EDUCATION TAX FUND (ETF) HEADQUARTERS, ABUJA: FIRE PREVENTION IN OFFICE BUILDINGS

BY

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FACULTY OF ENVIRONMENTAL DESIGN
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OCTOBER, 1999

DECLARATION

I, MUAZU ABUBAKAR, hereby declare that this thesis has been composed by myself, and that it is a record of my own research work under the supervision of Arc. A.K. Yeboah. It has not been accepted in any previous application for a higher degree.

All quotations are distinguished by quotation marks and sources of information are duly acknowledged by means of references.

MUAZU ABUBAKAR

12-01-2000
DATE

CERTIFICATION

This thesis, entitled **Education Tax Fund (ETF) Headquarters, Abuja: Fire Prevention in Office Buildings**, meets the regulations governing the award of the degree of Master of Science in Architecture of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

H.T. SAAD — CHAIRMAN, SUPERVISORY COMMITTEE — 08/02/00 DATE

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DEDICATION

I dedicate this work to the following:

Father, Mother, Grandfather, Brothers, Sisters and well wishers.

I also dedicate this work to:

Late Sani Isa (a colleague).

ACKNOWLEDGEMENTS

All praise be to Allah the beneficent and the merciful, master of the day of Judgement to whom we shall finally return and be judged accordingly.

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ABU, Zaria — *Muazu Abubakar*

October 1999

TABLE OF CONTENTS

		Page
Declaration		ii
Certification		iii
Dedication		iv
Abstract		v
Acknowledgements		vi
Table of Contents		vii
List of Tables		xii
List of Figures		xiii
List of Plates		xvi
CHAPTER ONE		
1.0	Introduction	1
1.1	Problem Definition	1
1.2	Aims and Objectives	2
1.3	Research Methodology	2
1.4	Sources of Data..	3
1.5	Motivation	3
1.6	Justification	3
1.7	Architectural Significance	3
1.8	Scope of Design	4
1.9	Constraints and Limitation	4

CHAPTER TWO

2.0	Literature Review	5
2.1	Stages of Fire	5
2.2	Fire Behaviour	5
2.3	Causes of Fire	5
2.4	Historical Background of Fire Prevention	5
2.5	Actual Fires	6
2.5.1	Andraus Building	6
2.5.2	Military Personnel Record Centre	7
2.5.3	One New York Plaza Fire	7
2.5.4	Nigeria Telecommunications Limited (NITEL), Ikeja ..	8
2.5.5	Fire Outbreak in Nigeria (1989-1993)	8
2.6	Fire Prevention in Office Buildings	8
2.7	Fire-Safety Codes and Standards	10

CHAPTER THREE

3.0	Case Studies	13
3.1	Introduction	13
3.2	Education Tax Fund Headquarters, Abuja (Temporary Office)	13
3.3	Ahmadu Bello University Senate Building Zaria ..	19
3.4	Northern Nigeria Investment Limited (NNIL) Waff Road Kaduna	26
3.5	Nigeria Industrial Development Bank (NIDB) Waff Road Kaduna	30
3.6	Place Victoria Office Building Montreal Canada ..	35

