NATIONAL STADIUM ABUJA

(IMPROVING ON SITTING AND VIEWING IN STADIA DESIGN)

M. TECH. (ARCH) THESIS

BY

OWOJAIYE, ADEDEJI OLAKANMI

(91/1846)

ATHESIS SUBMITTED TO THE DEPARTMENT OF
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IN PARTIAL FUFILLMENT OF THE REQUIREMENT FOR THE
AWARD OF MASTER'S OF TECHNOLOGY
(M. TECH. ARCH.) DEGREE IN ARCHITECTURE

MARCH 2000

CERTIFICATION.

I hereby certify that the thesis entitled "NATIONAL STADIUM, ABUJA" by Owojaiye, Adedeji Olakanmi (91/1846) of department of Architecture, school of Environment Technology, Federal University of Technology Minna, is authentic in partial fulfillment of the master's of Technology Degree in Architecture

.....
Mentor

9-MAY-2000
.....
Date

.....
External Examiner

.....
Date

.....
Head of Department

9/5/00
.....
Date

.....
Dean, Post Graduate School

.....
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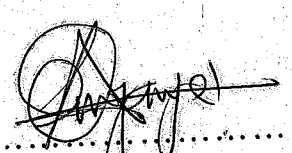
.....
Date

DECLARATION.

I, Owojaiye, Adedeji Olakanmi, of department of Architecture, school of environmental Technology Federal University of Technology, Minna, do whereby solemnly declare that the research and work presented for the Masters of Technology, Archtecture has been carriedout solely by me under close supervision by my Mentor Architect(Mrs) Adeshina of the department of Architecture, Federal University of Technology Minna.



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Owojaiye .A.O
(Student)

8-05-2000
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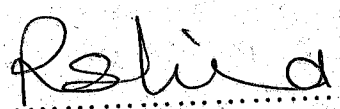
Date



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Arc (Mrs) Adeshina
(Mentor).

9-MAY-2000
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Date

DEDICATION.

To the almighty God, for His Love endure forever, to him who alone does great wonders, who by his understanding made the heavens, who spread out the earth upon the waters, who made the great light the sun to govern the day, the moon and stars govern the night, to the one who remembered us in our low estate, and save us from our enemies and who gives food to every creature, gives thanks to the God of Heaven His Love endures forever.

To every member of my family and to the lot that believe in me.

ACKNOWLEDGEMENT.

I would like to acknowledge the almighty, who sent the Lord and saviour Jesus Christ, who laid down His life for us, and the privilege he has given us to know him as Lord and personal Saviour, and for making me what I am today.

My acknowledgement goes to my Treasured Dad and Mum, Chief and (Mrs) Owojaiye. For their support both financially and morally and my brothers, Yinka and His Wife, Motun, Bisi, Jide and my only sister Foluke who have all together in every way influenced my person, you are all dear to me.

I will also like to acknowledge my mentors prof. Solanke, Dr. (Mrs) Zubairu and Arc. (Mrs) Adeshina – my project supervisor who through patience guided me through this project work and to other lectures.

To all my former classmate and mate in studio 2000 especially Justice Nasiru, Edicha, Tope Ogundele, Ibrahim Buba, and to my special Friends Taiwo Oniola, Deji Afolabi, Yinka Olawode, Bro. yemisi Olokundun, Funsho Ibitoye, Idris Joeachin, Adekunle Olaniyi, to all I say thank you.

To every members of RHEMA Campus Ministry FUT. Minna, who have at different times been different people to me especially, Pastor, Femi Banigbe, Deolu Tella and Buky, David Onikosi and Lara, Akin Olumodeji, and other pastors of the ministry and to all members of Thema Campus ministry I say God bless you abundantly and to the rest of you which space will not permit me to mention I say thank you.

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ABSTRACT.

History cannot afford to push aside sport not only that it enhances the individuals physical and mental health, but also emancipates the individual form social repression, giving him a sense of direction and the ability forester harmony with societal valves in general. It's growing economic and political importance need not be emphasized in international Polity.

Every culture has it own unique cultural sport, which she is known for. Games can be said to be a part and parcel of us as a country, this can be traced back, before the colonial days and even beyond. The aparthy toward sport can be examined in the contest of less priority attachment given it by government and the general populace. However, its social, economic and political importance is of great benefit to the individual and nation at large.

A need therefore for a comprehend sport programmed is highly required in the right direction, policies and infra-structure development for sport could go a long way in manifesting the much needed stimulation in national sport growth.

The one amenity that is needed in Abuja is a National Stadium, A national stadium can be defined as an area for sport protected by state for the use of the public. The thesis therefore looks into how we can achieve the minimum satisfaction for both the participant and the audience, affect will be made that facilities provided will meet the above requirement, in

the provision of facilities both indoor and outdoor Games. It is in this light than an architectural approach to all the basic requirement needed to enhance its development are explored and are exploited to ensure a better design. This includes looking into the social and physical needs of the participant and the audience.

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CHAPTER ONE

1.0 INTRODUCTION

Attaining victory of course is a sibling of good preparation where the impetus to actualizing the dream comes from training, preparing the body and mind into excellent physiological balance, high spirit and with the sole aim of anticipated conquest. All athletes appreciate this glowing necessity. Thus, making efforts at developing necessary conditions to ascertain skills and stamina, a prevailing doctrine.

Training is an inapplicable task, equipping profound commitment and well articulated atmosphere for its manifestation on participant, there must be however in strong term, adequate world class and up to date training facilities both in terms of infrastructure and equipment, to mould the individual to a more result oriented and purposeful to meet the ever heightening challenges of the dynamic nature of sports management strategies and programs coupled with well laid out functions organization are requisite expectation to condition the environment to which the athlete is expected to mutate into a would class better programs outlines generously executed in a most proficient manner. In respect of the desire for performance are overriding measure same at sterilizing the nature of performance expected from the participant.

Nigeria is not an exception to this believe but the facilities on ground are grossly insufficient to take us to global sporting grant.

bundles of talent abound the land but the facilities to develop, are not enough or even not to the standard demanded of the highly fast nature of sports metamorphosis. Individuals and government alike expand Lange amount of capital in developing athletes abroad, a situation that could easily be contained if the required facilities are on ground.

This thesis however, looks at a proposal of a sports stadium that could provide all the needed services required and obtainable in advanced countries into Nigerian Setting. In term of training sport man and women to attain global status and provide an excellent plat form to foster on thrives at facility the much needed avenue of generating coating programs that would effectively go on stream to the training facilities to be used there.

AIM AND OBJECTIVES

AIM

The aim of the project is to design an ideal National Stadium that will provide the service of training Nigerian's and be able to express and discover themselves in there chosen field of sport, to bring glory to our father land in regional continental and global sports competitions.

OBJECTIVES.

The objectives of the design hinge on the following architecture approaches.

(1) To serve as a unifying centre for athletes from different parts of the country by providing functional and well laid out plan that would bring them together for different purposes.

(2) To promote sportsmanship among athletes by providing accommodation that would cater for athletes of different background through functional planning.

(3) Serve as a place of exchange as idea through sport and also a source of revenue generation for Government, through the collection of gate fee, during organized competitions or games.

(4) It serves as a venue for relaxation and stress management. This will be schemed through courtyards, open air leisure and common rooms dinning area and walkings.

(5) To curb the surge of athletes to foreign land by ensuring that the unfair structural facilities are by every standard comparable to theories obtainable in any part of the world by making them aesthetically and sound looking

(6) To make sure that the problem of seating and viewing in stadia is solve and any viewer seating at any part in the stadia is at an advantage.

1.2 MOTIVATION.

Abuja been the new Federal Capital and with the pressure of development on every expect of the town. This is due the movement of Federal Government Ministries from Lagos to Abuja and also the pressure of multi-nation Companies and Industries. It's status also made it a centre of attraction and the need for amenities to provide a form of stress management has almost become a daily cry. The Government on it part has promised to support sports development at all levels to the desired standard.

1.3 SCOPE AND LIMITATION.

The project is divided into two parts to effectively deal with the demanding nature of the project requirement. The first part consist of a written thesis, while the second part consist of physical planning of the project design showing each segment of the National Stadium.

The main area of concentration are.

(i) Administration
(ii) Accommodation
(iii) Health center
(iv) Sport Stadium Soccer and General athletics

Sport listed for training include

(1) Badminton
(2) Lawn tennis
(3) Swimming
(4) Table tennis
(5) Hand ball
(6) Boxing
(7) Volley ball
(8) Basket ball.

Consideration is specifically given to the planning of the sport Stadium to make it architecturally functional and aesthetically pleasant. The project is specifically limited to the design of the hostel and the Gymnasium hall (multipurpose, and the training grounds).

LIMITATIONS.

The main constraint toward information regarding the project came from the inability to get enough information concerning propose change of site for National Stadium in Abuja by Government.

1.4 RESEARCH METHODOLOGY.

The research methodology of this project will be carried out in followings two ways

(i) Case study method

(ii) And participant method

This is followed

(i) **CASE STUDIES:-** A visit to the existing Stadium need to be carried out and thoroughly examined, outlined, then various design consideration and lapses associated with such.

(ii) Participant method

(a) Oral consultation:- Consultation carried out by asking questions from professional, who are specialized in the field

(b) Site visitation:- Site visitation carried out in order to know the problems facing the site and how it can be tackled in the design.

1.5 DATA COLLECTION.

Data collected during research defined in two aspect general requirement of a National Stadium, interms of infra-structural faculties and functional organization, and data collected on the requirement for standard count/training facilities on various sports that would be part of the proposed provision will be made for the followings.

(1) Accommodation

(1) Directions' Office

(2) Director's Secretary/Long

(3) Deputy director/Secretary and Long

(4) Head of Department Offices

(iii) Training and coaches

(a) Coaches

(b) Instructors

(iv) Management studies

(a) organization

(b) Sports managers

(iv) Research:- Research Officer

(v) Technical Department

ACCOMODATION.

(1) Hostel Rooms for athletics and coaches

(2) Conveniences

(3) Laundry

(4) Common rooms

(5) Feeding.

TRAINING.

(1) Class room

(2) Training pitch

(3) Gymnasium

(4) Muting-purpose Hall

(5) Conveniences.

AUXILLIARY FACILITIES.

(1) Medical Facilities

(2) Relaxation facilities e.g. gardens

(3) Press centre.

It should be noted that facilities provided is not to accommodate all sports at the same time. Data obtained from standards are include in the following tables.

CHAPTER TWO

CHAPTER TWO

2.0 LITERATURE REVIEW

DEFINITION

The standard encyclopaedia on its review of sport defines sports as physical activities in or observed for pleasure and for pay in the form of context competition and depend on skills, promotes stamina of the contestant. Other similar attributes to sports were expressed in terms of E.O. Reuben, B. frost. Thomas K.K and Curetan Jurallagree to this in their Encyclopaedia of physical education, fitness and sport. In the context of sport, the prevailing factor is for determine individual preparedness in term of fitness in readiness to any competition challenge, either in regional continental and global area.

However, other contributors opined that sport is an activity, which sets the individual participant in passive or creation mode, which requires more or less strenuous activity. The web star's new twentieth century dictionary refers to sports as any activity or experience that gave enjoyment or creation pastime and diversion, such activities require more less vigorous bodily exertions and carried or according to some traditional form or set ruler, whether indoors and outdoor' this assertion signifies the role sports plays in reforming the individual from a state of pressure and stress to a refreshing being devoid of stressful state.

The Webster's sports dictionary shares the same view in which it refer to sport as a recreational or competitor activity which involves a degree of physical recreation or which requires skill in playing of an object for scoring. The term encompasses rules, athlete context in the outcome is in draft.

2.1 HISTORICAL BACKGROUND OF SPORT

No one can say when sport began since it is difficult to imagine a time when children did not spontaneously run races or wrestle. It is clear that children have always included sports in their play, but one can only speculate about emergence contests for adults. Hunkers are depicted in prehistoric art. But is cannot be known whether the hunters pushed their prey in a mood of grin necessity or with the joyful abandon of sport man. It is certain, however, from the rich literary and monographic evidence of all ancient civilization that the count soon become an end in itself at least for loyalty and nobility. Archaeological evidence also indicates that ball games were contests rather vitual performance like the Japanese football game Kemari, then they were instances of sports in the most rigorously defined sense. That it cannot simply be assumed they were contests is clear from the evidence presented by Greek and Roman antighity, indicating that ball games seem to have been the most part playful pastimes like those recommended for health by the 2nd century AD and Greek physician Galen.

2.1 (**STADIUM**

A structure consisting or an open area and tiers of seats for spectators, such as the Greek hippodrome, the Roman amphitheater and circus. and the modern bowl and sports palace. Ancient stadiums were oblong and unroofed. In modern times they may be of any shape and covered.

- Ancient stadiums-Greek.

The term stadium is derived from the Greek stadium, a unit of measure equaling about 6oo feet (186 meters) the length of the standard footrace. The Greek stadium for civic games was stadium long allowing for a straightaway course. It generally provided tiered seats for spectators on the sides and at the ends, which were sometimes built against rising ground, as in a Greek theater. The fully developed stadium, also contained dressing and bathing facilities for the athletes the beck-know surviving Greek stadium are the one at Athens which held more than 50,000 people on 46 rows marble seats and those at Delphi, Epidaurns, and Olympia, A some what similar Epidaurns was the hippodrome for horse and chariot races.

2.1.2 ***ROMAN:**

From the Greek stadium with its incidental baths developed the great Roman public bath, to each of which was attached a stadium in an inconspicuous architecture location. This reversal of the importance of stadium and bath reflects the shift from the Greek emphasis on exercise

and gymnastic competition to the increasing roman preference for luxurious idleness and for physical therapy to counteract the effects of bodily indulgences, the Roman version of the hippodrome was the circus, such as the circus maximums in Rome.

- **Modern stadiums-Development.**

In the 19th century growing interest in sports and increasing urban populations encouraged the contraction of many buildings for sports events. In Europe, roofed circular structures were built for the traditional one-ring circus, consisting of performing clowns and animals An example of the cirque d' Hives in Paris in Spain, Portugal, and Latin America, the number of bullrings, a form of an phitheater built since the 18th century for the traditional bull fight. Multiplied.

The revival of the Olympic Games in 1896 led to the building or rebuilding of stadiums in each city where the games were held. The first Olympic stadium was reconstructed in Athens in 1896 from ancient ruins. Other notable stadiums built or rebuts for the Olympics are those of London (shepherd's Bush), strokholm, Paris (Columbus), Amsterdam, and los Angeles (coliseum) the Berlin stadium was also used for mammoth Nazi optical rallies post- world war II Olympic stadium include those of Rome and Tokyo.

