and Iida, 2005) and the evolution of the local centre's and sub-centers (Hillier, 2006; Hillier, 1999);
- Spatial design on feelings of security and insecurity (Hillier 2004);
- Urban spatial segregation and social disadvantage (Vaughan et al., 2005);
- Spatial layouts on organizational cultures (Penn, 1999);
- Office redesign on productivity (Bafna, 2005);
- Museum layout on use and satisfaction (Stravroulaki and Peponis, 2002; Hillier and Tzortzi, 2007).

Space syntax tools and methods have been used for spatial accessibility analyses of London, Jeddah, and the World Trade Center redesign for lower Manhattan. Architect Norman Foster (1997) says that "I know that these techniques work from the tough environment of practice. I love the world of analysis, observation, of research, but also passion, imprecision, the

hunch. Space syntax is the testing of the interaction of these opposing worlds." Proponents say that "Space Syntax studies provide public and private agencies with robust techniques for evaluating the social, economic and environmental impact of accessibility proposals."

2.8.2.2 METHODS OF ANALYSIS (SYNTAX)

Although Hillier and Hanson first developed syntactic analysis to understand the behavioural impact of space, they strove to describe space and spatial relationships separately from their use. Accessibility is a function of the number of direction changes made, the number of boundaries crossed, or the number of spaces traversed and, in the more recent work, metric properties. Hillier's early work followed Thiel (1970), who coded patterns of behaviour and perception, including Lynch's (1960) parameters of urban space (districts, notes, edges, paths, and landmarks). Thiel's notational system described the elements defining space, their relational patterns, and spatial connections.

There are two approaches to the analysis of spatial syntax: examining patterns of connections (graph-based), and analyzing perceived spatial relations (geometry-based). Graphs consist of nodes (vertices) and edges (lines). In the graph-based system, the "integration" of a space, a measure of its accessibility or centrality, is expressed as "distance," so that a more integrated space is less distant from other spaces. Since the system standardizes these measures, spaces can be compared to one another or to ideal regular patterns known as benchmarks (Hillier, 1998). However, analysis of open spatial plans with ambiguous boundaries is more difficult than cellular plans. Spaces are classified as one-dimensional paths of movement or as places inviting prolonged occupation. Understanding

the social information contained in plans links "geometric intuition with our intuition regarding the human dimensions of inhabiting space" (Peponis and Wineman: 274).

Perception-based approaches to analysis of space syntax include axial maps, convexity, and visibility polygons. Axial maps, or linear representations, describe all the ways to move around a spatial layout to reach other spaces, and the lines traced most often, which are darker, are more integrated or central to the system. The analysis of spatial convexity results in "convex maps" documenting "isovists" or visibility polygons within visual fields (Benedikt, 1979; Batty, 2001; Turner et al., 2001). Visibility diagonals represent potential lines of movement across space (Peponis et al, 1998a and 1998b). Archaea's (1977) early work on visual fields demonstrated behavioural correlates, showing that people position themselves within a space according to their preferences for seeing (visual access) or being seen (visual exposure), so the environment is a place that concentrates or diffuses information.

2.8.2.3 REPRESENTATION OF SPATIAL CONFIGURATION

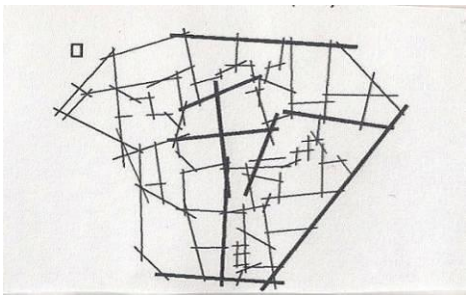


Figure 2.13: Lines representation of space syntax

(Source: www.spacesyntax.com)

"Space syntax" has largely described spatial configuration as a set of lines that represent directions of uninterrupted movement and visibility and cover all the areas of a plan and all the ways of moving around one dimensional (1D) and two dimensional (2D) boundaries situated within it. These linear representations have been originally referred to as "**axial maps**". It was proposed that axial maps can be derived by drawing the longest straight line possible, and then the next longest until "all convex spaces are crossed and all axial lines that can be linked to other axial lines without repetition are so linked" (Hillier and Hanson, 1984, pp 99). This method of deriving linear representations of spatial configuration is dependent upon the convex partition of space.

Figure 2.14: Example of a convex map

Source: Hillier et al (1983),

The "**convex map**" of a configuration was taken to comprise the fewest and fattest possible convex spaces needed to cover all the area (Hillier and Hanson, 1984).

The original linear representations of configuration have been powerful tools in the analysis of the social and cultural functions of space. They have been associated with the discovery that spatial configuration is correlated with the distribution of movement patterns and the probabilistic generation of encounter in urban areas which has already stated above (Hillier et al, 1987; Peponis et al., 1989; Hillier et al., 1993); they have been used in the empirical study of the organizational use of space in buildings (Hillier and Penn, 1991; Peatross and Peponis 1995) and the empirical study of the intelligibility of layouts (Peponis et al., 1990). They have been applied to the analysis and interpretation of historical evidence (Hanson, 1989; Markus, 1993). They have even been found fruitful in the analysis of small building plans (Hanson, 1994). Most importantly, they have been used as expert tools applied to the formulation, evaluation and reformulation of designs on the ground (Hillier, 1993; Stonor 1997). At the first international "space syntax" symposium, held in London in 1997, 23 out of 35 contributions refer to axial maps in some way.

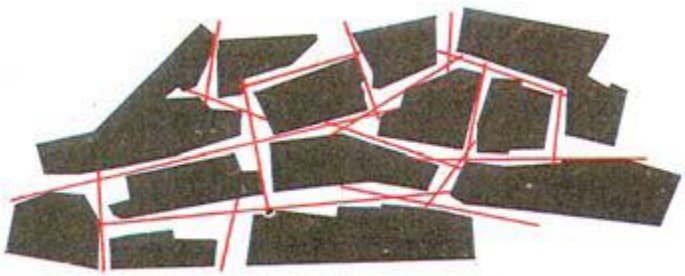


Figure 2.15: Combination of axial & convex map

Source: Hillier et al (1983),

The above definition of axial maps is, however, dependent upon the prior establishment of a unique and economic partition of a plan into two dimensional convex elements. This cannot be treated as an easy task. In computational geometry, algorithms that provide which provide partitions of polygons into the minimum number of convex sub-polygons, drawing diagonals only (Keil, 1985), or also drawing lines which meet at internal intersections known as "Steiner points" (Chazelle and Dobkin, 1979). These partitions are not always uniquely specified. The main problem, however, is the fact that dealing with polygons which involve "holes" has remained "intractable" (Suri, 1997). In architectural plans, a "hole" arises when we have a circulation loop around a set of walls in a building, or a set of streets around an urban block in an urban layout.

Spatial configuration cannot be treated in isolation to achieve the define goal. Therefore other related area should also be touch.

2.8.2. SPATIAL PATTERN

It is wildly accepted that space is the key aspect of how social and cultural life proceed, not the framework. As B. Hillier (1996) described that different human behavior not just happen in space, it has its own spatial forms. No matter that space use for what purpose, gathering, interacting, teaching, eating or dwelling. The arrangement of spaces always constitutes a spatial pattern which B. Hillier call it spatial configuration. Hillier showed general types of spatial configurations. Although they have similar appearance in physical existing, their underneath topology are totally different. These graphs we called justified graphs. According to the patterns, spaces are associated with number and chained in a sequence order, the higher the level represent that space reside deeper in the whole configuration, conversely, number with small value is regards as more integrated.

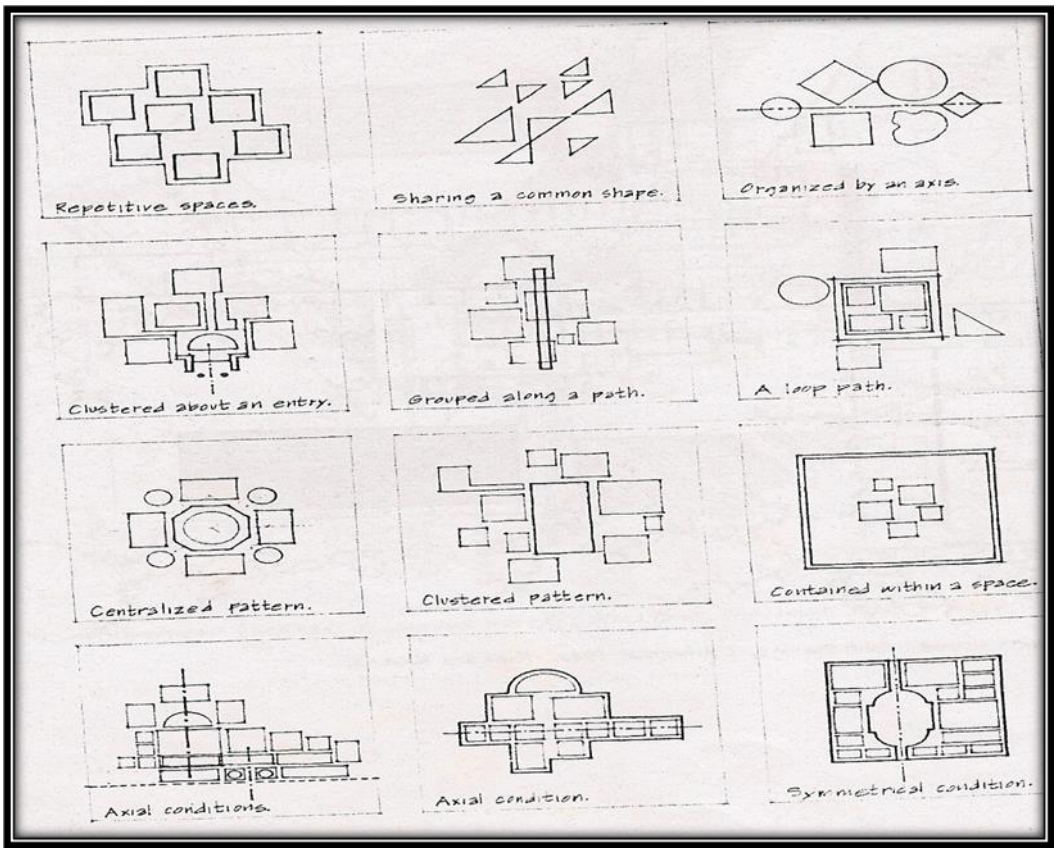


Figure 2.16: Clustered System of Planning.

(Source: Ching (1979).

2.8.2.1 Clustered spatial pattern; It uses proximity to relate spaces together. To a degree, it consists of repetitive, cellular spaces that have similar functions, and share a common visual trait such as shape or orientation to another degree, it can accepts within its composition spaces that are dissimilar in size, form, and function, but related to one another by proximity and a visual ordering device such as symmetry or an axis (Ching, 1979). Because it does not originate from a rigid geometric concept, the form of a clustered spatial system is flexible, and can accept growth and change readily without affecting its character.

Clustered spatial architecture can be organized about a point of entry into a building, or along the path of movement through it. The spaces can also be clustered about a large, defined field or volume of space. Since there is no inherent place of importance within the

pattern of a clustered system, the significance of a space must be articulated by its size, form, or orientation within the pattern. Symmetry or axial condition can be used to strengthen and unify portions of a clustered system and help articulate the importance of a space or group of spaces within the system.

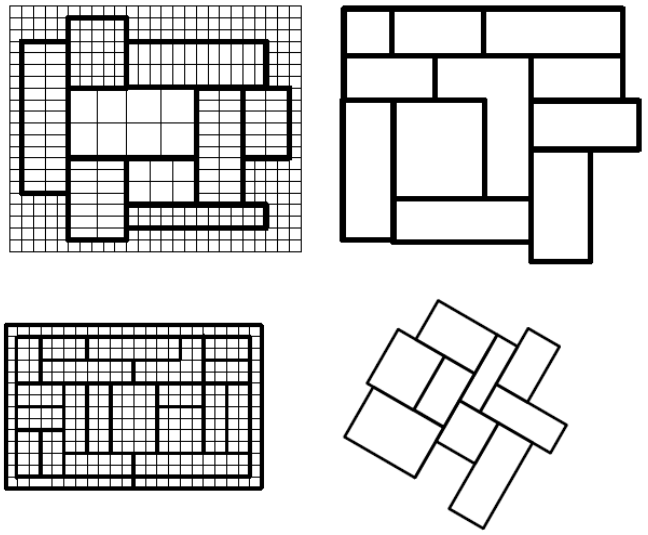


Figure 2.17: grid System of Planning.

(Source: Author)

2.8.2.2 Grid pattern; The grid plan, grid street plan or gridiron plan is a type of city plan in which streets run at right angles to each other, forming a grid. In the context of the culture of Ancient Greece, the grid plan is called Hippodamian plan. The grid plan dates from antiquity and originated in multiple cultures; some of the earliest planned cities were built using grid plans. By 2600 BC, Mohenjo-daro and Harappa, major cities of the Indus Valley Civilization, were built with blocks divided by a grid of straight streets, running north-south and east-west. Each block was subdivided by small lanes.

A simple example of a grid street pattern (see figure 2.17) illustrates the progressive reduction in total street length and the corresponding increase in block length. From the pedestrian perspective, the smaller the block is, the easier the navigation and the more direct the route. Consequently, the finer grids are preferred.

Patterns that incorporate discontinuous street types such as crescents and cul-de-sacs have not, in general, regarded pedestrian movement as a priority and, consequently, have produced blocks that are usually in the 1000-foot range and often exceed it. As a result, street frequency drops and so do the total street length and, therefore, the cost. In general, it is not the street pattern per se that affects costs but the frequency of streets that it either necessitates or purposely incorporates.

An inherent advantage of the orthogonal geometry of a proper grid is its tendency to yield regular lots in well-packed sequences. This maximizes the use of the land of the block; it does not, however, affect street frequency. Any frequency of orthogonal streets produces the same packing effect. Orthogonal geometry also minimizes disputes over lot boundaries and maximized the number of lots that could front a given street. John Randal said Manhattan's grid plan facilitated "buying, selling and improving real estate.

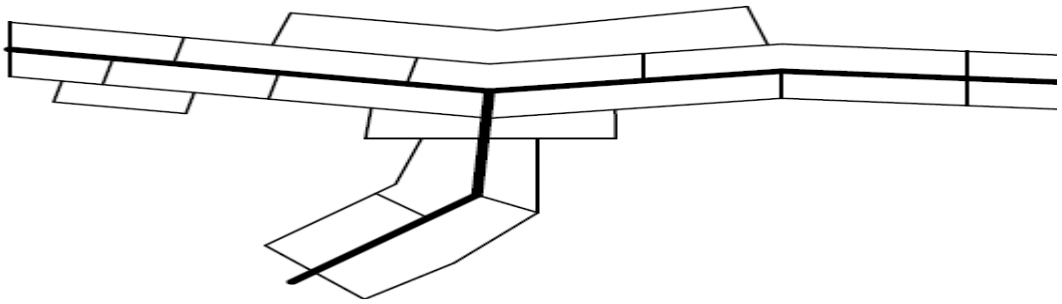


Figure 2.18: linear spatial system.

(Source: Author)

2.8.2.3 Linear spatial pattern; It essentially consists of a series of spaces directly related to one another, or linked through a separate and distinct linear space (Ching, 1979).

It consists of repetitive spaces that are alike in size, form, and function. It can also be a linear space that organises along its length, a series of spaces that differ in size, form and function. In both cases, each space along the sequence has an exterior exposure.

Because of it characteristic length, it expresses a direction and signifies movement, extension and growth. To limit its growth, linear spatial system can be terminated by an elaborated or articulated entrance, or merging with another building form or topography of its site.

The system (Figure 2.18) is inherently flexible and can respond readily to various conditions of its site. It can adapt to changes in topography, manoeuvre around a body of water or a stand of trees, or turn to orient its spaces to capture sunlight and views. It can straight, segmented, or curvilinear. It can run horizontally across a site, or diagonally up a slope, or stand vertically as a tower.

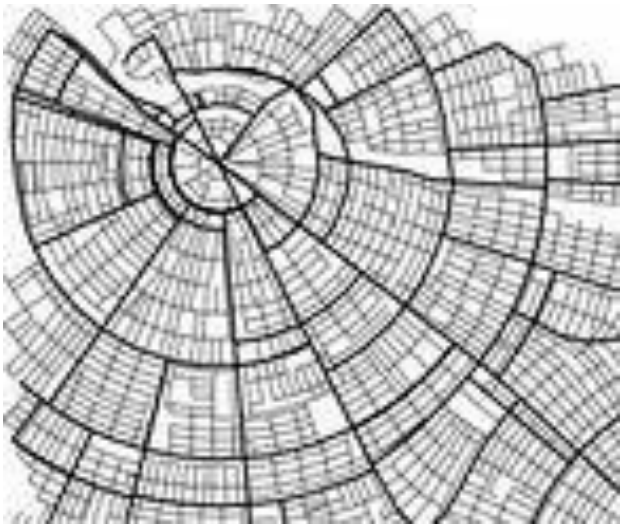


Figure 2.19: Radial spatial system

(Source: pytr75.blogspot.com, 2007)

2.8.2.4 Radial spatial pattern; It is a composition of both linear and central spatial system which is also called "***tress pattern***" because of it nature in two dimensional representation. It has a dominant central space from which a number of linear spaces extend in a radial manner. Whereas centralized spatial system is introverted, radial (Figure 2.19) is extroverted. With its linear arms, it can extend and attach itself to specific elements or features in the layout of the site.

The radiating arms can also differ from one another to respond to their individual requirements of function and context, just like the sector urban form theory which is radiate out from CBD to out skirt of the town.

2.8.3 SPATIAL PLANNING

Spatial planning refers to the methods used by the public sector to influence the distribution of people and activities in spaces of various scales. Spatial planning includes all levels of land use planning including urban planning, regional planning, environmental planning, and national spatial plans.

There are numerous definitions of spatial planning. One of the earliest definitions comes from the European Regional/Spatial Planning Charter (often called the 'Torremolinos Charter'), adopted in 1983 by the European Conference of Ministers responsible for Regional Planning (CEMAT): *"Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy."*

It is the consideration of what can and should happen where. It investigates the interaction of different policies and practice across regional space, and sets the role of places in a wider context. It goes well beyond ‘traditional’ land-use planning and sets out a strategic framework to guide future development and policy interventions, whether or not these relate to formal land use planning control.

2.8.4 SPATIAL ORGANIZATION

Spatial organization refers to the arrangement of physical and human objects on the Earth's surface. Points, lines, areas and volumes are the four geometric features with which spatial organization can be easily described. For example a school can be thought of as a point, connected by roads (which are lines) leading to nearby parks and neighborhoods (which are areas because they have length and breadth or some irregular measurable shape), whereas a lake in a park can be thought of as a volume (because it has an area and depth).

The descriptive process of spatial organization uses concepts such as location, distance, direction, density, and arrangement (linear, grid-like) to capture spatial relationships.

2.8.5 SPATIAL INTEGRATION

"**Spatial integration** expresses the opportunities for and level of (economic, cultural) interaction within and between areas and may reflect the willingness to co-operate. It also indicates, for example, levels of connectivity between transport systems of different geographical scales. Spatial integration is positively influenced by the presence of efficient administrative bodies, physical and functional complementarily between areas and the absence of cultural and political controversies."

Spatial interaction or estimate the flow of people, material or information between locations in geographic space. Factors can include origin propulsive variables such as the number of commuters in residential areas, destination attractiveness variables such as the amount of office space in employment areas, and proximity relationships between the locations measured in terms such as driving distance or travel time. In addition, the topological, or connective, relationships between areas must be identified, particularly considering the often

conflicting relationship between distance and topology; for example, two spatially close neighborhoods may not display any significant interaction if they are separated by a highway. After specifying the functional forms of these relationships, the analyst can estimate model parameters using observed flow data and standard estimation techniques such as ordinary least squares or maximum likelihood. Competing destinations versions of spatial interaction models include the proximity among the destinations (or origins) in addition to the origin-destination proximity; this captures the effects of destination (origin) clustering on flows. Computational methods such as artificial neural networks can also estimate spatial interaction relationships among locations and can handle noisy and qualitative data.

2.8.6 SPATIAL NETWORK

A spatial network is a network of spatial elements. In physical space (which typically includes urban or building space) spatial networks are derived from maps of open space within the urban context or building. Space map are broken into units; most simply, these might be road segments. The road segments (the nodes of the graph) can be linked into a network via their intersections (the edges of a graph). A common instance of a spatial network, the transportation network analysis, reverses this and treats the road segments as edges and the street intersections as nodes in the graph.

More generally, the term 'spatial network' has come to be used to describe any network in which the nodes are located in a space equipped with a metric. For most practical applications, the space is the two-dimensional space and the metric is the usual Euclidean distance. This definition implies in general that the probability of finding a link between two

nodes will decrease with the distance. Transportation and mobility networks, Internet, mobile phone networks, power grids, social and contact networks, neural networks, are all examples where space is relevant and where topology alone does not contain all the information. Characterizing and understanding the structure and the evolution of spatial networks is crucial for many different fields ranging from urbanism to epidemiology.

An important consequence of space on networks is that there is a cost associated to the length of edges which in turn has dramatic effects on the topological structure of these networks. Spatial constraints affect not only the structure and properties of these networks but also processes which take place on these networks such as phase transitions, random walks, synchronization, and navigation.

CHAPTER THREE

3.0 CASE STUDIES

HILLINGDON CIVIC CENTRE, UXBRIDGE, ENGLAND (CASE STUDY ONE)

The Hillingdon Civic Centre is located in Hillingdon, one of London's new boroughs formed during the reorganization of local government about forty-seven years ago- 1965. The architects that handled the project are Robert Matthew, Johnson – Marshal and partners. Some of the partners were made to handle specific aspects of the project, for instance, Andrew Derbyshireand Alan Crawshaw were the partners in charge of the whole project; David Parkers and Terry Swales were in charge of offices; Rob Owston handled the car park; Alan Robinson and Peter Bishop handled the civic suite and building conversion; and finally, David Pitt, David Dixon and Edwin Craves took care of the engineering aspect.

The London Borough of Hillingdon called for the design of their new offices that form the bulk of the Hillingdon civic centre in 1970 and that was when the design took place. This civic centre was meant to provide spaces for a lot of activities which range from official to social, from cultural to educational and a lot of effort was made in the design and in the materials used to see that there is a proliferation of local features so as to give the civic centre a character.This was achieved by the reactivation of popular notions of European architecture, viz: low-key suburban buildings, and a familiar English tradition of Brick and tile. The bricks were used on the walls while the tiles were for the roofs.

Plate 3.1 Main entrance to the civic center

Source; www.google.search. Hillingdon civic center.com

Plate 3.2. Parks and recreation

Soure; www.google.search. Hillingdon civic center.com

Fig. 3.1. location map of the civic center

Source; www.google.search. Hillingdon civic center.com

Plate 3.3 Administative office

Source; www.google.search. Hillingdon civic center.com

The site for this project measures about 8.856 acres on a polygonal shaped area of land bound by city streets in a town of mid-risk brick buildings. The design brief or program called for a design with the following spaces and functions; borough offices (20.057sqm) for 1,3000; a civic suite; a multistory parking garage 584 cars totaling 2325sqm net usable space, including council chamber for 70 member, offices and members rooms, registry, restaurant. Existing building (1731sqm), formally used for middle sex country council, has been retained and converted to multipurpose hall, restaurant, and manager's apartment.

The mere fact that the site is surrounded by city streets means that accessibility will not be a problem.The overall cost of the centre was put at 18.6 million pounds (£18.6 million) and the general contractor that handled the job was Higgs and Hill Building Ltd., while the consultants were: Zisman Bowyer &Partners for mechanical aspects; Young & Brown for quality surveying; Acoustical investigation and Research for the acoustical aspects of the design.

SPACES PROVIDED

The spaces provided here are very many and varied, but broadly grouped, they include the following: Entrance Lobbies and Porches; civic suite; offices; car park; circulation; terrace; cafeteria; bar; kitchen; lounges; library; exhibition; plant house; conservatory; waiting area; marriage room; multipurpose hall; medical suite; painting; conference room; meeting; etc.

CONSTRUCTION ASPECT

- The structural system employed in the construction are the following:

  Reinforced concrete frame; pad foundations, bearing on gravel layers; structural steel for main roof members; timber rafters.

- Mechanical systems: gas fired heating; central air handling with local fan-coil heating and cooling units; air extracted through lights for heat.

- Major construction materials: they include the following; brick; tile; concrete; steel; wood. Material reused include these: cupola on civic suite; wrought-iron gate outside registry office.

The materials used include:

1. 2,800,000 bricks
2. 750,000 roofing tiles
3. 700 windows
4. 3,250 tonnes of steel reinforcement
5. 40,000 cubic metres of concrete

   Covering an area of eight acres, including extensive gardens and the paved entrance square, the building cost £18.5million.

APPRAISAL:

Generally speaking, due to the proliferation of local features and the generous use of traditional building materials like brick and tile, the Hillingdon civic centre has character. It also looks picturesque, and this has made it a touristically valid project.The massing, materials and forms used were beautifully manipulated so that the centre blends with the general architecture of the existing buildings in the locality that it is sited. In the words of Robert Maxwell, a partner in the firm of Douglas Stephens & partners, and also a professor of architecture at the Bartlett school, University College,

London: “Derbyshire (the architect of the Hilling don civic centre) places a special emphasis on the role of the locality in influencing his though as he began to prepare his plans. The area was combed for examples of traditional building: churches, schools and the forms of suburban housing were given a new appraisal. The preponderance of brick and tile vernacular suggested that these materials should be used in the civic centre so that it would appear as a native and not a foreign element in the environment”. That need for consistency in the architecture of an area was achieved by Derbyshire, so that nothing looked out of place.

Another factor to the credit of this civic centre is generous provision of functions, so almost every aspect of civic need was provided for. Prominent among the missing functions are recreational facilities, auditorium or movie hall. There also seem to be ne provision for a maintenance workshop, but if it was provided, it was not indicated. Others are bank and post office.The elevations, though delicate and picturesque in appearance, look rather chaotic as no

definite guiding principle for varying levels, recesses and depressions are immediately discernible.But all in all, in spite of the fact that Derbyshire (the architect) considered the project "architecturally unconvincing" it is a popular success. This is made obvious by the

acceptance of the scheme by council members and the community alike.

3.2 TSUKUBA CIVIC CENTRE ACADEMIC NEW TOWN, JAPAN. (CASE STUDY TWO)

Tokyo is to Japan as Paris is to France: it is not just the country's largest metropolis, but also its cultural and professional lodestone, which few among the talented and the ambitious are able to resist. But Tokyo – with a population approaching 12 million that make it the third largest city in the world, is so gigantic that its decentralization is not so much a matter of option as it is of survival. As part of a comprehensive plan to draw people away from the overcrowded capital, the Japanese government in 1966 unveiled the master plan for Tsukuba Academic New Town, a community for 120,000 inhabitants on a 4,000 acres site some 40 miles (64Km) north-east of Tokyo.This new Town, though very idealistic, was not so ideally realized, largely for reasons of economic. New towns, unlike conventional suburbans, are rarely able to escape the financing systems that create them. It is in realization of this that the Japanese government, feeling that Tsukuba will not be truly independent of Tokyo without an integral employment base, decided to provide its main industry namely: higher education and government-funded research. Centre piece of satellite town was Tsukuba University, construction of which began in the early 1970s. But as time went on, it was realized that something had gone fundamentally wrong somewhere. The component part of this sprawling new town had never meshed into a coherent whole.

The shortcoming of the new town's architecture and planning had seriously affected the perceived quality of life there. The town had attracted only 3,000 inhabitants, a quarter of its projected population, and many employees of the university and the research institutes there refused to settle in Tsukuba, preferring to make the hour-long journey to and from Tokyo, thus defeating the basic reason for the ambitions development scheme.

One of the basic problems of the new town was traced to the fact that social amenities and cultural facilities of most basic sort were virtually no-existent. This was what led that housing and urban development corporation of Japan, an equivalent of New York urban development corporation, to propose a new civic centre that would give Tsukuba the focus, both physical and psychological, that it so desperately needed. The competition to design the centre, organized for the ten different architects, was won by Arata Isozaki & associates.

From the fore-running commentaries, we can see the important role a civic centre can play in welding a community together both in the physical and paychological sense.The civic centre was completed in June 1983, that is about 5 years ago. The architects that formed the design team include the following: Arata Isozaki, Suichi Fujie, Takashi Ito, Aoki, Makoto Watanabe, Matsuura.The engineer were: Toshio Kimura structural Engineers (structural); Kanky Engineering Co. Ltd. (Mechanical); Chiyoda Engineering Co. Ltd. (plaza structure).

The consutants were: Shiro Kuramata (Interior design(); N.H.K Technical research Laboratories (acoustics); Keio Landscap Garden Planner Co. Ltd. (Landscaping) The general contractor was a joint venture of: Toda construction Co. Ltd.; Tobishima construction Co. Ltd. And Kabuki Construction Co. Ltd.

Plate 3.4 The east facade of the Civic center.

Source; www.google search.tsukuba.com

Plate 3.5 The facade of the Civic center.

Source; www.google search.tsukuba.com

Plate 3.6; Entrance to the Civic Centre, designed by Arata Isozaki, 1983

Source; www.google search.tsukuba.com

SPACE PROVIDED

The space provided in the civic centre include the following: the two major structures of the complex are the Tsukuba Dai Ichi Hotel (a 14 storey, 115 room facility) and the nova hall (a 1,003 seat concert auditorium). The other are: entrance lobbies; interior plaza; guest chambers; public rooms; several halls of various sizes; ball rooms; cocktail lounge; restaurant; concert hall; a multi-use, or mixed-used building housing offices, a bank, a bakery, a coffee shop, restaurant, a shopping arcade and circulation.

CONSTRUCTION MATERIALS

Some of the materials used in the construction of the centre are: concrete, granite, panels of gray and white Neoparies (a new crystallized glass material manufactured by Nippon

Electric Glass company), deep green Kijamon marbla, aluminum paneling, salivary ceramic tiles, pilaster, mechanized horizontal louvers, fabric covered sound absorption panels, etc.

APPRAISAL

If there is one thing that is immediately noticed and appreciated in this design, it is the beautiful and mature use of building materials. It is one thing to have a lot of building material at your disposal and it is quite different thing altogether to know how to use or combine them beautifully. The developed nations generally and Arata Isozaki in particular, have these materials at their disposal and make use of them beautifully. That I know much. Just like the previous case studies, the functions provided in the Tsukuba civic centre are by no means exhaustive, though an appreciable effort has been made to provide as many as possible, depending, most probably, on the needs or requirements of the community for which the centre is being designed.

I am of the opinion that a civic centre the size of Tsukuba civic centre and with the amount of planning processes it went through ought to have sporting or recreational facilities like lawn tennis courts, swimming pool(s), sports hall, and a host of others.

But all of these are conspicuously absent. Or at least they were not indicated in the drawings.

In the overall design, there was an extensive quotation of extraneous, even foreign sources. A lot of historical allusions were drawn and used on the design. Perhaps, Isozaki was prodded into the pursuit of historical references by the criticism of Charles Jencks, who once wrote that Isozaki's architecture lacked sufficiently allusive content. Kazuo Shinohara, one of Isozaki's serious rivals of the claims of being Japan's most important living architect, in an interview characterized the Tsukuba civic centre as "Isozaki's compromise with postmodernism". Perhaps, the proliferation of historical reference in the design may be as a

result of isozaki's awareness of himself as an international figure. But all these contributed to the problems of the Tsukuba civic centre, because here was a commission in which function and image were crucially interrelated: to give the new town a true sense of place it was essential to make it work

not just as a series of buildings and sequences of spaces (which it does quite well) but also to have it serve as an authentic symbol of community (which it does considerably less well). So as absorbing as the Tsukuba civic centre is as an impressive display of a broadly informed architectural intelligence, it does not provide Tsukuba with it so acutely requires: "a unique identity of its own".