KASIM IBRAHIM LIBRARY

3.7 Office Building of the Chase Manhattan Bank, New York .. 40

CHAPTER FOUR

4.0 Fire Prevention in Office Buildings 46

4.1 Introduction 46

4.2 What is Fire? 47

4.3 Classification of Fire 48

4.4 Initial Spread of Fire 49

4.5 Causes of Fire in Office Buildings 51

4.6 Fire Detection 53

4.7 Orientation and Training of Staff in ETF HQ, Abuja .. 56

4.7.1 Active Fire Suppression 57

4.8 Passive Fire Suppression 61

4.9 Fire prevention 64

4.9.1 Architectural Design Approach 66

CHAPTER FIVE

5.0 The Site 83

5.1 Introduction 83

5.2 Site Consideration (Merits) 83

5.3 Site Location 85

5.4 Site Analysis 86

5.5 FCDA Development Control Regulations, Abuja .. 89

5.6 *Site Viability* 90

CHAPTER SIX

6.0 The Education Tax Fund 101

6.1 Historical Background 101

6.2 Functions of the Fund 102

6.3 National Policy on Education 103

6.4 Education in Nigeria 104

6.5 Metamorphosis and Present Trend 104

6.6 Departments in Headquarters 105

6.7 Detailed Staff Breakdown 107

CHAPTER SEVEN

7.0 Design Information 124

7.1 Planning Criteria 124

7.1.1 Concept Development and Other Planning Criteria .. 125

7.1.2 Site Concept 126

7.1.3 Site Planning 126

7.2 Schedule of Accommodation 127

7.3 Design Report 133

7.3.1 Circulation 133

7.3.2 Floor Plans 134

7.3.3 Elevations 134

7.3.4 Sections 135

7.3.5 Landscaping 135

7.3.6 Services 135

7.3.7 Construction Materials/Fire Prevention 135

CHAPTER EIGHT

8.0 Conclusion 143

Bibliography 146

LIST OF TABLES

Figure		Page
4.1	Classification of Fires	67
4.1.1	Fire Outbreak in Nigeria	68
6.1	Population of Nigeria by State and Sex (1991)	114
6.2	Primary School Enrolment Figures and Controlling Agency For Southern and Northern Nigeria (1912/1913)	115
6.3-6.5	Present Trend of Nigerian Education	..116 - 118
	Chart 6.1-6.2..	..119 - 120
	Chart 6.3 Management Structure of ETF, Abuja	121
	Chart 6.4 Personnel Structure of ETF, Abuja	122
7.1	Walls and Partitions: Fire Resistance and Gradings	141
7.2	Floors and Roofs	142
7.3	Floors and Roofs	142

LIST OF FIGURES

Figure		Figure
3.1	Site Plan of ETF Headquarters, Abuja	15
3.1.1	Plans of ETF, Abuja	16
3.1.2	Plans of ETF, Abuja	17
3.2	Planning concept of Ahmadu Bello University Senate Building	22
3.2.1	Ground Floor Plan ABU Senate Building	22
3.2.2	First Floor Plan ABU Senate Building	22
3.2.3	Second Floor Plan Senate Chamber	22
3.2.4	Fourth Floor Plan (Typical Floor)	23
3.2.5	Section Through Senate Building	23
3.3	Site Plan of NNIL Building Kaduna	25
3.3.1	Ground Floor Plan	25
3.3.2	First-Seventh Floor Plans (Typical Floor)	25
3.4	Ground Floor Plan, NIDB Building Kaduna	26
3.4.1	First-Seventh Floor Plans Typical Floor NIDB Building Kaduna	26
3.5	Ground Floor Plan 1st-47th Floor Plans of Place Victoria Office Building, Montreal, Canada	28
3.6	Plans of Chase Manhattan Bank, New York	30
4.1	Federal Ministry of Education Headquarters along Moloney Street Lagos	69
4.2	Nigerian External Telecommunications NET Building Lagos	70

4.3	Cocoa House, Ibadan	71
4.4	Heat Detector	72
4.5	Smoke Detector	72
4.5.1	Manual Call Point	73
4.6	External Appearance of Compensating Heat Detector ..	74
4.7	Internal Layout of the Compensating Heat Detector ..	74
4.8	Expansion of Metal Fixed Temperature Heat Detector ..	75
4.9	Typical Spot Optical Smoke Detector	75
4.10	Basic Circuit of an Ionisation Detector	76
4.10.1	Block Diagram of Circuits within the Ionisation Detector ..	76
4.10.2	Heat Detector Spacing	77
4.10.3	Fire Extinguisher Mounting Height	78
4.10.4	Automatic Sprinkler Systems	78
4.10.5	Sprinkler Heads	79
4.10.6	Sprinkler Coverage Area	79
4.10.7	Ceiling Configurations	80
4.10.8	Water Flow Indicators	81
4.10.9	Diagram of the Control Valves of a Typical Wet Sprinkler Installations	81
5.1	ETF Site at Wuse Zone Four District Centre	93
5.2	Abuja Master Plan (1992)	94
5.3	Site and Section	95

RAHIM LIB

5.4	Physiographic Map of North Central Abuja	96
5.5	Vegetation Map of Abuja North Central	97
5.6	Bioclimatic Chart	98
5.7	Annual Monthly Rainfall	99
5.7.1	Temperature-Humidity	99
5.8	Courtyard System of Planning and Single Banking ..	100
5.8.1	Trade Winds NE and SW	100
5.8.2	Map of Nigeria Showing FCT Abuja	100
7.1	Concept Development	137
7.2	Site Concept	138
7.3	Site Zoning	139
7.4	Use of Horizontal and Vertical Elements for Effective Prevention of Fire Spread	140
7.5	Partitioning Methods and Materials that Discourage Fire Spread within the Building	140
8.0	Fire Apparatus..	145

LIST OF PLATES

Plate		Page
Plate I	Façade of ETF Complex	18
Plate II	Façade of ETF Complex	18
Plate III	Façade of ABU Senate Building	22
Plate IV	Façade of ABU Senate Building	24
Plate V	Façade of ABU Senate Building	24
Plate VI	Façade of NNIL Building Kaduna	25
Plate VII	Façade of NNIL Building Kaduna	25
Plate VIII	Façade of NIDB Building Kaduna	27
Plate IX	Façade of NIDB Building Kaduna	27
Plate X	Perspective View of Place Victoria Office Building, Montreal Canada	29
Plate XI	Perspective View of Office Building of Chase Manhattan Bank New York	31

CHAPTER ONE

1.0 INTRODUCTION

Education is the training of the mind and the ability of an individual to have a focus, it is the basic rudiment of a nation's progress and development standing as an upliftment of the cultural, social, technological and political stability of the nation.