Many other stadiums for athletic and civic event were built around the world, published figured for spectator capacity are diffident to compare, since they may refer to permanent stating temporary bleachers,

or standing areas. Examples are numbly stadium near London; municipal stadium, Riode Janeiro: and Melbourne cricket Ground, Melbourne. A great number of stadiums or bowls were constructed by U.S Colleges or cities. The Yale Bowl(1914;New Haven), accommodating 70,000,was the first stadium to exceed the capacity of the ancient Roman coloseum.

Structure.

Modern Olympic stadium are generally oblong with curved corners, but other stadiums may be any shape- rectangle oval round, horseshape u-shaped, or open-ended- depending on their purpose. Generally they have been unroofed, except for special section called ground stands. However modern technological advances, such as steel construction and reinforced and pre-cast concrete, have made it possible to cover large areas which can then be heated lighted, and even air conditioned.

Early examples covered stadiums are the original Madism square Garden (1890) in new York city and the Chicago stadium (1982) both of which were built with steel-girded roofs and cantilevered balconies. Post World War II stadiums made use of remorse concrete and plastic. The small round sports palace in Rome, constructed by pier Luigi Nevi and Annibale Vitelloz for the 1960 Olympics, is roofed by a shell dome of reinforce concrete without interior supports. The much larger Astrodome (1965) in Houston, Texas, is covered by a shallow, plastic- paned done

the geodesic dome, invented by the America architect R. Buckminster Fuller. Can be made to cover an area of virtually any size. Its plastic skin is stretched over a generally spherical framework composed of a three – way grid of intersecting arcs. Another possibility of stadium roofing is a skin of light weight plastic or vinyl – coated fiberglass, supported by compressed air.

In Africa, the first form of organized sports which was referred to as the pan African Games (TPGA) now known as All African Games (AAG) first held in 1965 was made to stage the games at Alexandria. Egypt in 1927.

The games until 1963 was known as friendship, Organized for only French speaking countries the all African Nations with the exception of south African then (i.e during parthied)

In the all Africa games, Virtually all major sporting events are being competed for by the participating countries. Apart for a couple of postponement due to political reason, the games was held regularly on a biennial basis.

However, modern sports came to Nigeria Via missionaries and colonial masters who introduced foot ball and later athletics, cricket, tennis and goft for leisure and recreational competition. The spread of such sports amongst school and versions communities led to the creation of their respective associations to ensure the application of discipline and rules during competition.

However, before the advent of white colonialists, some sports which now attract national and global frame had already taken root. These include wreatling and aquatic sports e.g. Aruguigu fish introduced by the ancient Birnin Kebbi in the 16th century as well as boat races, boxing and hauling of spear around Lagos.

As Dr A.F.A Folawiyo argues, the growth of modern sports in Nigeria could be traced to the formation of Nigeria football Association (NFA) in 1945, Amateur Athletics Association of Nigeria (AAAN)in 1944, and the National sports council (NSC) in 1961. When all association began to function under one umbrella in each region. The establishment of National union of Nigeria student (NUNS) in 1959 saw the involvement of higher institution in sport, hence the first Nigeria university Games (UNGA) competitions held at the university of Ibadan in 1966. Presently there are atleast 27 affiliated sporting association in Nigeria, as against two in 1962, 15 in 1978, and 22 in 1985. Although the country has made appreciable mark on the sport map of the world excellent performances in the past was inhibited by various degree of obstacles in ranging from modern infrastructure, training facilities standard camping facilities, lack of adequate encouragement and absence of any serious national policy on the sport sector. Consequent to the increasing development and achievements by individual collectively (as in National teams) the need for a standard and adequate National stadium to provide the required facilities for the various national sporting teams aspiring the excel in various national and international competitions.

CHAPTER THREE

CHAPTER THREE.

3.0 RESEARCH AREA.

3.1 SEATING AND VIEWING IN STADIUM DESIGN

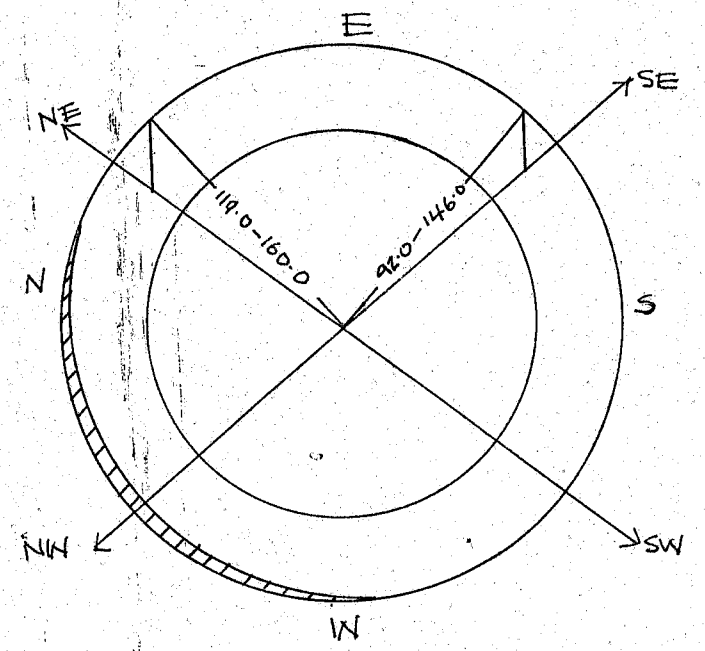
3.1.1 Introduction.

This research bring about studying, to find out more about seating and viewing and how best to meet the required needs of the audience, and also finding out design requirement and standards in providing comfortable seats for the endure

One of the primary purpose of this research area (Seating and viewing) is to give attention to the position of the worst seats, and view, in the Stadium in terms or viewing distance and angles, taking into consideration the sight lines, acceptable viewing angle, seat arrangement and the types of seats.

SIGTH LINES.

In Europe areas of Stadia namely NE-SE, ensure most spectators have sun behind them. According to virtruvius (in-century BC) rows of seats and standing terraces should rigs at steady rate 1:2 for staggered seat arrangement every other back row should look over head of corresponding front rows gives parabolic curve.



Visibility determines size of Stadium Fig 3.1

(a)

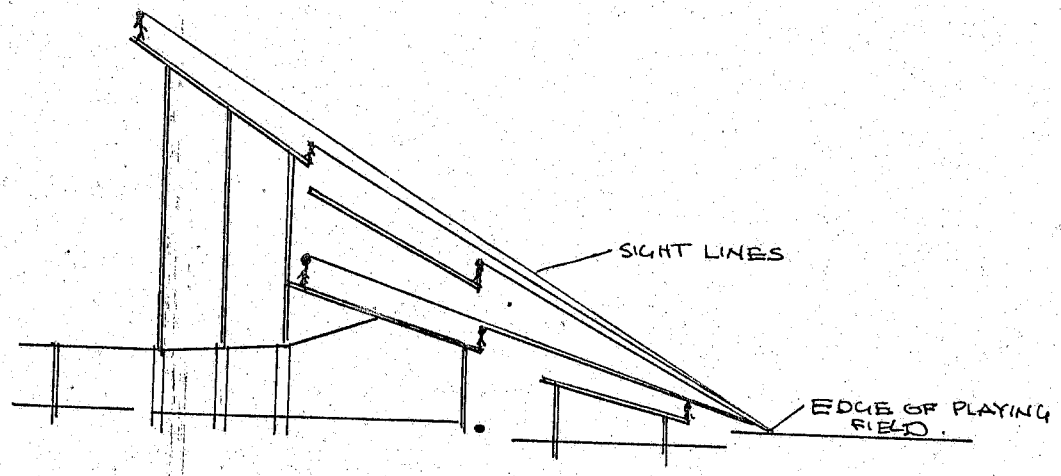
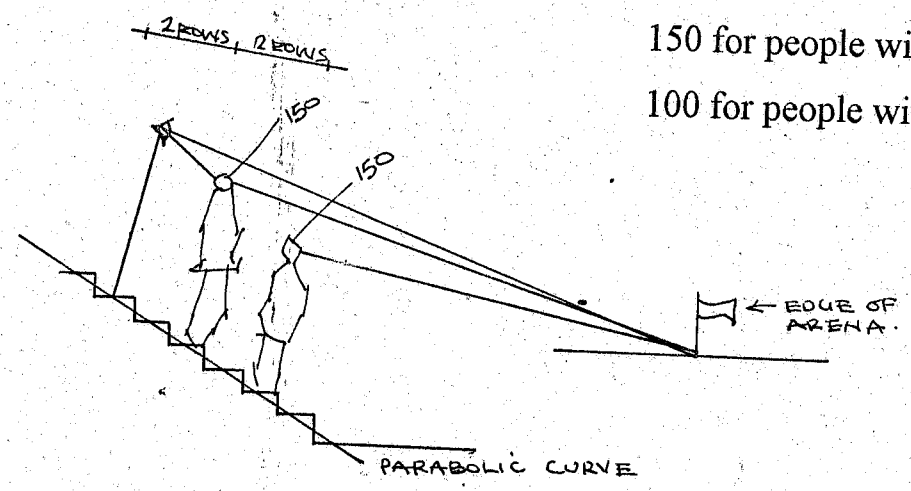


Fig 3.2

- Design for grand stand of Stadium for 100.000 spectators (Nervi)
- Section and construction of sight lines.

(b)



150 for people with hats

100 for people without hats.

Construction of sight lines. F-3-3

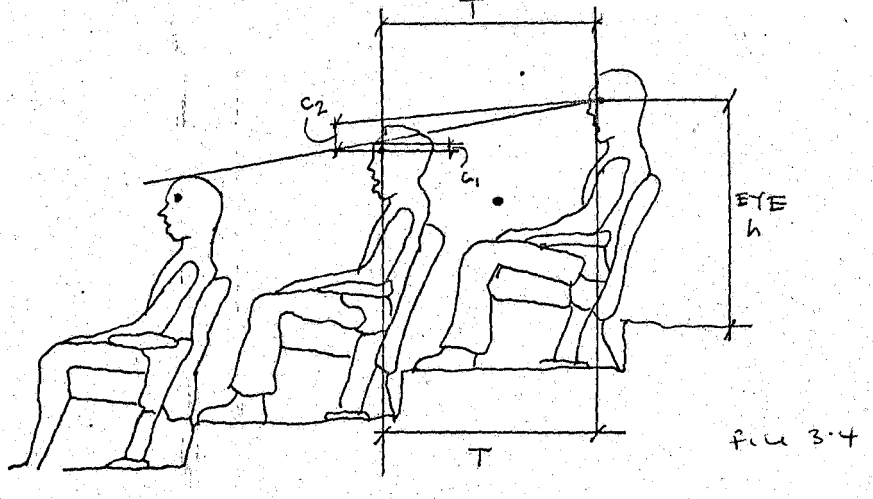


fig 3.4

Typical seated spector eyesight. 1120 ∓100

Tread upsetting tier (row spacing) T: 800 ± 1150

Head clearance C: C1 = 65: min clearance/row, assuming specter will see between head row in front (every-row vision)

Typical seated specter

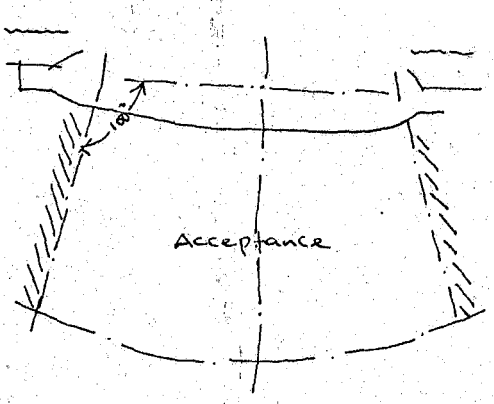
SEATING ARRANGEMENT

Primary attention should be given to the position of the worst seats in the stadia in terms of viewing distances and angles. Consider the following.

(1) No person should be seated so close to the stage that he or she had to look up more than 15^0 continuously (a max of 30^0) in order to observe action, on the stage or field.

(2) No person should have to keep his or her head turned continuously to the right or left more than about 15^0 in order to watch a performance

(3) Surveys of where people sit indicate that they invariably avoid seats that are outside the angular illustrated in the accompany sketch, even though they could probably still see adequately from the seats.



PEOPLE AVOID SEATS OUTSIDE ACCEPTABLE VIEWING ANGLE.

Fig 3.8

People avoid seats outside receptacle viewing angle.

(4) Persons in the last row of seats should be able to see as much of the upper patron of scenery back drops as required to appreciate it relationship to the stage action

(5) Person in the front seat on the main floor should be able to see the stage or field surface.

(6) Minimize person discomfort (i.e. having to keep the head in awkward positions for long periods). Consider the suggestion illustrated by the accompanying sketches arrange seats so that persons can see past person in front of them.

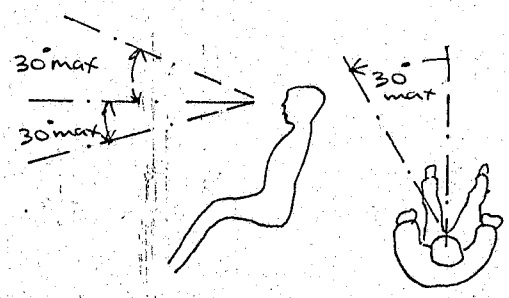
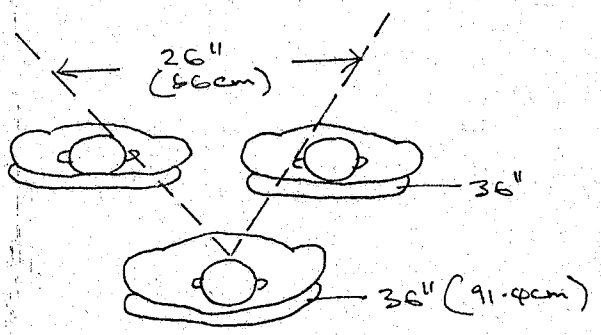


fig 3·6

(7) There should be enough space between seats so that person can get in and out with minimum annoyance to other persons.



fig·3·7

(8) Although a generally "fan-shaped" seating arrangement is desirable, it requires that considerable included seat adjustment be made in order to create straight aisles and not to include hazardous pockets where persons could become entrapped during an emergency evacuation.