3.3 ISAAC ADAKA BORO PEACE PARK (CASE STUDY THREE)

The Isaac Boro peace park/civic centre, is located in ovom village of the Atissa kingdom in Yenagoa L.G.A of Bayelsa state. The project was built by the Bayelsa state government to serve as a meeting place for social activities, meetings and some cultural activities Access to the site is through the Mbiama-Yenagoa road. This center serves as a notable landmark in memory of Major Isaac Boro who was a war veteran and a Niger delta hero.

Plate 3.7 Arcade of the **Isaac Adaka Boro** peace park

(Source: Author's field work)

Plate 3.8 site plan configuration **Isaac Adaka Boro** peace park

(Source: Author's field work)

Plate 3,9 Goodluck Jonathan Amphitheatre, **Isaac Adaka Boro** peace park

(Source: Author's field work)

Plate 3.10a and 3.10b Artificial lakes for canoeing, **Isaac Adaka Boro** peace park

(Source: Author's field work)

Plate 3.11a and 3.11b Children's playground, **Isaac Adaka Boro** peace park

(Source: Author's field work)

SPACES PROVIDED

The spaces provided in this centre are the following:

1. A ceremonial square (Musa Yar'Adual ceremonial square): a mini auditorium with a large open space at the center constructed to suit varying events

2, An Arcade, with the statue of Major Isaac Adaka Boro

3. Children's playground

4. Reserved gardens with sitting slabs

5. A theatre (Goodluck Jonathan theatre)

6. Artificial lakes

7. Water fountains and pergolas

8. Sporting facilities (Tennis, Basketball, Handball courts),

9. Conveniences, Stores,

CONSTRUCTION MATERIAL

The main materials used for construction in the centre are high quality steels, concrete blocks, reinforced concrete beams and columns, sliding windows with Aluminum frames; critical hope glass doors with metal frames, metal railing; metal grill window protectors; corrugated aluminum roofing sheets; wooden trusses, asbestos ceiling boards.

APPRAISAL

The Isaac Boro peace centre. The little it has in its favor includes: the possibility of adding more functional activities to the centre. The center has good circulation flow pattern with all sporting facilities articulately positioned facing due North.. The site is spacious with less enclosed structures thereby allowing the designed spaces to breathe which is a good feature in site planning and designing because they will admit air thereby aiding ventilation.. other desirable/ undesirable futures of this centre include the following:

-Features like ramps to aid the physically handicapped are not conspicuous and were provided.

-sufficient soft landscaping and also hard were necessary like the walkways

-There are no wings or stores by the stage. This is a very serious over-sight.

-The roof eve projection for the arcade is not sufficient and is not functional.

-there is no backstage in the Goodluck Jonathan Amphitheatre as well as

-The function provided for are grossly inadequate. More functions are needed to upgrade the centre.

-No parking spaces within the centre

-the construction of the drainage system is superb. This means that drainage does not depend on the topography of the site.

-Transportation services to the site is perfect, as the access road are good.

-There are recreational facilities provided within the site.

- poor raking of seats in the Amphitheatre

- wrong choice of trees were used in shading the walkways, outdoor sitting within the park

-The surrounding is not fully landscaped to enhance the beauty of the site.

-All the flaws above should be looked into and appropriate correction made.

- Inadequate security most especially in the Gardens

- The water fountains are dirty and appear moribund.

3.4 NKPOR CIVIC CENTER, AMAFOR VILLAGE, NKPOR. (CASE STUDY FOUR)

The Nkpor civic centre is located in the Amafor village, Nkpor. It is along Nkpor-ojoto road. The building was started in the year 2008 and is still under construction till date. The construction of the project was sponsored by members of the Nkpor community as a result of revenue generated from development and market levies of the town. The main motivating factors was the provision of a muilti-purpose Hall where members of the community can gather during important occasions like meetings, celebrations, etc.

The site of the centre is a virtually flat expanse of land with a slope of less than two percent (2%). The area of land is not wide enough to give a very good scope for future expansion.

Access to the site is by branch off of Nkpor-Ojoto road.

SPACES PROVIDED

The spaces provided in this civic centre include the following: -

The structure is two storey building with one multi-purpose hall on each floor with rostrums, offices, changing room, store, toilet facilities etc.

SPACES PROVIDED

FOR

(a) Entrance lobby

(b) staircase

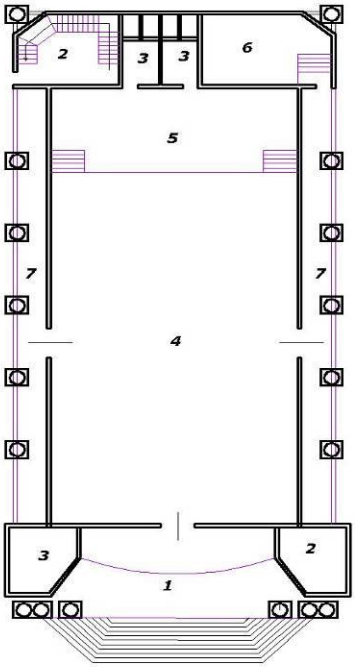
(c) Toilets

(d) Hall

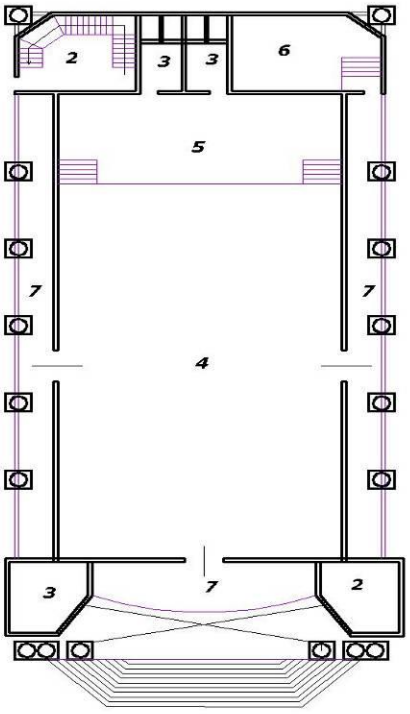
(e) stage

(f) changing room

(g) verander/balconies



GROUND FLOOR PLAN



FIRST FLOOR PLAN

Fig 3.12a and 3.12b ground floor and first floor plan of Npor community centre (source author's drawing 2014)

Plate 3.13: front Elevation

Source; Author's field work, 2014

Plate 3.14: front Elevation

Source; Author's field work, 2014.

Plate: 3.15 Right- side Elevation

Source; Author's field work, 2014

Plate 3.16 well landscaped portion of site plan.

Source; Author's field work, 2014

Plate 3.17: Interior view of the muilti-purpose .

Source; Author's field work, 2014

Plate 3.18: Interior view of the first floor multi-purpose Hall .

Source; Author's field work, 2014

CONSTRUTION MATERIALS

The walls are built of concrete blocks while the roof is of steel trusses and corrugated Aluminum roofing sheets. Some parts of thereof, however, are built of concrete. The window is made up of Aluminum projection casement. The doors are of two types. Wooden flush doors and critical hope metal security doors

APPRAISAL

This civic centre has some points to its credit, but with even more points against it. The points in its favour are the following:

Merits

-The orientation is good enough to reduce solar radiation to a minimum in a large area or portion of the centre.

-The location of the staircase is very logical, being at the entrance lobby, it can be easily located.

-The courtyard provided will aid air circulation, good natural lighting and communication link.

-Top or upper floor were kept at a minimum.

-The light coloured paint will reduce heat absorption.

The points against it include the following: -

Demerits

-The site is too small which makes future expansion impossible whenever the need arises.

-The functions provided for are grossly inadequate for a civic centre.

- the easement does not conform to building od and standard

- The building does not speak of its function

- there are no facilities and functions that will promote and enhance communal relationship among people

- the site lacks soft lanscape

-The location of some of the functions. Like the offices, are not too favourable for cross-ventilation. .

-No particular consideration was given to the handicapped. This is obvious by the total absence of things like ramps.

-There is no construction for drainage of rain water. The slope of the site is depended on to take care of this.

-There is no provision for recreational facilities like badminton court, lawn tennis court etc due to small nature of the site..

-No local building material was exploited to reflect our cultural heritage.

- Parking spaces are highly inadequate

3. 5.0 CASE STUDY OF ADAPTABLE SPACES

3.5.1 MARIE JUJURIEUX, FRANCE (CASE STUDY ONE)

The multipurpose assembly hall Marie Jujurieux is a located in a small locality of Ain, Rhone-Alpes, France. Coordinates 46° 2' 0" North, 5° 25' 0" East


Plate 3.19a and 3.19b: Marie Jujurieux as an assembly hall

Source: Figueras (2009)

Jujurieux is a commune in the French region of Rhône-Alpes in the Ain department. As in many localities with small populations, the local council's ability to provide a variety of facilities for different types of events is limited. So when the municipal council decided to renovate its assembly hall, the goal was to come up with a solution that would enable them to make the most of a single space.

The project guidelines called for a seating system that would allow the hall to be cleared automatically in just a few minutes. To meet this requirement Figueras installed the Mutamut System, which makes it easy to convert an assembly hall equipped with movable seating into an open space that can be used to hold events of all types, including banquets, dances and ceremonies of any kind.

This new system changes the concept of public space by addressing the rising price of land and the need to design multipurpose halls. The Mutamut System makes it possible to easily and effectively convert a conference seating area into an open space for staging an exhibition with a minimum amount of work. The need for any additional storage space is eliminated since seating is kept under the stage when not in use. Seats move along floor rails to be

stored under the stage, (see fig 18, 19 and 20) a system that makes changing the configuration of the hall a simple matter as seen in the illustrations below.(Figueras, 2009).

Plate 3.20: Marie Jujurieux

Source: Figueras (2009)

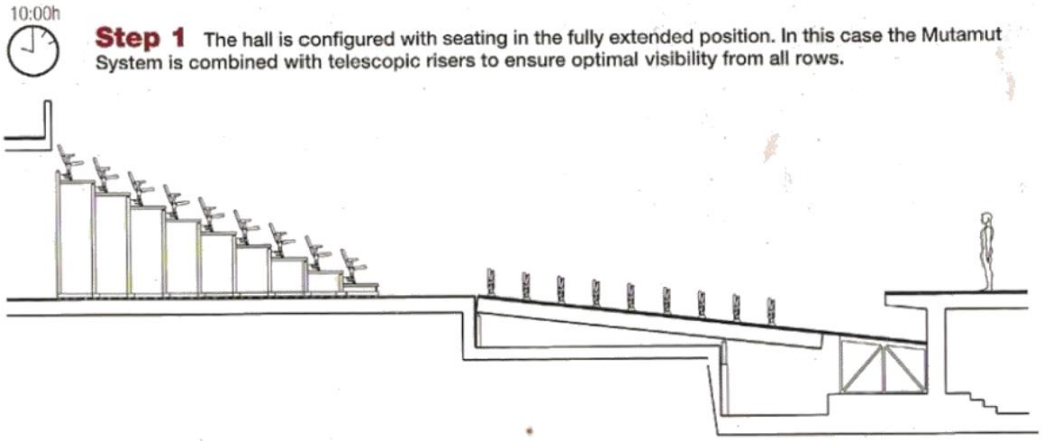


Fig 3.3: Marie Jujurieux section

(*Source: Figueras (2009)*

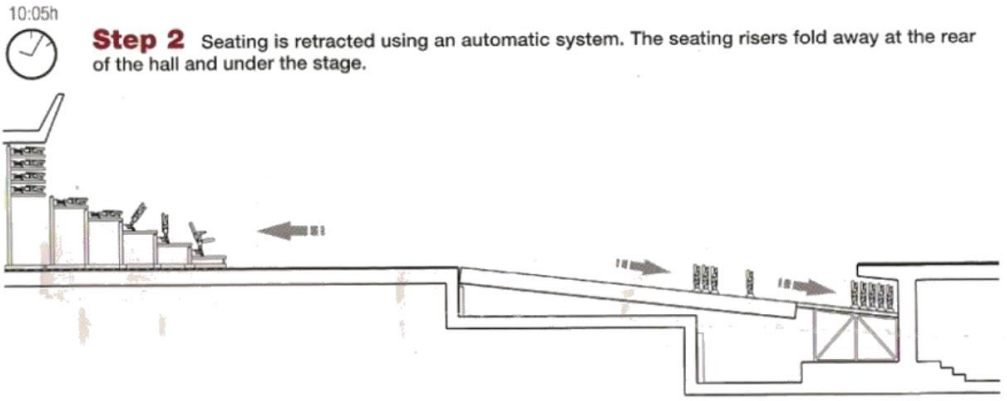


Fig 3.3: Marie Jujurieux section

(*Source: Figueras (2009)*

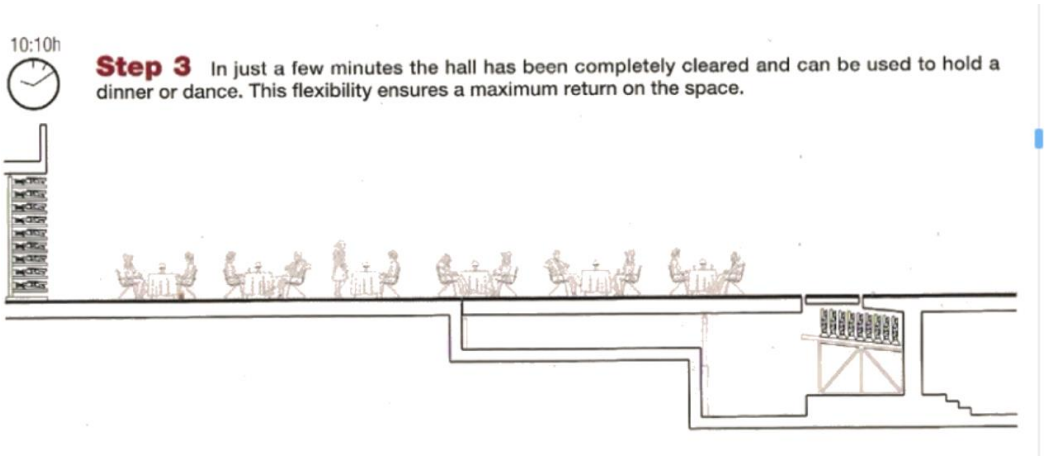


Fig 3.4: Marie Jujurieux section

(*Source: Figueras (2009)*

Plate 3.21a and 3.21b: Jujurieux as an assembly hall (left) and as a community gathering for the elderly (right

Source: Figueras (2009)

3.5.2 THE CASINO DE PARIS, FRANCE (case study 2)

ARCHITECT: Duc de Richelieu (1730)

Fig 3.6: Google image of the location and road map to Casino de Paris.

Source: google maps 2010

LOCATION: 16, Rue de Clichy, Paris, France.

BRIEF BACKGROUND

Casino de Paris is a music hall of Paris and in 1880, it became the Palace theatre. In 2004, Cle Millet, an architectural practice proposed a system that would make it easy to clear the theatre seating in a few minutes to leave an open hall for a concert (www.casinodeparis.fr).

Plate 3.22a and 3.22b: Entrance (left) and Casino de Paris used as a theatre.

(*Source: Figueras (2009)*

Plate 3.23a and 3.23b: Casino de Paris as a concert hall (left) and Casino de Paris used for formal dining (right

(*Source: Figueras (2009)*

CHAPTER FOUR

4.0 GENERAL PLANNING PRINCIPLES AND DESIGN CONSTRUCTION

1. Utopia and integrated planning. In the spirit of the utopian vision to create perfect

places, we should create integrated planning strategies. By translating the essence of utopian ideals into tangible objectives, these strategies should give shape to models which enjoy extensive freedom and flexibility in both space and time. It is important to have in mind that, in order to create a community centre, it is not simply a question of formalising an architectural and planning technique, but also of providing a framework for architecture which fosters human activity.

2. Community of learning. A community center should stimulate personal contact and serve multiple functions, and thus nurture a fully-fledged community of learning. Here, the human scale should prevail throughout the various loci and foster a sense of belonging among users. Through carefully studied design, the users of these spaces should bond with their physical environment. In this way, urban planning and architecture stimulate interaction with fellow users of the facilities.

3. Spatial synchronization. The configuration of a 'community centre' architecture and urban planning must be thoroughly aesthetic, given that it will form part of the users' collective memory. The physical elements of a place must amount to more than just an equipped built surface; it must also dispense visual education by creating a coherent spatial whole where as much heed is paid to built volumes as to open spaces. The center is the hub and backbone of the metropolis: it is a "three-dimensional public space" in tectonic corporal form.

4. Nature and arts. The presence of nature (created by God) and arts (objects deliberately created by man) creates and tends to give a form of an integrated architectural model in buildings and spaces which could serve other utilitarian purposes like the use of trees as cool spots, shrubs for overall beauty of the environment, the use of sculptures to tell the cultural heritage of the people, educative inscriptions and artworks that thus facilities further experiences et cetera.

7. Sustainability and adaptation to the environment. An community center should ensure that its architecture and urban planning are in harmony with its surrounding geographical and

climatic conditions. It should be exemplary in relation to the environment, biodiversity and

sustainability. It should use construction materials and technical solutions that are in line with this policy, and employ mechanisms that use renewable sources of energy and are respectful of the environment.

7. Sustainability and adaptation to the environment. A community center should ensure that its architecture and urban planning are in harmony with its surrounding geographical and climatic conditions. It should be exemplary in relation to the environment, biodiversity and sustainability. It should use construction materials and technical solutions that are in line with this policy, and employ mechanisms that use renewable sources of energy and are respectful of the environment.

9. The center/city relationship. The center and city should work in collaboration,

create synergies and actively encourage the presence of users in social and urban contexts.This way, both users can support each other's efforts to innovate. They can also enlist the efforts of social and cultural projects.

Here in this chapter, my beam light addresses the considerations and the analysis of major architectural and environmental problems involved in the design of a community centre as well as the design principles of for the design of adaptable spaces.

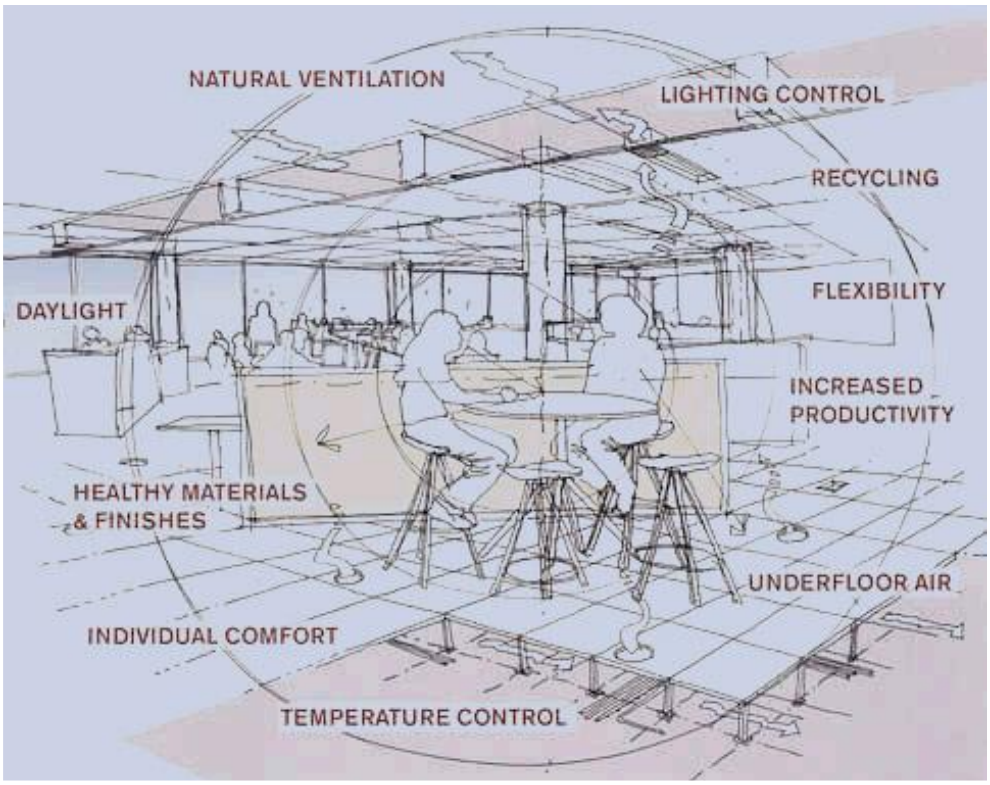


Fig 4.1. Illustrating different consideration parameters

(*Source: Google images)*

4.2 DESIGN CONSIDERATIONS OF THE COMMUNITY CENTRE

Parleying on the case studies and cognitive- architectural analysis done, some architectural consideration of facility will be treated below.The following design elements should be applied to the center and should be taken into consideration in all building and site development. These elements are generally considered by most

architects and landscape architects, and are articulated here as a reminder and check list.

- Planning consideration
- Environmental consideration
- Building system
- Security & safety

4.2.1 PLANNING CONSIDERATION

4.1.1.1 STAGING SOCIAL EXCHANGE (SPACES OF SOCIALIZATION)

The purpose of a community centre is to bring together diverse people and their ideas in an environment that creates potential for social exchange. While the physical character and quality of a centre is defined by both its buildings and its open space, it is the open space which has the greatest potential for unifying and equalizing the shared space of the center. It can promote the sense of community derived from actively shared space, and provide for the enriching experiences of both ***planned and chance encounter***. Comprised of walkways, greens, courtyards, gardens and playfields, open space has the potential to knit together the diverse elements of the facility in a coherent way.

Plate 4.1: central arena designed for socialization

Source: Google images

Individual buildings should also be designed to maximize the opportunities for social and intellectual exchange. Public spaces in the center should be generous, provide places for conversations, and be visible to the user of buildings and people passing by them. The centre will have both indoor and outdoor spaces suitable for gatherings and social occasions. While there will always be pressure to maximize the proportion of dedicated spaces in buildings, their success will ultimately depend upon balancing the public and private spaces.

Trees and Pergolas

They provide the most natural setting for interaction. Usually, man is attracted to shade of tree as a means of escape from the scorching sun, and for receiving fresh air generated by trees. Informal seats could be provided. Thus trees could be planted at strategic locations. Pergolas provide a less natural setting than trees. Pergolas are therefore better constructed with natural materials, the beauty of the interaction centres lie in the fact that they provide the users with a relaxed atmosphere. Moreover, they become more effective when they are oriented to catch more and good views. Eremasi's thesis report (2010).

4.1.1.2 LAND USE CONSIDERATIONS

Land use is a broad planning process that encompasses zoning ordinances, subdivision regulations, and master planning. Regulating land use development has been a common practice in the nation for many years, with numerous regulations and other tools in use by state and local governments to influence the configuration of urban sites. Comprehensive planning will encourage certain types of development, incentives, allocation of resources, and capital improvement programs oriented to improve the quality of a community center. In most cases, sound site planning will increase the land area needed for individual buildings and maximize the generative and productive qualities of the site.

4.1.1.3 SITE PLANNING

The community centre is made up of different units such as the administration, medical unit, lodging and accommodation library, lecture auditoriums, and open spaces to be integrated to create a potential for intellectual and social exchange of its users

Therefore careful planning major will be taken to properly integrate the units for the well being of the users. A Very good zoning ordinance will be applied with a spatial system which will integrate all facilities together without compromising access, circulation, the eco-system.

4.1.1.4 SITE DESIGN

To maximize safety, security, and sustainability, there should be a holistic approach to the community centre site design that integrates form and function to achieve a balance among the various design elements and objectives. Several basic spatial systems schemes can be developed by manipulating the transitional space. Each scheme is evaluated in terms of activity interrelationships, flexibility of use, adaptation to site and climate variables, and provision for expansion; such systems are:

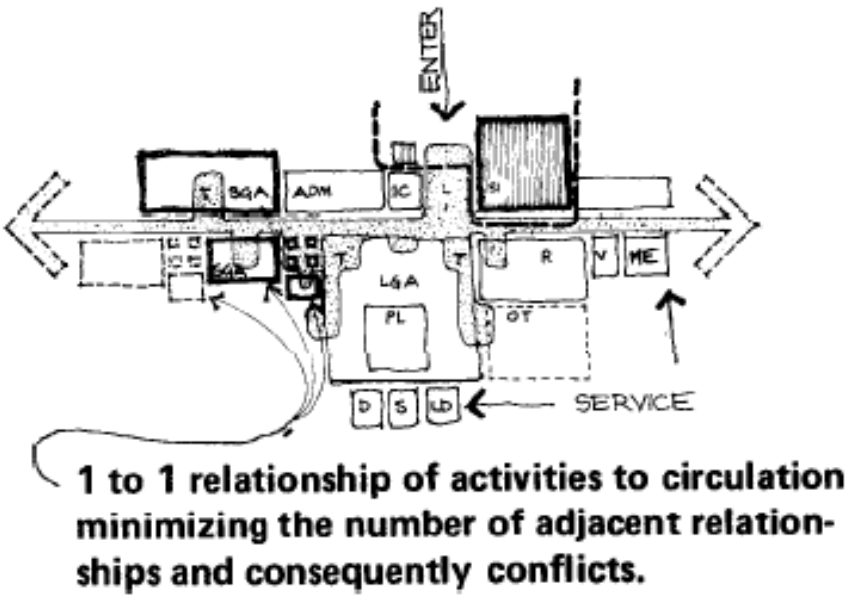


Figure 4.2.linaer spatial relationship

(source: http//*140.194.76.129)*

4.1.1.4.1 The **linear system** is characterized by a single transitional spine along which activity spaces are arranged; central program area is centrally located (see figure 4.1 above).

Linear plan maximizes distance between activities which facilitates noise control but inhibits visual control. However, in smaller centres the proximity of activities necessitates a technological approach to sound control as well as planning considerations which is good for public areas.

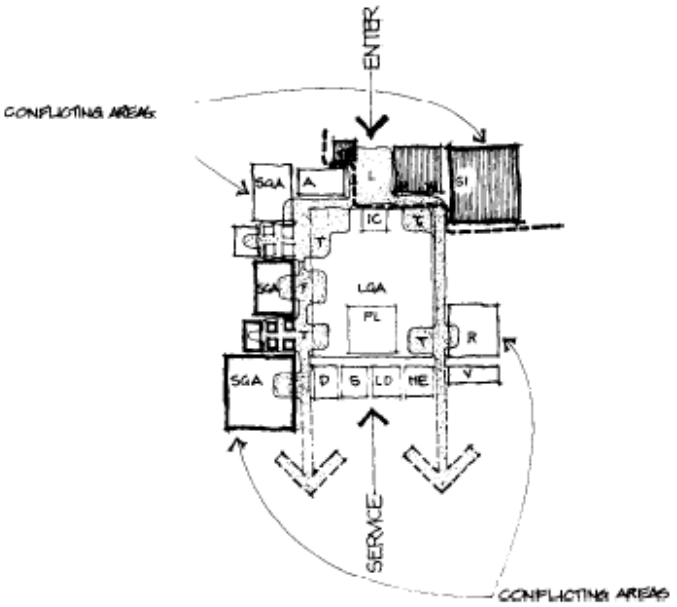


Figure 4.3.central spatial relationship

(source: http//*140.194.76.129)*

4.1.1.4.2 The **Central system** places the central program in a core position with small group activities encircling it; the transitional space separates the two elements. The large group activity area is central and separates conflicting small group activities.

Since the large group area is adjacent to all other areas across the transitional area, opportunities for social interaction are maximized

.

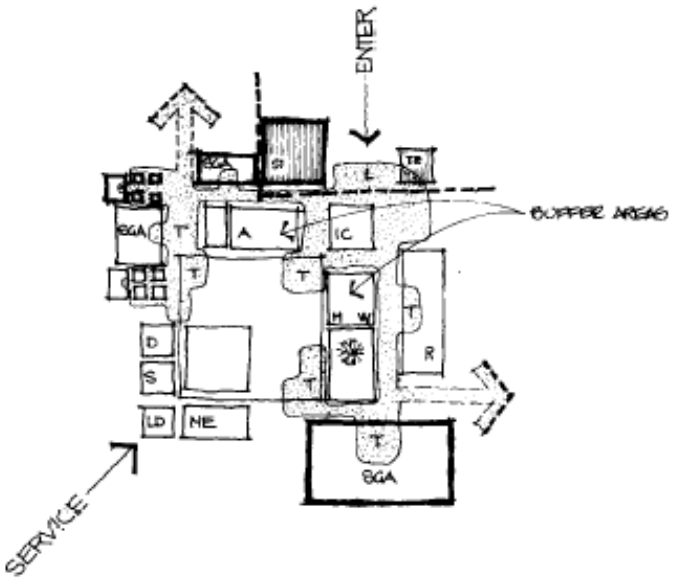


Figure 4.4Dispersed spatial relationship

(source: http//*140.194.76.129)*

4.1.1.4.3 The **Dispersed system** scatters spaces to reduce conflicts, uses enclosed spaces to buffer sound and separate open spaces. The transitional space acts as a decentralized link that both connects and separates activities. Buffer activities separate the large group area from peripheral small group activities. This arrangement decreases opportunities for social interaction but allows diverse activities to occur within a relatively constricted area. Taking advantage of site conditions when possible, the roofs of buffer areas should become mezzanines or overlooks which visually connect peripheral areas and the large group area.

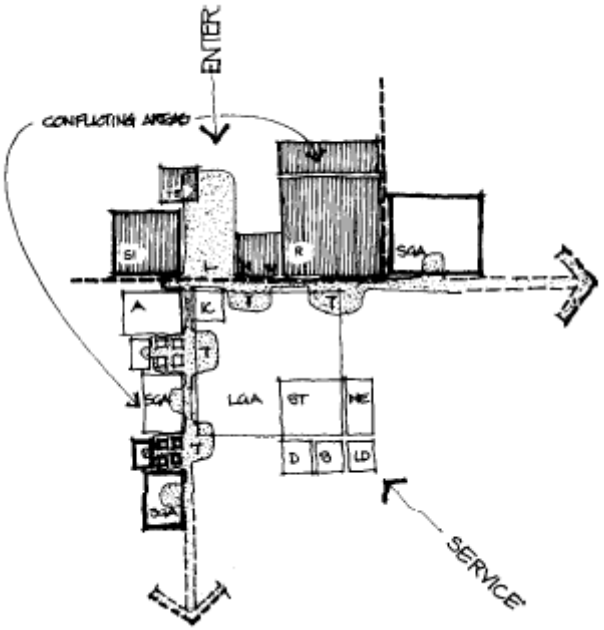


Figure 4.5.Axial spatial relationship

(source: http//*140.194.76.129)*

4.1.1.4.4 The **Axial system** combines intents of the Linear and Central schemes; the transitional space is divided into two axial paths around the central program area which separate incompatible small group activities. The central large group area separates conflicting small group activities and is adjacent to most areas including the lobby across the transitional area. This arrangement should maximize opportunities for social interaction.

Therefore, this entire scheme put together in the different units in their architectural significant will yield a good design.

4.1.1.5 LANDSCAPE

Structures will be sited and designed to have a good spatial configuration to form lively public areas that will increase the social well being of users of the facilities

Each infrastructure should take responsibility for improving adjacent streets and pedestrian ways. The centre palate of landscape materials, walkways, lighting, signage and street furniture must be used on all public spaces that are part of design projects. These elements should be used to create both active gathering and contemplative spaces, and to reinforce linkages within the centre.