The importance of education in a nation's development cannot be under-estimated. The standard of education in primary, secondary and tertiary levels is falling significantly. It is amazing therefore that, in Nigeria education sector has for long not been accorded the prominence it deserves.

The Education Tax Fund (E.T.F) is therefore established to intervene in the primary, secondary and tertiary levels of the education sector, the intervention will be for a rehabilitation, restoration and consolidation of existing facilities in the institutions. The body will be coordinating, planning and funding the activities of the education sector.

The Education Tax Fund (ETF) secretariat comprises of office complex, and conference facilities which was design with fire safety in mind. Important documents, records, computers, cash and communication gadgets are kept in this complex. The source of this fund will be through taxation as tallied with its description Education Tax Fund (ETF), from limited liability companies registered in Nigeria.

1.1 PROBLEM DEFINITION

This thesis is concerned with the problem of how to evolve an architectural solution to fire prevention in office building. Smoke, heat and toxic gases produced by

an outbreak of fire in a building can sometimes be a more serious hazard to the occupants, a lot of lives and properties are being lost in fires.

1.2 AIMS AND OBJECTIVES

a. To evolve a design that takes care of fire safety through fire compartmentation.

b. To provide a safe environment for records keeping, computers and communication gadgets.

c. To provide means of fire escape route by providing corridor lobby staircase through design, this minimizes the high proportion of lives lost in fires.

d. To incorporate three building elements its structure, contents and interior finishes for fire safety during design stage.

e. To achieve automatic fire ventilation through design. This removes heat and this lowers the air temperature within the building environment (courtyard). This will prevent distortion of the building structure, roofs, and the walls and ultimate collapse of the building.

1.3 RESEARCH METHODOLOGY

Relevant literature review in the research subject is done to give a proper theoretical background for the research.

Case studies on some existing administrative offices within and outside the country were carried out. This assists in analysing the problems encountered and possible solutions. Unresolved problems are highlighted to be tackle in the proposed design.

A field research is also conducted. This includes observations of the researcher and informant.

1.4 SOURCES OF DATA

i. Federal Republic of Nigeria Annual Abstract of statistics 1995 edition.

ii. Unpublished and published works of authors.

iii. Information from reliable informants.

iv. The education Tax Fund Headquarters Abuja. (ETF Management).

User/Client

The users of the building are workers at the headquarters of the Education Tax Fund Abuja.

The client is the Education Tax Fund (ETF)

1.5 MOTIVATION

The frequent occurrence of fire incidence in office buildings which always claims a lot of lives and properties worth millions of naira and the need to tackle this problem right from the design stage has motivated this thesis proposal.

1.6 JUSTIFICATION

In view of massive destruction of lives and properties in office buildings for instance Ministry of Education, Republic Building, Nigeria External Telecommunication Building and Cocoa House during fire, this indicates the inadequacy of our existing building codes and fire fighting equipment, this ultimately justifies this thesis research.

1.7 ARCHITECTURAL SIGNIFICANT

The importance of safe environment especially for this type of office building, where important records, computers and communication gadgets are kept is of primary consideration. Therefore there is need to design each and every element of the structural framework of the building with fire safety in mind.

1.8 SCOPE OF DESIGN

The scope of the thesis is limited to the brief of the client, which covers the Education Tax Fund Secretariat Complex, this includes:

a. Administrative Offices

b. Conference hall

c. Welfare and other facilities and the well landscaped environment.

1.9 CONSTRAINTS AND LIMITATION

In this thesis research, administrative office buildings is documented to carry out a detailed study.

The willingness of respondents to provide vital information and the building by-laws of the site impose restrictions on the design. The economic state of the country and time available for the research also act as a set back.

CHAPTER TWO

2.0 LITERATURE REVIEW

Fire is a chemical reaction that occurs when fuel, heat and oxygen are present in the proper ratio and in sufficient amounts to produce heat and light. This chemical reaction is referred to as fire, oxidation or combustion.

2.1 STAGES OF FIRE

Knowing the stages of fire will later help us understand fire extinguishers, the importance of the detection equipment, and a bit more about the problem of fire:

a. **Incipient State** - Invisible products of combustion are given off

b. **Smouldering State** - Visible smoke emerging

c. **Flame Stage** - Presence of flame indicated sufficient heat, fuel and oxygen to sustain combustion.

d. **Heat Stage** - Stage of complete combustion of fuel.

2.2 FIRE BEHAVIOUR

How does fire spread? Fire spread through the following: conduction, convection and radiation.

2.3 FIRE CAUSES

Fire is cause by men, women and children except fire cause by nature (lightening).

2.4 HISTORICAL BACKGROUND OF FIRE PREVENTION

When "men began to live in primitive groups, fire became a greater danger to himself and others of his kind. Before Rome no sustained organised efforts to protect man from raging fire.

The first recorded organised fire protection discovered thus far the use of slaves for the Familia publica later, the Romans merchant for organization and protection of its citizens gave rise to what was possibly the forerunner of modern fire department, the corps of vigiles. The corps of vigiles was a paramilitary organization that assigned specific ranks and duties including the equivalent of the modern fire chief, fire marshal, engineer, and fire fighter. They also had fire houses (castra) and an early warning system manned by the nocturnes.