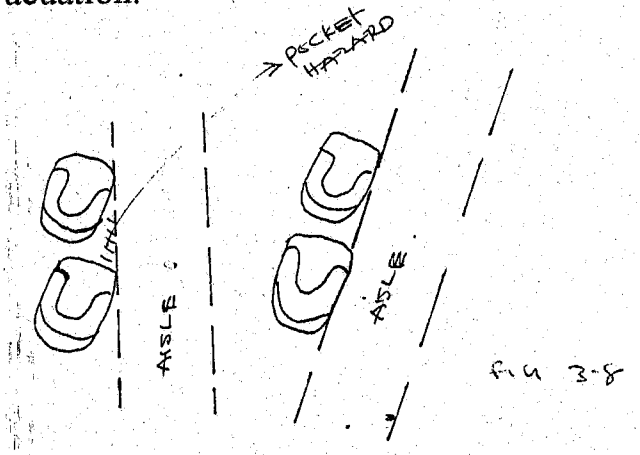


fig 3·8

(9) Aisle should be large enough for two people to pass each other comfortably in the darkened stadia. Because the central section of my seating arrangement contains the best viewing positions, it is suggested that a central aisle be avoid and illustration be used.

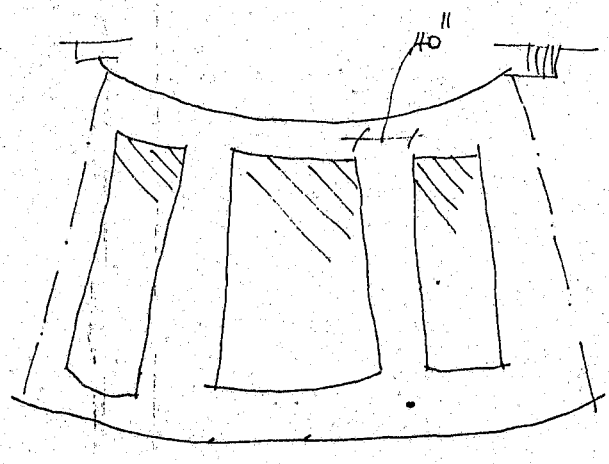


Fig 3-9

SEATING TERRACES.

(a)

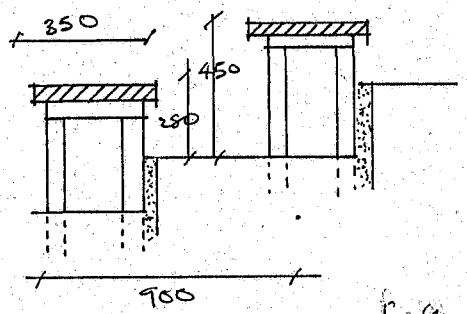


Fig 3-1-1

Wooden benches with plank step

(b)

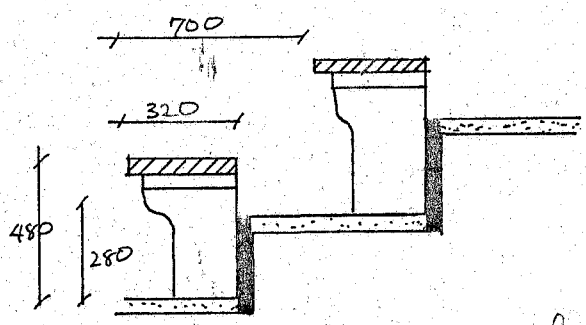


Fig 3.1-2

Wooden seats on concrete upright.

(c)

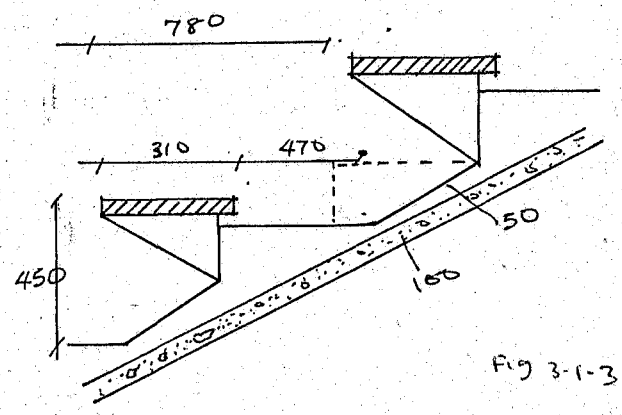


Fig 3-1-3

Sloping RC deck with steps in concrete topping.

(d)

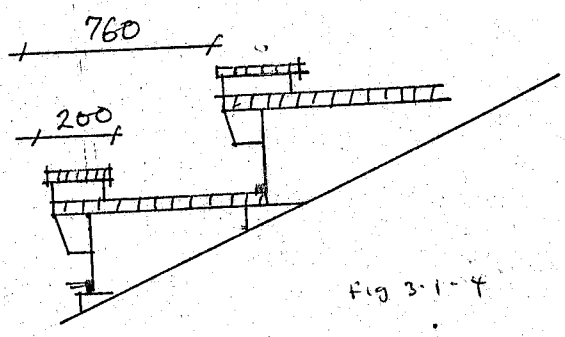


Fig 3.1-4

Seating tiers d 750, h450, w500.

(e)

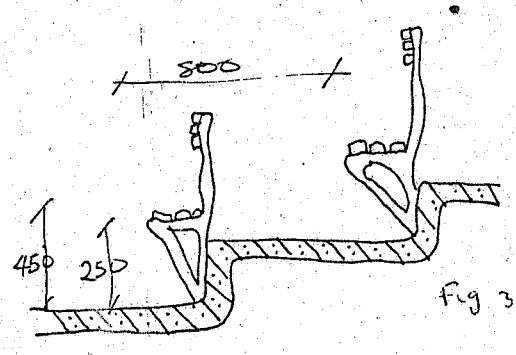


Fig 3.1.5

Seating with backs.

CHAPTER FOUR

CHAPTER FOUR

CASE STUDY

4.0 CRITERIA FOR CASE STUDY SELECTION

A National stadium to meet at least three basic needs of the athletes, which include

(1) To provide standard training facilities within a functionally designed space.

(2) To provide accommodation facilities for camping (training) and competing athletes.

(3) To provide administrative/ organizational base for sporting activities.

It could as well fulfill other functions but these three are basic to stadium design. In other to achieve these basic objectives existing Stadium Complex and sport complexes were visited and studied so that they can serve as case studies among those visited are;

- LIBERTY stadium complex, Ibadan, Oyo State
- National stadium complex Stadium, Lagos state
- Cophall sport centre London

4.1 GENERAL INFORMATION ON CASE STUDIES

OBJECTIVES: the objectives of carrying out these case studies include;

(1) To evaluate users requirements of facilities provide the existing spaces and the relation ship between then as well as in relation to required space standard.

(2) To evaluate the standard and functional performance of facilities.

(3) To evaluate the degree of response of athletes to the existing facilities at various places visited.

4.2 CASE STUDY 1: LIBERTY STADIUM COMPLEX IBADAN OYO STATE

4.2.1 INTRODUCTION

Liberty stadium complex which is located at Liberty road, in Ibadan. It is owned by the federal government of Nigeria. This sports complex, have facilities that has been used for both National and international sporting events especially football. The major facility here is the 19,253 seat capacity stadium for football and other track and field events, other facilities available at Liberty sports corner shops, parking and administrative block and police post.

4.2.2 ARCHITECTURE/ELEMENTS

The sports complex is well laid out with facilities related in location and connected by partly covered walk way. The entire sports complex has four entrances. The architectural facilities fully depicts sporting activities with large double volume halls raked sitting and adequate lighting facilities. There is a noticeable harming in the architectural representation of various facilities provided for the different sporting events the compatibility of the facilities provided makes movement from one facility to other be achieve within minimal period

4.2.3 OBSERVATION

This will be made in the form of merits and demerits which are as follows:

Merits: the merits observed are as follows;

1. The complex is easily accessible as it is surrounded by well laid out road network.
2. Spacious land area which will adequately accommodate the anticipated large crowd.
3. Basic facilities for common sporting events are adequately provided.

Demerits: the demerits observed are as follows:

1 The seating capacity is small (19,253) compare to it usage. For National and international competitions.

2 The entire site of the complex is under utilize

4.3 CASE STUDY II: NATIONAL STADIUM COMPLEX SURULERE, LAGOS STATE

4.3.1 INTRODUCTION

National stadium complex which is located at surulere, in Lagos. It is owned by the federal Government of Nigeria, have Facilities that has been used for both national and international sporting events especially football, the major facility here is the 34,084 capacity stadium for football and other track, field events. Other facilities offices, hostel, administrative block, corner shops, parking and police post

4.3.2ARCHITECTURAL ELEMENTS.

The sports complex is well laid out with facilities functionally related in location. The entire sports complex has three entrances there is a noticeable harmony in the architectural representation of the various facilities provided for the different sporting events.

4.3.3 OBSERVATIONS

These are made in form of merits and demerit. They are as follows:

Merits: they include the followings

(1) Basic facilities for common and international sporting events are adequately provided.

(2) The complex is easily accessible as it is surrounded by well-laid out road network.

(3) Spacious land area which will adequately accommodate the anticipated large crowd.

Demerits: The demerits observed are as follows:

(1) Traffic around the sports complex at peak periods is usually congested because the complex is located at the hearty of Lagos city.

(2) The entire site of the complex is under utilize.

(3) No adequate training pitches, this invariably leads to the over use of competition pitches.