Plate 4.2 Hard and Soft Lanscape Isaac Boro Peace Centre

(source Author's field work 2014)

4.1.1.6 BUILDING SITING

Building locations should conform to the Planning ordinance of the site. How the building is situated on the site will have a significant impact on the success of the design solution. Care should be taken to site the building in a way that creates a positive connection between the building and pedestrian paths. Although there are no setback lines, building should acknowledge what the setback requirements are, what are common in relation to the adjacent buildings and buildings located along the same block line. Setback lines are intended to develop unity among buildings by means of common alignment and location. Adjacent buildings should also be studied in regard to their entry locations, potential for shared public areas or entry arrangements, and for the development or enhancement of outdoor spaces and spaces between buildings. Aligning buildings will help to clearly define open spaces. In order to achieve the full long-range capacity of recreational space in the center, setback lines must be respected.

The location of building service entrances also deserves special consideration. The view from and to site landmarks should also be analyzed and incorporated when locating a building.

4.1.1.7 SCALE AND PROPORTION

The scale and proportion of a building will impacts the “sense of place” within center. Siting of one building should acknowledge entire context of the community center, but recognize and establish human scale. The design of the building should take into consideration how the design affects a person standing at the face of the structure as well as the building’s materials can all influence how the building scale is read.

4.1.1.8 ARCHITECTURAL STYLE

Buildings on the centre can reflect many styles, and the essential quality of the facility is one of buildings that speak in their own voice about their purposes and the era in which they will be built. It is the landscape and public spaces that integrate these buildings into a coherent whole.

Buildings will express the aesthetic ideas of our times and times past, so that as we look back on them they also become a cultural record of ideas about architecture and community life.

4.1.1.9 CIRCULATION

The community centre should be designed in a way as to accommodate the ever-growing populace The multi-functional nature of such a centre should allow for independent activities of the respective units of the facilities, while also at the same time provide space for communalism and interactivity. Therefore the need for the flexibility in planning becomes apparent *(BCO, 1994).*

The need to adequately tackle the circulation challenges that might become evident as the centre will not exist alone but would be an integral part of the community environment that should integrate itself rather than isolation.

Consideration must be given to the various functions of the different spaces within the units and their functional relationship of one to another.

Circulation will cover this two areas:

6. Internal circulation

7. External circulation

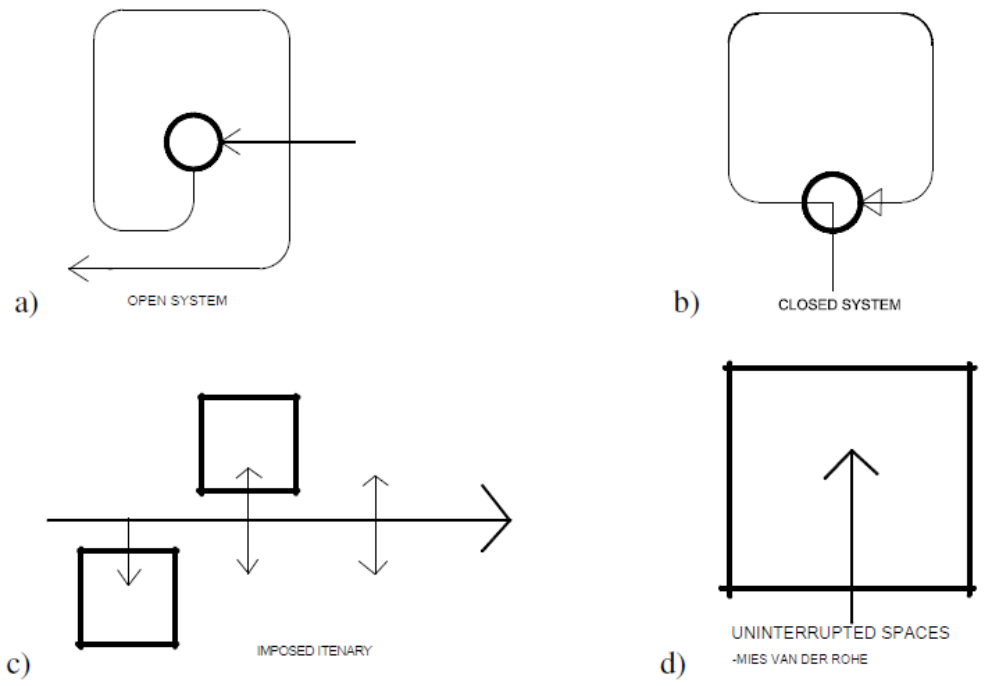
Internal circulation is the linking of various units of a building and spaces through the use of corridors, lobbies, and lounges. The spaces mention helps to distribute occupants or users of a building to their workstations within the building and also help in the proper configuration of spaces in the entire building. Special attention should be given to such areas when developing the design.

Lounge introduce in building play a dual role by bringing people together which is fostering communalism of occupants or users. Then as an element of circulation which is linking other units together. This zone would provide the much needed area or space for relaxation within the public areas.

Lobbies, corridors and walkways has more vital role to play than the lounge. Particular attention must be given to the general circulation within the office complex from the entrance lobbies down to the several circulation lobbies that take one to the more semi-private areas of the complex. Walkways should be planned to link units and various volumes of structures to improve circulation without compromising aesthetics.

External circulation is the movement of people by either vehicle or pedestrian path to access building units and to reach other facilities within the site. In fact this circulation affects the general planning of the layout of the site. It determines how buildings will be located or sited, the spatial networking of the site, zoning of activities and the spatial system which will be used in the road network.

Therefore, very good spatial system should be chosen to integrate all the activities of the community center which will centre on the theories of spatial configuration –creating ***generative*** and ***productive*** spaces that form the centre of activities movement will go toward the peripheries of the site to network all facilities.



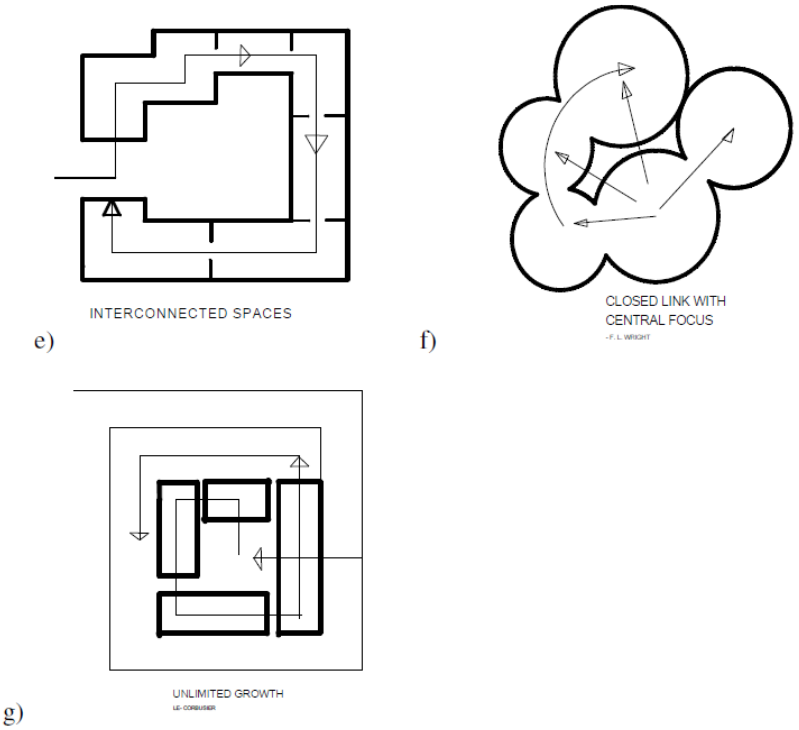


Figure 4.6 different circulation patterns:

(illustration by author)

4.1.1.10 PARKING

Parking is one essential thing that should be considered in every design that one embarks on. It is not just creating of parking lot for users or occupants. Is also add to the entire beauty of the landscape of the site. Parking lots should be created much closed to building and the same time in area which is vision to occupants in working workstations. They will be best placed adjacent to building.

4.1.1.11 FORM

The form of the building can greatly impact the texture of its area of the center. A consistent form used throughout a specified area provides a cohesive, identifiable appearance to that area. The roofline, proportion and visual mass of the building affect the overall form. By using similar building forms, a high degree of unity between buildings on the campus can emerge, even among buildings of differing architectural style.

4.1.1.12 MATERIALS

The materials from which structures or landscape elements are constructed can have a significant effect on the image the community center will projects. Defining a palette of appropriate building materials, including their colours, can allow my freedom of expression of my inward impressions, yet establish a unity among buildings.

4.2.2 ENVIRONMENTAL CONSIDERATION

4.2.2.1 BUILDING ORIENTATION

Orientation is the way the building would be located on site so that majority of the windows face the prevailing wind direction on site. In Nigeria, the prevailing wind direction is NE/SW direction. Thus, building oriented WE will reasonably capture the prevailing wind, while those in the NW/SE direction would maximally make use of the prevailing wind, other factors which include the direction of the sun‘s movement, noise source and intensity, also come into play, these factors should also be taken into good consideration.

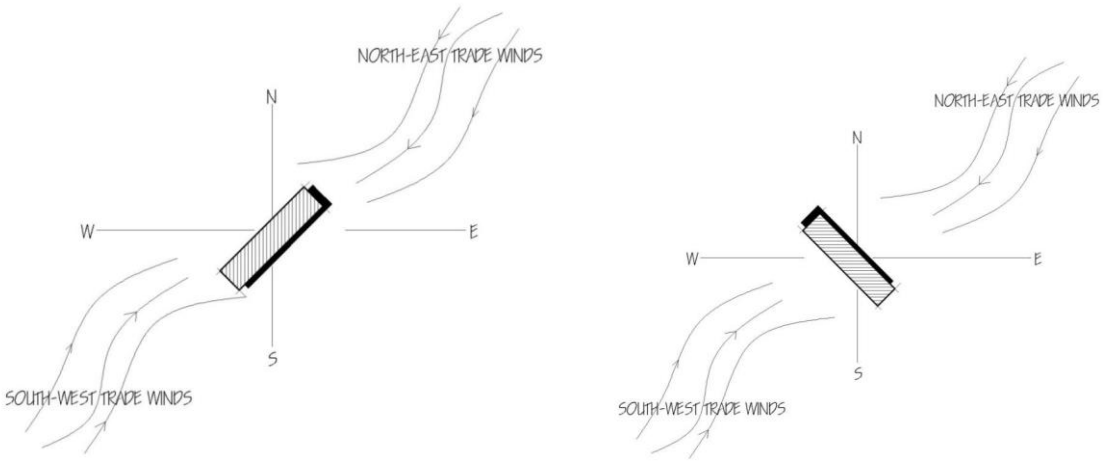


Fig 4.7a(left) Illustrates NE orientation; Fig 4.7b.(right) Illustrates NW orientation

(Source; author"s sketches)

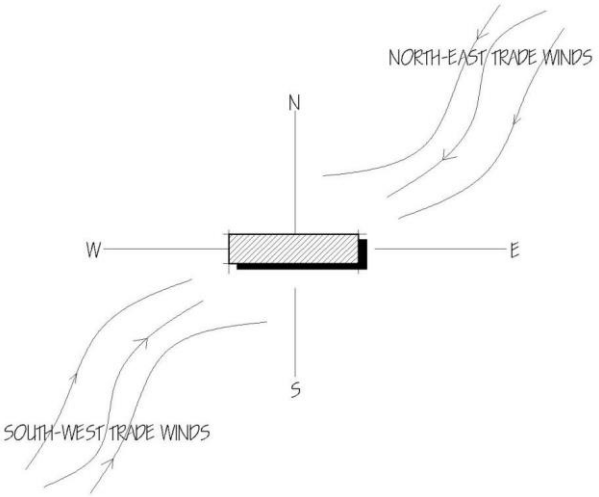


Fig. 4.7c illustrates WE orientation

Source; author"s sketches

Buildings are executed in site to use advantage of the geographic location of the area to achieve some set goals such as natural lighting, ventilation, and thermal comfort of the occupants.

Therefore these major factors determine the positioning of a building to achieve the set goals above:

- Solar radiation and shading measures.
- Wind direction.
- Topography.
- Access and road network.

1. sunlight. Since the beginning of architectural history, sunlight has influenced building design. Advanced solar architecture and urban planning methods were first employed by the Greeks and Chinese, who oriented their buildings toward the south to provide light and warmth. Therefore, careful measures will be taken to site building to take advantage of common features of passive solar architecture by orientating structures relative to the Sun, compact proportion (a low surface area to volume ratio), selective shading (overhangs) and thermal mass. When these features are tailored to the local climate and environment they can produce well-lit spaces that stay in a comfortable temperature range.

2. Cross ventilation is indespensable for a comfortable interior climate. It is more vital particularly in the tropics, to orientate a building perpendicular to the direction of the prevailing wind than to concentrate on solar radiation screening. The optimum for orientation is to select a position relative to the wind direction, to achieve the maximum

duration - ideally 24hours, of cross ventilation with suitable open facades and without mechanical aids.

The cross ventilation achieved depends in the type, size and position of the window openings on the windward side of the buildings. The best compromise must be reached in each case.

3. In siting of a building the topography should be considered so as to contribute to the efficient drainage, ground floor level manipulation of buildings and surface treatments. The surface treatment in the immediate vicinity of the building has a considerable effect on the micro-climate.

Building entrances should be visible to those arriving on the center, and will contribute to the life and activity of streets and walks. Where buildings front on public streets there should be public entrances and attractive, open streetscape facing the street.

Building entrances are frequently the meeting places, and gathering places of those using buildings, and will be designed to encourage interaction.

4.2.2.2 VENTILATION

This entails the flow of air. The tropic is associated with very high temperature and high humidity level, most especially the southern part of Nigeria where this project is sited humidity is a very essential issue. To provide a conducive environment within buildings, there has to be constant removal of air. This is to expel stale air and replace it with fresh air. There is more to ventilation than just air exchange, it maintains and moderates the temperature of the building spaces. Proper ventilation mimics natural outdoor air currents,

reducing levels of indoor air pollutants by continually circulating fresh air (Awbi, 1991). This process of ventilation can be carried out in 2 ways - naturally and artificially:

Natural ventilation as the name implies occurs when advantages of air movement in nature are made use of. The prevailing winds over the site are admitted into the building through windows or other openings.

The resultant in-equilibrium in air pressure outside the building allows for the extraction or suction of the air mass that was inside previously. It occurs by stack effect, cross ventilation, or by air passage through adjacent walls. To achieve this, the building is oriented taking into cognizance of the prevailing winds directions. See sketches that enhance ventilation below. According to walker (2010), natural ventilation systems rely on pressure differences to move fresh air through buildings. Pressure differences can be caused by wind or the buoyancy effect created by temperature differences or differences in humidity.

Artificial Ventilation is a supplement for natural ventilation, which involves the use of mechanical devices such as air conditions, exhaust fans, ceiling fans, to effect or force the removal of air from a space. The use of these devices is supplement what natural ventilation could not achieve on its own. The building should provide for sufficient ventilation of the spaces.

In this project buildings should maximize the use of natural ventilation, which should be complemented be artificial ventilation

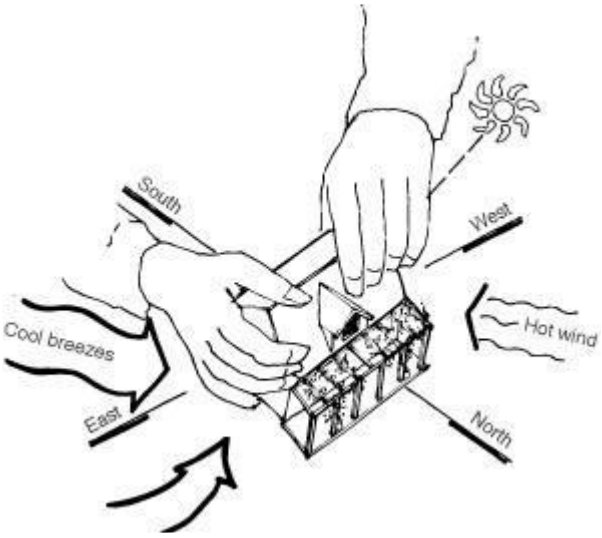


Fig 4.8: illustrates orientations and its effects on ventilation

(Source; Google Images)

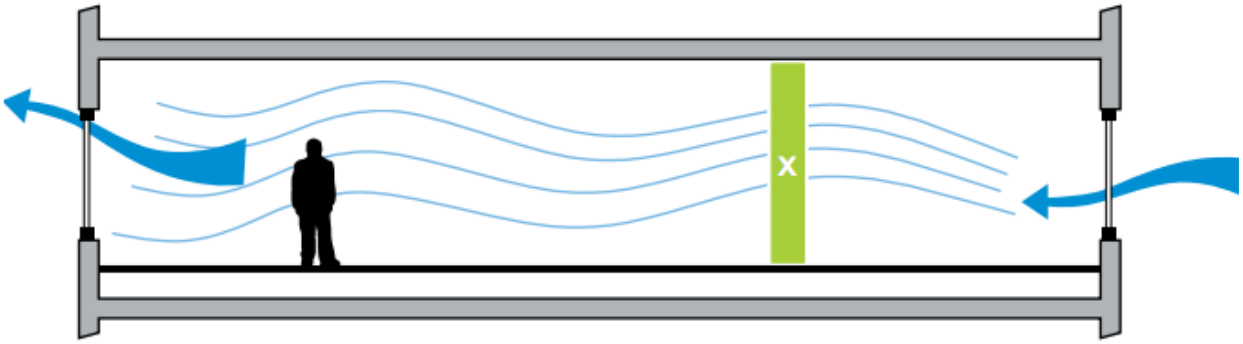


Fig 4.9: illustrates cross ventilation

(Source; natural ventilation systems)

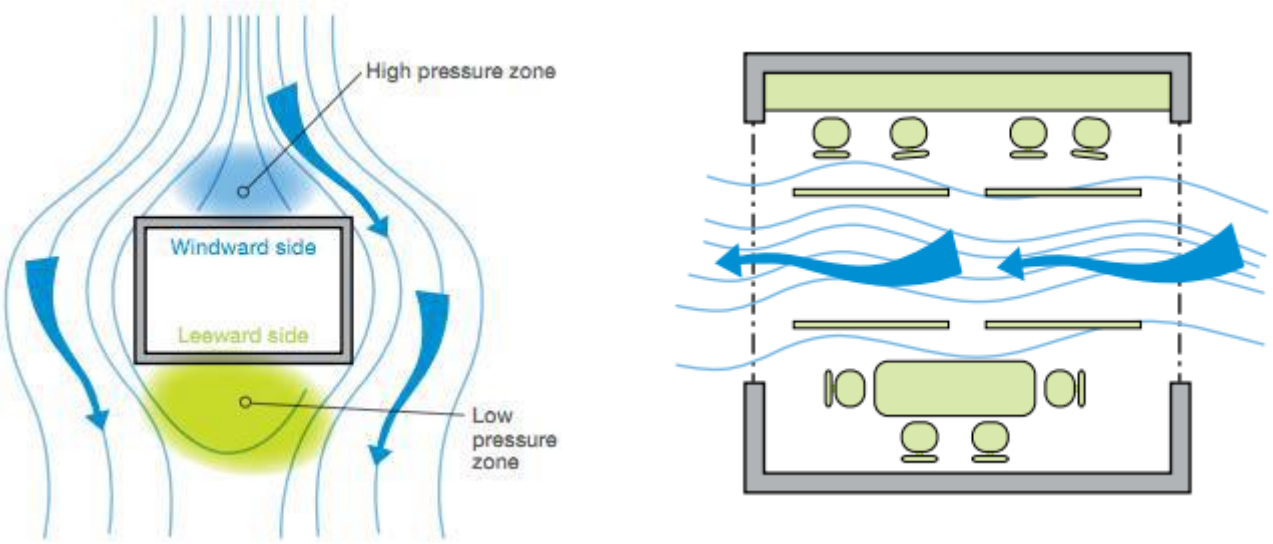


Fig 4.10a and 4.10b: illustrates pressure from wind aiding natural ventilation (left) and alignment of partitions to reduce resistance for cross ventilation (right)

Source; natural ventilation systems

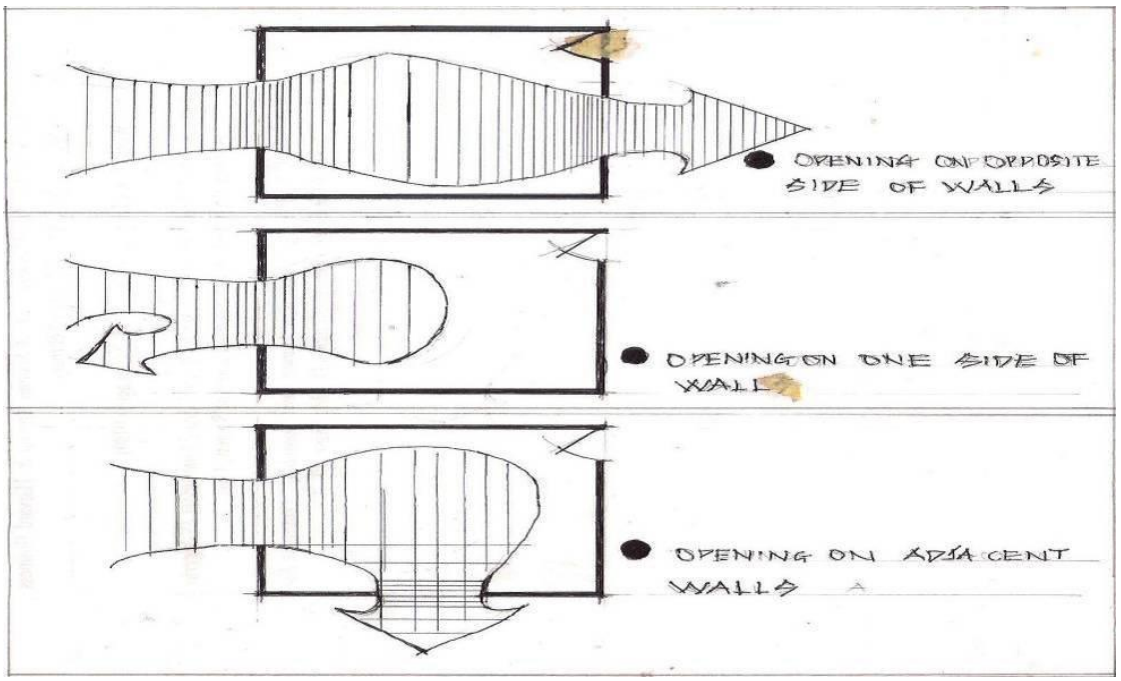


Figure 4.11-Showing the different air movement patterns and effects

(Source- Author, 2010).

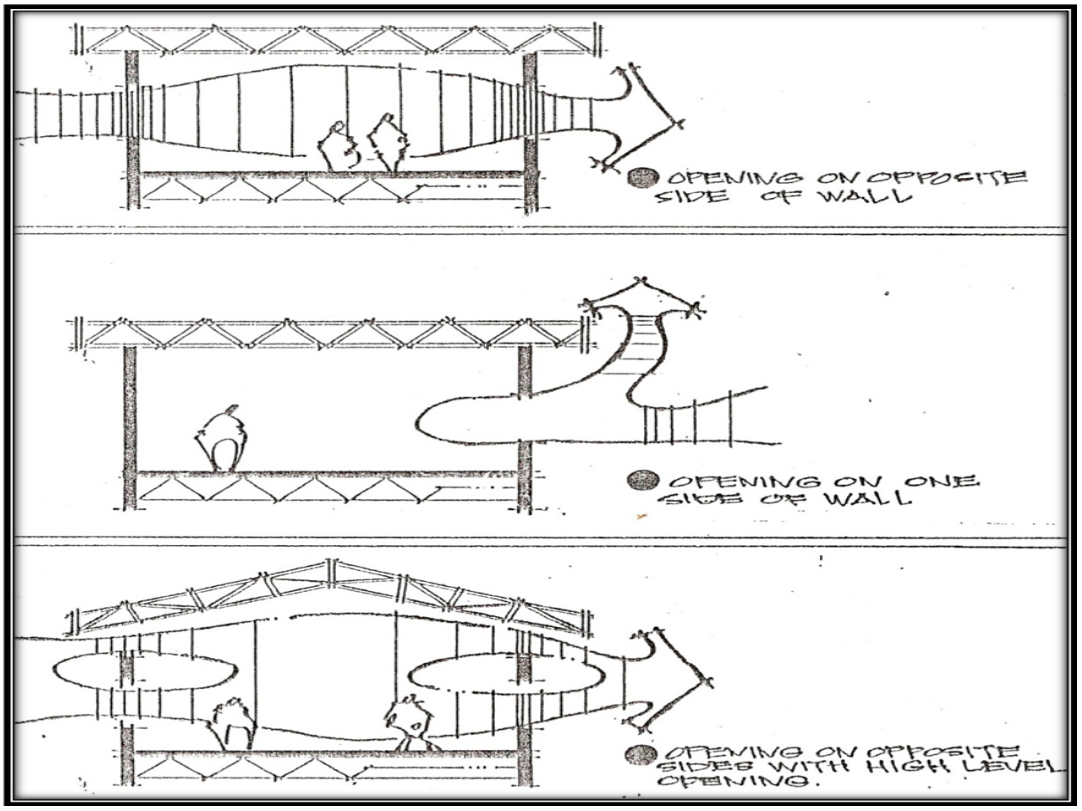


Figure 4.12 Showing the different air movement patterns and effects.

(Source- Ukpong, 2010).

4.2.2.3 LIGHTING

Lighting is an integral part of architectural design of buildings. It determines, in a large part, the utilitarian as well as the aesthetic environment provided by the designer. The perception of a building space is dependent first and foremost by how lit the space is. Lighting primarily is seen as letting in light into a space to aid vision. Because light does more than its primary function of brightening up a building space for the purpose of clarity in vision, extra care must be given in lighting design to achieve the desired effect of a space. It is a matter of common observation that up to a point, the more light that is available, the better

vision. The discussion here will be based on during daytime, not night hours and it will in two phase- natural lighting and artificial lighting.

Natural light is the act of using the sun light to brighten the interiors of buildings. The attribute of lighting is the ***daylight*** factor. It is not possible, and never has been, to consider the lighting design for a building without assessing the daylight and its relationship with the entire building (Guzowski, 1999). To do this demands an understanding of variation in amount of daylight, the changing position of the sun, site orientation, exterior obstruction, climate, the adverse effects of glare and the means to cope with it. Window design is at the heart of day lighting and to determine the quality of light admitted into building, various window types, sizes, placements and orientation are used.

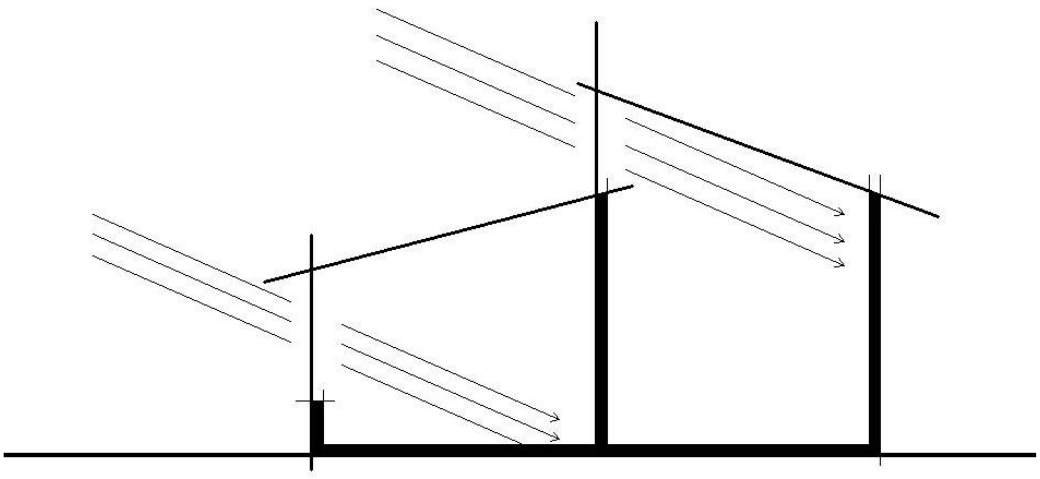


Fig 4.13: illustrates day lighting through lateral and north light

Source; Author"s Sketches

The window, and other means for admitting daylight into an interior, can be treated much like any other source. The variations in the amount, the direction and the colour of incident daylight, however, add an interest to the day lighted interior, which no static lighting system can possibly produce. Daylight, skillfully and creatively employed, provides the architect with one of his most effective modes of aesthetic architectural expression.

Artificial lighting: Just as daylight is a critical design issue, so likewise artificial lighting. Artificial lighting is most used as a supplement for daylight. This is because though natural lighting can be influenced to a certain extent (it travel 6 meters at length within interiors spaces), artificial lighting will be used to illumination the building spaces. It is essential, therefore, that artificial light sources are identified with their characteristics (see Figure 3.9). The most commonly used light sources are incandescent, fluorescent and high-density discharge.

There are three ways of bringing daylight into the interiors, these are:

i. Top lighting (roof/sky light)

ii. Lateral lighting (window) and

iii. Total glazing using curtain wall

Lateral lighting would be adequate for all the requirements unless the building design requires otherwise. This involves the use of either high or normal level windows. It is also cheaper to provide than top lighting or total glazing. In using lateral light, the following factors have to be considered.

i. Incident angles of penetrating light rays should be controlled so that light admitted into the interiors does not cause glare.

ii. The size of the opening should not unnecessarily large so that is not over illuminated thereby causing glare.

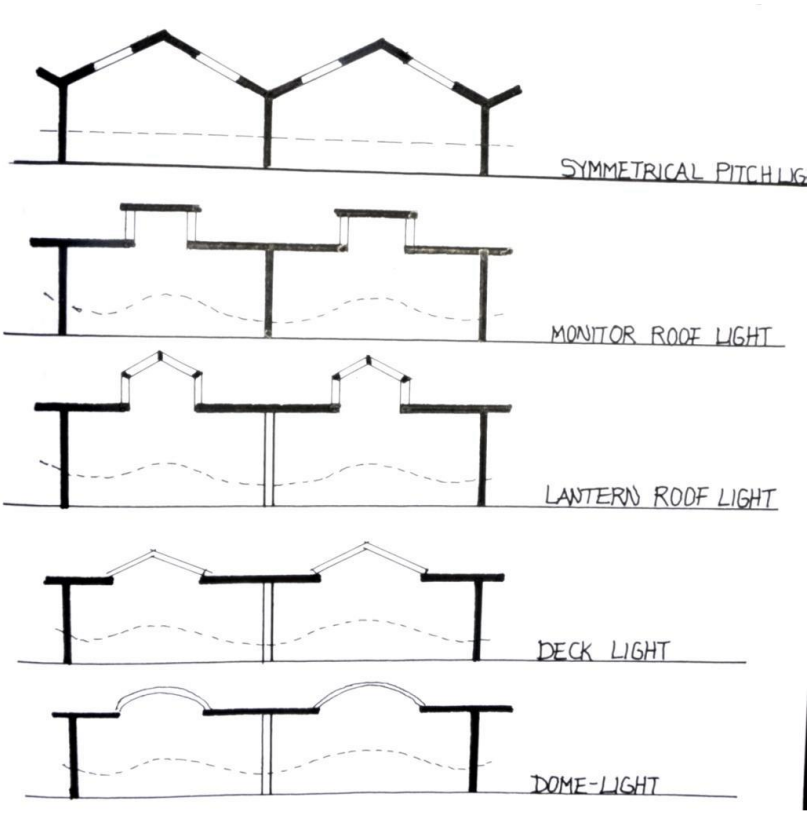


Figure 4.14: illustrates natural daylight: various types of roof light with their daylight distribution pattern

Source; Okeke N.O.