The next major step in organised public fire protection occurred in Europe after 1666. Insurance interest organised salvage groups after the Great Fire of London, and these groups were the forerunners of the modern London Fire Brigade also better organised fire protection came after the Great Chicago fire in 1871. Several insurance companies banded together under the name of the National Board of Fire Under writers (NBFU). According to William K. Bare.

2.5 ACTUAL FIRES

Recently Malhotra presented a paper in which three fires in concrete building of various sizes, types and occupancies were examined.

2.5.1 ANDRAUS BUILDING

"The Andraus Building is a 31-storey reinforced concrete department store and office building located in Saopaulo Brazil, fire occurred on 24 February 1972. A solid flame engulfed the entire building within 15 minutes after the fire started. It continued at high intensity for 3 to 4 hours.

The fire gutted many areas of the building there was no collapse of the building, although some load bearing members on the 25th floor were severely damaged. It was eventually repaired.

Three hundred and fifty people were rescued from the roof during the 4 hour period when the fire was most intense. Two hundred were rescued from a stairwell in the upper floors.

2.5.2 MILITARY PERSONNEL RECORD CENTRE

"The military record centre is a building 86m wide by 221m long. This 6 - storey structure was constructed of reinforced concrete floor and roof construction did not have expansion joints.

The fire began on 12th July 1973. It started on the 6th floor and burned out of control about 20 hours. It was extinguished in 4 days.

The building was inspected during and after the fire. Practically no structural damage occurred to the building below the sixth floor. The sixth storey was removed and the structure is now used as a 5 - storey building.

2.5.3 ONE NEW YORK PLAZA FIRE

"This building is a 50 - storey skyscraper shafts, stair towers, utilities and air conditioning supply and return air shafts. The structural frame was steel. A fire believed to have started on the 33rd floor of the building occurred on 5th August 1970, this was brought under control after 5 hours.

Most of the damage to the steel frame occurred at the interior portions in parts of the 33rd and 34th floors steel filler or intermediate beams on these floors were twisted or deflected several inches and the connecting bolts sheared off, allowing the filler beams in

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some sections to rest on the flange of the girder there was no structural collapse of the steel frame or floor system".

2.5.4 NIGERIAN TELECOMMUNICATIONS LIMITED NITEL IKEJA

"Nigerian Telecommunication Limited, NITEL Ikeja exchange was gutted by fire July 3rd 1996 this caused a phenomenal break in communication and the ripples spread to virtually every other sector of the economy, repairing the damage has cost the Government N2.385billion of tax payers' money this after two years of waiting".

Reported by Ibim Seminitari.

2.5.5 FIRE OUT BREAK IN NIGERIA 1989 - 1993

"The fire incidences during the period of 1989 - 1993 in office buildings claimed 59 lives and properties worth N1,380,562 million were lost during fire". According to the Federal Fire Services of Nigeria. As shown in table 4.1.

"Since 1946, Fire Brigade in the United Kingdom (UK) have been sending reports on all fires they attend to fire research station and from these comprehensive annual of fires are compiled. Deaths from fires were 822 and there were 5017 non-fatal causalities, material losses were of the order of L130 million (Pounds Sterling)". According to Building Research Establishment 1972 Annual Report.

2.6 FIRE PREVENTION IN OFFICE BUILDINGS

Fire resistance - is a property, currently measured in a British standard 476 (BS 476) part 8: 1972 furnace test, of a particular element of building construction and is the measure of its ability to satisfy for a stated period in minutes some of the following criteria are itemized below.

i. Stability - resistance to collapse or excessive deflection.

ii. Integrity - resistance to passage of flames and hot gases

iii. Insulation - resistance to excessive temperature rise on unexposed face.

The above mentioned criteria could be achieved through the following:-

2.6.1 a. Site Planning

b. Structural fire precautions

i. Planning for structural requirements.

c. Fire compartment and fire doors, Fire compartment - cavity barriers - opening through fire compartments, fire stops - fire doors.

d. Fire Officers Committee (FOC) Rules for construction.

i. FOC standards of construction.

ii. Fire proof doors, lobbies and shutters.

e. Automatic sprinklers installations and fire detectors

i. Automatic fire detectors installation

Part 1 Rules of the FOC

Part 2 systems not required for insurance purpose

Fire Detecting Devices

i. Heat detectors

ii. Smoke detectors

iii. Intruder detectors

f. Automatic Alarm Systems

g. Fire - extinguishing

i. Portable fire extinguishers

ii. fixed fire extinguishing systems

iii. Private water supplies, hydrants, Hose and Pumps.

h. Private Services.

2.7 FIRE - SAFETY CODES AND STANDARDS

Major elements of fire prevention technology are the codes and standards developed to prevent fires. The National Fire Protection Association (NFPA) publishes fire - Safety standards for such diverse areas as high rise buildings, Nuclear Plants (NFPA) standards are developed by committee of experts from appropriate fields.