CHAPTER FIVE

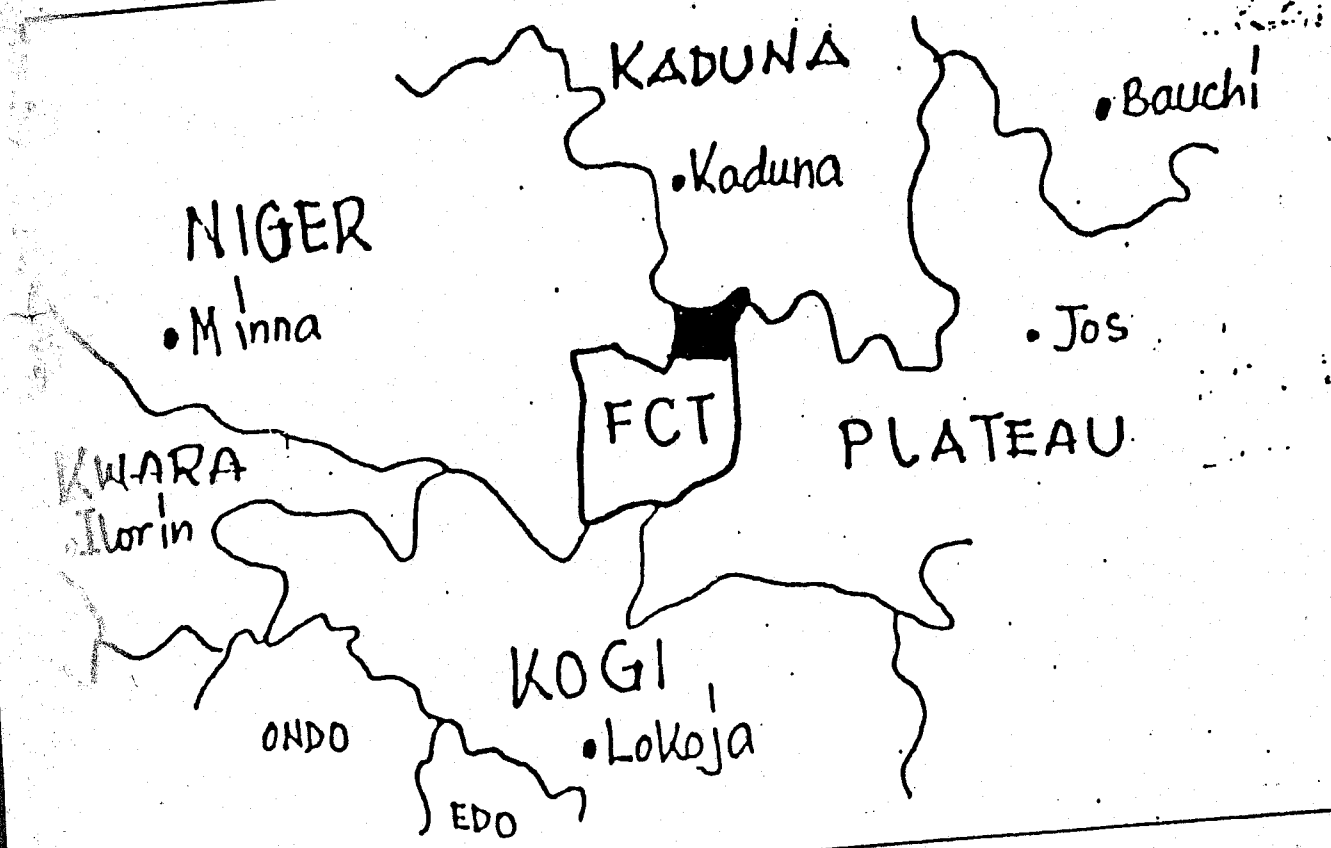
5.0 DATA COLLECTION

5.1 SITE LOCATION

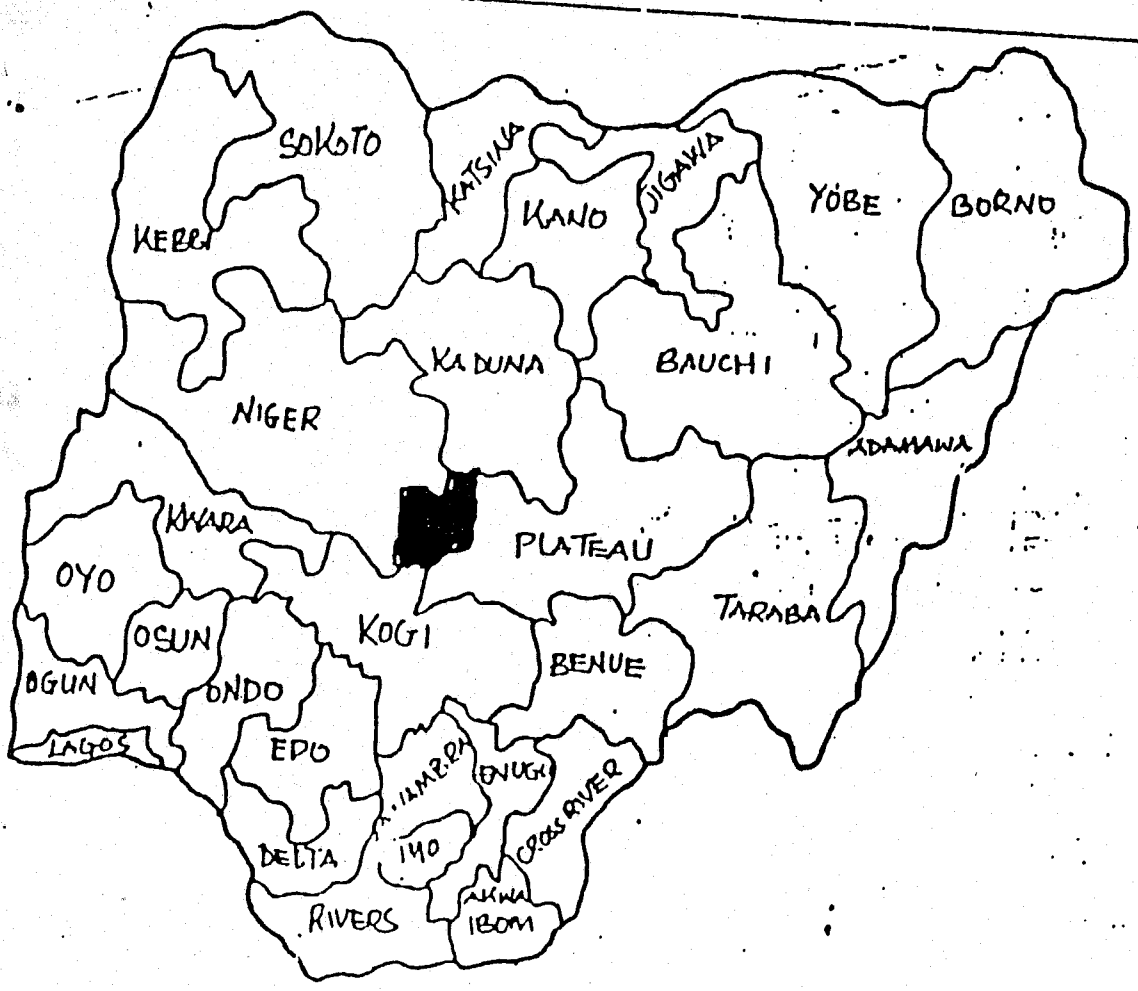
The proposed site for the National stadium is located in Abuja. Abuja which is the federal capital city is located at the center of the country on latitude 8°2 in and 9°20'N and longitude 6°39'E and 5°4E and, it lies in the Savannah region between the sparsely vegetated north and the densely forested south.

5.2 Social – cultural and physical background

The urban tradition in Nigeria is very important, this is simply because the tradition include how people have lived both in cities with ancient roots dating back to centuries and in new towns created dating back to centuries and in new towns created during the colonial period. The important ingredient in the development of Abuja, is a review of the relationships that has developed between social and physical aspects in existing Nigeria cities. This is basically a measure of continuity with social and cultural traditional while encouraging, when appropriate, amalgamation of the various stream of the urban tradition and life style into a new modern Nigeria urban context.



Source: ABUJA 1985 TO 1992



Source: ABUJA. 1985 to 1992

The indigenous traditional structure of Abuja exhibit the following social/physical characteristic.

(1) **Overall urban form:** This is a process of accommodating the city form to maximize the site opportunity and for providing for public transportation.

(2) **Local Residential unit:** within this community tradition both the natural site constraints of the city and the flexibility of the grouping various local service facilities, such as hospitals, has resulted in a pattern of residential land development parcels capable of accommodating local residential communities of between 3,000 and 12,000 persons,

Traditionally, then, residential sub-area shall ones been defined by kinship-liked clusters of household

With substantial social inter reaction. Additionally there is a high correlation between local administrative designation and local social identity grouping.

There has been the evolution of the tradition pattern with some elements replaced by modern counter parts. Increasingly a set of social services and amenities (churches, mosques, primary schools, markets, and hospitals) have played a role as the social focus within a sub-area or ward and may even take the name of ward, supplementing the traditional association structures.

4.4 CASE STUDY III

COPTHALL SPORT CENTRE LONDON

Introduction

Capthall sports centre which is located at London, England Borongh of Barnet, the sports complex, here facilities that has been used for national sporting events, the major Facility here is the stadium for football and other track and field event. Other facilities available include parking. Swimming pool

ARCHITECTURE /ELEMENT

The sport complex is well Laidout with facilities related in location, the Architecture facilities fully depicts sporting activities, there is a noticeable harmony in the architectural representation of various facilities provided for the different sporting events.

Merits

(1) Spacious land area which will adequately accommodate the anticipated large crowd.

(2) Basic facilities for common sporting events are adequately provided

DEMERITS

(1) The complex is not easily accessible as it not surrounded by well laid out road network.

(2) The seating capacitating is small.

CHAPTER FIVE

Five types of factors that identify a local residential community;

(a) **Primary** spatial boundaries and local design quality.

(b) **Service system;** facilities and services shared by residents

(c) **Social;** kinship and cultural ties which encourage inter change among residents

(d) **Government;** mechanisms of service, communication and control between the local area and various level of formal government.

(e) **Economic;** Employment and establishments within short travel distance of homes.

(3) **Household organization;** This illustrate the important of permitting multiple options of residential layout to accommodate a wide variety of urban life styles, more so, moderate (200 pp/ha) residual density, which result in affordable plot and optimum combinations of walking distance and service unit sizes while preserving enough space for future growth and change.

(4) **Central public space;** It's aimed at creating a functional and organically wholly central area early in the life of the new capital by concentrating facilities along the axis to convey a sense of completeness and urbanity.

The organization is based on;

(a) Defining the central area as a unique and social place

(b) Producing a sense of arrival at the central area for those coming into it from else where.

(c) Imposing geometry's which allows flexibility and predictability in movement patterns in the central area.

5.2.1 GEOGRAPHICAL LOCATION

One of the most significant development being under taken by the federal Government of Nigeria is Abuja, the federal capital city. The though of a new federal capital became inevitable and was conceived when the continued retention of Lagos as the federal capital is impracticable aseptically with the intractable traffic, housing and sanitation problems and its multiple role as a state and federal Capital. Abuja a symbol of Nigeria's aspiration as a City of national unity lies between latitude 8°25'N and 9°20'N and longitude 6°26'39'E. It occupies an area of 8,000 Sqkm. Bounded to the north or Kaduna State, to the east and south east of Plateau State. To the northwest of Kwara State and to the west by Niger State Being centrally located, the Federal Capital territory is accessible from all parts of Nigeria Designed and planned a target population 1-6 million people by the year 2000 and an ultimate size of 3.2 million people when fully developed

5.2.2 GEOLOGY AND TOPOGRAPHY

The Gwagwa plains arise from an elevation of 305m in the west to 610m in the east within, the area of the new city the bulk of the city could be concentrated in land with elevations from 1200ft to 1700ff to capitalize on climatic advantages of higher attitudes.

Apparently. The upper Gwagwa plains area is dotted by number us large outcrops of rock or near-surface bed rock around which it is necessary to arrange developments. where possible, this has been incorporated into park areas. They frequently form interesting and sometimes spectacular shapes which just out from the plain. Where possible, these has been used to design focal points.

Topographically, the area is typified by gently undulating terrain inter laced by riveting depression. Inselbergs and other granite clusters occupy about 8% or the total plain area, and are generally bare and rocky, varying is size, and occurring as isolated masses or in groups resing abruptly from the plains. Steep hills from the resting abruptly from the plains. Steep hills from the Gwagwa plain are comprised of granite masses. Rising above the level of the surrounding country, having very steep sides and culminating in prominent crest or summit. Plain include the other Precambrian unit or metaphoric sedimentary rocks and an intrusion of younger Precambrian rocks. The major rock unit underlying the federal capital city site itself are described in the three categories below.

(a) **Metamorphic Rock!** This include biotite-muscorite schist, maguite (underlying majority of the city site); porphritic gniesis and granitic gnesis.

(b) **Igneous Rock;** This include biotite granite (coarse porphritic) large intrusive masses commonly elliptical in shape forming out crops or the Gwagwa plain; Biotite Granite (fine to medium grained); Rhyolite, forming small round intrusive surrounded by prophetic gneisis.

(c) **Sedimentary rock;** Including alluvium, located in stream beds throughout the territory. Consisting of largely sand with rear gravel beds and local deposit of clay.

5.2.3 PHYSICAL CONDITIONS

1. VEGETATION

The Vegetation of the capital city is characterized by park Savannah. However river side have an addition high trees and tickets. And also with few occasioned patches of forest and or heavily wooded areas. Large trees on site are maintained while tickets are replaced by mourn or cultured banks to reduce water borne disease problem. Park Savannah are typically a stratified community, characterized by discontineous foliage shrub and gross layer. The tree stratum is less dense

then that of Savannah word-land but more substantial that that of shrub Savannah. The park Savannah mainly includes a thick. Tall grass area consisting of Andopogon and Hyparrhenia species and a shrub layer in which terminally, piliostgus, Ammonia, Nuclear and Bombax are most common.

Smaller area of reverine forest, rain forest and Savannah woodland occur along streams and in steeper areas, and those flat and undulating areas not recently used for agriculture. The Savannah woodland is characterized by canopy specie like Albizia, Butyrospermum, Daniella and parkia. Flat plains and undulating terrain are rich in shurb Savanna Vegetation it is commodes, basically of shrub vegetation, well developed grass layer, and a few scattered emergent trees.

Low level channel banks of water courses and streams valley bottom often enjoy reverine forest and patches of rain forest, which however, varies from high forest to a mixture of woodland, gallery forest and dense thickets,

Savanna woodland is common on steeper slope it is composed of a thin continuous canopy of five resistant species with a thin shrub and herb below. The cover type is not uniform and is found to vary from one location to the next. Savannah wood land stabilized areas of steeper slopes also reducing erosion rate should be protected.

Efforts are made to preserve woodland areas in and adjacent to Abuja city for then values as aesthetic and recreational resource, and for their ameliorating effects on climates, on clemate, as well as for their fuel and industrial value.

2. TRAFFIC CONTROL

The use of liner spine /feeder system make possible a series of entrances and exists to allow buses to loop off the spine and to provide direct services to a district and then to reform to the spine the direct palters allow maximum flexibility in transit service within the sector as well as providing high level of transit survive service between sectors via the transit spine. This is not fix feeder loop, this additional access points to the transit spine have been developed to accommodate projected transit demand.

3 DRAINAGE.

The construction of an urban complex of the size and magnitude being planned in the rural areas of the Gwagwa plains will cause increase in stream channel degradation / aggregation rate, as run-off is increased in both magnitude and velocity by the construction road and building and by stream channeling.

Approximately about 97% of the capital city lies within a single fan –shaped catchment tributary to the usman river. Because of the crater like configuration of the catchment with it stepper upstream slopes draining toward a central point. Ditch and open channel system with culvert and bridges at appropriate pedestrian and vehicular crossing where employed.

5.2.4 SOCIO-CULTURAL FACTORS

1. POPULATION

Extrapolation from the latest available determines the demographic characteristics of Abuja city and its subsequent influence on the project at hand. These characteristic are: agel sex distribution the number of household; and the anticipated income distribution in the year 2000 population

2. LAND USE

The land use requirement were based on current Nigerian practice and new service delivery system under development in Nigeria as well as international practice were relevant special attention was paid to standards for residential and real public facilities as the major land seeping element in the city.

slop not other wise programmed for open space. The total city area is equivalent to 256 sqkm.

Planning and implementation purposes make the development or the federal capital city in stages imperative.

3. ECONOMY AND COMMERCE.

Ranges of business household personal services that supply goods and services to the capital city includes

(i) Large scale modern retail shopping outlets.

(ii) Private commercial offices in the commercial core, sectors centers and district centers.

(iii) Specialized business services e.g. banking, insurance, real estate, etc.

(iv) Retail establishment are of both modern and traditional form.

4. SUPPORT INFRASTRUCTURE SYSTEM

Basic support infrastructure systems have been developed to support the functioning of the city. These utility system which include; water supply, waste water disposal drainage, solid waste management telecommunication and power have been planned in response to the demand of the turner.

5.3 CLIMATIC CONDITIONS;

A comfortable living environment will depend on maximizing the aspects of environment which reduce heat and the effect of humidity, and protect from rain and dust. These factors are discussed below.

5.3.1 TEMPERATURE HUMIDITY

In human terms net radiation is felt as air temperature, the response to which is greatly influenced by the humidity conditions in the air. The capital city record its highest temperature when there are few if any clouds change in temperature of as much as 17c. Have record between the highest and the lowest temperature in a single day. During the rain season, the maximum temperature is lower due to dense cloud cover.

Human sensibility to temperature is greatly affected by relative humidity the figure below shows the mouthy variation in temperature and humidity for Abuja city taken at 0700hus, and 1600 hrs. During the rain season, relative humidity fall to a lows as 20% this low relative humidity compiled with high afternoon temperature account for the desecrating effect of the dry season. In the rain season, the relative humidity is much higher especially in the morning hours when it can reach as high as 95%. Even though the temperature. Is slightly lower, the effect is to create a leat trap. These fluctuation in temperature and humidity will be resolved

architecturally to suite human comfort during the design state by means of cross ventilation and or artificial aesthetic function but also to help in achieving a suitable temperature balance as shading devices. The affect of solar radiation will be controlled by appropriate selection of walls and floor finishing, roofing material glazing materials and paint amongst others

5.3.2 RAINFALL

The start of the raining season in north eastern part of Abuja city is around the 10th of April. The rain tapers off rapidly after the 20th of October. Thus the duration of the raining season is between 180 days to 190 days the figure below shows the mean monthly rainfall for Abuja area. In the Abuja area 60% of the annual rainfall is in the month of July, August and September. These concentrations of rainfall show the need for drainage systems that can handle large volumes of water very quickly.

The capital city has frequent occurrences of squall lives, which begins with dense, dark cumulo-numbus clouds with thunder and lightening, followed by drizzles of several hours duration. This condition is then replaced by few days of bright, clear skies, this is most common into the late afternoon at the beginning and ends of the raining season, and after causes serious property damage. The architectural implication of this rainfall characteristic is that it necessitated the need for safe and

durable structure or building that can oyer come the rainfall effect. T: use of parapet walls winds cress and brazing will be also necessary to protect building on site from storms other landscape plants will be planted to serve as wind breakers.