Plate 4.3: shows a well day-lit interior space

Source; localfitness.com

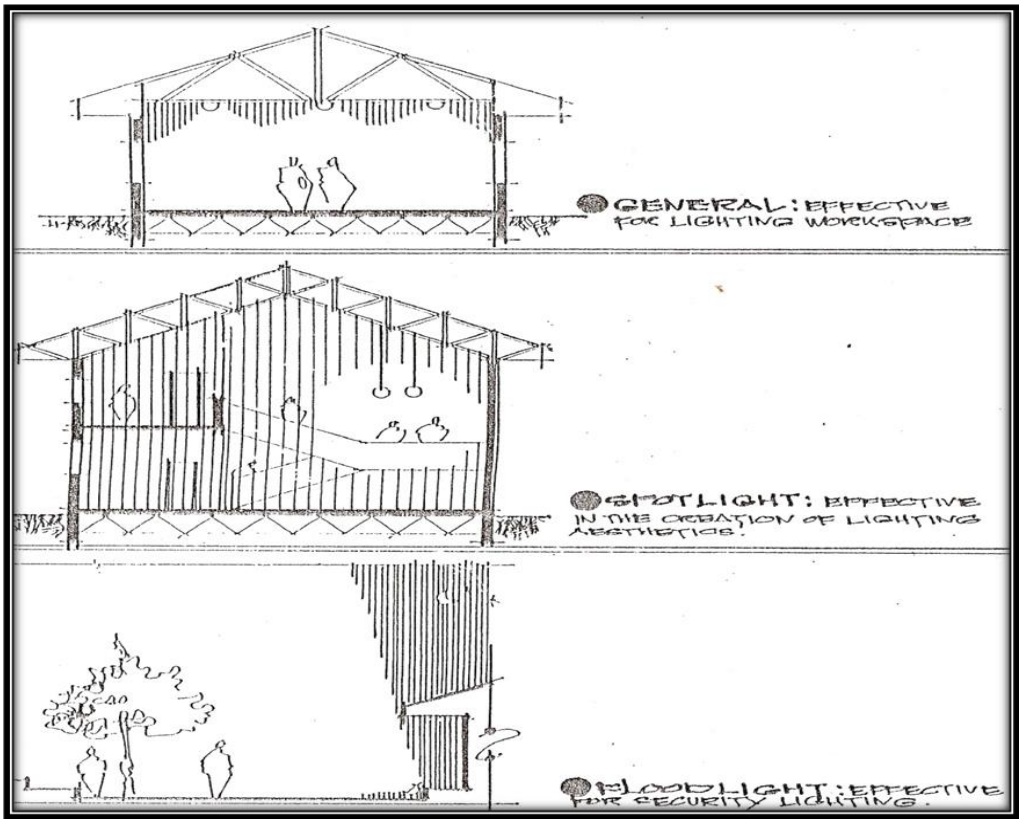


Figure 4.15 Showing the different effects of artificial light on a building.

(Source- Nwaiwu, (2008).

4.2.2.4 ENERGY AND NATURAL RESOURCES

This project should undertake a comprehensive analysis to diminish the use of energy and reduce the use of non-renewable resources. The centre intends to be a leader and champion of environmentally sensitive design, demanding innovation and creativity.

The project is committed to creating an environment that moves beyond merely adaptability and sustainable, to one that actively improves the quality of life and the environment for its users. The goals include:

- Using landscape design to create healthy and ecologically appropriate spaces, provide pleasant outdoor environments, reduce exterior lighting demand and minimize storm water runoff.
- Siting structures mindful of orientation, shading and the effect on adjacent buildings and spaces.
- Reducing marginal energy costs by promoting selection of locally manufactured or fabricated products and materials.
- Reduce energy consumption of building and site systems (HVAC, hot water, and lighting) through the use of appropriate mechanical and construction technology (natural cooling, light recovery, passive solar design,).
- Minimizing maintenance and operating costs by employing whole-systems lifecycle evaluation to determine the true project costs, and by integrating innovative daylighting and building engineering solutions at project inception.
- Maximizing building flexibility to satisfy the varied demands of current and future users and residents.
- Improving indoor environmental quality.

These goals will thus be respected by this design.

4.2.2.5 ACOUSTICS

Acoustics is the science of noise control within buildings for effective and efficient noise suppression to the bearest minimum. The first application of architectural acoustics was in the design of opera houses and then concert halls. More widely, noise suppression is critical in the design of multi-unit dwellings and business premises that generate significant noise, including music venues like bars. The more mundane design of workplaces has implications for noise health effects

The acoustic of a workspace is typically given little or no attention during project planning and design. The functionality and aesthetics of the workspace are usually the primary focus of the designer. Workspace comfort is really a combination of factors that includes daylighting and electric lighting, indoor environmental quality, temperature, and acoustics.

Though there are some differences in the acoustical requirements of offices, and conference rooms, several common noise problems affect these occupancies:

- Too much noise outside the building entering the space
- Too much noise from adjacent spaces, and
- Lack of sound control in the space itself

Noise in these occupancies is typically not at a high enough level to be harmful to human hearing. Rather, the noise is distracting from concentration on work or study and provides less than ideal working and learning environments.

To protect the spaces in a building from noise from a nearby external noise source lay out the building so that restrooms, mechanical and electrical equipment rooms, and other less noise-sensitive spaces are adjacent to the external noise source. When designing a

community center near high noise activity, locate gymnasiums and other less noise-sensitive facilities closer to the noise source and place buildings needing quiet surroundings in the shadow of those facilities.

Then, Windows and glazing are key elements of the building envelope. These elements also control sound and, for some projects, are blast resistant. The extent of windows and glazing, and their size and location are decisions that must be made in the project concept phase to ensure proper, daylighting, ventilation and noise control in buildings.

Again, material for Interior building surfaces can be constructed of many different materials and finishes. Ideal acoustical panels are those without a face or finish material that interferes with the acoustical infill or substrate. Fabric covered panels are one way to heighten acoustical absorption. Finish material is used to cover over the acoustical substrate. Mineral fibres board, or Micore, is a commonly used acoustical substrate. Finish materials often consist of fabric, wood or acoustical tile. Fabric can be wrapped around substrates to create what is referred to as a "pre-fabricated panel" and often provides the good noise absorption if laid onto a wall.

4.3.3 BUILDING SYSTEM

4.3.3.1 FOUNDATION

The foundation of a building is a somewhat invisible and sometimes ignored component of the building. It is increasingly evident; however, that attention to good foundation design and construction has significant benefits to the users and the builder, and can avoid some serious future problems. Good foundation design and construction practice means providing effective structural system.

Foundation is the element of a structure that serves to support the loads super-imposed to it through the transmitting elements. The most important aspect of the foundation design is the necessary check for the stability of foundation under various loads imposed on it by either dead load or live load, which it supports. The foundation should remain stable under all the possible combinations of loading, to which it is likely to be subjected under the most stringent conditions.

In addition, foundation also serves some other functions, such as:

- Prevent settlement (including differential settlement) of a structure
- Prevent possible movement of structure due to periodic shrinkage and swelling of subsoil
- Allow building over water or water-logged ground
- Resist uplifting or overturning forces due to wind
- Resist lateral forces due to soil movement
- Underpin (support) existing or unstable structures

Raft foundation is a large combined thick slab designed to seat and supports the whole or a large part of a structure. A raft is usually used when subsoil is weak, or columns are closely located and with deviated loadings. It also serves as a transfer slab to combine and tie up all the vertical loading elements to the plate-form foundation. By doing so, differential settlement can be avoided.

Pad foundations are used to support individual or multiple columns, spreading the load to the ground below. They are generally square or rectangular in plan, with the plan area being determined by the permissible bearing pressure of the soil. The shape in plan will be dictated by the arrangement of the columns and the load to be transferred into the soil. The thickness of the slab must be sufficient to ensure distribution of the load.

Piled foundation is a form of foundation using piles to transfer the loads of a structure down to a firm soil stratum with sufficient load-taking capacity. Materials for the piles can be of:

- Timber
- Precast concrete (sometimes also pre-stressed)
- In-situ reinforced concrete
- Steel piles in 'H'or circular section

The design, performance and options of piled foundation depend on several factors, such as:

- Depth of sound subsoil
- Constituents and nature of subsoil (e.g. existing of boulders, cohesive/non-cohesive nature of soil).
- Physical environment of site (e.g. accessibility, space or headroom for the operation of equipment)
- Speed of work
- Loading condition of pile (compression/tension pile)

- Efficacy of using a right kind of pile (e.g. whether use lesser piles in larger diameter instead of more small-diameter piles)
- Layout of the structure

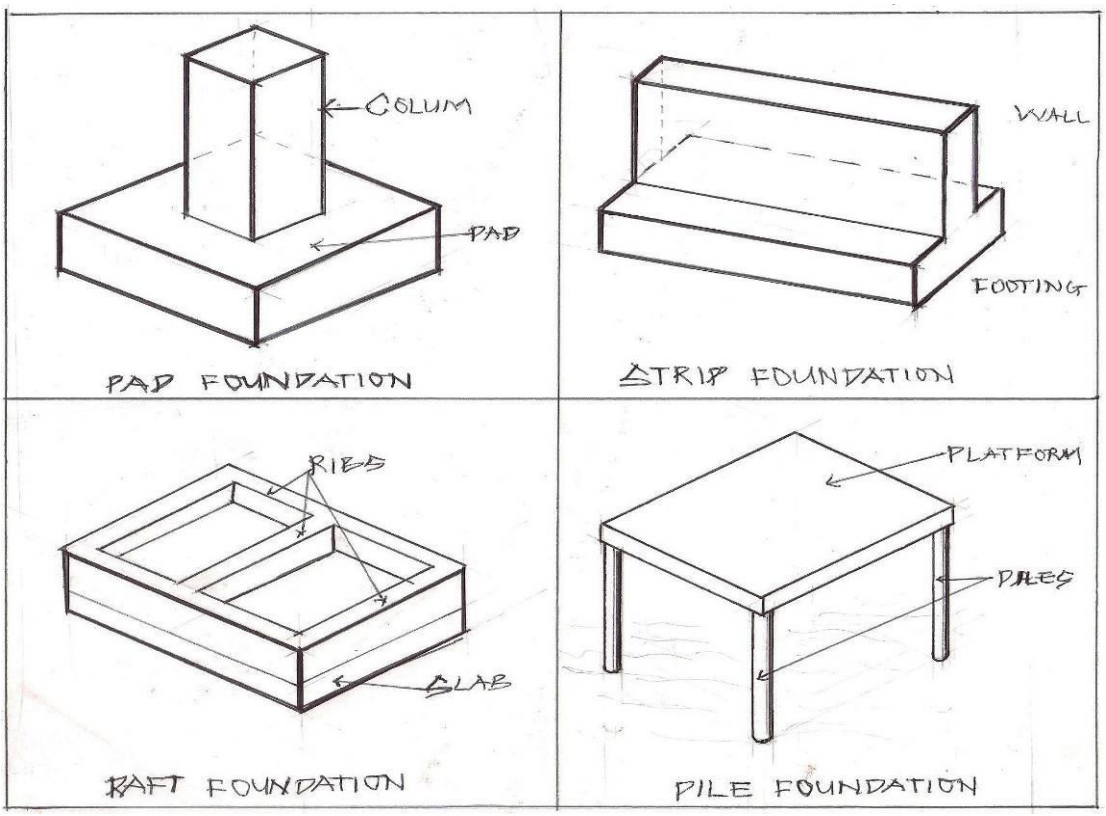


Figure 4.16 showing the different types of foundations.

(Source: author 2014).

4.3.3.2 FLOOR

Floor is another significant element that makes up a building which should be considered in any building design. The flooring types will affect the cost, aesthetic and the entire structural system of the building. Like in this project whereby some of the building will go beyond one floor and have very wide spaces the slab type and design to be used is very important but only concrete slab will be used.

Various concrete slab types and design will be considered:

A concrete slab is a common structural element of modern buildings. Horizontal slabs of steel reinforced concrete, typically between 10 and 50 centimetres thick, are most often used to construct floors and ceilings, while thinner slabs are also used for exterior paving.

Form of Designs

In many domestic and industrial buildings a thick concrete slab, supported on foundations or directly on the sub soil, is used to construct the ground floor of a building.

For a suspended slab, there are a number of designs to improve the strength-to-weight ratio. In all cases the top surface remains flat, and the underside is modulated:

- Corrugated, usually where the concrete is poured into a corrugated steel tray. This improves strength and prevents the slab bending under its own weight. The corrugations run across the short dimension, from side to side.
- Ribbed slab, giving considerable extra strength on one direction.
- Waffle slab, giving added strength in both directions.

Reinforcement design

A one way slab needs moment resisting reinforcement only in its short-direction. Because, the moment along long axes is so small that it can be neglected. When the ratio of the length of long direction to short direction of a slab is greater than 2 it can be considered as a one way slab.

A two way slab needs moment resisting reinforcement in both directions. If the ratio of the lengths of long and short side is less than one then moment in both direction should be considered in design.

Construction

A concrete slab can be cast in two ways: It could either be prefabricated or cast in situ.

Prefabricated concrete slabs are cast in a factory and then transported to the site ready to be lowered into place between steel or concrete beams. They may be pre-stressed (in the factory), post-stressed (on site), or unstressed. Care should be taken to see that the supporting structure is built to the correct dimensions to avoid trouble with the fitting of slabs over the supporting structure.

In situ concrete slabs are built on the building site using formwork - a type of boxing into which the wet concrete is poured. If the slab is to be reinforced, the reinforcement bars are positioned within the formwork before the concrete is poured in. Plastic tipped metal, or plastic bar chairs are used to hold the reinforcement bars away from the bottom and sides of the form-work, so that when the concrete sets it completely envelops the reinforcement

The formwork is commonly built from wooden planks and boards, plastic, or steel. On commercial building sites today, plastic and steel are more common as they save labour.

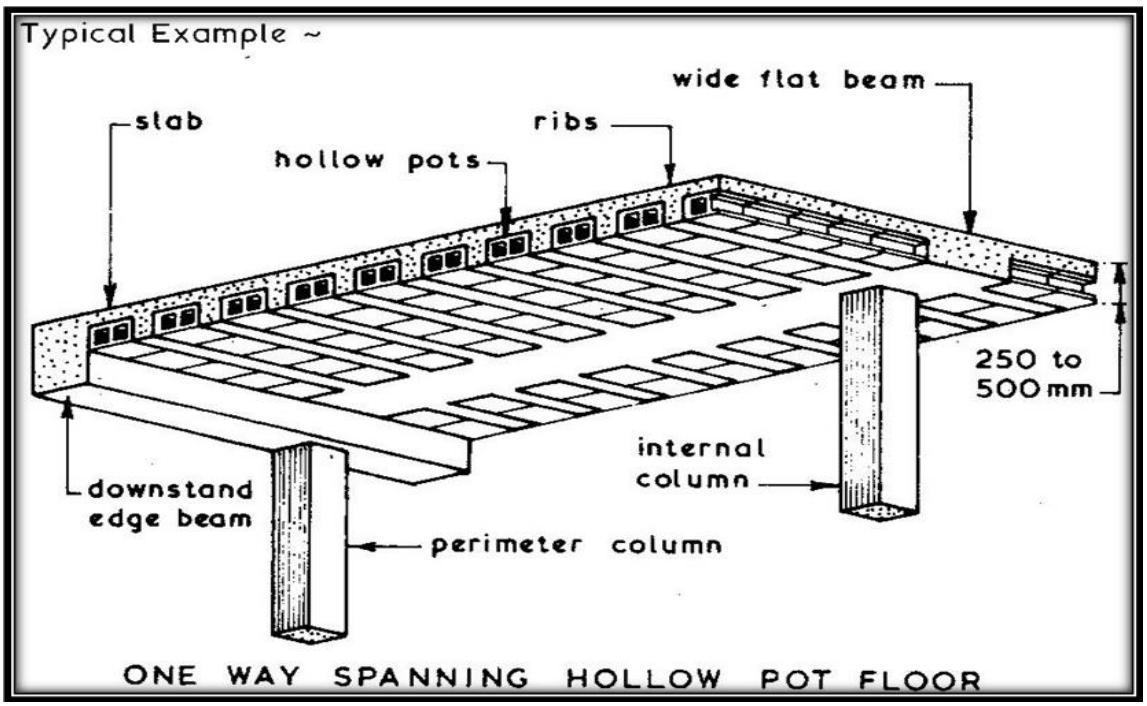


Figure 4.17 showing the different floors.

(Source: Ukpong (2010).

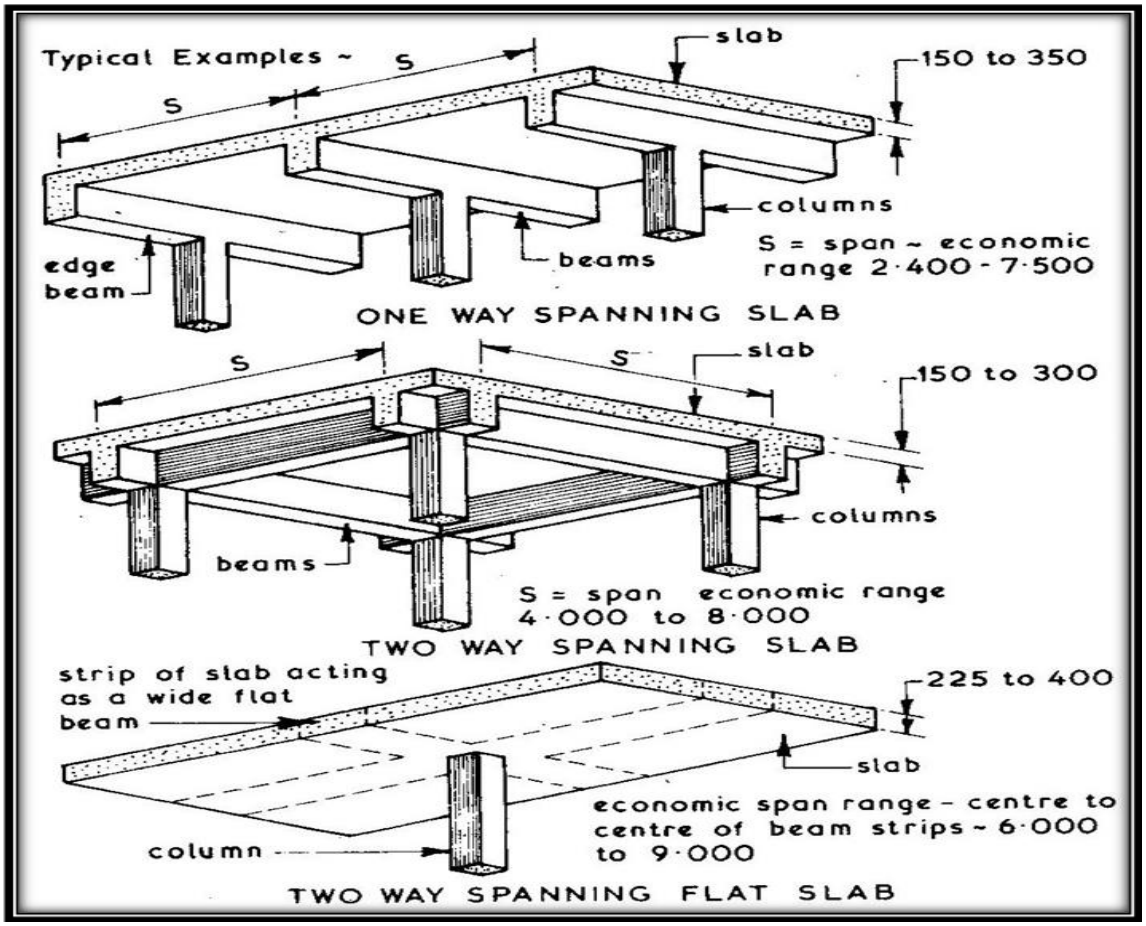


Fig. 4.18 also showing the different floors

(Source: Ukpong (2010).

4.3.3.3 WALL

A wall is a continuous, usually vertical, solid structure of brick, stone, concrete, timber, glass, or metal, thin in proportion to its length and height, this encloses and protects a building or divides buildings into components or rooms. There are three major structural walls: building walls, exterior boundary walls and retaining walls.

In selecting the type of material to be used for the construction of a wall, one must respect critical functions like economy, water proofing, thermal insulation, durability, fire resistance

and strength. The walls that will be used is load bearing walls for the external walls and continuous walls and internal walls in place like toilet will be made of non-load bearing walls.

4.3.3.4 ROOF

The character of the roof is a major feature for most structures. When repeated along the street, the repetition of similar roof forms also contributes to a sense of visual continuity for the neighbourhood. In each case, the roof pitch, its materials, size and orientation are all distinct features that contribute to the character of a roof. Gabled and hip forms occur most frequently, although shed and flat roofs appear on some building types. See figure 3.13.

Although the function of a roof is to protect a house from the elements, it also contributes to the overall character of the building. Historically the roof shape was dictated by climatic considerations, which determined roof forms and pitch.

The roof is the structure's main defence against the elements. However, all components of the roofing system are vulnerable to leaking and damage. When the roof begins to experience failure, many other parts of the house may also be affected. For example, a leak in the roof may lead to damage of attic rafters or even wall surfaces.

Therefore in this project attention will be given to the roofing system where creating roofs that will adapt to the environmental factors and the entire structural system.

4.3.4 SECURITY & SAFETY

4.3.4.1 SAFETY

In specifying the design of a building or structure, the designer should understand how the building or structure can be constructed, cleaned, maintained, and decommissioned or demolished safely. He must therefore study the design and look at the risks to those carrying out the proposed works and others affected by it, such as the public or people using the building or structure in the future. In addition, accidents are often a result of either poor planning or lack of communication between the designer and occupier, resulting in loss of information this is because both the designer and the users has their own role to play.

Nevertheless, the designing should know that he has the follow duties:

- Assess the design so as to review the safety and health risks that the design creates.
- Eliminate the hazards as far as reasonably practicable. Where hazards cannot be eliminated, designers should assess the resultant risks by looking at the severity and probability of occurrence.

The design of buildings or structures should consider risk from following:

- Vehicular and pedestrian movements within and around the site, and condition and proximity of adjacent buildings.
- Specifying less hazardous materials, e.g. solvent-free or low solvent adhesives and water-based paints.

- Consider prefabrication to minimise hazardous work on site, for example: Designing elements like steel structures so that they can be prefabricated and assembled on ground and then lifted to position for installation.
- There should be adequate lighting, directions, warning and backup power in the emergency route for mass evacuation of people.

4.3.4.2 FIRE SAFETY

Fire outbreak is a thing which takes one unaware. So when designing building architects should consider fire safety. Fire safety in buildings is evaluated by careful examination of the design of the building to determine whether the building meets the criteria set forth in the building code. The circulation, construction type, and materials must meet standards for fire exits, fire resistivity, flame spread, and amount of smoke produced.

However some measures should be taken to control fire safety:

Fig 4.19: Showing a fire extinguisher

(Source; Google Images)

- Firefighting equipment should be installation at strategic locations within the buildings.
- Building material should have at least one hour fire resistant capacity
- Escape routes should always be provided in design.
- All equipment should be recessed so as not to obstruct corridors and any other routes of escape.
- Installation of fire detecting alarm system..
- Design should be used to reduce the chances of fire spread in the event of a fire outbreak.

4.3.4.3 SECURITY

Comprehensive planning can encourage certain types of development, incentives, allocation of resources, and capital improvement programs oriented to improve the security of areas vulnerable to manmade disasters. In most cases, sound site planning will minimize the protection measures to be adopted. Security involves the protection and control of property, and the safety and supervision of all persons entering or leaving particular facility most especially public ones. Design measures could be applied to control security and such as:

- Walls should be created to avoid hide outs by minimizing too much extrusion and recession of walls.

- Parking lots should be visible to main entrances and overviews from windows & opening.
- Surveillance of everyone entering or leaving. Entrances must be planned so that they are always watched.
- Creation a good visual views within interior spaces and external areas.

4 .4 PLANNING PRINCIPLES FOR ADAPTABLE SPACES

According to Butin (2000), on the principles of Flexibility and adaptability, the multipurpose space should be able to handle a wide range of functions. As noted, it should be designed with, several lighting systems, have acoustically treated walls and ceilings, and be technologically integrated and easily maintained. A good multipurpose space should be able to satisfy the needs of its assigned functions whether they are multimedia presentations, stage and musical productions, physical education, or dining services at reasonably high levels of performance. A building should be structurally flexible enough to adapt to changes such as children "leaving the nest," elderly relatives moving in, or the need for home office space. Freidman (2002). According to same book, *The Adaptable House* written by an internationally recognized flexible housing advocate, there are specific design approaches and techniques that facilitate flexible design, both on the inside and outside, making it simple to alter a dwelling layout, demolish partitions or build new ones, upgrade heating systems, change the locations of stairs, etc. Design for adaptability begins with a systematic approach and evaluation of aspects other buildings serving required purposes. Freidman (2002)

4.4.1 Forms of adaptability

According to Freidman (2002); Strategies for the adaptability of homes can be integrated into the design before construction begins. They can take several forms, each with its own unique characteristics, opportunities and constraints. Forms of adaptability depend on many factors, among them the type of home, the method of construction and the procedure used to make the changes. Achieving adaptability could be the result of changing the character of an entire building or simply a component of it. Four main areas of intervention have been identified as critical to achieving adaptability in a dwelling:

1. Manipulation of volumes, which refers to the considerations that a designer, builder, or occupant will give to use the entire volume, such as all the floors of a multi-storey building.

2. Spatial arrangement, which considers the way in which the spaces themselves within the volume are dealt with and used. A space can be an entire floor or a single room on that floor

3. Growth and division, which refers to the design strategies or means that permit the expansion or reduction of volumes or space either during design and construction or later throughout the occupancy.

4. Manipulation of subcomponents, which are the elements employed in the construction and use of a building, which can be as large as structural components or as small as a water pipe.

4.4.1.1 Manipulation of volumes

Manipulating volumes is a manifestation of dwelling adaptability, which could be combining several floors to make a larger unit, then dividing it at a later stage. In order for such a process to occur, the designer must consider elements that limit the conversion, such

as the location of circulation areas and utilities. Changes to volumes could also require alteration of the building envelope which, as a result, could change its appearance. Freidman (2002)

4.4.1.2 Spatial arrangement

A range of design strategies can allow adaptability of space within a home‘s volume prior to or following occupancy. One of these strategies, for example, is to propose a room that can accommodate multiple uses, such as a living room, an office, or bedroom. Freidman (2002)

4.4.1.3.Growth and division

Design that considers expansion beyond the dwelling (add-on) or growth into a space within the perimeter of the original volume (add-in) is another form of adaptability. The process could also be reversed and a large home cold be divided to form two dwelling units. Taking advantage of unused area under a staircase or enclosing an alcove and turning it into a room is also a form of expansion. The added space needs to be designed to function along with the existing one. In the event of a division, the new spaces need to be designed to function independently. Freidman (2002). The designer must pay attention to issues such as natural lighting and to circulation between the old area and the addition, among other considerations.

4.4.1. 4 Manipulation of subcomponents

According to Freidman (2002); Subcomponents are the elements that are fitted into the house once the structure has been erected and prior to the closing of the horizontal and vertical surfaces. Recent advances in information technology, for example, have introduced additional and different kinds of subcomponents into homes. They can be electrical or computer wiring, heating and ventilation ducts, kitchen and bathroom fixtures, prefabricated façade elements. The useful life of many such components is often shorter than the life of the house‘s structure, which requires replacement when the part is obsolete. Designing for adaptability would permit easy access and replacement when the subcomponents need repair or upgrading

4.4.2 THE PRINCIPLES

For a single space to provide enough flexibility for use as a venue for combinations of activities that could conceivably/possibly involve worship, entertainment, meeting, study, feasting, play or social gathering, it will depend on a range of variables. Such variables are space size and the arrangement of features, and the application of finishes and furnishings, as well as the degree of thought given to the number of uses that is truly practical given cost and configuration constraints. Dutton (2007). Others could be openness of spaces, acoustics, lighting, use of stage, seating, acoustics etc. This section elaborates on the principles to achieving space adaptability.

4.4.2.1 Shapes

Another important strategy that encourages the efficient use of space is the use of a square or rectangular floor plan with as few interior subdivisions as possible. Freidman (2002).

Economy was achieved through the square floor plan, since it minimized the amount of materials required for foundation walls and insulation. It was also substantially cheaper to service, due to lower heating costs resulting from more efficient surface area exposure. In the elimination of many extraneous traditional rooms, adaptability was used as a design strategy to incorporate multiple activities within a limited amount of space. According to Kim et.al. (2004); Ultimate flexibility of space division within a very large structural grid can be achieved by rearranging the function components, core elements and structural system, the space efficiency can be increased. These may be considered more remarkable uses when compared to the usual single use building and multi-use building. change of configuration iss made possible with the rectangular shapes of spaces.

4.4.2.2 Seating

Once again, flexibility is provided through innovative equipment selection and configuration. Seating for sports events and dramatic presentations can be handled with built-in bleachers that pull out from alcoves along the walls. Moveable tables and chairs can be helpful.

And for fixed, tiered seating schemes, fold-up desktops for each seat will provide both a ready work surface and easy ingress and egress from each row of seats. If the multipurpose space will be used as both a theater and a cafeteria (for instance), allow 10-14 square feet per person for dining and 7.5 square feet per person for performance seating. Douglas, (2010). Plan should also be made for adequate chair and table storage. Figuera‘s methods as seen under case studies are perfect examples of how seating can be used in principle to achieve adaptability and emphasizes the need for storage space.

4.4.2.3 Storage space

As far as furnishing options for a multi-use room go, Dutton (2007) recommends that they be manageable in weight and form. Users must be able to configure spaces to meet changing needs. “Storage is also a factor”, Dutton (2007). Furnishing items must _stack‘ or _nest‘ to easily fit into efficient storage spaces. This is as far as regular provision of box rooms and stores are concerned. On the other hand, mechanical powered furniture arrangements like seats also need their own specialized storage arrangement.

4.4.2.4 Compatibility This section refers to the compatibility of use of spaces. For a space to be designed to adapt to changing needs and requirements of the separate purposes meant for the subject space, the purposes should have similar spatial requirements.

. 3.4.2.5 Use of stage

The stage should be as similar as possible to one in a traditional auditorium and allow easy movement of materials and large equipment. It should have access to a loading dock and any related spaces such as a gymnasium or outdoor area. It also should have storage and a fly space, where curtains and scenery can be hung and stored. Raised stages must be accessible, via a ramp or other means, in accordance with federal accessibility requirements. Despite the tendency for schools to use permanent stages for storage, the multipurpose aspects often make sightlines a problem. Douglas, (2010).