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REFERENCES:

1. Building Research Establishment (1972) Annual Report London, (UK) PP. 43

2. Federal Republic of Nigeria Annual Abstract of Statistics (1995) Edition: Federal Office of Statistics Lagos PP.156

3. Fire Protection Assocaition (1968): Planning for Fire Safety in Buildings. 4th Edition, Published in London. (UK)

4. Hall F. (1979) Building services and Equipment. Volume 2 Longman, London (UK) PP. 85 - 102

5. Nduka, O. (1964) Western Education and the Nigerian Cultural Background. Oxford University Press, London. (UK) PP.21.

6. Ogogo, L. and Huoiza A. (1990) "National Primary Education Commission Headquarters Abuja. Unpublished M.Sc Arch. Thesis P. 1 – 5. A.B.U. Zaria.

7. O.O Ogunsute (1991): Introduction to Builiding Climatology A.B.U Press, Zaria.

8. Popoola, T. S. (1983) Relevance of Education on a Nation's Development. In Nigerian Herald, March 3rd Page 6. (Herald Nig. Ltd.) Ikoyi, Lagos.

9. Smith/Harmathy (1979) Design of Building for Fire Safety Baltimore, MD PP. 68 - 70.

10. Seminitari I. (1999) NITEL Fire Ikeja. Tell February 15th PP.12 (Tell Nigeria Ltd.) Ikeja, Lagos.

11. Taylor J. and Cooke G. (1978) The Fire Precautions Act in Practice, the Architectural Press. London. (UK) PP.5

12. Under down (1979) Practical Fire Precautions Gower Press London. P 139-397.

13. William K. B. (1978) Introduction to fire science and fire protection. John Wiley and sons New York, PP 25-35, 75-76.

CHAPTER THREE

3.0 CASE STUDIES

3.1 INTRODUCTION

Case studies are conducted on similar office buildings which are concurrently used to form a guide for the proposed design. (Education Tax Fund Headquarters) Abuja. The buildings are observed critically in terms of building description, planning concept, services/circulation structure and type of construction, merits and demerits all these are concurrently analysed.

Similar offices being conducted as case studies in Nigeria are Education Tax Fund Headquarters temporary office Abuja, Ahmadu Bello University Senate Building Zaria, Northern Nigeria Investment Limited (NNIL) Waff road Kaduna, Nigeria Industrial Development Bank (NIDB) Waff Road Kaduna and Foreign ones are Place Victoria Office Building, Montreal - Canada, Office Building of the Chase Manhattan Bank New York.

3.2 EDUCATION TAX FUND HEADQUARTERS ABUJA TEMPORARY OFFICE

ARCHITECT: ***Gumec Nigeria Limited***

Location: **Azores Street Maitama District**

DESCRIPTION:

The headquarters comprised of three blocks A, B and C Block A and B are administrative blocks while Block C is the maintenance block. Block A and B are two storey residential complex use as ETF headquarters as its office complex. The last floor

housed the office of the Executive Secretary in Block A while Block B and the following storeys housed other staff of the headquarters, as shown in fig 3.1 and plate I and II.

3.2.1 Planning Concept

The building in block A is a rectangular in form with a central staircase that acts as a conveyor between the two twin blocks. Reception hall, secretary are housed in general living and dining while self contained bedrooms housed office of the Executive Secretary and other staff. Still in general living toilet is located, which is now being used by staff and visitors.

3.2.2 Services Circulation

The central staircase serves as a main circulation space and due to the height of the building (2-storey) separate fire escape staircase is not required.

3.2.3 *Structure And Type Of Construction*

The headquarters (E.T.F) made up of solid block walls load bearing elements beams and columns and office dimension is 6m x 6m. Walls finish is smooth plaster with white emulsion paint. Building recesses act as sun shading devices. Terrazzo floor finish. Tiles floor finish in toilets and wall tiles, in kitchen converted to office red long aluminium roofing sheet.

3.2.4 Merits.

- The building is simple in form this ease fire fighting operations.
- Aesthetically good building
- The building is convertible to office use because all spaces are partionable
- Effective lighting and ventilation
- Good functional layout