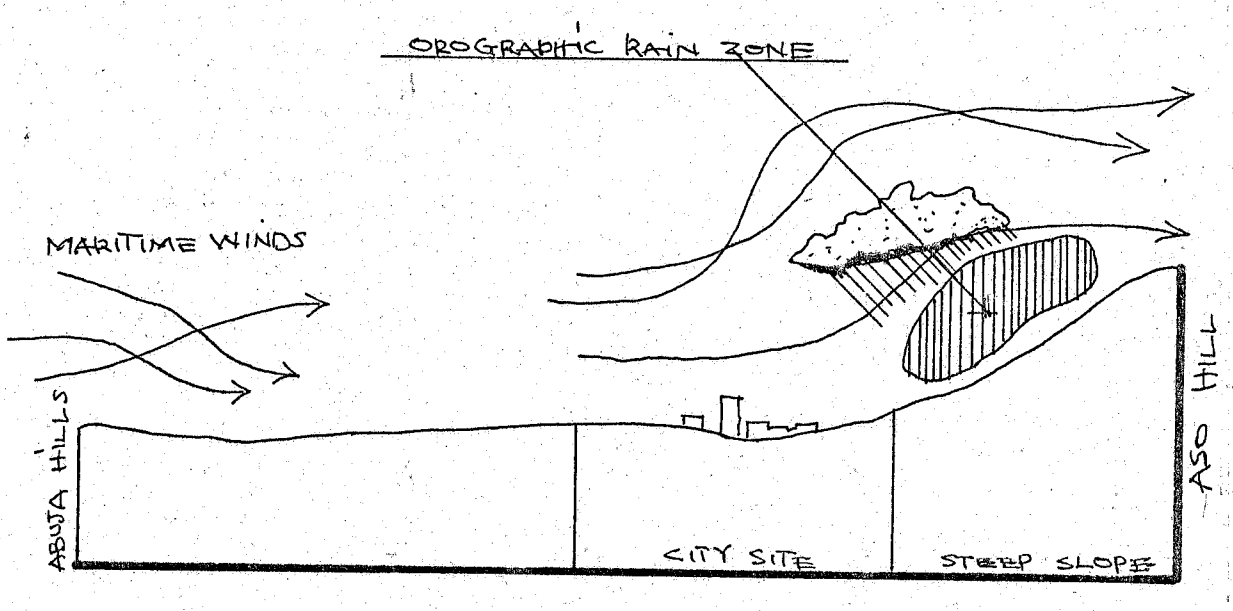
5.3.3 WIND/DUST

Two major air masses dominate the climate of Abuja city. These are tropical maritime air mass and the Tropical continental Air mass. The Tropical maritime is found over the Atlantic ocean to the south of the county and it is therefore warm and moist. It moves inland generally in the southwest to northwest direction. The oscillation between these two air masses produces the highest seasonal characteristic of weather conditions in the country. The tropical continental Air mass is associated with dry season, and the Tropical maritime Air mass create the wet season. The formal is associated with the Northeast Trade wind, while the later gives the south West monsoon winds.

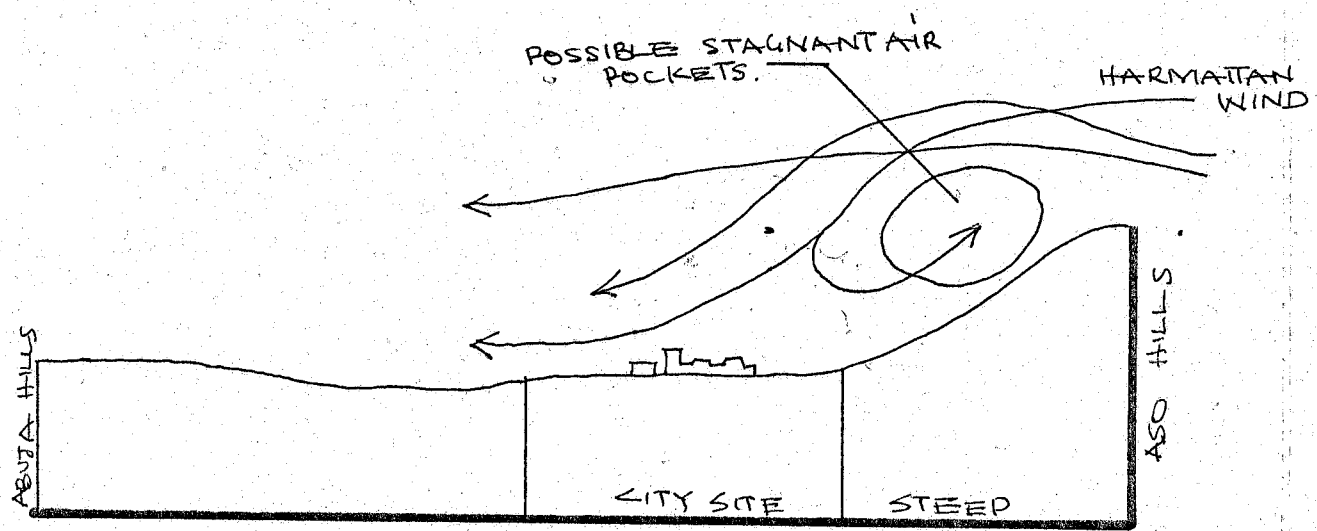
The presence of these two air masses is indicated by characteristic of prevailing wind illustrated in fig below.

The wind characteristics will guild in the design as per orientation of buildings and as ventilation is concerned and also in the selection of roof types.

SEASONAL WIND PATTERN.



WET SEASON 6–7 MONTHS. Fig 5-1



DRY SEASON 5–6 MONTHS. Fig 5-2

5.3.4 SUN AND CLOUD COVER

According to Mabogunje 1977. Abuja City is exposed to 2500 sunshine hours annually. During the dry month (NOV-APRIL), the monthly variation in the amount of sunshine follows the general trend of an increase from over 275 hours on a city site. As the raining season approaches, the tend is to increase cloudiness (i.e. decrease in sunshine hours). The amount of location gives room for the use of materials which can reflect or absorb solar radiation in or from building. The figure below illustrates the mean monthly sunshine duration.

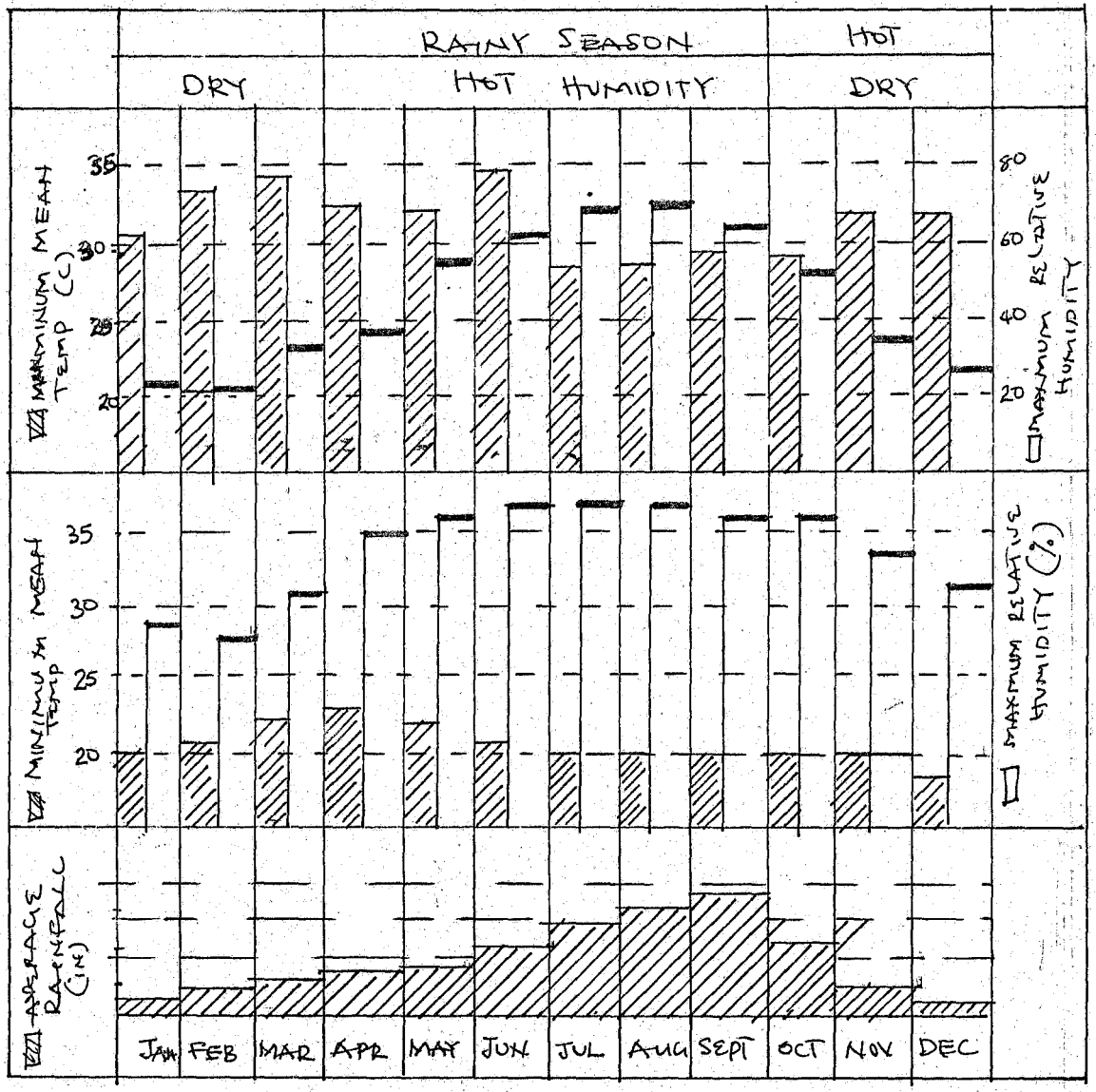
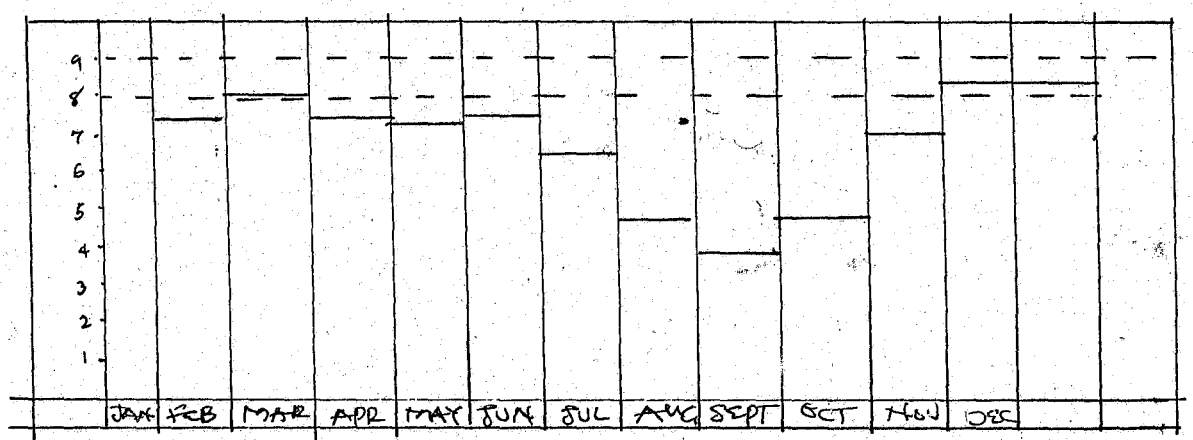


Fig 5-3 Mean Monthly temperature, Humidity and Rainfall.

Source: Abuja master plan (19...)



Mean Monthly Sunshine Duration

Fig 5-4

Source: Abuja master plan. (19...)

CHAPTER SIX

CHAPTER SIX

5.0 SITE SELECTION CRITERIA

The criteria for the selection of a particular site depend mainly on the following.

(a) Design consideration.

(b) Function to be performed with in the designed space

(c) Cost factors.

(d) Aesthetic appreciation

These factors were adequately considered in choosing the site for the proposed stadium complex.

6.0.1 MICRO SELECTION FACTORS.

The micro selection factors include the following;

(a) Marked out on the city master plan for the development of sport activities

(b) A network of water, sewage, drainage, power infrastrure, preserving the landscape and respecting existing pattern

(c) A seasonal river that could be dredged so as to introduces aquatic sports.

6.0.2 MACRO SELECTION FACTORS

The macro selection factors include the following;

(a) An open land area with busy corridors to provide high accessibility to the city periphery and for inter and intra sector travels

(b) A centrally located site with respect to the heart of the federal capital city.

(c) A centrally located site with almost equal distance from other parts of the city and state.

(d) Though easily accessible. It is yet some distance from town center. This entrance the privacy needed.

6.1 SITE ANALYSIS

Before one begins to design and construct a building there is need to carefully consider the implications of its proposed physical content, the building site, its geographical location, topography, climate, orientation and peripheral condition will affect or influence the overall building from its orientation and relationship to the group plane and its interior space design and legant. These factors affect the choice of building structure system and its material and construction. The correct sitting of building can also help control natural high, heat view, weight and other environment elements.

As these factors shall be fully analyzed as to enhance functional and structurally sound facilities for the Nation stadium complex.

6.1.1 TOPOGRAPHY

The greater part of the site has a compact soil i.e. gravel and gravel and sand mixture which has generally characteristics of adequate soil bearing capacity: no frosts action and excellent drain.

The site is highly undulating to the southwest with the northwest being relative by flat up to the northern part of the site. This allows for sitting of training /competition facilities to the northwest and north taking advantage of the relatively flat land for pitches and gentle slop for spectator sitting (i.e. ratting of sittings). Where necessary cutting and filling of land surface will be employed and in some other instances, levels will be introduces as the case may be.

The topography of the site generally allows for easy drain of the site. There is a seasonal River that flows through the site from Northeast . to south this will be dredge to allow for some acquits sporting events.

6.1.2 LOCATION, ACCESSIBILITY AND SURROUNDING FEATURES

The site is located at Abuja the federal capital territory of Nigeria. The site in defined to the northwest by a major trunk road that links the international airport and the eastern part of the country to the city. The city date is located right of the head of this road one of the feeder road that fined the major road from airport defined the northwest the northeast and southern part of the site are defined by inner ring road.