4.4.2.6 Lighting According to Dutton (2007), lighting and controls can have a significant influence on the mood of a space. “Multi-purpose spaces need to have lighting that can be adjusted to fit a particular event”, More than one lighting system may be required in the multipurpose space. In addition to serving meetings and dining events, the lighting system may be required to handle performances and multimedia presentations. Performance lighting might require spotlights, light controls, and a dimmer system. Plus, windows and skylights should have shades so that the space can be darkened adequately. Douglas, (2010)

4.4.2.7 Adaptable Acoustics According to Scott (2002), an architectural space can adapt itself to meet the ideal acoustic requirements of a range of functions through careful study, design, and planning. Although there are limits to a space‘s adjustability, it is possible to maximize the range through this type of acoustic design. Acoustic limitations restrict the planned activities in existing multi-purpose spaces. It is generally understood that when one tries to accomplish too many things well, none of the accomplishments are of above average quality. This concept has held true for music performance venues. Scott (2002)

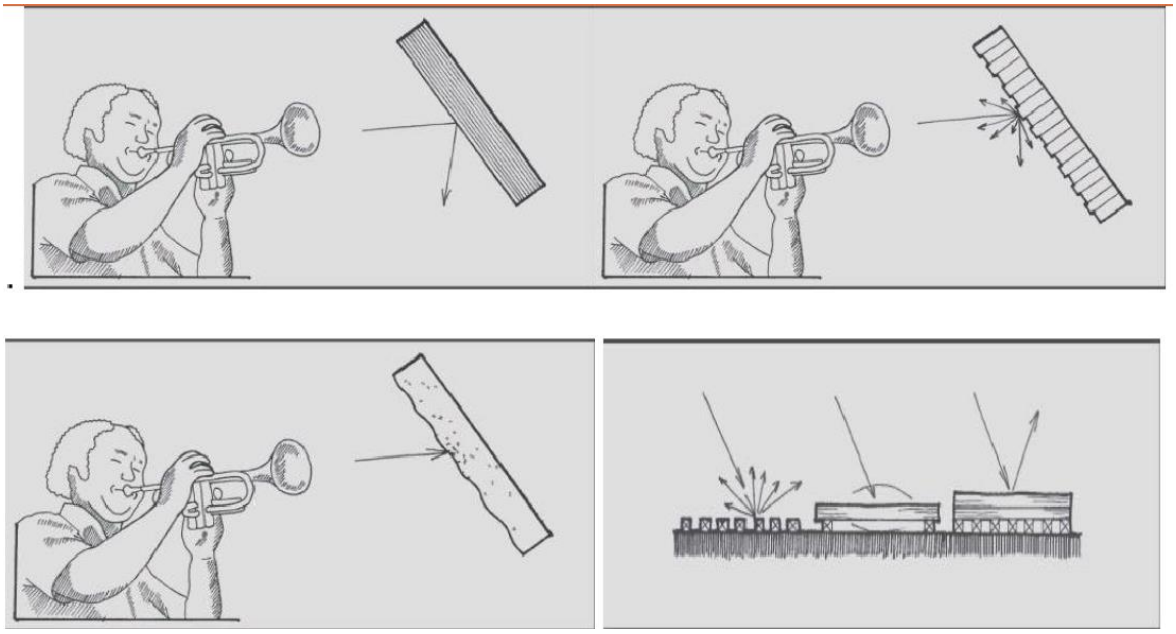


Fig 4.20: showing sound diffusion, reflection, absorption and material for achieving such (*Source; Adaptable Acoustics in Multi-Use Music Performance Spaces)*

The question remains if a space be acoustically designed to meet the needs of many different types of activities and achieve excellent sound for each. This quality standard can be met by a multi-purpose performance facility through the use of *adaptable acoustics*.

As just indicated, acoustic treatment can be one of the most difficult balancing acts for multipurpose spaces. Douglas,(2010). Depending on the mix of uses, the space may need to accommodate voice, film, and dramatic productions and be capable of handling microphones and the public address system. Walls and ceilings should incorporate proper acoustical treatment. Room configuration is also important, such as a multi-tiered ceiling that can enhance acoustics. In the design of a combined cafeteria and auditorium, the cafeteria function typically dominates the planning and layout of the room (e.g., flat versus inclined floors and movable versus fixed seating). Luckily, even though acoustic requirements for a cafeteria are significantly less critical than those for an auditorium function, the amount of sound absorption required for an auditorium is typically also adequate to keep general

chatter down during cafeteria use. Douglas,(2010). So, for acoustics, a space should be designed primarily for speech and musical presentations.

Adaptable methods for acoustics This can be optimally achieved by having a sound reflective/diffusive lower ceiling area (or suspended acoustic clouds) in front of and over the stage, highly sound-absorptive material for the rear and sides of the ceiling, reflective/diffusive lower walls and upper walls treated with materials that absorb sound in mid-to-low frequencies and diffuse sound in high frequencies. This allows mid- and low-frequency reverberation time to be controlled without sacrificing the high frequencies that are crucial for speech intelligibility and music clarity. The lower wall areas are often almost entirely occupied with doors, windows, and vending machines, and, therefore, are not typically considered for acoustic treatment. For walls, acoustic treatment is best placed above 10 feet (3m), which also keeps treated areas above the reach of most users. Douglas,(2010).

Room shape The most basic architectural determinant of acoustics is the room shape. It may have more impact than any other decision on how the space is perceived by the inhabitants. Scott (2002). This is the case partly because the room shape is a visual key as well as an acoustic key. Not only do the surface elements of the room shape affect what is heard by the ears, but the eyes perceive them as the limits of the inhabitable space. The brain is accustomed to correlating the volume of a room with the sound produced within that room. The acoustical properties of the room shapes that are commonly used primarily depend on

the side walls, not the walls behind or in front of the stage. Room forms are fan-shaped, rectangular, reverse-fan-shaped, and horseshoe-shaped.

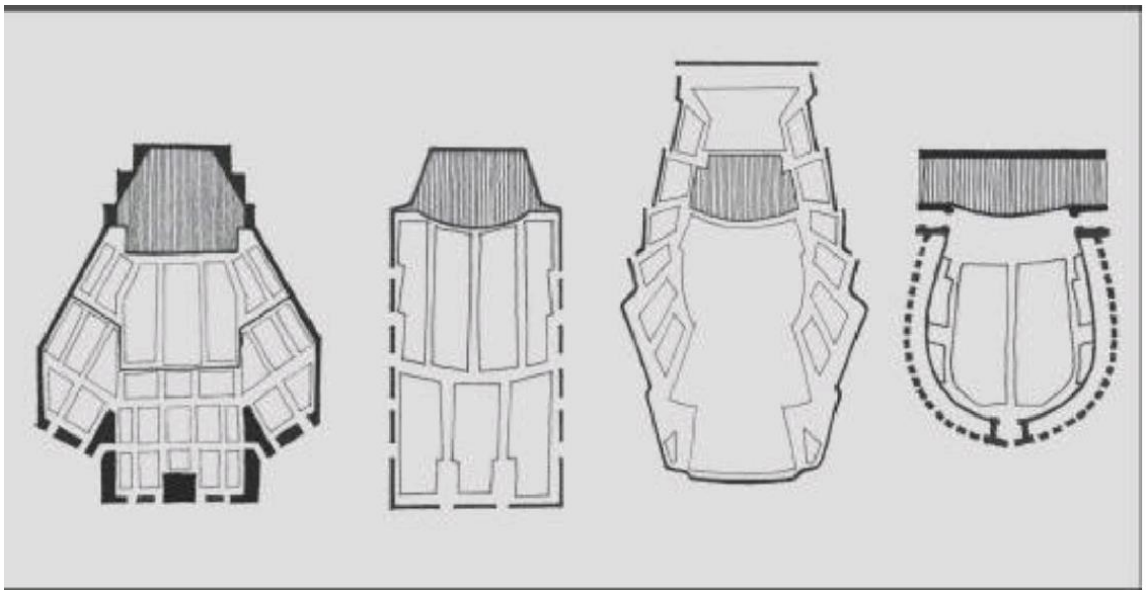


Fig 4.21: floor plans. Left to right; NHK Hall – Tokyo, Symphony Hall – Boston, Concert Hall of the Sydney Opera House, and *Teatro Alla Scala* – Milan

(Source; Adaptable Acoustics in Multi-Use Music Performance Spaces)

layout for a traditional concert hall; long reverberation times are easy to achieve. The **reverse-fan-shaped** room is a modification of the rectangular room, but the side walls angle towards each other as they get farther from the stage. This shape makes it easy to increase the number of sound reflections off the walls. A **horseshoe-shaped** room is the typical shape of an opera house, often with many balconies that wrap around the main floor in a U shape. (See fig. 4.9). Generally, the volume of the horseshoe-shaped rooms is smaller and the sound absorption is much higher due to a large amount of people in a small space than in other shapes, making it easier to achieve a shorter reverberation time.

Stage location

The location and placement of the stage, or performance platform, works with the room shape to bring the performance to the audience both visually and audibly. There are two locations for the stage. One is behind a proscenium, which is how a standard theatre is set up. The proscenium is a wall that divides the audience seating area from the stage area. (see fig 4.10). There is usually a series of curtains that can close off the opening between the two. Scott (2002). This arrangement is ideal for dramatic performances because the proscenium opening acts as a window into the imaginary world of the performance. When it is used for a musical performance, wall and ceiling panels are often needed to reflect the sound from the stage into the audience; otherwise, the sound would resonate or be absorbed behind the proscenium.

The other location for a stage is within the same room volume as the seating. This has the acoustic advantage of the sound originating closer to the audience, keeping the direct sound louder and more immediate.

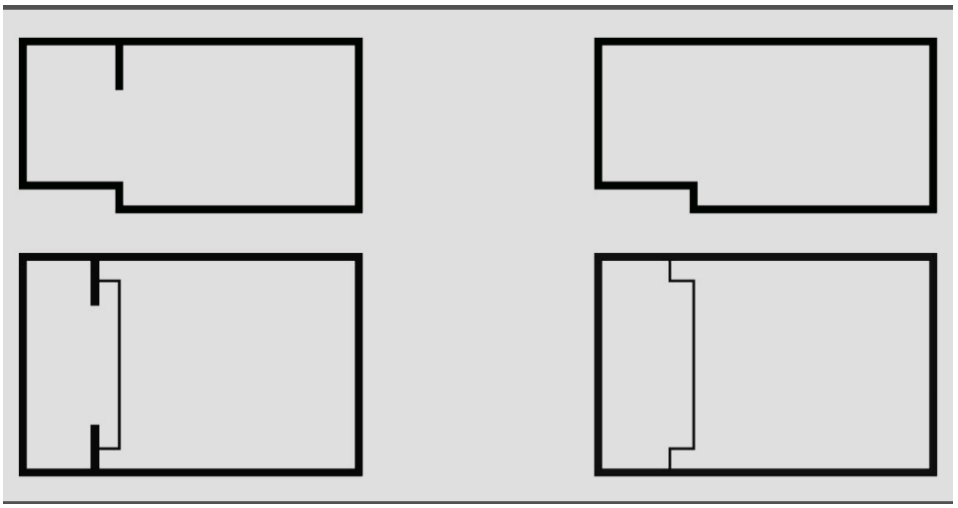


Fig 4.22: showing section on top and plan bottom (one with proscenium over the stage, the other without)

(*Source; Adaptable Acoustics in Multi-Use Music Performance Spaces)*

Recommended materials for multipurpose rooms

Depending on the use of a hall, an adequate reverberation time is required. For instance, assembly halls and conference rooms require a short reverberation time. Drotleff and Zhou, (2006). In case of conference rooms attention must also be paid to speech intelligibility. Music performances require a somewhat longer reverberation time, but also other quantities such as clarity, lateral fraction etc. must be taken into account. Drotleff et. al (2006) Multi-purpose use should, however, be realized with only one well-defined reverberation time. A compromise is sought for every single auditorium in the following way: - A carefully chosen moderate reverberation time, - Minimum variation over the whole frequency spectrum, - A small increase towards low frequencies.

Micro-perforated Panel Absorbers (MPAs), Micro-perforated Foil Absorbers (MFAs), Micro-perforated Suspended Ceilings (MSCs) are also perfectly suited for attractive interior design. Drotleff et al (2006). Since these absorbers can be made of almost any material e.g. acrylic glass, metal, plastic foil or timber they fit into nearly any interior design concept. The absorption features of all types of Micro-perforated Absorbers are tunable to the respective requirements merely by choosing its various geometrical parameters.

4.5 ADAPTABLE APPROACHES TO FLEXIBILITY (A CASE STUDY)

4.5.1 Non kinetic approaches

These are approaches that involve architectural solutions without the use of any form of external energy. In this section, there are:

- Use of open spaces
- Use of multifunctional furniture
- Use of partitions and space for expansion

4.5.1.1 Open spaces

The scarcity of interior space and the dynamic needs of the family resulted in the reduction of such fixed features as walls that would instill rigidity in the plan and counteract the notion of adaptability these homes embodied. Freidman (2002). The objective of maximizing the potential range of uses within restricted interior spaces was accomplished by presenting an open floor plan that allowed the occupants to define the space according to their specific requirements, as opposed to designer dictating the definition of the space. Unobstructed spaces allow reconfiguration of activities to suit different needs as required. (fig. 4.11)

Fig 4.23: illustration of varied uses an open space could be configured into

(*Source: open network architecture)*

According to CABE, (2001); the use of partitions between open spaces can provide some of the benefits of a large flexible space combined with the ability to form two smaller separate rooms. Studies suggest that one of the most effective ways of achieving flexibility is make plans as open as possible so as to accommodate partitions and changes as when needed though there are disadvantages to that approach as mentioned in table 4.1.

Table 4.1 Comparison between Cellular Plan and Open Plan approach

Source *CABE (2001)*

Open plan	Cellular
May reduce market acceptability	Market norm
Flexible	Fixed
Spatially efficient	Spatially inefficient
Acoustic problems	Acoustic separation
Improves daylight penetration	Reduces daylight penetration

4.5.1.2 Use of multifunctional furniture

One of the easiest ways of making a space adaptable is by making the furniture have the ability to serve different purposes at a time or different times. (See plate 4.4a and 4.4b). Here the furniture can be seen to be adapted for more than one use. Daoana (2009) points out that the key to a multi-functional room is to make the furniture multi-functional as well. Adapting spaces can also be achieved by using furnishings. The initial design could anticipate such a process by creating appropriate dimensions for storage spaces. A hide-a-bed, for example, can turn a living room into a bedroom. Freidman (2002). A set of

bookshelves can serve as the divider between the living and dining spaces in one large room. One thing that cannot be overemphasized is the furnitures‘ adaptability and both its arrangement and the arrangement of the space as a whole.

Plates 4.4a and 4.4b. Showing shelve and cabinet (movable) used for more than one purpose (*Source; Gail Wright (multifunctional rooms)*

4.5.1.3 Use of partitions and space for expansion

The sixty-eight one- and two-storey dwellings, designed by Fællestegnestuen for Copenhagen‘s Public Housing Association (KAB) noted in chapter two helps explains this. Here the construction system allows walls to be moved around very easily, so any layout can be adapted to different needs and requirements at any point in time. A study after 3 years of completion showed that various residents had changed the position of doors, added additional rooms and altered room sizes. Hartany et. al. (2010). Rooms could easily be transformed as required with the implementation of innovative such as sliding walls and movable partitions that allowed privacy levels to be modified and the rooms to be created or merged at the discretion of the residents. The use of partitions between habitable rooms can provide some of the benefits of a large flexible space combined with the ability to form two

smaller and separate rooms. Closing down a room can, for example, form a temporary guest bedroom or a quiet area for home-working or open it to create a more generous space for other suitable functions. CABE (2001).

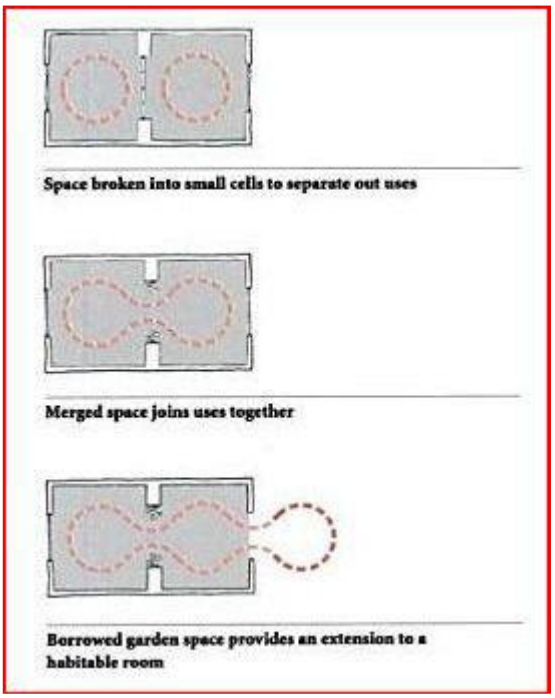


Fig 4.24: illustrating the use of partitions and expansion spaces to reconfigure spaces

(Source : CABE 2001)

Plate 4.5: Macassar ebony sliding wall used for partitioning

Source; www.couturefurniture.com

4.5.2 Kinetic approaches

These are approaches that involve architectural solutions that make kinetic systems to adjust space components or furniture at different times. New architectural typologies are emerging and evolving within today's technologically developing society. According to Fox and Yeh (2000); these programs present practical architectural situations where intelligently responsive kinetic solutions can be considered for unique and wholly unexplored applications. Intelligent kinetic systems are an approach for utilizing technology to create architecture that addresses today's dynamic, flexible and constantly changing activities. In this section, there are:

- Movable partitions and retractable walls
- Movable floors
- Retractable roofs

- Retractable furniture/seating

4.5.2.1 Movable partitions and retractable walls

Theory suggests that movable partitions are good but an instantly operable partition is better. Mumford (1996) Moveable/operable walls and partitions themselves come in two main categories. There are portable walls — they‘re on casters so they can move from room to room and even from building to building. And there are walls that are hung from tracks. Within each of these categories are numerous options so that one can choose to meet needs for space adaptability. Kollie (2006). There are instances where electrically operated partitions are used to change space configurations to provide flexibility. Plate 4.6 shows “Multirole”, a partition curtain that has been designed for use in large sports or multi-purpose halls. This fully automatic system unrolls at the bush of a button to allow the utilization of space, creating two or more separate areas. When not in use Multirole is hidden in the roof area not taking up any of the floor space. Lateral guides can also be installed to guide the curtain into position, these move with the lowering an lifting of the curtain ensuring smooth and safe operation at all times. Dorma (2006) the flexibility of Multirole means it can easily overcome obstacles such as steps, slopes or seating areas.

Plate 4.6: Multirole partition hung (notice the larger arena)

Source; Dorma (2006)

4.5.2.2 Movable floors

This is usually seen in stage usage, stadium and sports facilities and instances where a swimming pool space is converted for other purpose. For instance, at the luxury end of the indoor pool market, moving floors are seen as the ultimate way to maximise the use of the pool room. The space need not be limited to exercise and swimming alone. At the press of a button the rising pool floor will raise itself to the same level as the pool surround. With appropriate choice of materials it can be difficult to detect what lies below the new games room, dance floor or banquet hall. This fabulous new open space can now be used for a multitude of functions and turn back to a swimming pool at the press of a button.

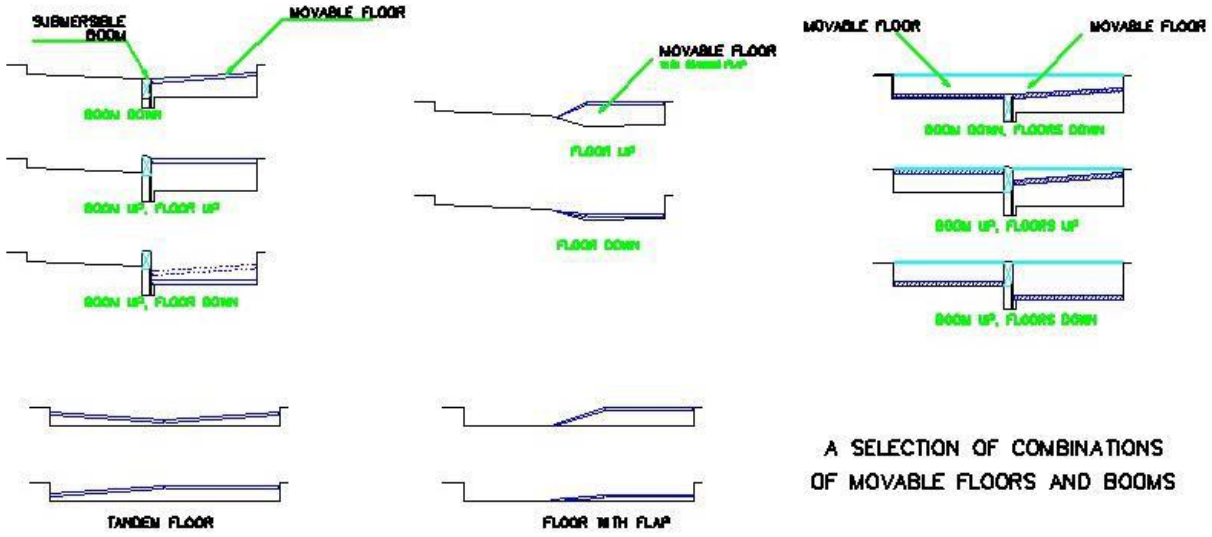


Fig 4.25: sections: movable floors

Source; http://www.designsonengineering.com

4.5.2.3 Retractable roofs

A retractable roof is a kinetic architectural element used in many sports venues, in which a roof made of a suitable material can readily be mechanically deployed from some retracted or open position into a closed or extended position that completely covers the field of play and spectator areas. They are generally used in locales where inclement weather, extreme heat, or extreme cold are prevalent during the respective sports seasons, in order to allow for playing of traditionally outdoor sports in more favorable conditions, as well as the comfort of spectators watching games played in such weather. Unlike their predecessors, the domes built primarily during the 1960s, 1970s, and early 1980s, retractable roofs also allow for playing of the same traditionally outdoor sports in outdoor conditions when the weather is more favorable.

Plate 4.7a and 4.7b: Aerial photograph of the Amsterdam Arena, open and closed roof respectively

Source:Quistnix

Another purpose of retractable roofs is to allow for growth of natural grass playing fields in environments where extreme hot and/or cold temperatures would otherwise make installation and maintenance of such a field cost prohibitive. Not limited to stadiums, retractable roofs are also used in residences, commercial buildings, swim centers, and other places with overhead enclosures. Wikipedia (2010). Installations throughout the world employ a variety of different configurations and styles

4.5.2.3.1 Workability

A retractable roof closure for a vehicle body having a windshield header spaced from a fixed rear roof panel to provide an unobstructed roof opening. The closure panel has its rearward end supported and guided by the cooperation of a guide track extending along each side of the vehicle body beneath the fixed roof panel and guide rollers mounted on the rear end of the closure panel and engaged within the guide track. The forward end of the closure panel is supported by a telescopable extension device on each end of the vehicle body. Each telescopable extension device includes a first member mounted along the fixed roof panel

and a second member having its forward end pivotally connected to the forward end of the panel. A third member telescopably connects the first and second members to permit movement of the second member between a forwardly extended position supporting the front end of the closure panel in a closed position and a rearwardly retracted position in which the closure panel is supported and stored beneath the fixed roof panel to open the roof opening. A tape drive assembly includes a tape track mounted on the fixed roof panel and a flexible drive tape movable within the tape track. A connecting link connects the flexible drive tape with the second member to forcibly move the closure panel between open and closed positions.

4.5.2.4 Retractable furniture/seating

Movable/retractable seating systems were created to optimize space and profitability. They are a response to the rising cost of land and the need to design multipurpose halls. These systems make it possible to simply and effectively convert a conference seating area into an open exhibition space with minimum labor. Seats are kept under the stage when not in use, eliminating the need for any additional storage space.

Plate 4.8: a hall left open for presentations

Source: figueras

Plate 4.9: seating during retraction

(Source: figueras)

Plate 4.10: hall adapted for conferencing

Source: figueras

Most retractable seating has a telescopic folding design and a versatile nature accommodating a full seated audience, which then stores compactly away at the push of a button. Maximising visibility it can accommodate a variety of audiences including sports, gym, theatre, conference, school, stadium, arena and auditorium. It is the ideal seating solution for utilising multi-purpose spaces.

. CHAPTER FIVE

5.0 PRESENTATION OF ANALYSES

5.1 SITE LOCATION STUDIES

The success of any project, is anchored on the most suitable and appropriate location of the facility when it comes to public buildings in architecture.

LOCATION

Yenagoa City, the capital of Bayelsa State, lies in northeastern sector of the state and is thecentre of the Yenagoa Local Government Area(LGA), which is one of 8 LGAs in Bayelsa. Thecity is located on the banks of Ekole Creek and the Nun River; the latter being one of the major river courses making up the Niger River's delta. Yenagoa is the northernmost city of the state's signifi cant population centres: Ogbia,Okubie and Brass. The nearest larger cities outside of BayelsaState are Port Harcourt, in Rivers State, located approximately 80 km to the east; Warriin Delta State, approximately 90 km to the northwest; and Owerri in Imo state, approximately100 km to the northwest. Owerri and Warri offer domestic airports while the airport at Port Harcourt provides

international flight connections.

Figure;5..1 Map of Nigeria showing the states highlighting Bayelsa state

(Source: Google search)

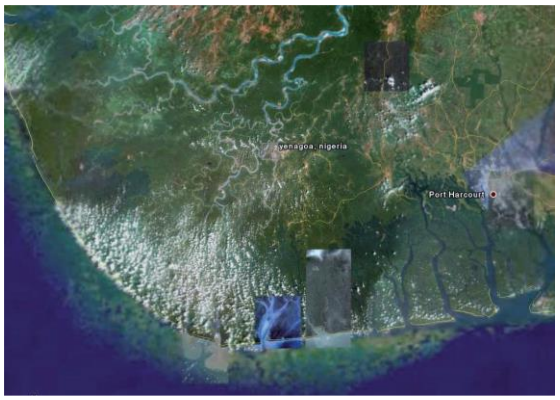
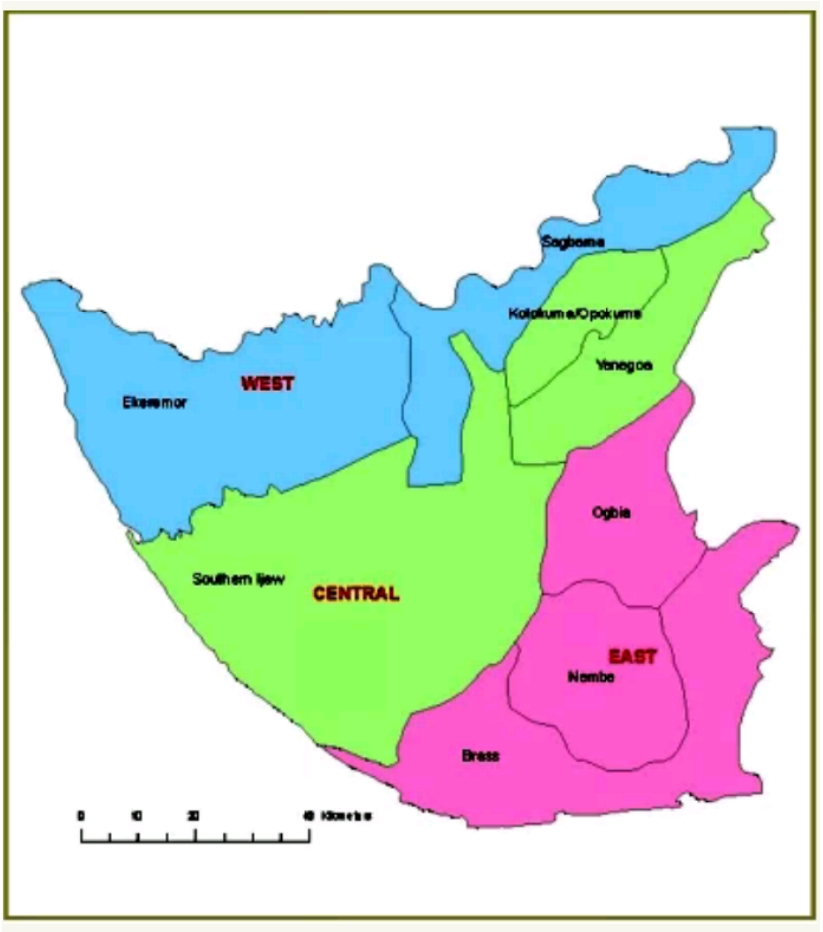


Plate:5.1 Satellite image of the Niger Delta

(source: Google Earth)



Figure;5.2 Map of Bayelsa state showing the local government areas

(Source: www.ialnigeria.com)

Ethnic, Culture and the Arts: The ethnic compositions of the local government area are the **Epie's /Atissa's**. The **Epie's and Atissa's**) are one of the many ethnic groups in the Niger Delta region of Nigeria. They are generally considered a subgroup of the Ijaw people of south-south Nigeria, although a few consider themselves a separate ethnicity. The Epie/Atissa's constitute the minority of state. They are traditionally farmers, fishermen and hunters, but in recent times, the environmental degradation and urban sprawl associated with oil exploration and exploitation has caused a sharp decline in the amount of farmland, forests and rivers available for their traditional occupations.

The **Epie's/Atissa's** are very rich in culture and arts. Several cultural bonds exist, particularly in music, dances, plays and masquerades. Literature in **Epie/Atissa,** consists of the oral tradition of folk tales, legends, myths, proverbs, riddles and poetry in religious incantations.

Reason for site location

Yenagoa is the primary centre of the region. Yenagoa was chosen because it is the hub of Bayelsa in a strategic location that will not suffer some internal problems and there are other existing compatible land use structures which serve as a complimentary component to the project like the Oxbow lake that will aid full utilization of the site. Furthermore the unique character of the riverine **culture** of Yenagoa must be reflected in the structure and vista of the city.

The Oxbow Lake keys into a new tourism area serving international, domestic and local visitors. Oxbow Lake's key features:

• Public waterfront corniche;

• Public marina;

• Two main activity nodes;

• Some lots with private waterfront on the mainland; Island kept free of development.