The site is accessible through the major trunk road from the airport and the innerving road from town centers. The site is barely 10 minutes drive from city center. The site can be easily located by all and soudry. At present there are no immediate surrounding facilities but to the opposite side (North) is a veil. All other part are surrounded by grasses, shrubs and trees.

6.1.3 VEGETATION

Vegetation affects primary the microclimate views and sun travels on the site the vegetation cover consist of mostly shrubs and trees of different species. A good number of these trees will be cut white another hard full will be preserve and some planted where necessary to serve no butter and wind breaker and also for sit out and other form of outdoor passive recreation.

6.1.4 SERVICES

Services in this context include facilities that aid the prevision of telecommunication, electricity and water services. All these are really available on the site in form of telephone live. Electricity supply with major power line at the boundary of the site and pipe line for water distribution.

6.1.5 DRAINAGE

Due to the indicating nature of the site adequate drainage facilities will be provided along lines where sharp contesting level is noticed this will check lively erosion and run off problems.

The present damage available on site will be up graded to adequately serve the facilities that will be provided at National stadium

6.1.6 EXISTING FACILITIES

Apart from the citing with monument and pavilion located at the head of the road that of links the airport to the town there are also other built up existing structure in other wards the site is virgin of any sort of construction.

6.2 CONCLUSION

The sum path (i.e. sun rise to sun set) the way the northeast (continental air mass) and south west (monsoon air mass) trade wind approach the site and the many factors analyzed above will be fully taken into consideration in distribution and orientation of the building mass.

The choice of building materials and constriction methods, type and size of building foundation system, site damage, building a general orientation, type of landscape, natural lighting ventilation and any other design criteria.

In all the choice of this site will permit future expansion and easily accessibility by athlete and spectators like and general patronage by the generally of the community

CHAPTER SEVEN

CHAPTER SEVEN

7.0 DESIGN CONCEPT AND CONSTRUCTION

7.1 DESIGN CONCEPT AND PHILOSOPHY

7.1.1DESIGN CONCEPT

The concept of this design work is a depiction of a flower, which bring out his pollen grains after cross pollution by insect.

The flower is the stadia, which is the center of attraction within the complex, bring out a pollen grain which gamete to form seed and plant which are the other sports within the Stadium Complex.

The concept is achieved on the site plan, this bring about good circulation within the Stadium this is needed because of the different sports that exist within the complex. Security easy accessibility of facilities encourages high level of social interaction and promotes unity.

7.1.2 DESIGN PHILOSOPHY.

A number of guiding principles was employed and adhered to in order to fulfill the intended objectives of this project. In the project, the philosophy emphasizes.

(a) Ease of maintenance should be affected especially on the interior construction of facilities should be durable and easy to maintain and at the same time will like interiors of great necessity ingenuity in planning is required.

7.2 MATERIALS AND CONSTRUCTION.

Before designing and the construction of a building complex, a careful consideration implication on it proposed physical content, the building site. Its geographical location, topography, orientation and relationship to the ground plane, and its interior space design and layout. And the factors contribute to the choice of building can also help to control natural light, heat, noise and other environmental elements.

7.2.1 MATERIALS.

The choice of materials for such a building as the national Stadium regime careful consideration. This consideration maybe broadly classified into economic, mechanical and aesthetic, the basis on which economic consideration is made consist of cost maintenance, five resistance, replaceebility and durability.

Building materials are characterized by distinct properties of strength, stiffness and elasticity, density, hardness and resistance to wear cause by physical or chemical action, fine materials are those which combine elasticity with stiffness, every material has its elastic limit beyond which it will permanently deform or break. Among at other things to be considered is the standard size which building materials are manufactured so as to avoid wastage during construction. Also the method of fasting and finishing materials will be given careful consideration keeping in mind the various functions the building shall be put into. Some of the basic materials employed in the design and construction of this project are briefly discussed below.

(a) CONCRETE.

Concrete is a mixture of sand, gravel crush rock and or other aggregates held together by hardened part of cement and water this mixture when properly proportioned, is at first a plastic mass can be cast or molded into a predetermined size and shape. Concrete becomes stone like in strength, hardness and durability upon hydration of the cement by the water, concrete can vary through a wide range in characteristic depending on the nature of the ingredients and the proportion of the mix. The technical employed for mixing, placing, finishing and curing can also assent the guilty of the concrete.

In this design concrete and reinforced concrete are mainly used floor materials.

(b) MASONRY.

Masonry refers to man made units which are formed and hardened into modular building units, masonry units (e.g. tiles, block and bricks) must be laid up in such a way so as to enable the entire masonry mass act in entity masonry is structurally effective in compression.

This design will employ the use of masonry mainly in construction of wall units

(c) WOOD.

As a construction material wood offers, in addition to its strength, durability, light weight and easy workability, natural beauty and warm in to site and touch. The are two major classes of wood soft wood and soft woods are the evergreens and are used for general construction. Head woods comes from deciduous or broad leaf trees and are generally used for flowing stairs, paneling, furniture and interior from. In this design wood is employed for door, interior paneling and cladding, furniture and interior finishes.

GLASS

(d) Glass is chemically inert, transparent, hard, brittle material it is used in building contruction in various terms. Glass in used commonly to glaze a building window and slight openings. There

are three basic types of glass sheet, flood and plate glass. The vacation of these types glass, safety laminated glass, wired glass, and insulating glass.

In this project glass will be used for all windows and some doors

(e) CERAMIC TILES.

Ceramic tiles are relatively small surfacing unites made of fire day and other ceramic materials. It provides a permanent durable water proof and easily clearable surface for interior walls, floors and ceiling. The type of ceramic tiles differs according to material composition, manufacturing process, Finnish and degree of vitrification (a measure of the tiles density and absorpturity).

The appearance of creative tile surfaces depends on the tile size, laying pettern, finish and colour. For finishing work in this design ceramic will be used over sound dimensionally stable masonry walls, act in organic adhesive Glazed tiles will be used on the will in the toilets, kitchen, and bars. Tiles will be used on the floor for they are non slippery surface.

The choice of the tile is based on consideration of beauty, cost ease of maintenance and durability.

(f) PAINT FINISHES.

The purpose of a finish is to protect, preserve or visually enhance the surface of which it is applied paint generally regress to an opaque or clear film – forming material that acts as should or berrier between the material and there elements or condition a that adversely affect or deteriorate it depending on end use, paint film must resist deterioration due to sunlight, heat, temperature variation water or mixture vapour, mildew and decay, chemical and physical abrasion, point may also serve to affects and promote human comfort.

When using part, the psychological affect of colour and lecture must be considered, certain colour maybe stridulating while other are relaxing light colour will be used in this design to reflect light, brighten and active interior spaces and increase visibility as well as create interest inform of spaces.

ROOFING SHEET.

Corrugated sheet material maybe used as structural self supporting roofing, spacing between linear support members. Long span aluminum corrugated sheets will be used for the purpose of this design and the manufacturer will be consulted for material specification, size, finishes, colour, spacing capability and application details.

The support system will consist of sheet sections and expansion joints requirements appearance and colour all depends on materials used the profile and the depth of the corrugations. The sheets are mechanically fastened to the support frame through the upper portion of the corrugation.

7.3 CONSTRUCTION.

SITE CLEARANCE.

Before a construction work begins on site, the site has to be cleared, site clearance involves member of operation which include taking a reconnaissance, noting in existing features on site, removing the ground, setting out the site, locating the building line e.t.c.

All these, as well as other necessary operations will be carried out on site before construction begins.

FOUNDATION.

The foundation system of a building which forms it substructure is a critical lick in the transmission of building loads to the ground. Bearing directly on the soil, the foundation system must both distribute vertical loads so that settlement of the building is either negligible or uniform under all parts of the building, and actor the supper structure of the

building against uplift and racking forces. The most critical factor in determining the foundation system of a building is the type and bearing capacity of the soil to which the building loads are distributed.

The choice of foundation system and materials affects and is effected by the soil which supports the building as well as the potential form of the super – structure.

In designing the foundations system other considerations that will be in mid include.

(1) The load it will carry (dead and line loads both occupants and contents)

(2) Lateral load from both ground pressure and wind

(3) Uplift forces and other forces

(4) Settlement e.t.c.

Expansion joint will be required to the intent size and form of the building structure.

STRUCTURAL SYSTEM.

Understanding the type and magnitude of the forces acting on a building and how the building might deform when acted upon by these factors give significant due as to how best to receive the factors, with the building structural system.

Basic structural clement (beans and horizontal glabs supported by columns and bearing walls) are joined together to compose three dimensional forms and define space care is taken such that these individual members are structurally stable to internally with stand the stress acting on them and also that the joints are rigid to facilitate the transfer of spress from one member to another and enable the overall structure to withstand heavier loads.

In this design allowance is made for the expansion and contraction of building materials which occurs in response to normal temperature changes in the term expansion joints to prevent distortion, cracks and breaks in the building materials.

These expansion joints will provide a separation of materials and allow free movement while maintaining at the same time the weather and water tightness of the structure.

WALLS.

Wall system are a buildings primary vertical planer element. In this case they are composed of linear bearing elements (columns and beans) with both structural and non structural panels distributed to fill in between them.

How these walls and columns supports either floor or roof system above and how they are supported in turns by walls, floor or foundation, systems below is determined by structural compactability of these system and the type of connections and materials used. Rigidity is a critical factor in the design and construction of these joints exterior walls serve as

a protective shield against exterior conditions for buildings interior spaces. Thus. It must be durable, resistant to ware and the element (sun, wind, rain). The exterior wall is also the point of which the control of air, mixture, and water vapour flow must take place.

Interior walls and partition maybe either load bearing or non structural and serves as dividers and defining elements of space visually and aesthetically – Therefore, there surface shall be durable and ware resistant and the desire finish colour and texture shall be compatible with the system used wall element will also serve to accommodate the vertical and horizontal frame of mechanical and electrical lines as well as their as well as their outlet.

In designing, block walls will be employed. The bearing strength of a masonry wall is dependent on the quality and compressive strength of both mainsonry and the mortar used and also the quality of workmanship. All these would be fully considered and duly taken care of.

DOORS AND WINDOWS.

Doors and windows provide for physical, visual, and light penetration into a through a building's interior while enclosing interior space and maintaining the continuity of the building is skin.

Doors and doorways provide means of access into a building interior frame the interior and passage between interior spaces. Exterior doors must provide light seals when closed, maintain the approximate

insulating valves of the building's interior well, and minimize the possibility of condensation forming on them interior surface s, at the same time they must be large enough to move through easily and accommodate the moving of interior furnishing and equipment's, Ease of operation, privacy and security requirements and the possible need for light, ventilation, and view must also the considered in a doors performance.

Interior doors provide for passage, visual privacy and sound control between interior spaces. Doors in closets and storage spaces are primarily for visual secreening although ventilation may also be a requirement.

Windows provide for light, ventilation and view as with interior doors, windows should provide as weather light seal when closed, have insulate valves and be free from condensation. There are many types and size of windows, the choice of which affect not only the physical appearance of a building but also the natural lighting ventilation, view potential and spatial quality of a buildings interior.

From an external point of view, doors and windows are important composition and scale going elements in a building faced. The manner in which break up a building surface affects the messing, visual weight, scale, and articulation of the buildings major plane in this design, the size, proportion, that the location of doors and windows have been carefully considered and planned for having in mind the stain and of doors and windows from manufacturers, in considering the materials for doors and window, factors such as maintenance durability, security, cost e.t.c have been taken into consideration.

ROOF AND CEILING.

Roofing system of building function as the primary shelling element protecting the interior spaces of the building from the natural elements. It should also control the floor of water, water vapour leat, and air. It should be structured in a way so as to carry it's own weight. The roof system should also be fire resistant and may have to accommodate mechanical or electrical equipment's.

Since the roof system is a primary generator of building loads, it must be compatible with the wall and or column systems through which these load are transferred down to the foundation system.

The roof system is potentially the most expensive system of building because of it's varied function task spread over a large area. Economy of erection and maintenance, durability and potential heat loss or gain should be considered in the choices of a roof system and its material. The form of the roof is a crucial element in the visual large of a building. The roof formed, and the spacing span and slop of its structured members also effect the choice of the finished roofing material, the interior roofing system and the layout and form of the buildings interior space.

In the design, all the afore mentioned factors and functions of the roof system have been put into consideration and consequently affects the choice of roof, material and construction.

FINISHES AND FITTINGS.

External wall surfaces must be wealth resistant, durable and relatively maintenance free. Interior walls should be ware resistant and clearable floors should be sake (non – slip) and durable against traffic ware ceiling should be maintenance free, factors such as strength, acoustical thermal, and fire resistant value etc will be determine the finish materials that would be used in this design.

For the purpose of the visual appearance all finished under will basically be considered in term of colour tenure, pattern, seal, modular characteristic and their jointing and edge condition.

In the design, the durability, cost maintenance and other importance factors that will be considered in the deletion of furnish materials and fittings.

7.4 SPACE REQUIREMENT.

7.4.1 FUNCTIONAL AND SPACE ANALYSIS.

The brief was formulated after detailed studies and analysis of facilities were carried out on the proposed type of facilities to be incorporated in the design.

The Stadium complex is to be made up of functional spaces and area divided into three major sections, by, reason of their functions. These include.

(1) Accommodation

(2) Training/Competition

(3) Services

It is important that this facilities be easily accessible to athletes and visitors during training.

ACCOMMODATION:- In the Stadium complex accommodation facilities forms one of the major features. This accommodation facility will be to international standard in order to allow for use of the Stadium complex for international rated competition. The accommodation unit will take cognizance both local and contemporary architectures. Facilities provided include: Athletes accommodation, Male and Female, coaches/Officials accommodation (Male and Female), staff/attendant accommodation.

TRAINING/COMPETITION AREA:- The other major feature of a Stadium complain apart from accommodation is the training facilities. The training facilities allow for the main aim of the Stadium

complex to be achieved i.e. The training enacting and practicing invidious sporting activities as the case may be these facilities will be of international standard in all ramification and will be easily accessible to all the athletes.

Facilities provided include pitches for various sporting events (such as Football, Basketball, lawn tennis e.t.c) spectators setting, parking.

In order to achieve an adequate Stadium setting memories services shall be provided at the complex these services need the basic necessities of the athletes (and spectators during competitions) as to make camping possible and reduces to the least minimum the need for athletes to leave the Stadium Complex for any necessity service proceeded for will range from shop to telephone and postal services and also eating facilities.