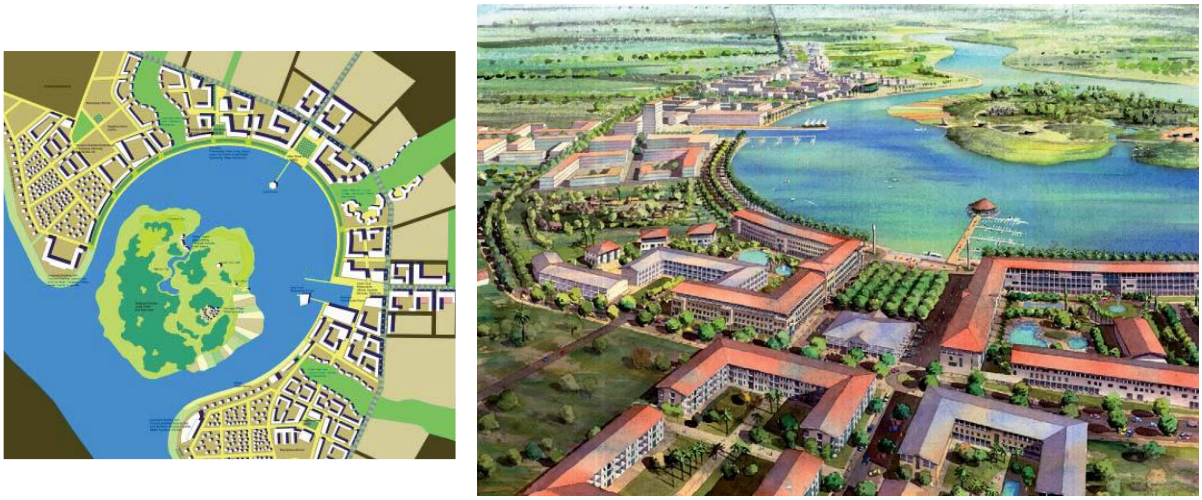


Plate: 5.2a and 5.2b Osbow Lake concept and a perspective of the osbow lake concept

(source: 2007 report sheet on yenagoa master plan)

The urban design of these squares has been inspired by the traditional scale of the existing ettlements. The goal is to create lively centres of community activity while retaining the established grain of the settlement so as to fully integrate and not alienate the local population. A typical village square would have the following (excerpt):

• A new centrally located village hall (1);

• A multi-purpose square) (2);

• Shops, (3);

• Recreation facilities. (4)

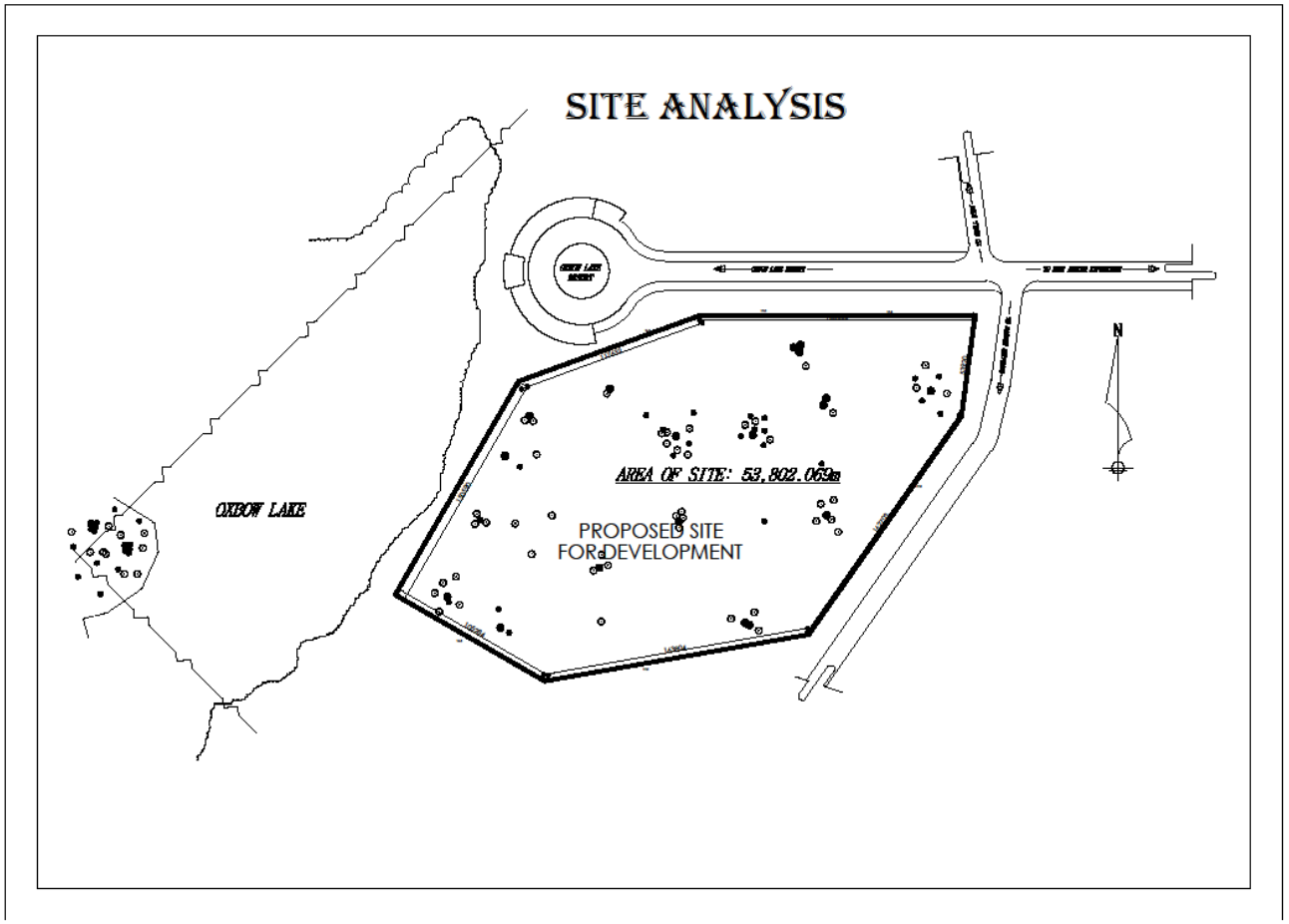


Figure 5.3. site analysis

(Source: authors field studies)

5.2 SITE CHARACTER AND ANALYSES

5.2.0 LANDSCAPE AND ENVIRONMENT

The natural environment will play a dominant role in the development of Yenagoa: the pattern of settlement in the delta has always been determined by the availability of dry land to build upon. Morphology, climate, ecology and hydrology are well-described in the 2004

Yenagoa Master Plan and the Niger Delta Regional Master Plan and those factors with major repercussions for development are highlighted as follows.

5.2.1 CLIMATE

Climate encompasses the statistics of temperature, humidity, atmospheric pressure, wind, rainfall, atmospheric particle count and other meteorological elements in a given region over a long period of time. Climate can be contrasted to weather, which is the present condition of these same elements and their variations over shorter time periods. The discussion will be based on the individual attributes.

In terms of climate the heavy rainfalls experienced for up to 9 months of the year mean that some 70% of the whole of Bayelsa state is inundated during the rainy season. Such conditions have implications for building design and the use of outdoor spaces. Protective roofs during sudden downpours, for example, are both necessary and welcome.

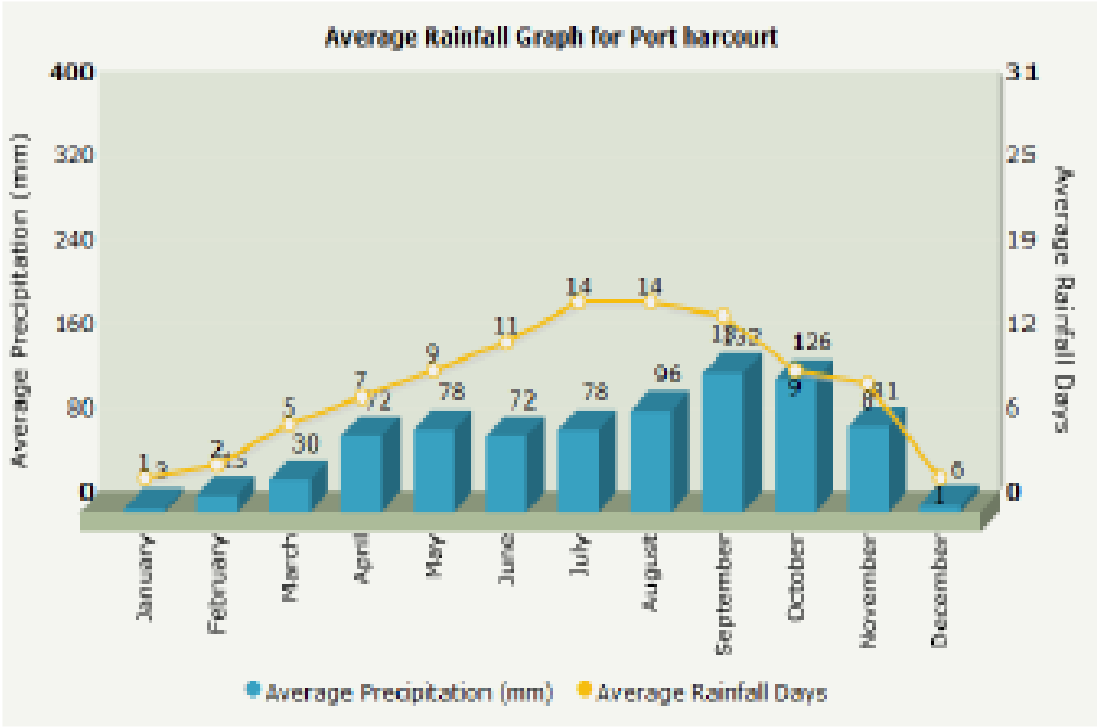


chart 5.1 A rainfall graph of Yenagoa

(Source: www.ialnigeria.com)

Rainfall in Bayelsa State is seasonal, variable, and heavy. Generally, south of latitude 05°N, rain occurs, on the average, every month of the year, but with varying duration. The State is characterized by high rainfall, which decreases from south to north. Total annual rainfall decreases from about 4,700 mm on the coast to about 1,700 mm in extreme north of the State.

Rainfall is adequate for all year round crop production in the State. The duration of the wet season is not less than 330 days, of which a great number is rainy days (days with 250 mm or more of rain). For Yenagoa, the rainy days are about 182.

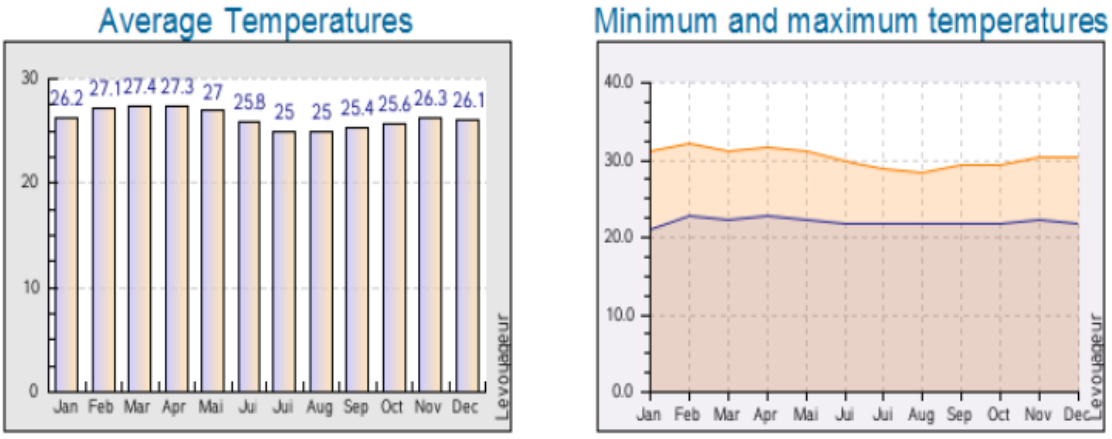


Chart 5.2a and 5.3b temperature graph of Yenagoa

(Source: www.ialnigeria.com)

Temperature is a physical property of matter that quantitatively expresses the common notions of hot and cold of a place. The temperature of a place will go a long way to determine the thermal comfort of inhabitants of that location.

Mean maximum monthly temperatures range from 28^{o}C to 33^{o}C, while the mean minimum monthly temperatures are in the range of 17^{o}C to 24^{o}C.The mean monthly temperature is in the range of 25^{o}C to 28^{o}C. The mean annual temperature for the State is 26^{o}C. The hottest months are February to May. The difference between the dry season and wet season temperatures is only about 2^{o}C.

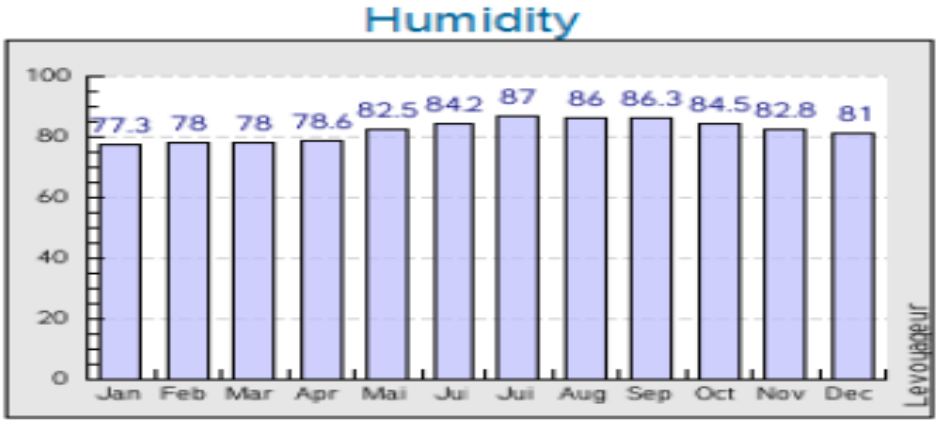


Chart 5.3 A temperature graph of Yenagoa

(Source: www.ialnigeria.com)

Humidity is the amount of water vapour in the air. Specific humidity is a ratio of mass quantities of water vapour to dry air. Humidity indicates the likelihood of precipitation, dew, or fog. High humidity makes people feel hotter outside in the summer because it reduces the effectiveness of sweating to cool the body by reducing the evaporation of perspiration from the skin.

The southern part of Nigeria is associated with high humidity; this is because of the rivers, water bodies, and the closeness to the Atlantic Ocean.

Yenagoa, has a very high Relative humidity throughout the year and decreases slightly in the dry season (Salawu, 1993).

Figure 5.4. vegetation belts of Nigeria

(Source: www.ialnigeria.com)

Plate 5.3 vegetation of the site

(Source: author's field work).

5.2.2 VEGETATION

Vegetation: Vegetation is a general term for the plant life of a region; it refers to the ground cover provided by plants. Broadly speaking, the national vegetation over a geographical area is essentially a response to the climate in that area. Nigeria's vegetation belts reflect this very close link between vegetation and climate. Nigeria has two broad belts of vegetation types, namely, the forest and savannah types. The state falls into three main groups; rain forest, fresh water swamp and salt water swamp.

yenagoa falls within the "upland" area of the state was originally occupied by rainforest which has been drastically modified by human activities.

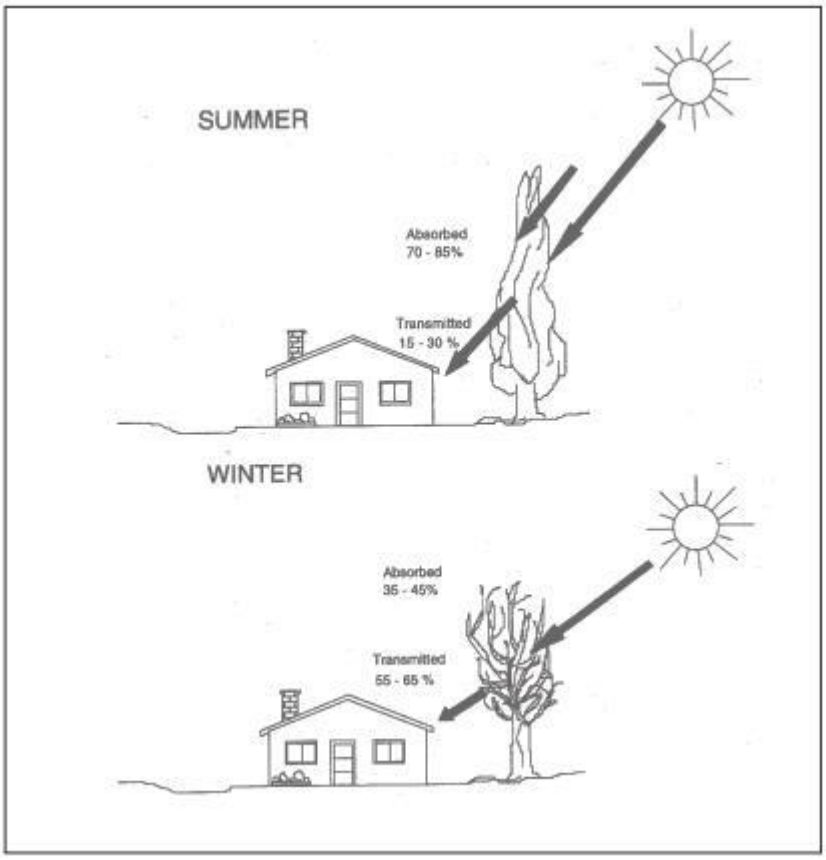


Fig 5.5: vegetation and architecture

(Source; technology module 3:natural cooling and ventilation)

5.2.3 SOIL

Soil; Bayelsa State lies on the recent coastal plain of the eastern Niger Delta. Its surface geology consists of fluvial sediments. This includes the recent sediments transported by Niger River distributaries and other rivers. These materials deposited as regolith overburden of 30m thickness are clays, peat, silts, sands and gravels.

The depositional sequence exhibits massive continental sand stones overlying an alternation of sandstones and clays of marginally marine origin, but eventually grading downwards into marine clays. Sands, by far, form the largest group of rock types in Bayelsa State, while mud constitutes all the polluted brackish waters of the riverine areas. However, peat constitutes the various vegetal and animal remains that lies in bogs and shallow pits.

The site is part of the up land areas of the state which fall in the plain coastal plain of fluvial sediments.

5.2.4 RELIEF

Topography; the land surface of the State can be grouped into three main divisions: the fresh water (upland), the mangrove swamps, and the Coastal Sand ridges zone. The freshwater zone is the plain that extends north wards from the mangrove swamps. The value of the mean thickness appreciates upward to about 45 m in the northeast and over 9m in the beach ridge barrier zones to the southwest

The upland is undulating to the hinterland and sandwiched with NWSE and EWW direction ridges and attains a maximum height of 30m above sea level located on the upland with varying heights between 13m to 45m above sea level.

The site attains a variation of height within 16m maximum and 14m minimum above sea level which is 2m difference from the north to the south of the site. See figure above.

Plate5.4 T**opography-Rise and Fall of Natural landforms**

(source: 2007report on Yenagoa master plan pdf)

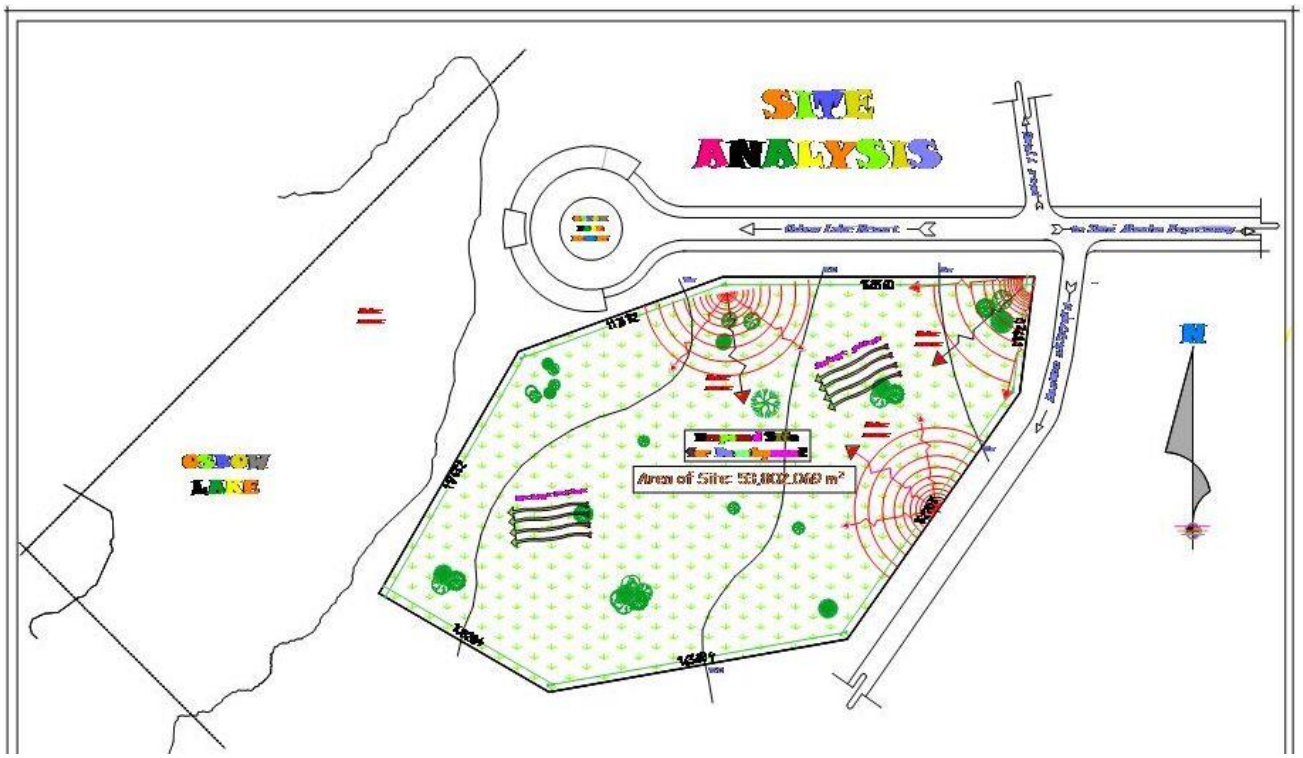


Figure 5.6 site drainage direction and noise sources

(Source: site study)

4.2.5 DRAINAGE

Drainage; this is how surface water is drained from from rain and melting snow or ice converges to a single point, usually the exit of the basin, where the waters join another

waterbody, such as a river, lake, reservoir, estuary, wetland, sea, or ocean naturally or artificially.

Since the site has 0.5m slope in height variation in height from north to south it will be considered to the planning and development of the site. Water drains directly flowing into the oxbow lake

The most important factor in terms of land suitability for urban development is quite obviously drainage and its implications upon accessibility.

4.2.6 NOISE

A nuisance which indirectly affect the well being of man should be diagnoses in site to zone and locate facilities properly; Noise orientated activities such as sporting and recreational facilities should be zone to noisy area.

4.2.7 WIND DIRECTION

There are two prevailing wind that are blowing across the site-the north east trade wind and the south west monsoon wind. Although there are other wind directions that blow suddenly due to mass movement of the air without a definite direction, they can blow from any angle.

The ***north east trade wind*** blow across the site during the dry season which introduce the harmattan. But it did not prevail much due to the closeness of the area to the Atlantic Ocean. It has little prevalence just within December to February.

The ***south west monsoon wind*** blow across the site during the wet season from the Bright of Bonny (Atlantic Ocean) which introduce the rain. It is the most prevailing wind in the zone and it influence the area year round, but prevails much within April to September.

4.2.8 SUN PATH

The suns rises from the east and sets in the west. It occurs within the time frame of 06:45 – 18:25 (GMT). Within the hours of 06:45 – 12:00 shadow will be cast toward the west and moves toward the east gradually to overhead shadow within 12;00 – 15:00 and finally in the evening shadow move to the east 15:000 -18:25 and twilight will take over.

This will go a long way to influence the orientation of buildings in the site to have a good passive system for thermal comfort.

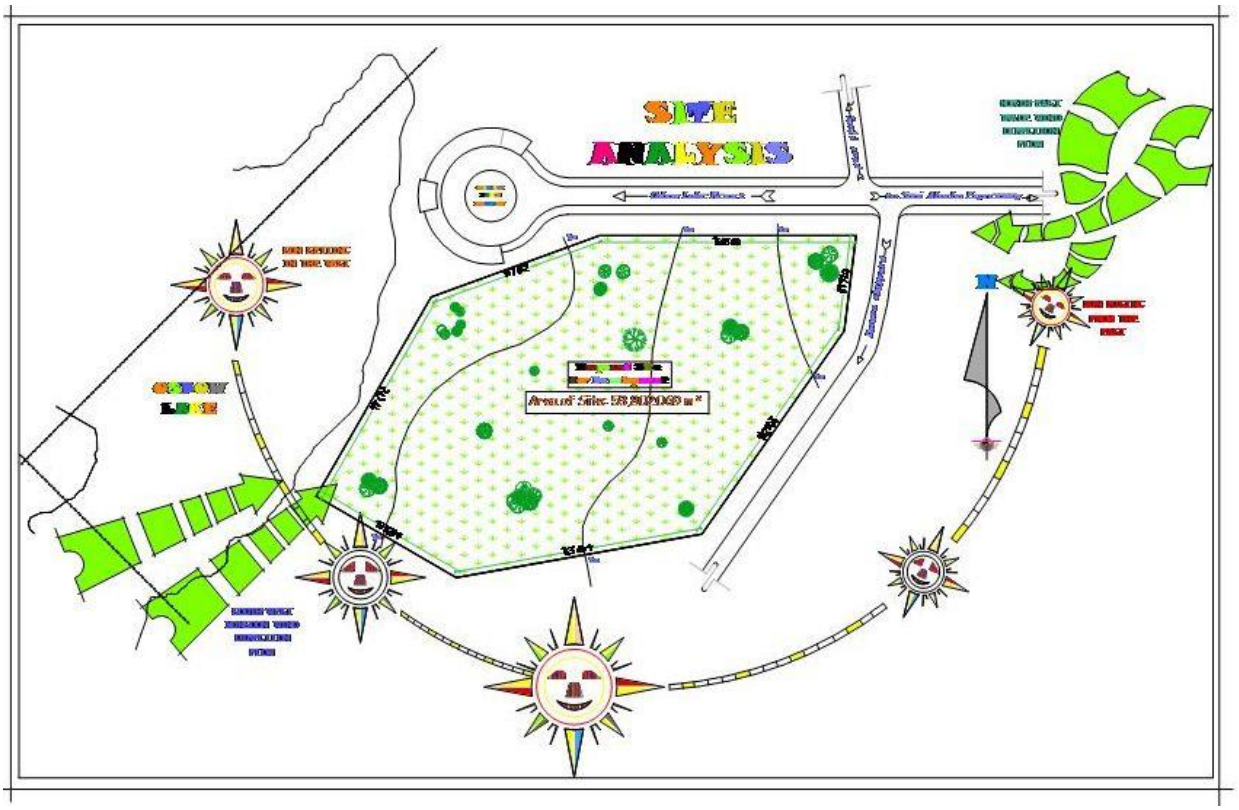


Figure 5.7 Showing sun path & wind directions

(Source: site study)

4.3 SPACES/FUNCTIONAL ANALYSIS

The space requirement for this center will be divided into two main groups which include;

Group A;

- Administration
- Auditorium/multipurpose hall
- Mini Library/cafe

- Amphitheatre
- Arts and craft workshop

Group B

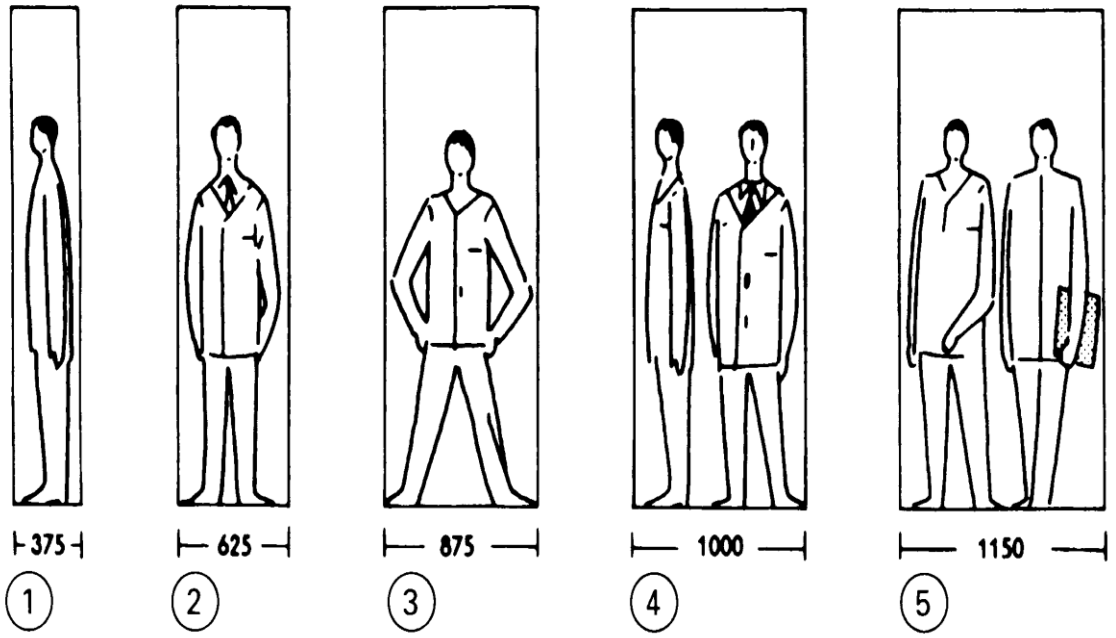
- Restaurant/ bar
- Sport/recreational facilities
- Exhibition halls and spaces
- Shopping outlets
- Bush bar/ gardens
- Maintenance workshop

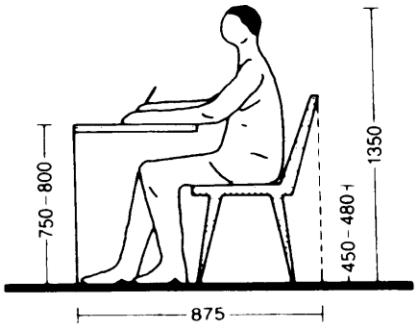
Below are the details of the individual spaces that make up these main functions:

The **administration** block is made up of many departments. They will be zoned according to their relationship and link up with circulation spaces in respect to their space requirement and space analysis to have good workstations, providing office accommodation for the staff that will run the community center.

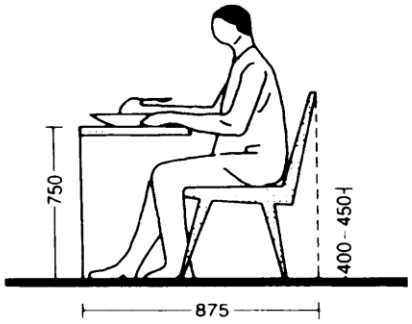
Table 5.1: Space Requirement for administration block

space	**No of unit**	**Capacity**	**Unit area**	**Net Area**	**Remark**
Offices	30		7.2m2	216m2	
Meeting room	1	20	18m2	$18m^2$	
lounge	1	30	30m2	$30m^2$	
stores	4		7.2m2	$28.8m^2$	
toilets	12		1.89m2	$22.68m^2$	

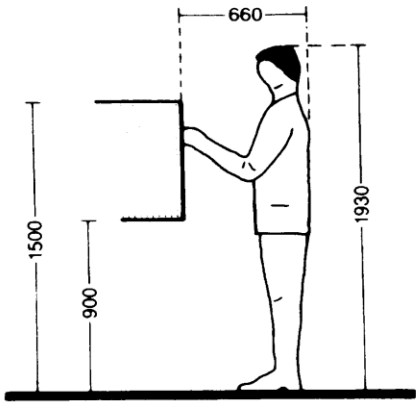




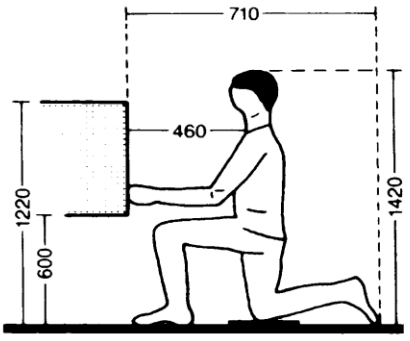
13 Dimensions: work table



14 Dimensions: sitting and dining room chair



17 Working while standing



18 Kneeling

Fig 5.8a human dimension for office spaces(13)(14): Figure:5.8b human/furniture analysis for office spaces(17)(18)

(source:neufert, 2000)

Auditorium/multipurpose hall

This will be designed for indoor stage performing arts such as music, dance, drama and some muiltipurpose functions. This unit will also have the following facilities;

- Performing stage.
- Control room.
- Changing room for artists.
- Storage room for costumes, equipments, props so on.
- Water closets and bath for artist and audience.
- Ticket offices

The **Mini library** for the centre is like every other library, but on a smaller scale with a business center and a cyber café with containing a collection of books and periodicals for reference purposes for the public and members of the organization, also serving as a space for collection of films and other audio visual materials for research which should b located in the quite zone of the center.

Like every other library, it follows basic library design principles but in my own discretion it will be design together with the information communication unit (ICT). It will not be designed as a separate structure, but it will take one wing of the of the administration block. The spaces involved, function layout of library and the requirements are stated bellow.

Amphitheatre

This is the outdoor area where open air activities like traditional dances, cultural carnivals, wrestling contests, masquerade outings, aerobatic displays, plays and a whole lot of other activities which cannot be conveniently organised indoor can take place.

Arts and Craft center

This will be a spearate unit from the main civic center complex, which will provide accomodation for the production of local arts and crafts wroks that will be exhibited within the center.

Sports/recreational facilities

the center is to have sporting and other recreational facilities both outdoor and indoor sports will be inculcated into the design so as to improve the health of the inhabitants of the users. This also goes in line with the unity and interactionsporting activities tends to create within users of suchprovided sporting facilities like water polo,tennis, children play grounds, swimming pools, football pitch et cetera

Exhibition halls and spaces

Provision of flexible open spaces in the form of passage or lobby and also as has to be rented out for an exhibition and other artifacts. The exhibition items designed for may include the following:

- Pottery
- Wood and metal works

- Leather and fabric works
- Historical materials: pictures and

Shopping outlets

Shops will be provided around the facilities on stategig locations to meet the purchasing needs of the users, with designed shops underneath the soffit of the raked viewing pavillions and amphitheatres, auditoriums as the case permits.

Bush Bar/Garden

This will be a separate unit from the main civic center complex as an outdoor recreational facility, aimed at replicating the typical traditional drinking shed and garden stereotype of the ijaw tribal bush bars

Maintenance Workshop

This will be a separate unit from the main civic center complex, which will provide accommodation for the maintenance of the structure and arts and crafts works that are not in good condition within the center

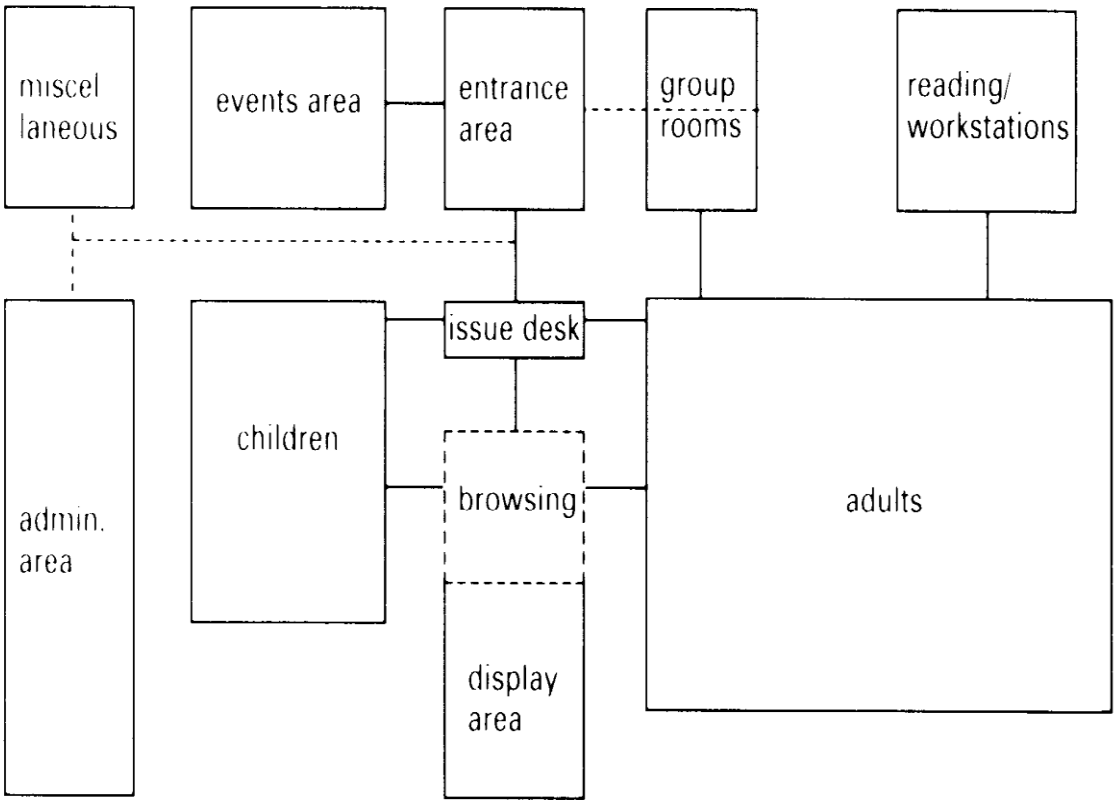
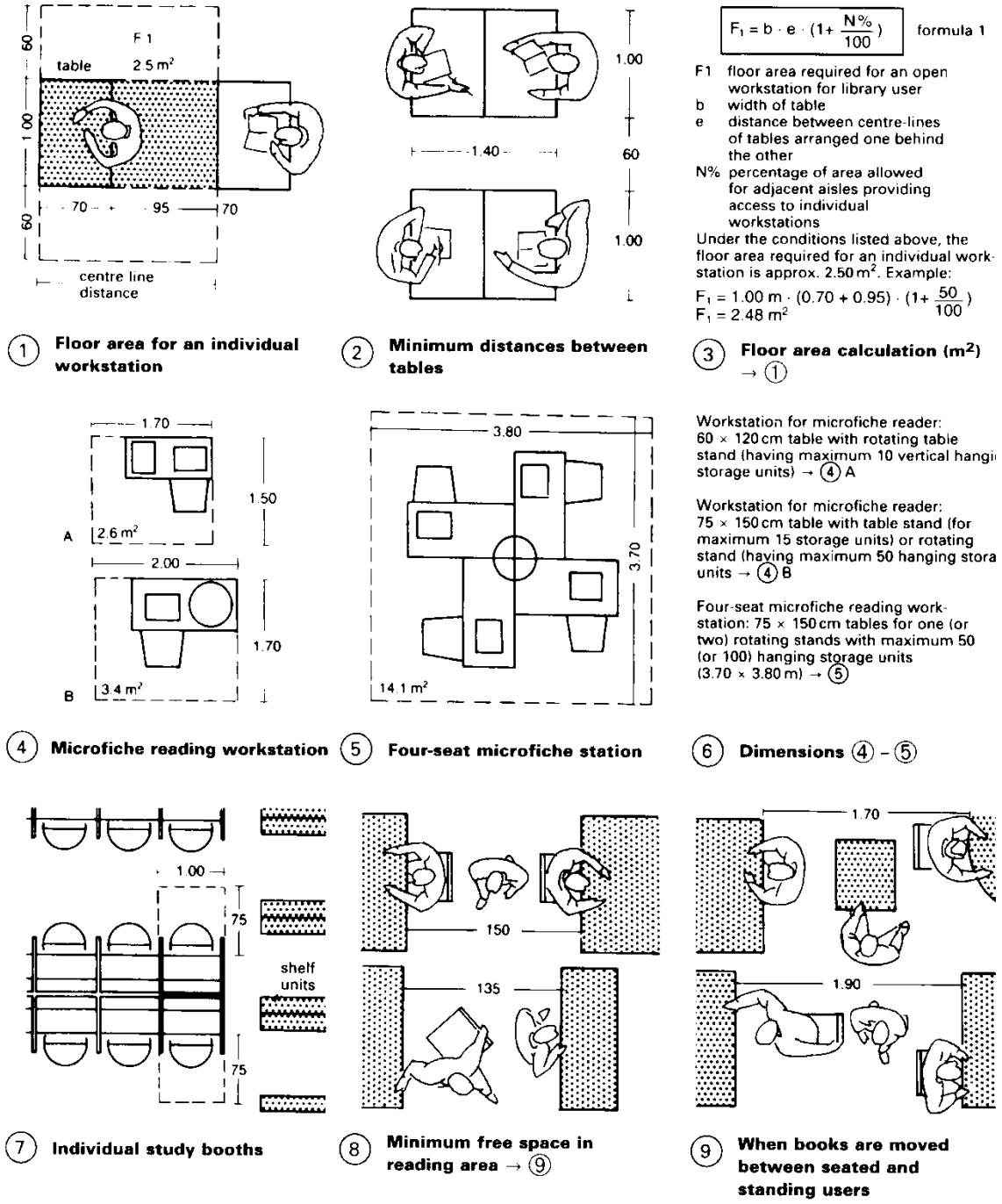


Fig. 5.9 Functional diagram of a library

(source: Neufert, 2000)

Table 5.2: Space Requirement for library

space	**No of unit**	**Capacity**	**Unit area**	**Net Area**	**Remark**
Reading area	1	100	80m2	$80m^2$	
Cyber cafe	1	50	50m2	$50m^2$	
offices	4		7.2m2	$28.8m^2$	
stores	2		7.2m2	$14.4m^2$	
toilets	8		1.89m2	$15.12m^2$	



1 **Floor area for an individual workstation**

2 **Minimum distances between tables**

3 **Floor area calculation (m²)** → 1

4 **Microfiche reading workstation**

5 **Four-seat microfiche station**

6 **Dimensions 4 – 5**

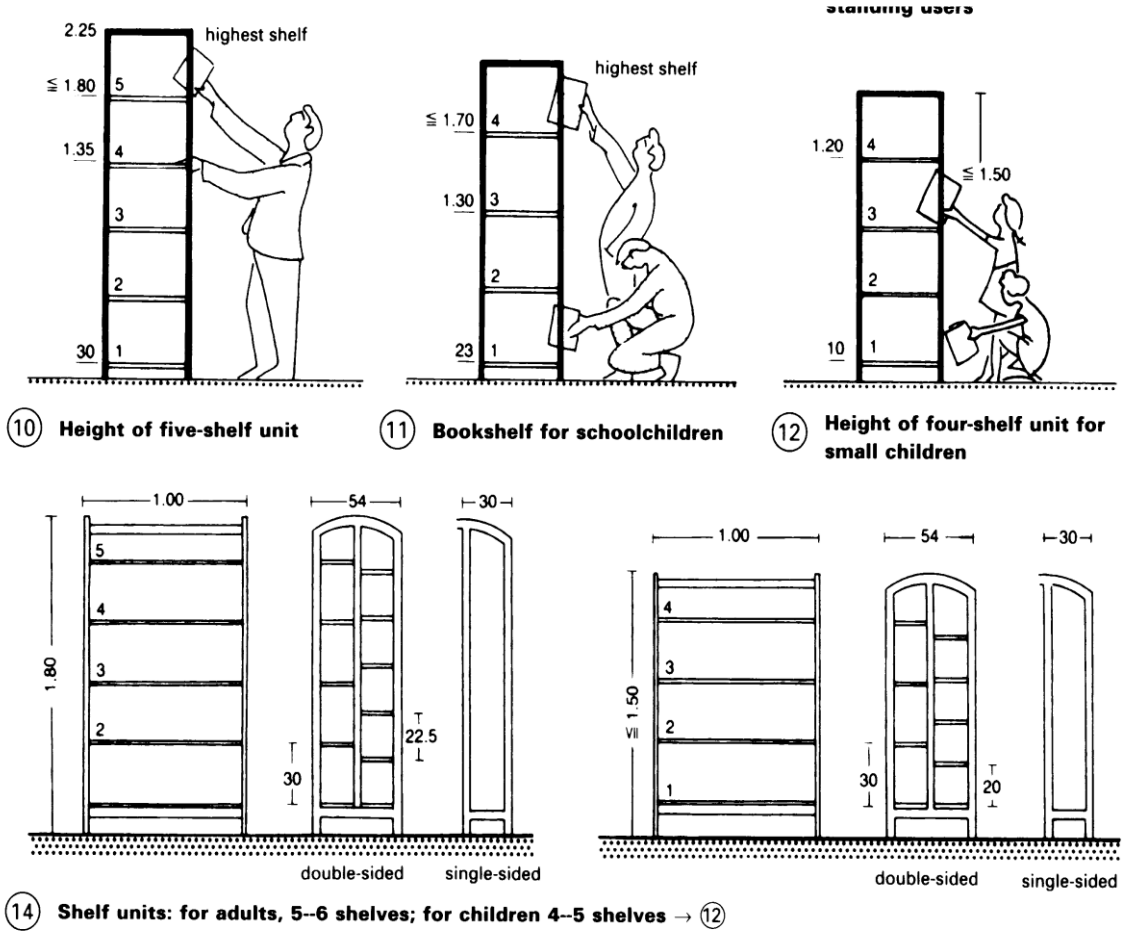
7 **Individual study booths**

8 **Minimum free space in reading area** → 9

9 **When books are moved between seated and standing users**

Figure 5.9a Functional diagram of a library

(source: Neufert, 2000)



(10) Height of five-shelf unit (11) Bookshelf for schoolchildren (12) Height of four-shelf unit for small children

(14) Shelf units: for adults, 5--6 shelves; for children 4--5 shelves → (12)

Figure 5.9b Functional diagram of a library

(source: Neufert, 2000)

The **restaurant** will be carefully articulated into the design so as to maximize its effectiveness and efficiency into the design

Table 5.3: Space Requirement for dining/ cafeteria

space	**No of unit**	**Capacity**	**Unit area**	**Net Area**	**Remark**
Dining halls	1	500	300m2	300m^2	
servery	2		20m2	40m^2	
kitchen	1		40m2	40m^2	
stores	2		7.2m2	14.4m^2	
Changing room	2		12.96m2	25.92m^2	
baths	2		2.88m2	5.76m^2	

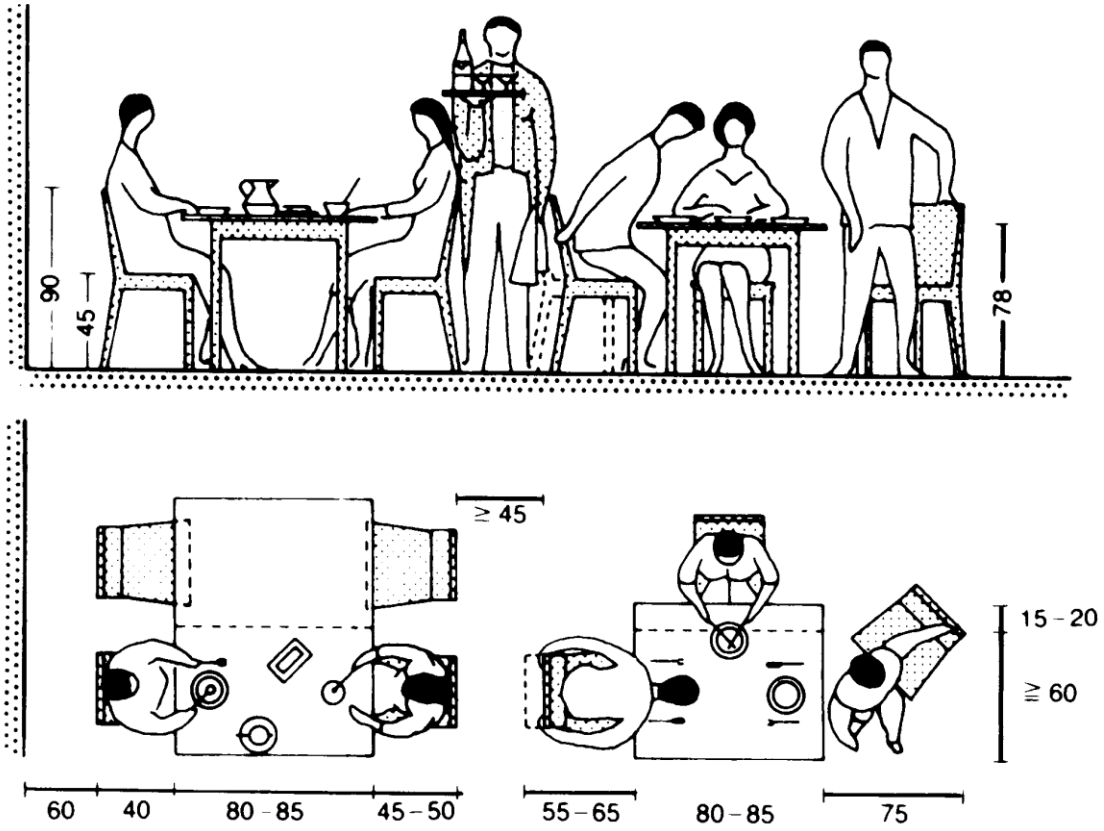


Figure 5.10a seating arrangements for dining/ cafeteria

(source: Neufert, 2000)

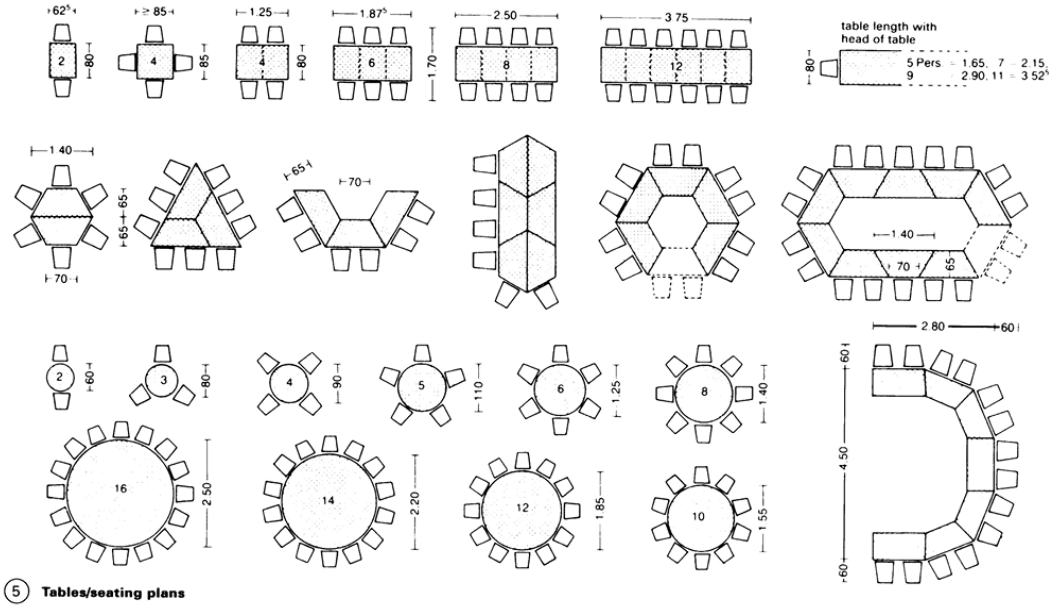


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Figure 5.10b seating arrangements for dining/ cafeteria

(source:Neufert,2000)

The spaces for the **sporting/recreational** facilities are going to be standard sizes and provision for spectator.

Table 5.4: Space Requirement for sport/recreational

space	No of unit	Capacity	Unit area	Net Area	Remark
Football pitch	1		$6500m^2$	$6500m^2$	
Volley ball pitch	1		$162m^2$	$162m^2$	
Lawn tennis	1		$195.63m^2$	$195.63m^2$	
Basket ball	1		$420m^2$	$420m^2$	

5.4 SCHEDULE OF ACCOMMODATION

1. AUDITORIUM / MULTIPURPOSE HALL

Bases for the seat capacity is a case study of existing Ogidi Town Hall. The hall is 700 seat capacity. At peak period three is about 50% overflow. To provide for the overflow requires additional 70 seats with surplus, that is approximately 1500 seats capacity.

- Space per person - $43m^2$ (Neufart, 1995)

  Therefore space for s - 1500x043 = $64m^2$(minimum).

- Changing /cloak room - 10 -$220m^2$ "

- Toilets - 1.5 - $2m^2$ "

- Mechanical/electice room	-	10 -20m^2	“
- Scenery/technical room	-	10 -25m^2	“
- Rehearsal	-	15 -25m^2	“
- Store/offices	-	10 -25m^2	“

..

2. EXHIBITION HALL

- Space per sculpture	-	6 – 10m^2	(Neufert, 1995) “
- Space per art work on ground	-	10 -20m^2	(Neufert, 1995) “
- Exhibition hall	-	30 – 50m^2	“
-Store/offices	-	10 -25m^2	“

3. AMPHITHEATRE

- Space per person	-	0.4m^2	“
Therefore space for 500 seats	-	500x0.4=200m^2	“

4. ADMINISTRATIVE

- Offices	-	10 -20m^2	(minimum)
- Toilets	-	1.5 -2m^2	“
- Conference room: space per person	-	0.5m^2	(Neufert, 1995)
- Therefore for 50 people	-	0.5 x 50 =25m^2	“

5. LIBRARY

- Reading hall: spaces per reader	-	0.54m2	(Neufert, 1995)
Therefore for 80 readers	-	80 x 0.54 = 43 2m2	"
- Shelving	-	20 – 40m^2	"
- Archives	-	10 – 20m^2	"
- Toilets	-	1.5 -2m^2	"

6. RESTAURANT

- Space per 4 seats table	-	5.8m^2	(Neufery, 1995)
Therefore for 15 table	-	1.5 -2m^2	"
- Kitchen	-	10 -20m^2	"
- Shwer/cloak	-	10 -15m^2	"
- Store	-	8 -15m2	"
- Toilets	-	1.5 -2m^2	"

7. ART AND CRAFT CENTER

- Space per working area per person	-	5.13m2	(Neufert 1995)
- Shower/cloak	-	10 -17m^2	"
- Stores	-	10 -20m^2	(minimum)

8. MAINTENANCE WORKSHOP

- Space per working area person	-	5.13m2	(Neufert 1995)
- Shower/cloak	-	10 -15m^2	"
- Stores	-	10 20m^2	"

9. OFFICES AND SHOPPING OUTLET

- Offices and shops	-	20 -30m^2	"

10. LECTURE THEATER

- Space per person	-	0.43m2	(Neufert 1995)
Therefore space for 100 seats	-	100 x 0.43 =43m^2	"

11. BUSH BAR/GARDEN

- Space per 4 seats table	-	5.8m2	(neufert,1995)
- Kitchen	-	10 – 20m^2	"
- Shower/cloak	-	10 -15m^2	"
- Store	-	8 – 8m^2	"
- Toilets	-	1.5 – 2m^2	"

5.4 DESIGN CRITERIA

In every design there are some specific features that one **is looking at or focusing at**. If these specific features are not there then it is a fiasco on the part of the designer. In this project the focus is the spatial configuration of spaces to develop activities for the well being of the users of the facilities in the centre

The following guidelines and criteria have been deduced to more effectively guide the designer in achieving a successful design within the context of the C centre and adaptable spaces.

5.4.1 Compatibility of proposed uses: For a successful and viable adaptable space, the proposed uses have to be compatible to each other. For instance the multipurpose hall can easily be switched from lecture hall use to theater use for performance to skill acquisition spaces.

Secondly, individual buildings will be conceived coherently with networking of the facilities and units involved with circulation spaces to fit in current architectural demand and the future putting functionally and comfort of the occupants as a priority of the design.

5.4.2 Conceptualization: Initial planning should ensure that the site design and construction preserve and emphasized key element of the immediate natural environment. It should encourage opportunities for sensing, experiencing, and/or understanding resources incorporated into the architecture and site design.

5.4.3 Designing: Designing should aim to function within the environment rather than separately. Thus it should be planned such that it effectively utilizes the surrounding services provided by the environment such as; vegetative screening, hills etc. care should be taken not to allow the environment interfere in the design.

5.4.4 Construction: Construction should incorporate both local building materials and contemporary building materials and methods that can bring the best out of a centre like this.

5.4.5 Design of Building Units: The design of housing units should also be according to the zoning principles. Grouping is often necessary on a large site to secure economics in engineering services (water, electricity communication, drainage), in access roads and paths (vehicles, access for maintenance, servicing, luggage and other deliveries), and land utilization. These groupings also help to establish a sense of association and social relationship.

5.4.6 Space design and functions: Spaces and functions within the facility should be planned to create ample opportunities for informal interaction between inhabitants of the region and visitors (tourist), creating avenues for healthy interaction.

5.4.7 Driveways: Driveways shall be constructed of a pervious or semi-pervious paver material (vertical draining) and in harmony with surrounding structures and connecting roadways. This does not preclude concrete beneath or immediately adjacent to the house. Drive ways are not permitted to enter leisure lane unless there is absolutely no alternative.

5.4.8 Separation from outside traffic: with provisions for public transport arrival bay and car parking users and staff of the facility.

5.4.9 Waste management: Water usage and waste disposal patterns should be considered during designing, to take advantage of natural conditions like topography, and incorporate avenues for recycling of water and waste.

Again, spatial configuration is the arrangement of objects in a space. This arrangement of objects or configuration of spaces will be in two phases;

- The entire layout design,

- The interior (individual building designs)

The **layout design** in every development is very important. It covers the entire development of the site and if it is not properly handled there will be confliction of activities.

These are the things to look out in community center design:

8. Efficient circulation,
9. Proper zoning,
10. Spatial system,
11. Environmental factors.

A good layout design will be achieved through proper zoning of activities and choosing a spatial system.

There are some activities that are closely related then others, while some the relationship is not strong. Such relationship should be observed to group activities and locating them to achieve spatial configuration goals because it is all by creating a generative and productive space. Again there are some activities that should be zone to some certain area to fit in a particular environmental factor: for instant sporting activities in this site should be zone to noisy area.

Then, a good spatial system should be used to network these activities or facilities that have been zone to integrate effective circulation of both pedestrian and vehicular movement in the center.

Interior: this is the configuration of spaces in individual buildings. There are lots of things to look out in the configuration buildings but due to the subject matter the following are considered:

a) Building orientation,

b) Structures,

c) Fenestration,

d) Function, and

e) Circulation

These factors are considered to knit one space to the other to produce productive spaces within a building. Bring out the individual space requirement of each building and knitting them together with

circulation spaces to create an enclosed three dimensional geometry for the occupants.

CHAPTER SIX

6.0 DESIGN SYNTHESIS

Synthesis is the combining of separate elements or substances to form a coherent whole, or the combining of often diverse conceptions into a coherent whole.

Design synthesis is an emerging contemporary design experience in the fields of architecture, infrastructure, interiors, installations, exhibitions, furniture, and product design which focuses on the merging of creative and intellectual design processes with intelligent fabrication and construction techniques to create beautifully crafted designs. Seeing this project as a unique opportunity to integrate diverse and often contending conceptions and constraints into a coherent whole.The emphasis is on the layout of the site because there are various components that make up the entire layout. These components will be networked with a good spatial system for the spatial configuration of the layout. So various spatial systems will be compared and evaluated to choose the best to suite centre which will enhance socio-cultural, recreational activities and the social well being of users and staffs.

First of all, the layout will be set out with a good radial spatial system which will integrate all the sectors and buildings together to form a coherent design. This will be achieved by breaking down the requirements into various groups according to the order of their relationship, then, they will be grouped and zoned to different areas of the site in accordance with environmental factors, their relationship in terms of functionality and will be networked together with radial spatial system.

To help in the area of design synthesis for this dissertation is the model of scope of architecture by M.G. Taylor on ―philosophy and practice of architecture‖, there are five areas which are;

i. Lifestyle and use; in this case, the project will be for the activities in a community centre. which is the primary project to be provided.

ii. The problem: the problem here is how to have all these uses in one place. It is clear that they will have to be mutually exclusive which is where the issue of adaptable space comes in. The efficiency of the adaptability of spaces will go a long way in defining the success of this project. Other problems in this aspect will be on how to produce a standard community centre

iii. Design solution: the design solution here is the summation of all the analysis, conceptualization and its synthesis to make the project work. The result of this will be a functional community center Abuja to be located in Yenagoa, Bayelsa State. According to Taylor (1978); the design solution is usually controlled by the developer and/or the patron‘s preferences through architect who is in fact the architectural designer. It's also controlled directly by laws, rules, and principles

iv. Contract documents: not in consideration here.

v. Construction and fabrication: this concerns the final building product part of the consideration of which is done at this stage of study to ensure its success and completion.

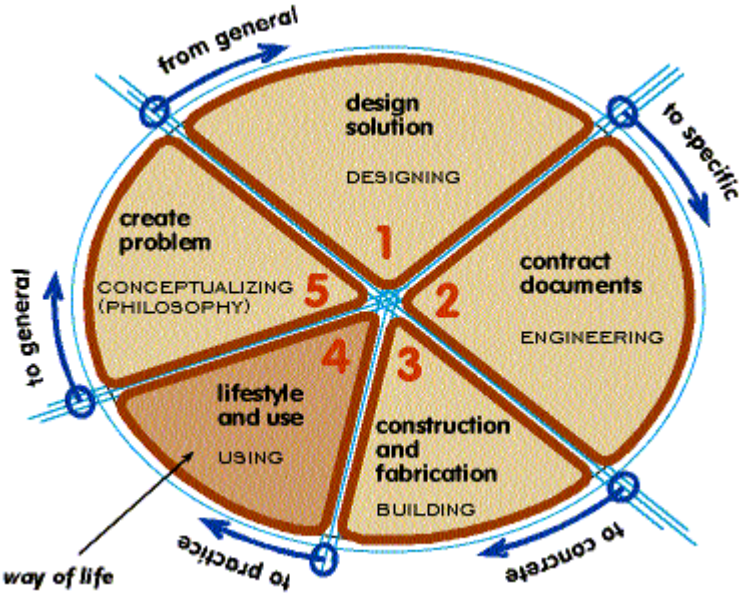

Fig 6.1; model of scope of architecture

Source: modified from M. Taylor

6.1 DESIGN CONCEPT

Concept could be seen as a general idea derived or inferred from specific instances or occurrences, something formed in the mind; a thought and notion or a scheme; a plan about thing in mind to establish.

Design concept is the central ideal governing the design process of a building or a particular design scheme, like this project there are various building types that are involved both institutional and residential buildings which will make up the entire scheme. Concentration here will depend on setting out the layout whereby uniting individual structures with circulation spaces of both vehicular and pedestrian movement (road network), parking lots, sport/recreational facilities and garden & lawns to conceive a well defined spatial configuration.

The concept behind this project will lay emphasis on the site layout development not in individual buildings, nevertheless individual buildings will be conceived through contemporary point of view most especially the receational buildings. Therefore, the concept behind the site development is the **sector theory** of urban land use. The sector model, also known as the Hoyt model, is a model of urban land use proposed in 1939 by economist Homer Hoyt. is a modification of the concentric zone model of city development. While accepting the existence of a central business district, Hoyt suggested that zones expand outward from the city centre along railroads, highways, and other transportation arteries.

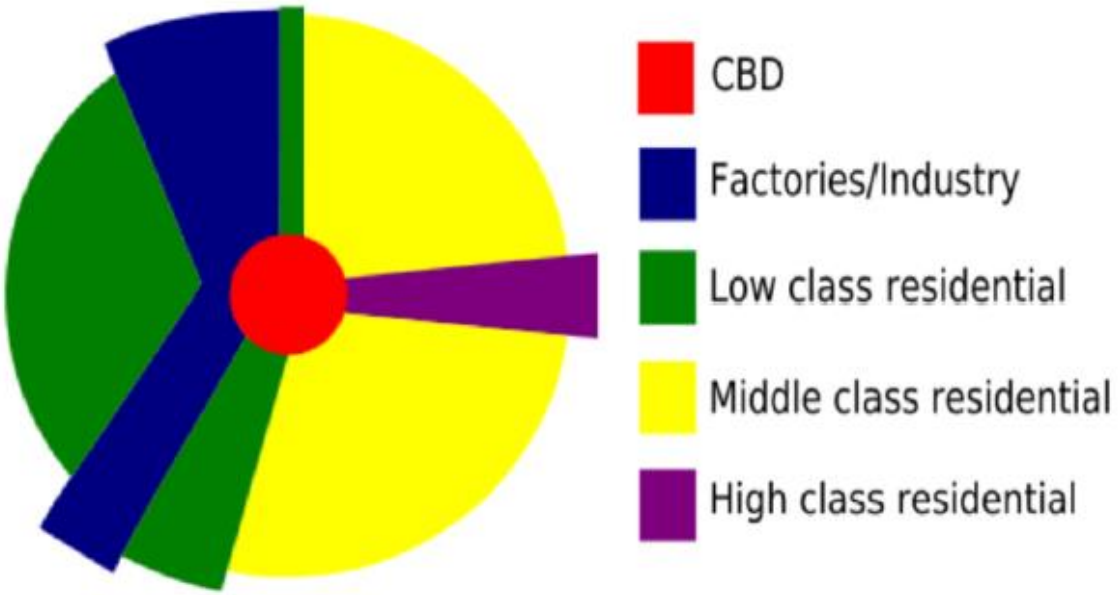

Figure 5.1 comparing of the sector theory model & zoning concept

(Source: author conception, 2014)

Hoyt theorized that cities tended to grow in wedge-shaped patterns -- or sectors -- emanating from the **central business district** and centred on major transportation routes

The community center is viewed to foster unity and promote peaceful co existence within the users therefore a circle is seen as a symbol .of unity that never breaks although lots of activity will b taking place inside of it with the circle forming a bond.