7.4.2 SCHEDULE OF ACCOMMODATION.

(A) ACCOMMODATION.

	FUNCTIONS	NO OF UNITS	AREAS/UNTO.
(1)	room (with bath & INC)	50	
(2)	Attendant office	9	
(3)	Store	2	
(4)	Administration	1	
(5)	Sigma chief suitet	2	
(6)	Conference	1	
(7)	Library /Computer	1	

(8)	Restaurant	1
(9)	Cold / Room	1
(10)	Dry room	1
(11)	Kitchen	1
(12)	Serving	1
(13)	Games Room	1

(B) INDOOR SPORTS COMPLER.

(1)	General/Equipment Store	2
(2)	Offices	
(3)	Basketball, Handball, wrestling & Boxing,	
(4)	Table Tennis, Gyninasium, Weight Lifting,	1
(5)	Coveniences.	8

(C) MAIN BOWL

(1)	Reception Plaza	1
(2)	Changing room with	4
(3)	Reference Room	1
(4)	First Aid	1
(5)	Five Service	1
(6)	Administration	2
(7)	Convenience	

ADMINISTRATIVE BLOCK

(1)	office spacing	8
(2)	Reception Plaza	4
(3)	Wc	32
(4)	Space for meeting with Wc	

CLINIC.

(1)	Reception Area	1
(2)	Doctors Room	2
(3)	Ward	2
(4)	Pharmacy Room	1
(5)	Injection Room	1
(6)	Emergency	1

GATE HOUSE.

(1)	Guard Room	1
(2)	Wc and Bath	1

7.5 PLAINING AND DESIGN CONSIDERATION

Services and or Function		Design consideration
(1) Location	-	Easily accessible to Athlete and visitors
(2) Site	-	Partly undulating and relatively open.
	-	Enough room for future expansion.
(3) Layout	-	Easy calculation and well defined pedestrian walkway.
	-	Parking space easily accessible to spectators especially.
	-	Expensive open spaces and well designed outdoor facilities for passive from of recreational relaxation.
	-	Outdoor facilities and other facilities well integrated into are another.
	-	Link between interior and exterior is quite important.
	-	Relationship between training facilities accommodation and during is very important.

(4)	Ventilation	-	Proper cross ventilation throughout the design of every facility
(5)	Utilities	-	Adequate wiring for electric appliance, power machines and Engines, solar panels e.t.c.
		-	No loose floor wiring.
		-	Convenient outlet no required for power tools and other equipment.
		-	Fine alarms.
(6)	Lighting	-	Should be adequate but without glare
		-	Proper outdoor lighting for games especially Stadium and security and also other outdoor Facilities i.e. sit-outs.
(7)	Equipment	-	Fire prevention and control equipment, pipes, poles,
		-	Proper installation of electrical and t telecommunication equipment.
		-	No projecting parts

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		-	No projecting parts

(8) Safety

- Special treatment for games surface as the case many require.
- All flooring ship proof.
- Proper insulation and earthling of all electrical appliance / equipment.
- Simple circulation within the building.
- Stratagic location and adequate number of

  exists in training / competition area.

(9) Colour

- Lighting and bright interiors
- Incorporation of national colour.

CHAPTER EIGHT

CHAPTER EIGHT.

8.0 DESIGN SERVICES

8.1 Electricity and lighting

The power company should be notified of the estimate total electrical Load requirement for the Stadium complex during the planning phase to confirm services available and to co-ordinate the location of the service correction, service switches and switch boards.

The meters, service switch, main switch boards and panel boards and good circuits will be properly installed and separate wiring circuits will be used for sound, alarm system, telephone television /cable system e.t.c. Floor systems for convenient access to floor and ceiling outlets. Night fixture and the wall switches are usually the most visible parts or in electrode systems and they will be located for convenience easy access and in co-ordination with the visible surface peter, for safety work place for these devices will be of insulation plastics.

A standby set of generating plant will be installed more be installed of the Stadium so that the entire system will run basically on solar energy.

8.2 HEATING, COOLING AND VENTILATION.

Environmental factors that may be controlled by mechanical

system include temperature of surrounding air, the main redial temperature of surrounding surface, the relative Lucidity of the air, air motion, due occur e.t.c.

In achieving thermal comfort in this design, these factors will be taken care of in the planning of the building's location and orientation, choice of building materials and construction assembly which can control heat, air, and water vapour; secreting the building from solar radiation; application of landscape features regulation and treatment of opening on building and application of the stack effect in ventilation.

The air Temperature entire in a building is affected by the main radiant temperature, relative humidity and air motion. Air temperature requirement are also affected by the level of activities that goes or within the users. The importance of ventilation in this design cannot be the activities that will be taking place in the Stadium and how all these will affect the air temperature in addition to the measures to the measures listed above, also considered in this design is the provision of ledge windows at the indoor spats complex and extractor trans

8.3 WATER SUPPLY.

In building plumbing works has to do with circulation, consumption and storage of water. For minimum comfort, water supply has to being the right quality and at the proper floor rate, pressure and temperature. The service pressure of a water system must be enough to

absorb pressure losses due to vertical travel and friction as the water flow through the pipes and fitting and still satisfy the pressure requirement of each building fixtures for safety, temperature relieve value are required for all water heaters. The must be sufficient pressure at each future to ensure satisfactory operation. The water pipe should be rise and corrosion resistant.

8.4 DRAINAGE AND SEWAGE DISPOSAL.

In this design toilet layout are meant to allow for economy in placement of plumbing fixations this will be verified so that the pipes would be correctly laid during the proper phase of the construction.

The sanitary drainage system depend on gravity of flow and will required large pipes and adequate installation space. All these will be properly taken care of and the layout of the sanitary drainage system will be straight forward and direct with properly slopes runs and angular connectors maximum standard and require menus are followed in other to ensure adequacy in use

8.5 FIRE SAFETY.

Fire resistant construction referred to method of

(1) Controlling the spread fire.

(2) Increasing the length of exposure to fire a material can withstand without damage

(3) Reducing a material flammability.

Materials had to provide fire protection for a building construction must be in playable and to understand very height temperature without Disintegration. They should also be low conductors of heat to insulate the protected material from the hit generated by the fire.

Fire code and requirement will be strictly while to so as to enhance controlling the spread of fire and allowing sufficient time for occupants of the building my to eight safety before the structure weakens to the extent that it because dangerous.

Other precaution that will be put in place toward fire protection and safety in Claude provision of structional protection, fire fighting aids, various inlets and outlets passages direct un-obstructed accessible and will it exit enclosures (floor, wall, ceiling, stair construction) all satisfy a minimum of one how fire rating requirements.

DESIGNING AGAINST FIRE IN BUILDINGS

The architect by virtue of his profession is concerned not only with the building itself but also its content, setting and occupant including visitors. His approach to fire consciousness in design should take these criteria into consideration.

For occupant, design should be concerned with safe means of escape and safety of people in the event of fire. for the content, design should consider the rate and extent of damages to property. For the structure itself, design should limit the ravage of fire on its integrity, structural or

otherwise. For the environment design should curtail the spread of fire from one building to another, environmental pollution and degradation.

The objectives of fire protections can be summarized as follows:

1. Life safety (occupants and visitor)
2. Property protection and
3. prevention of conflagrations.

The scope of fire protection in building is very wide (Fig II). This paper will however focus on passive protection. Passive precautionary measures are inbuilt characteristics of a building.

SITE LAYOUT

The possible fire hazard that a building presents depends upon its use and size- the same factor which determine its fire load and intensity of heat it can radiate. The element of risk is then at the heart of the matter when considering distance between adjoining building and internal arrangement of building. In the first instance, zoning regulations must be strictly adhered to. Below is a list (by no means exhaustive) of activities which are considered high hazards. Buildings housing such activities should be safely located away from other building and part of the building where "safer activities" take place.

INTERNATIONAL PLANNING

Building must be designed and supervised through construction to ensure that in the event of fire, they will resist fire, the will resist collapse for a sufficient period of time to allow escape and evacuation of occupant and also minimized the spread of fire. Design precaution should be

considered creatively as a matter of design and in conjunction with other design criteria right from the inception of the project. This aspect of design should no longer be left to other or treated like an after thought as so often seems to be the case.

Architectural designs should be as detailed as can be. In many cases like the Cocoa House, these ducts have aided the quick spread of smoke, heat and gases during outbreaks. Ducts and other cable holes should be fire stopped in tumescent stripes can be found useful for such purposes.

Compartmentalisations:

The smaller the area which the fire is confined, the less the difficulty in containing it and the chance of its developing into a big fire. Consequently, the less the risks and damage to life and property. A whole building depending on its size could be a compartment or be subdivided horizontally and vertically into compartment. Compartment walls and floor are those which subdivide a building for the purpose of separating the occupant (especially those who need to be evacuated) by restricting fire spread for a reasonable length of time. Compartmentalization is achieved by using fire resistant walls and floors to prevent vertical horizontal fire spread. Success depends on segregation of high risk area and isolation from one another e.g. kitchen and garage; adequate insulation and appropriate size of compartment. It has been suggested that with a functional sprinkler system, a compartment may be of unlimited area except for multi store buildings.

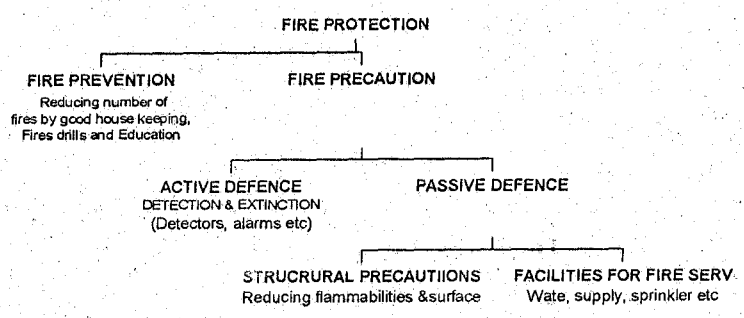


Fig II

Means of Escape:

In the event of fire within a building, people within a building should be able to escape or reach a place of safety within the building in safety within the building in safe condition. Escape must achieved during the first phase of fire preferably soon after dissever.

In designing escape routes, the architect should be able to visualize possible source of fire and predict the courses of smoke, heat and hot gases. He should also have an idea of how many people will be using the route at peak hours the way they move, their speed, familiarity with the building and tendency to panic. When considering the design of escape routes in building, it has been found that the time available for escape determines the safety modes of escape, while character of the route may determine its efficiency. A period of 2.5 minutes is considered maximum time available for escape before intolerable heat and flash over condition are reached. This is based on the fact that smoke can spread 70m in both directions along the major axis within 2.5 minutes and 200m within the same time in a flash over condition.

Provisions of means of escape requires protected escape routes, smoke control facilities, fire resisting doors and maintenance compartmentalization.

Exits

The number of exits requires depends on the functions of the building, degree of risks, availability of functional fire fighting equipment and number and characteristics of occupants. Exits should be located such that it will be unlikely for fire to block them all at the same time. Travel distance for another occupant should not exceed 45m. This is based on the premises that a mobile adult can travel at the rate of 15m per minutes in a smoke filled space where there is some degree of visibility and presences of oxygen, if only at a level. Informed persons will travel 60m per minutes under similar conditions. To determine exit with, the number of people who could be involved in escape is translated into exit with which can accommodate them safely.

Fire Escape Stairs:

To be effectives, these should be built within enclose shaft should open into shaft at all floors except final exit level. Doors should be located such that swing do not obstruct flow of people already in the staircase. Design of staircase should be subjected to detailed scrutiny as regards with, rise, and run of steps; size and placement of landing; head rooms; a hand rails; material; smoke control techniques and ventilations. In addition, stairs should not continue unobstructed into basement, as these will confuse people hurrying to escape. It may be pointed out here that means of vertical transport like escalator, elevator/lifts are not considered reliable means of fire escape. They are usually sensitive to smoke and

high temperature and are subject to stall in case of power failure.

Places of Refuge:

A large and complex building, immediate total evacuation of occupant may not be possible during fire. The need therefore arises for places of temporary refuge. They are separated from other part of the building by means of construction elements with high fire ratings they are thus, some, heat and gas free and provide a safe haven for people who are waiting to be rescued. If the building has a high fire risk, it is advisable to provide for filter air supply and lighting to these special compartment.

Sign and Notices:

A major cause is the inability of occupant of burning building to see escape route as a result of heavy smoke and darkness. In some cases, people especially visitors trapped in a burning building may not even know the escape routes. Building should have escape route sign. These provides architect another opportunity to exhibit their creativities.

Exit signs should be bold and placed at 2 to 5m intervals. They should be illuminated at all time. If need be their power supply must have a higher reliability rating the normal lighting. A study showed that the frequency of "lost" people on a complex but often used route was reduced from 40% to 17% by the improvement of one sign along the route.

Fire Equipment:

In spite of all precautionary measures taken at the design and construction stages, the risks of fire is not totally eliminated. There is the need therefore to have inbuilt fire equipment like fire alarms, detectors and

fighting equipment which become handy in the event of fire.

Detectors will indicate that a fire has been noticed within or around the building but will not do anything to control it unless some other systems is also activated as a consequence. By noticing a fire at an early stage, more time is available for occupant to escape and early action to combat the fire can be taken. A detections system need to be coupled with an alarm system which could also be triggered o prerecorded instruction on evacuation. Fire detection signals can be used to function other system such as closing doors shutters, escalatory operating smoke extract and pressurizing system. Active control of fire requires the provision of extinction systems automatic sprinkler installations are the most common. When properly integrated into the design and installed they are have been found effective in suppressing fire and thereby curtailing the extent of damage. On the average, automatic detectors can result in a 50% reduction in fire damage, while automatic sprinkler can reduce the change of a large industrial fire by a factor of 6 and a large shop fire by factor of 2.

To be able to specify appropriately, an architect must have a good working knowledge of the behavior of different building material especially with reference to fire. Materials used in conjunction to form element of buildings may behave quite differently from such materials when used in isolation. The Architect must know how to relate such behavior to required fire performance. A structure should be able to resist fire long enough for the occupant to be evacuated and operation of fire

CHAPTER NINE

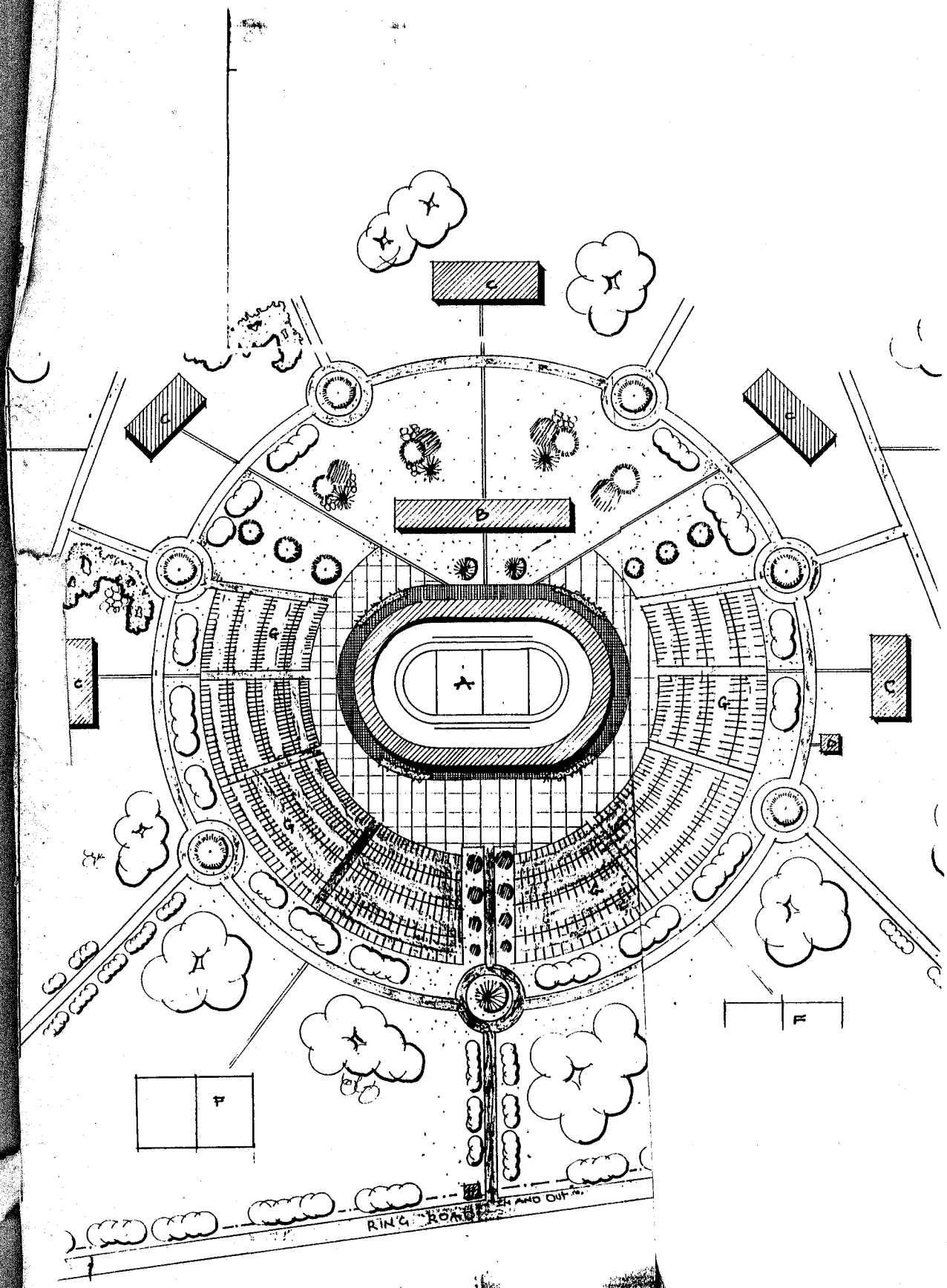
men. No construction material is fired proof. Then fire rating of 45minute to 4Hours may be required for different building elements.

Security

The security within the stadium will be achieve in two weeks

(1) By fencing the stadium all through

(2) By the introduction of gate house:- to control and regulate movement within the stadium.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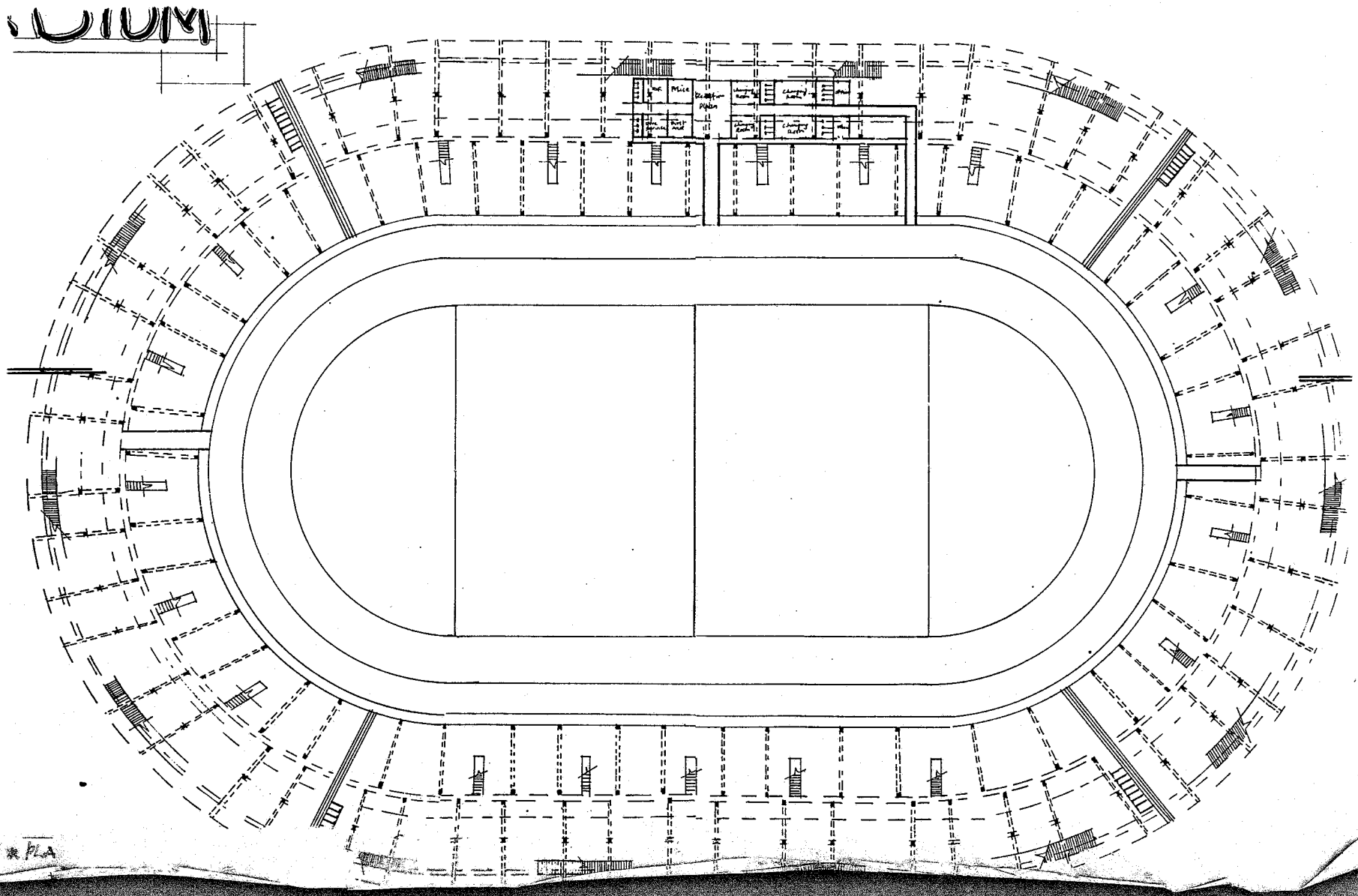
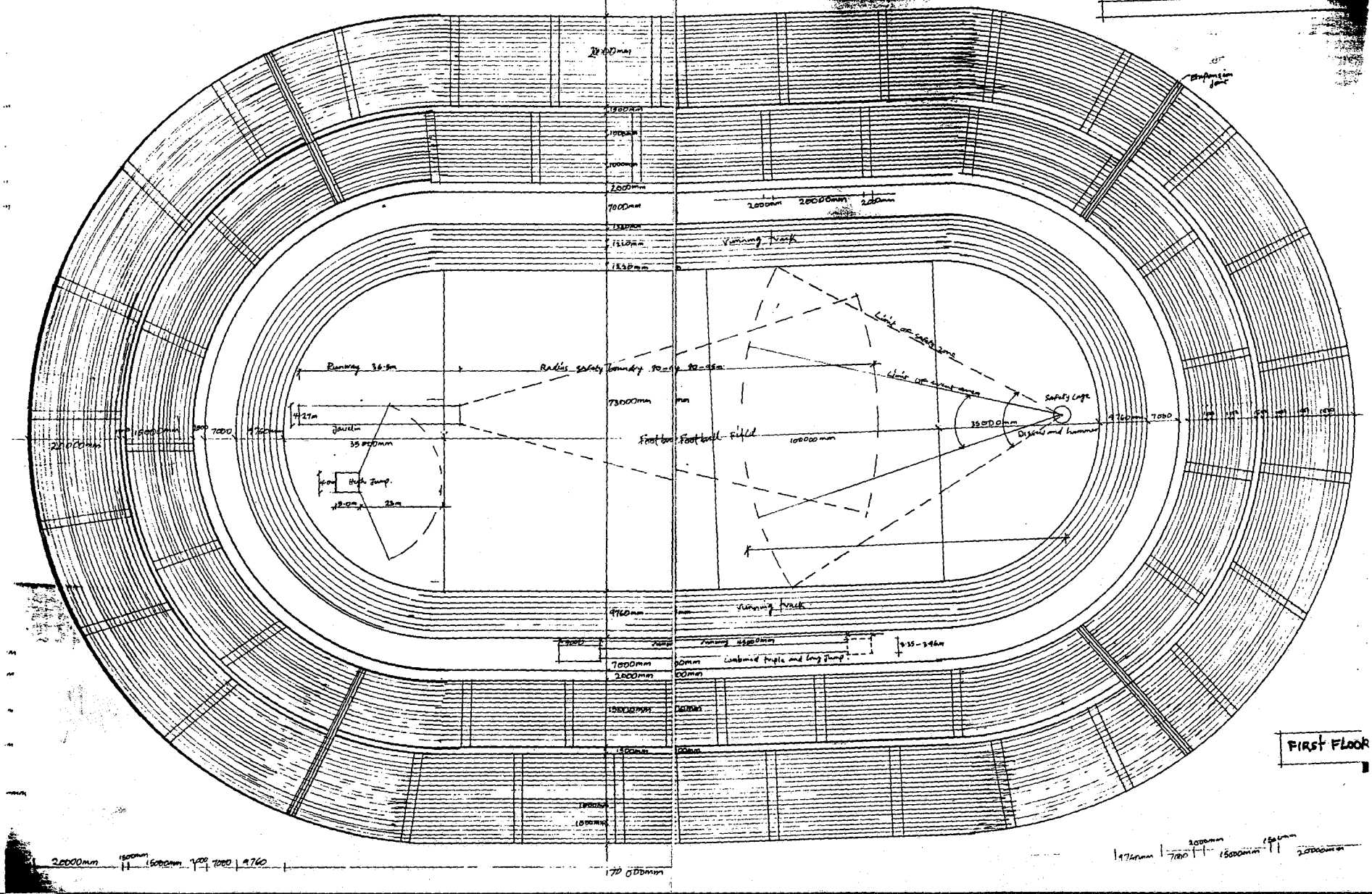
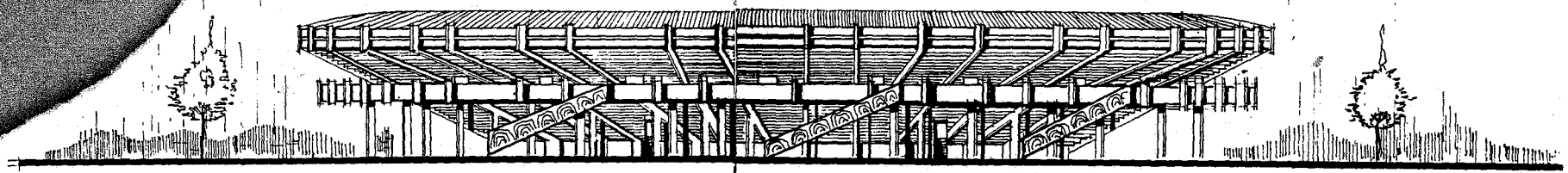
ENTRANCE AND EXIT



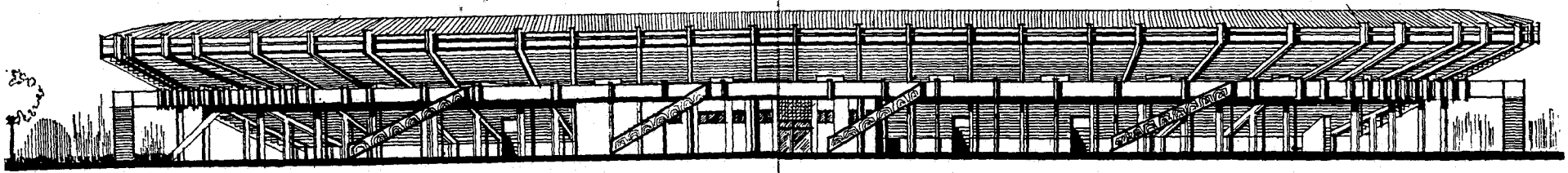
STAD



FIRST FLOOR



SIDE VIEW



FRONT VIEW

OWOJAIYE A. O

NATIONAL STADIUM ABUJA

ING AND VIEWING IN STADIUM DESIGN.

M. TECH THESIS

CHAPTER NINE.

9.0 GENERAL APPRAISAL AND CONCLUSION.

From the conception of the idea of a national Stadium Abuja to the proposed design and in an attempt to fulfill it's aim and objectives and also form its concept and philosophy has worked at providing spiting facilities of international standards for the Nigerian sports men and women. The increasing success rate of Nigerian athletes both individual level and on team level strongly emphasis the need for standard sporting equipment and facilities and also a very conducive atmosphere for training, camping and preparation for all levels of competition.

The National Stadium will not only provide and fulfill these things mentioned above but will also serve as one of the main base for developing sporting events in the country.

Considering the importance and the strategic role sports is playing in global polities today the actualization of this design proposal and its need cannot be over emphasized.

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