6.2 DESIGN CONTRIBUTION

It is truism that a research project lends credence to knowledge, a rediscovery of what exist or the discovery in process of study and how it will help in further studies and researches.

Nothing can have value without been an object of utility. Apart from the satisfaction one gets from the knowledge that a space could adapt to different needs, the same space is given more value and waste is reduced. A multi functional adaptable space extirpates wastages: economically wise- Nigeria is a developing country where constraints of budget, technical infrastructure, management capacity and lack of resources have meant that the provision of basic, standard and adequate infrastructures may be in short supply. It becomes imperative that in the design of such infrastructure, considerations should be given to making it multi-use oriented and flexible in that light.

This project will contribute in the following aspects:

- The spatial configuration of the layout and,
- The spatial configuration of each building.

The spatial configuration of the layout: the networking of activities the site will show a good relationship of activities in the priority of functionality and relationship putting the overall wellbeing of an individual as the ultimate goal.

Space syntax theories well be applied in the traffic system networking all the various activities paying attention on setting out of the site has a system carrying movement within and between all spaces it contains. The first corollary, the theory of "natural movement", states that the spatial configuration governs the distribution of movement (Hillier et al, 1993). The second corollary, the theory of "virtual community," says that movement within a space generates a pattern of co awareness and co presence (Hillier, 1989). The third corollary suggests that types of space uses will be located according to their relative dependence on social movement (Hillier, 1997).

Then, the spatial configuration of each building will also define second theory which applies to the components of common building types, defined by activity ("dining room"), social rule ("private room"), and function ("reception area") that spaces in a building will be conceived in order of function and social relationship.

I believe, any person that will go through this work will have something to fall back to in the integration of any community center design.

This project has contributed in revealing different systematic approaches to community center design by using various spatial systems, how activities will be zoned in terms of spatial functionality relationship and environmental factors to enhance educational, recreational and the social well being of the users.

6.3 RECOMMENDATION AND CONCLUSION

It has been a worthwhile run of researches which has lead to a wider horizon of intellectual accumulation of facts and ideas culminating into a tangible piece and factual presentations. After going through this whole process I discover a lot of things which should be recommended in any community center design, that since the audibility and fluency of any architectural piece varies

depending on the architect and the audience through buildings being able to speak, whether they are listened to or not;

Every community centre of activities from which other facilities will be grouped and zoned to the peripheries of the site putting generative and productive spaces as the priority of their spatial configuration.

Again, in any recreational, educative, commercial setting, there should be effective landscaping with planting, signatures & furniture and most especially some tectonic shapes and not only the regular rectangular forms of buildings and also integration of sporting & recreational facilities, this will go a long way to refine the mindset of people giving them a psychological freedom from feeling bored. I am saying this because of my discovery in the process of my

Then in further studies and researches I recommend the following areas of research on;

- The recreational environment (comparisim of spatial configuration and urban land use theories)
- The use of tectonic shapes in designs.
- Combination of hard and soft landscaping in designs
- Adaptable acoustics for multipurpose spaces to make adaptable spaces more effective
- More research done on the area site planning for community centres in Nigeria alongside proper Environmental Impact Assessments in choice of locating sites.

In conclusion, there are certain things this thesis have revealed in any community centre design which will solve the problems in our society, most especially in the subject area because the problem we are facing is functional spatial configuration and building adaptability. After critical analysis of the problem, I am fostering the solution is in the use of ***adaptable spaces in buildingdesigns and structures*** in solving the functional spatial configuration problem by ensuring the availability of spaces for other activities but will save the authorities lots of tax payers' money in erecting newer structures and within the context of use of space, it creates the impression of economy. Finally, this thesis through series of corrections has synthesized into forming reference material for further academic purposes and general studies.

APPENDIX I

TABLE OF SPATIAL ORGANISATION SCHEME

PRINCIPLES	LINEAR SCHEME	CENTRAL SCHEME	DISPERSED SCHEME	AXIAL SCHEME
Activity - Interrelationships	Facilitates noise control Inhibits visual control Works best with Centers of 12,700 SF or less	Separates conflicting activities Facilitates visual control	Sound control excellent Reduces visual/physical access to all spaces	Separates areas with conflicting acoustical requirements well Visual/physical access facilitated
Flexibility of Use	More opportunities for social interaction Highly flexible	Maximum opportunity for social interaction because of visual and physical access	Spontaneous social interaction hampered Houses many diverse activities well with no dysfunctions	Locate popular activities at ends of axes to encourage movement past new activities
Adaptation to Site	Can be focused outwardly Requires solar path orientation Suitable for temperate climates Natural cooling results from orientation to prevailing winds	Focused inwardly Suitable for severe climates Plan level changes carefully for sloped sites	Similar to site adaptation for Central Scheme	"Functions well in all climates Adaptable to any site condition
Expansion Potential	Can be expanded at either end	Restrictive	Limited	Expansion can occur at ends of axes

Source: **[PDF]** ***CHAPTER 5 SPATIAL ORGANIZATION***

Design Guide: Recreation Centers – Spatial Organization – January 1976

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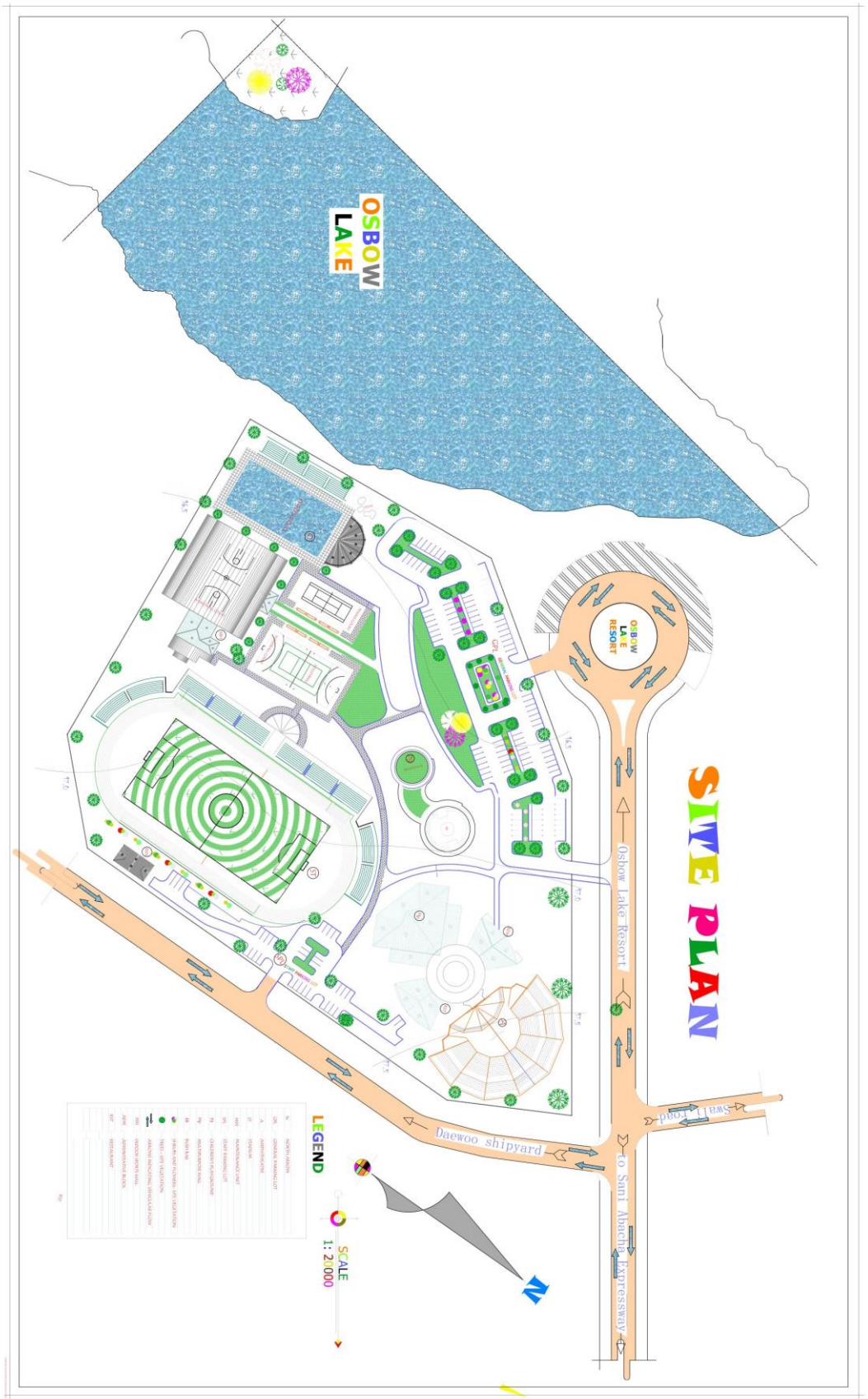
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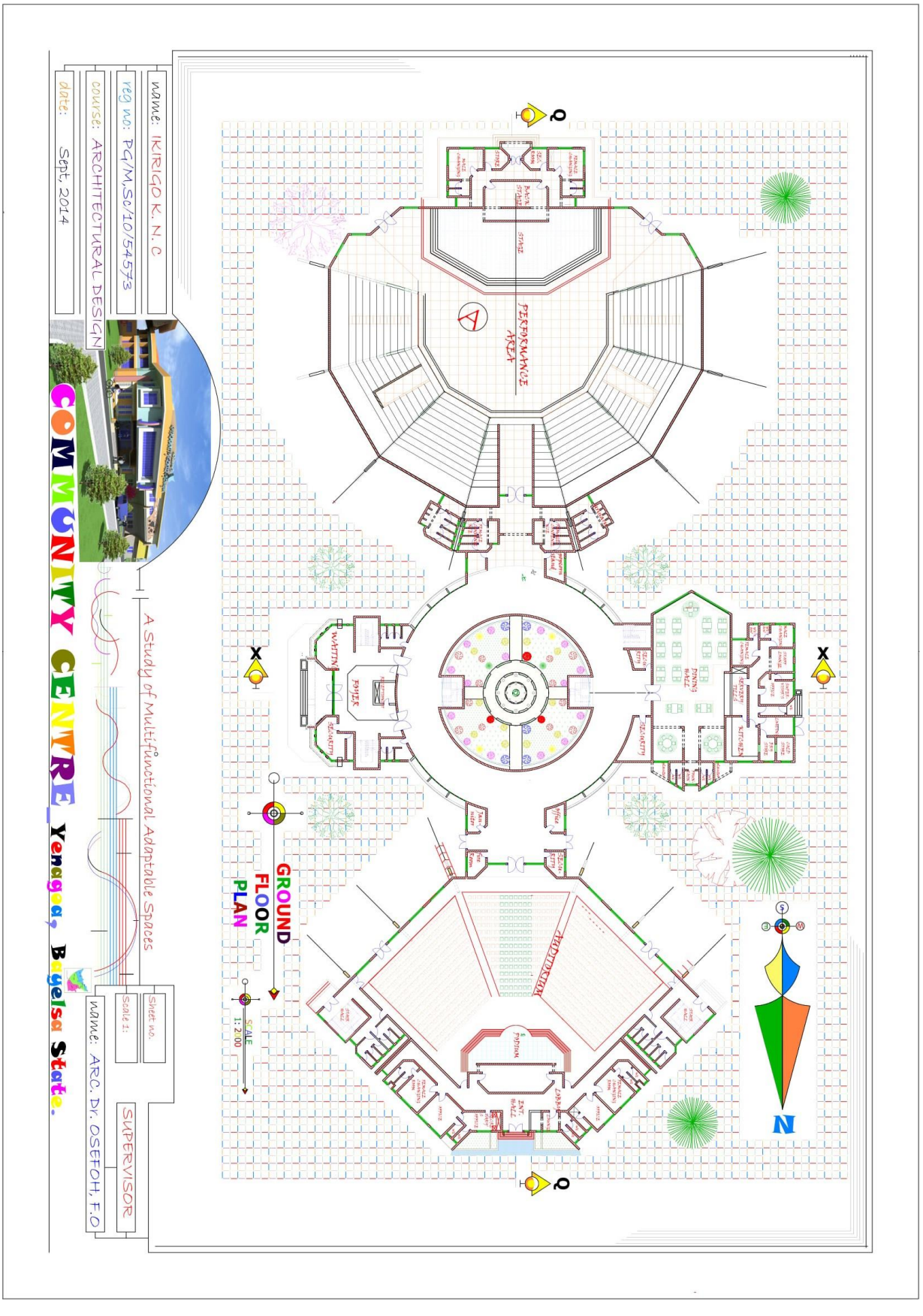
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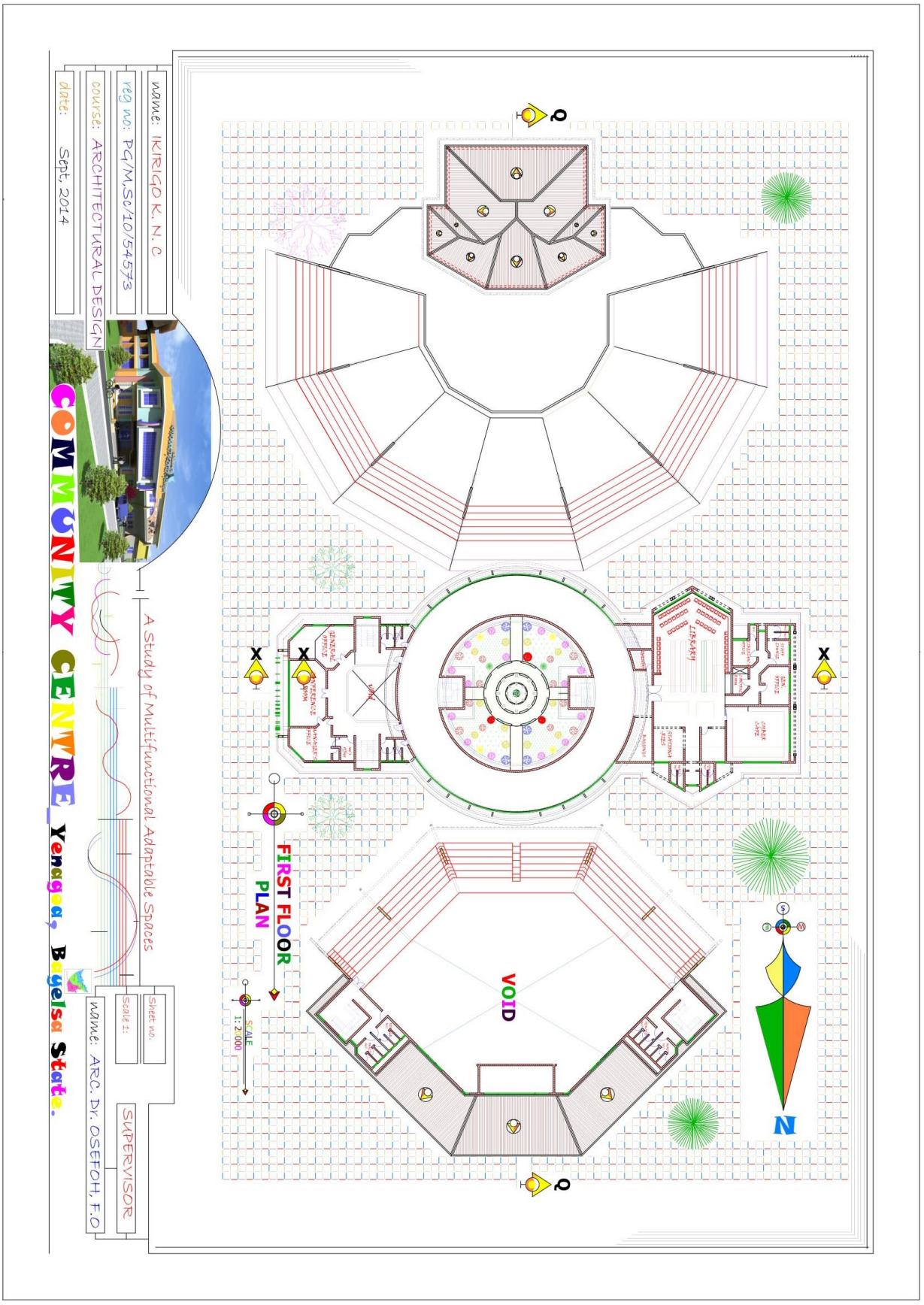
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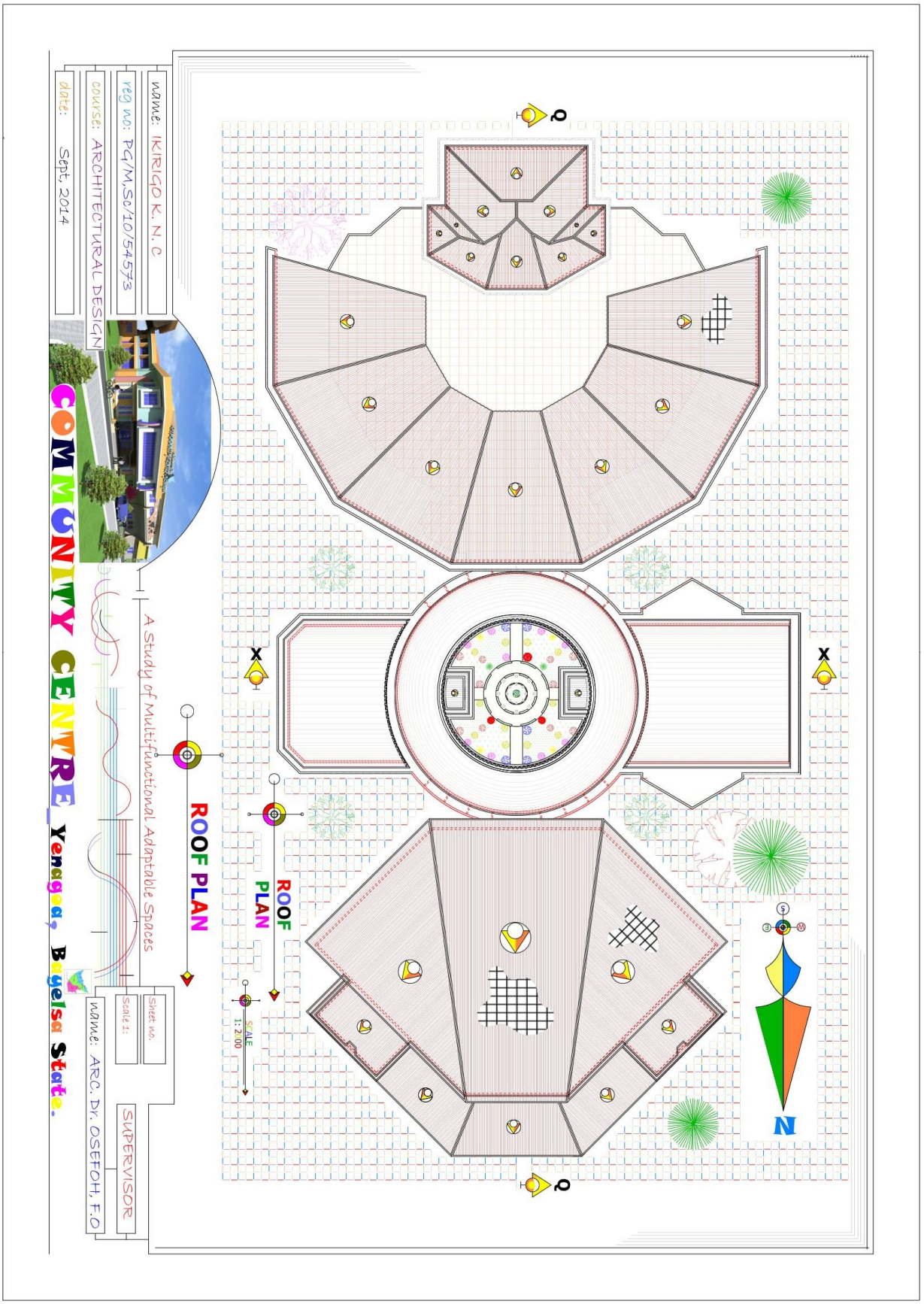
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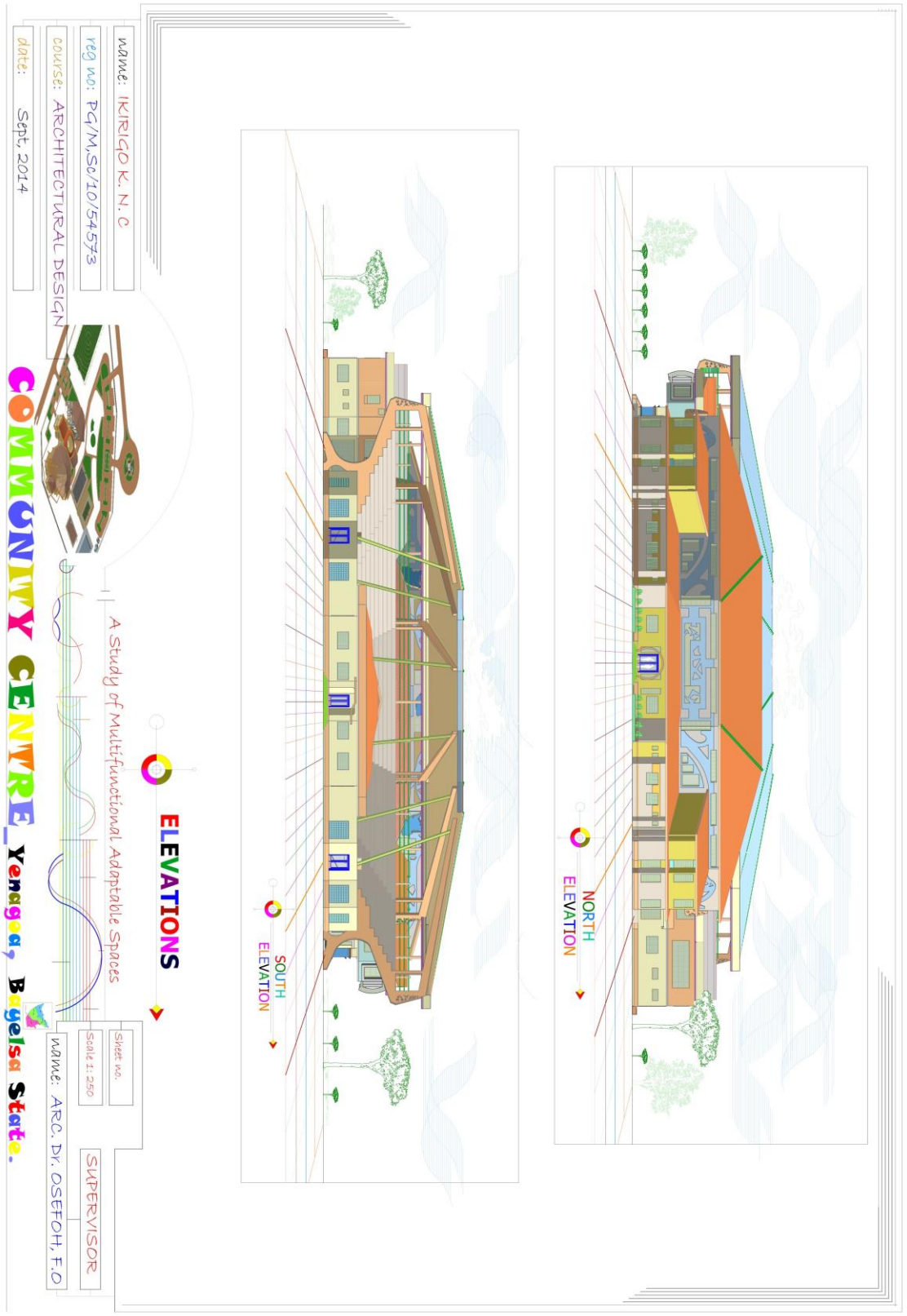
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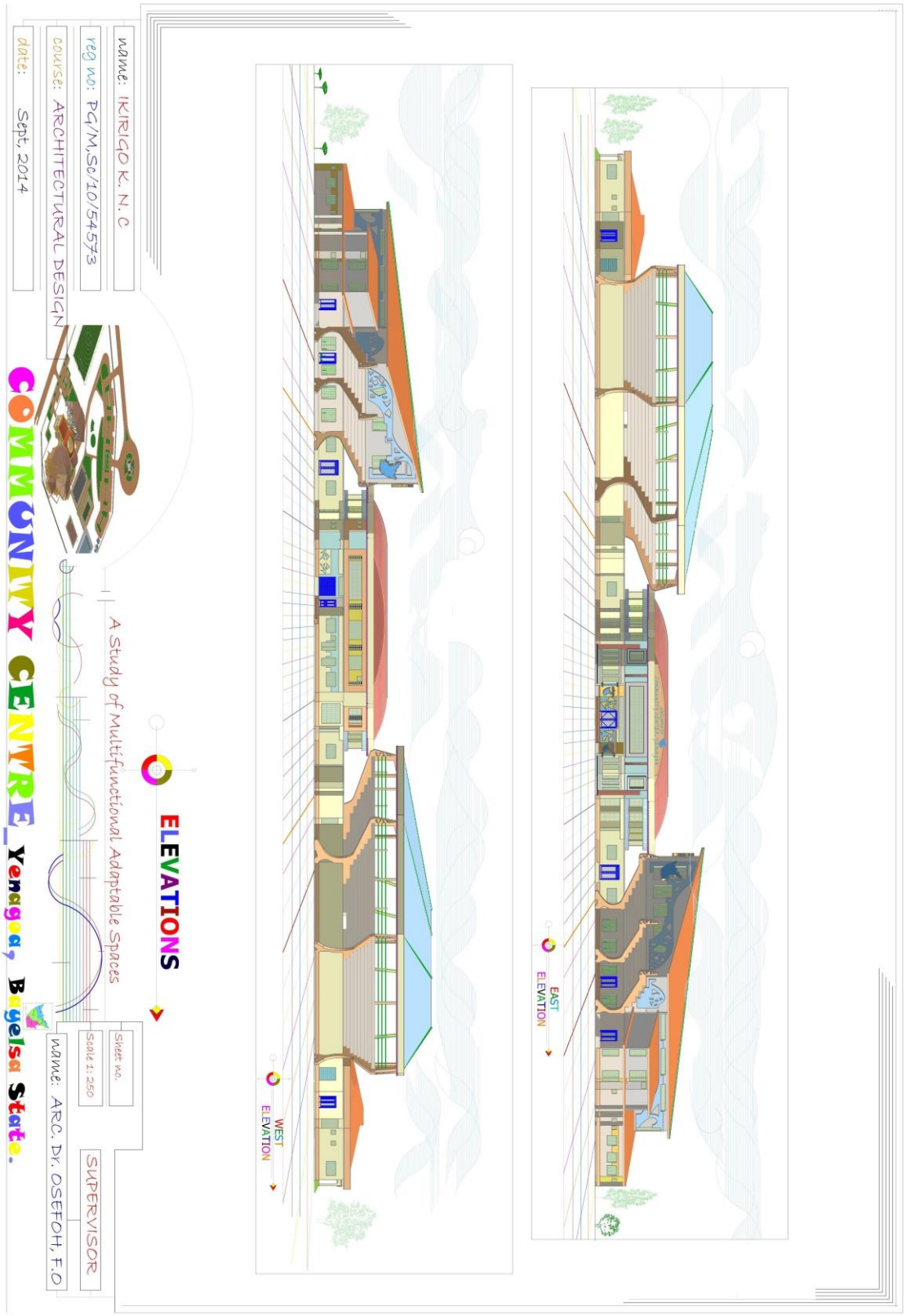
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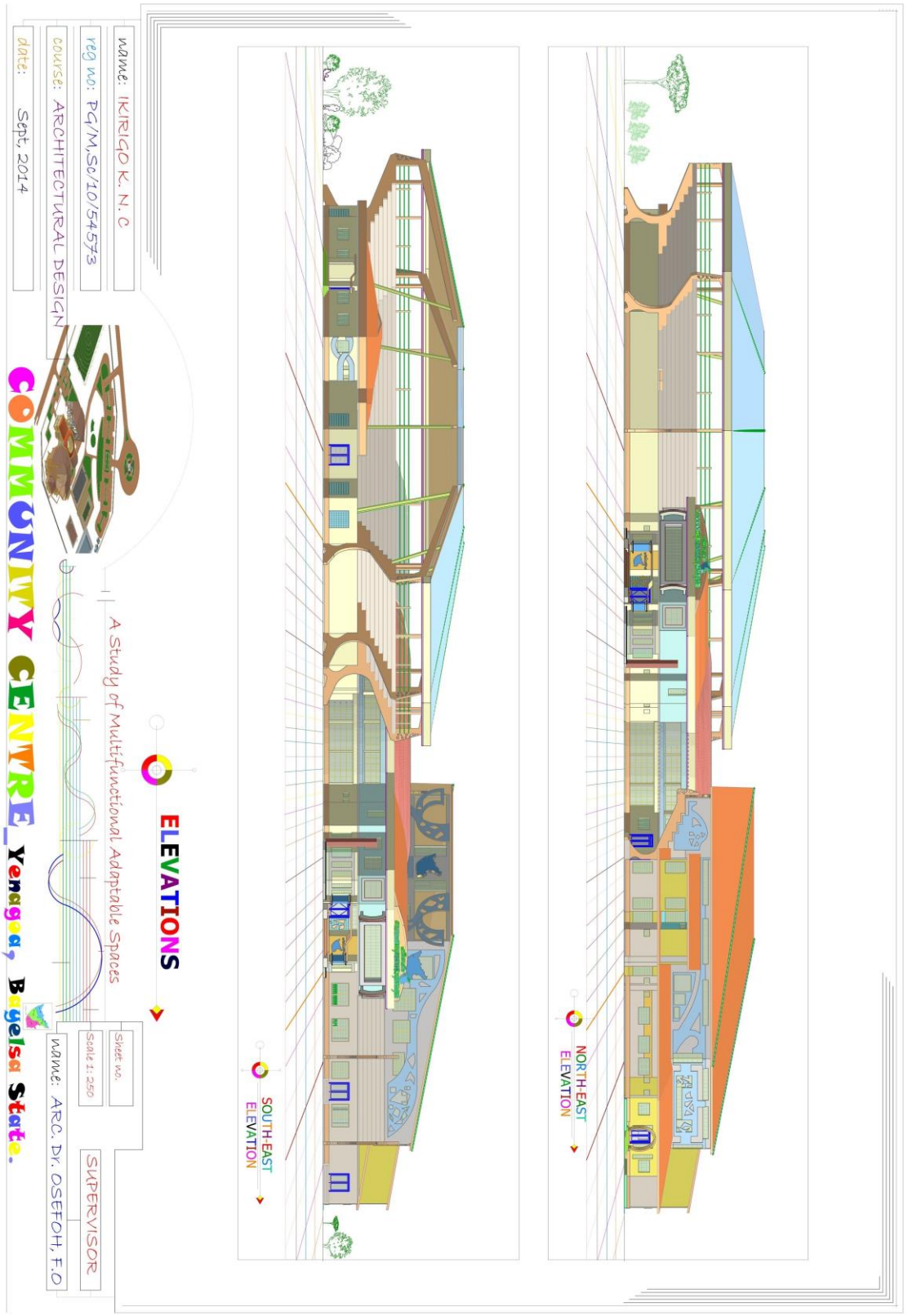
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