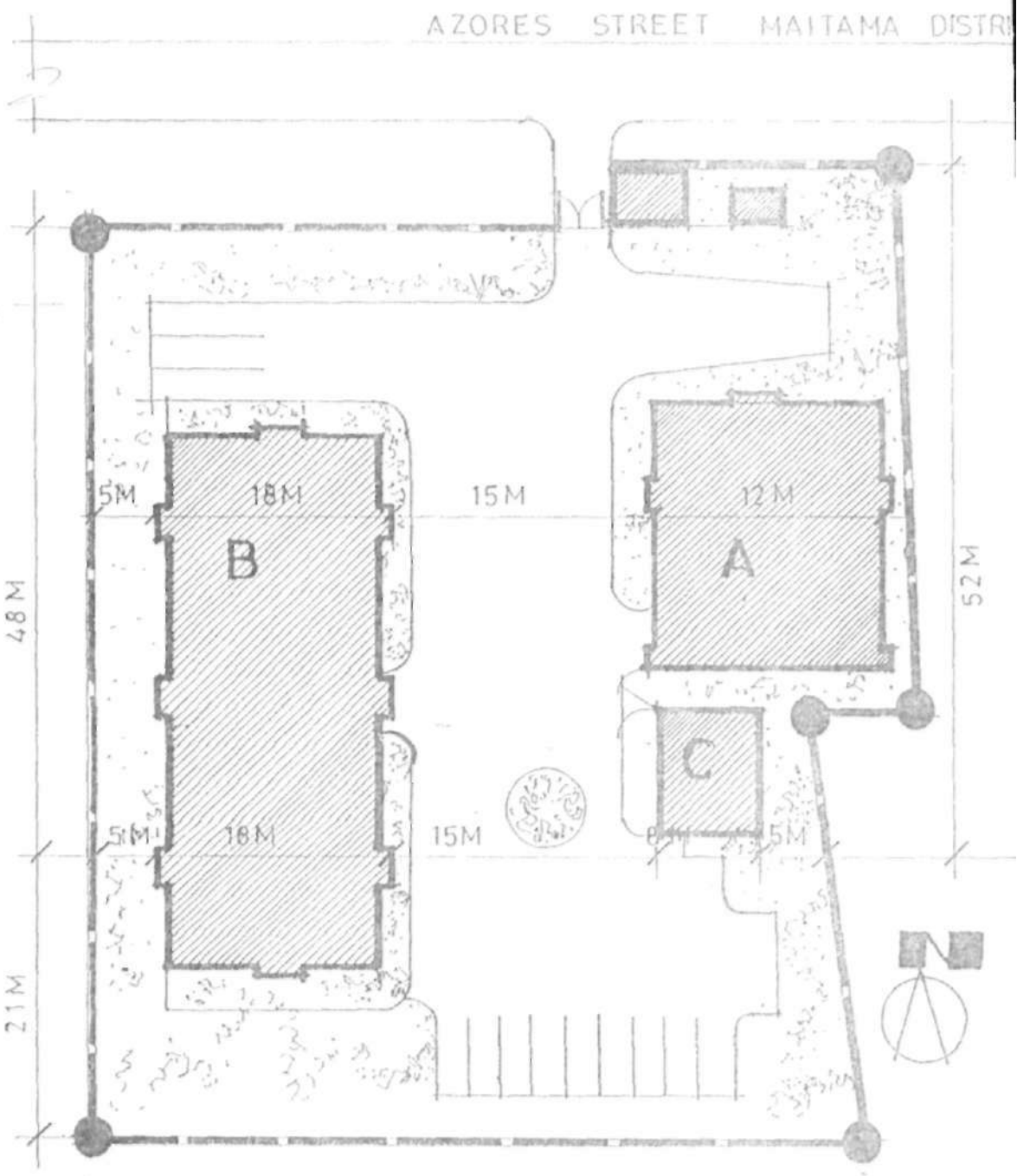


FIG. 3·1 site plan (ETF)
HEADQUARTERS ABUJA SCALE 1:500
SOURCE: GUMEC NIGERIA LIMITED ABUJA 1998

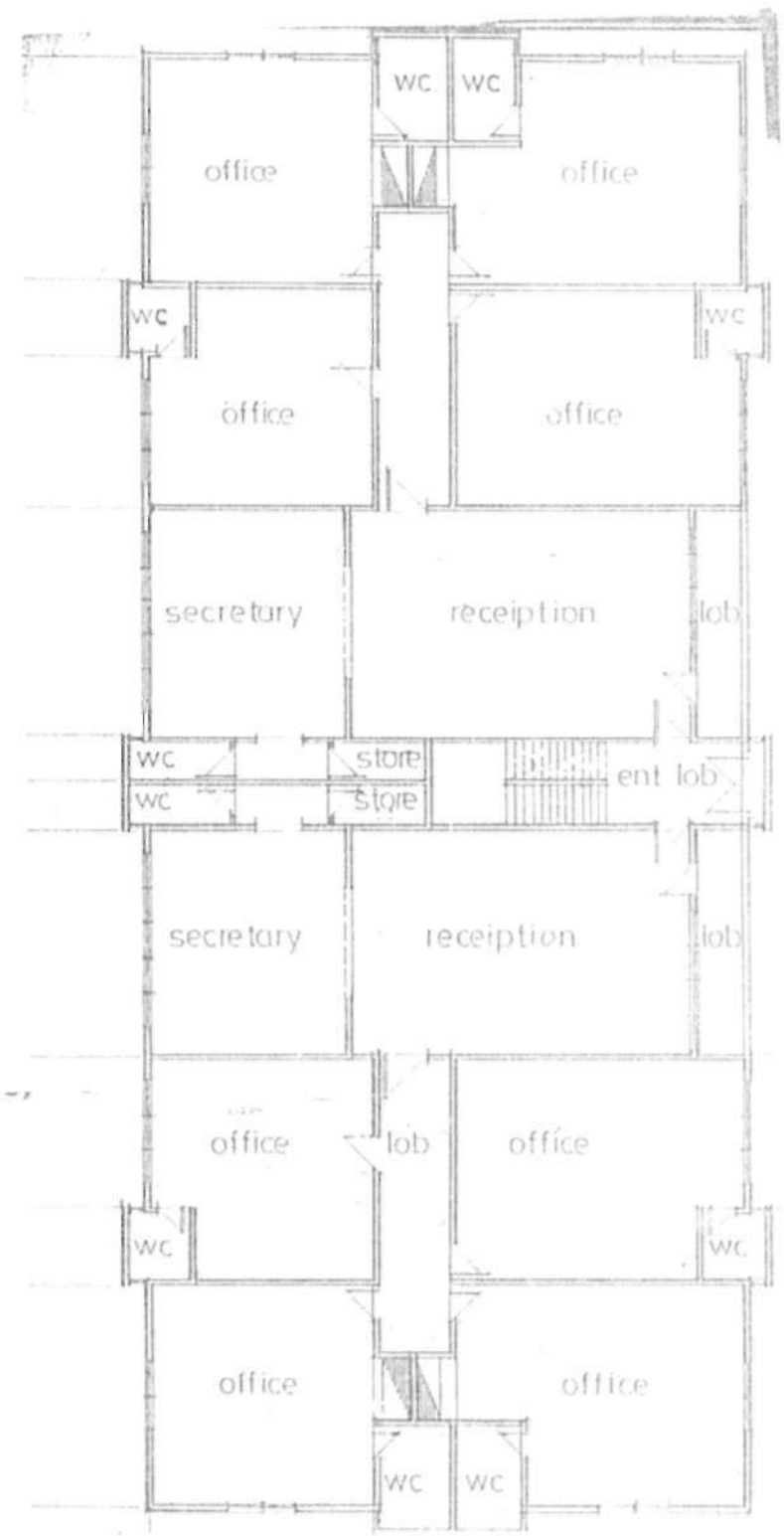


FIG 3.1.1 GROUND FLOOR PLAN SCALE
E.T.F. COMPLEX ABUJA
SOURCE: GUMEC NIGERIA LIMITED ABUJA 1998



FIG 3.1.2 GROUND FLOOR PLAN SCALE 1:200
E.T.F. COMPLEX
SOURCE: GUMEC NIGERIA LIMITED ABUJA 1998

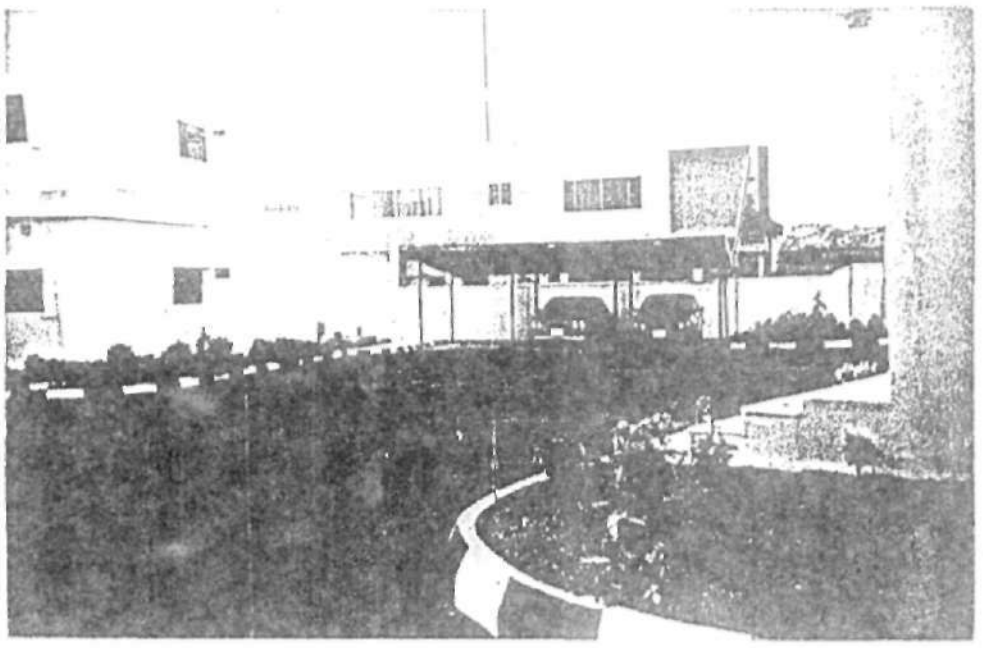


plate 1 FACADE OF ETF COMPLEX

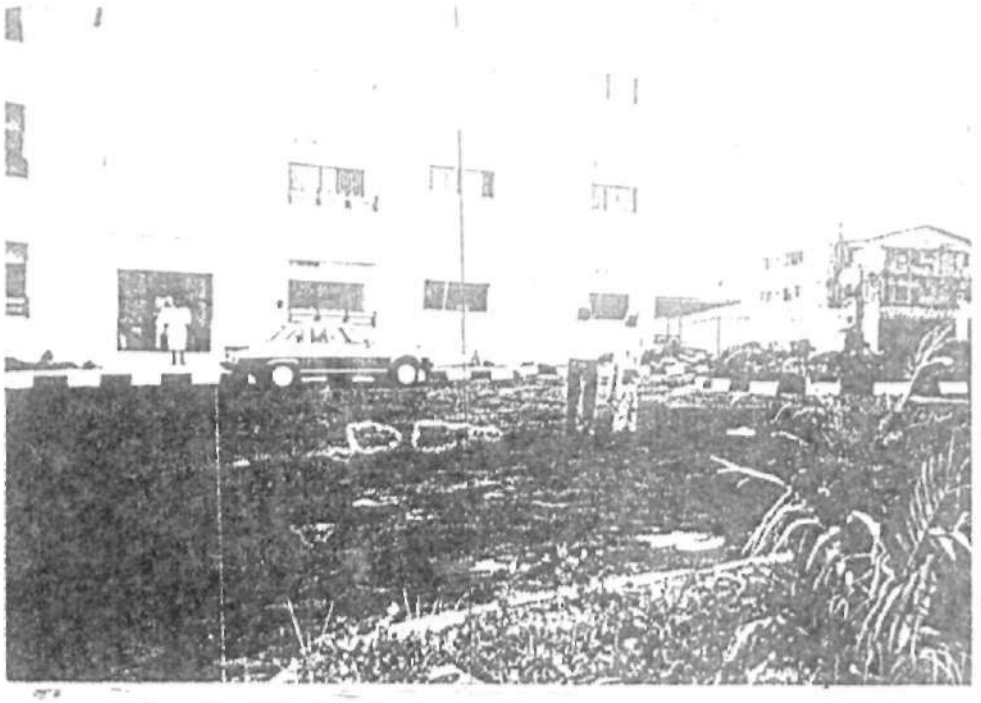


plate II FACADE OF ETF COMPLEX

- The building is successfully being used as temporary Education Tax Fund Headquarters because of its good architectural planning.
- Good site planning.

3.2.5 Demerits

- It is uneconomical to be used as office because of expenses incurred in conversion and renting
- Public are most often misguided of its residential outlook
- General reception for guests is lacking from the main entrance.

3.3 AHMADU BELLO UNIVERSITY SENATE BUILDING ZARIA

Architect: **Egbor and Associates**

Client: **Ahmadu Bello University Zaria**

Sponsor: **Ahmadu Bello University Zaria**

Location: **Main campus Samaru Zaria.**

Description:

Ahmadu Bello University Senate building is an 8 (eight) storey office complex located within the central part of the University. The building consist of tower and podium. The podium consist of a two storey plaza and the tower consist of a six storey tower, senate chamber is located in the second floor. The three arms of the University administration are Vice Chancellor's office, Bursary and the registry which are all housed in this structure.

3.3.1 Planning Concept

The senate building is square with a central void which enhances effective ventilation and lighting within the structure an end side central service core is used which housed three lifts, toilets and service ducts, its location enhances effective lighting, ventilation, maintenance, circulation and space utilization. Vice Chancellor's office is located at the top most floor following other offices in decreasing order in rank as shown in fig 3.2, 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5 and plate III, IV and V.

3.3.2 Service/Circulation

There are two escape stair cases located at equi-distant from the central part of the structure which are smoke proof and fire resistance structure, windows and doors.

Three lifts aid vertical circulation, two stair cases serve the first floor, toilets are located opposite escape staircases with service duct in between, this enhances effective maintenance.

3.3.3 Structure and Type of Construction

The senate building is made up of skeletal frame (columns and beams) reinforced concrete on grid of 6.25m x 6.25m ribbed concrete floor slabs of two way span. Walls, sun-shading devices are non structural elements. Textured finish walls and ceramic floor tiles finish. Windows are 1200mm x 600mm aluminium frames and weather resistant.

3.3.4 Merits

- Entrances are well defined and can convey large crowd of people in and out of the building.
- Well-defined lifts allocation which make it easily accessible.
- Good Architectural Planning

- Good workmanship
- Smoke proof staircases good for escape during fire.
- Effective ventilation is achieved through single banking, void and lift-up space provided in east-south facades.

3.3.5 Demerits

- Tower and podium planning act as obstruction during rescue operation and fire fighting.
- Improper location of escape stair cases
- Office space utilization is ineffective due to columns obstruction
- Parking space not enough during special occasions e.g. convocation
- Undefined public toilets this makes it difficult for public to use
- Central air conditioning disturb structural stability of the building.

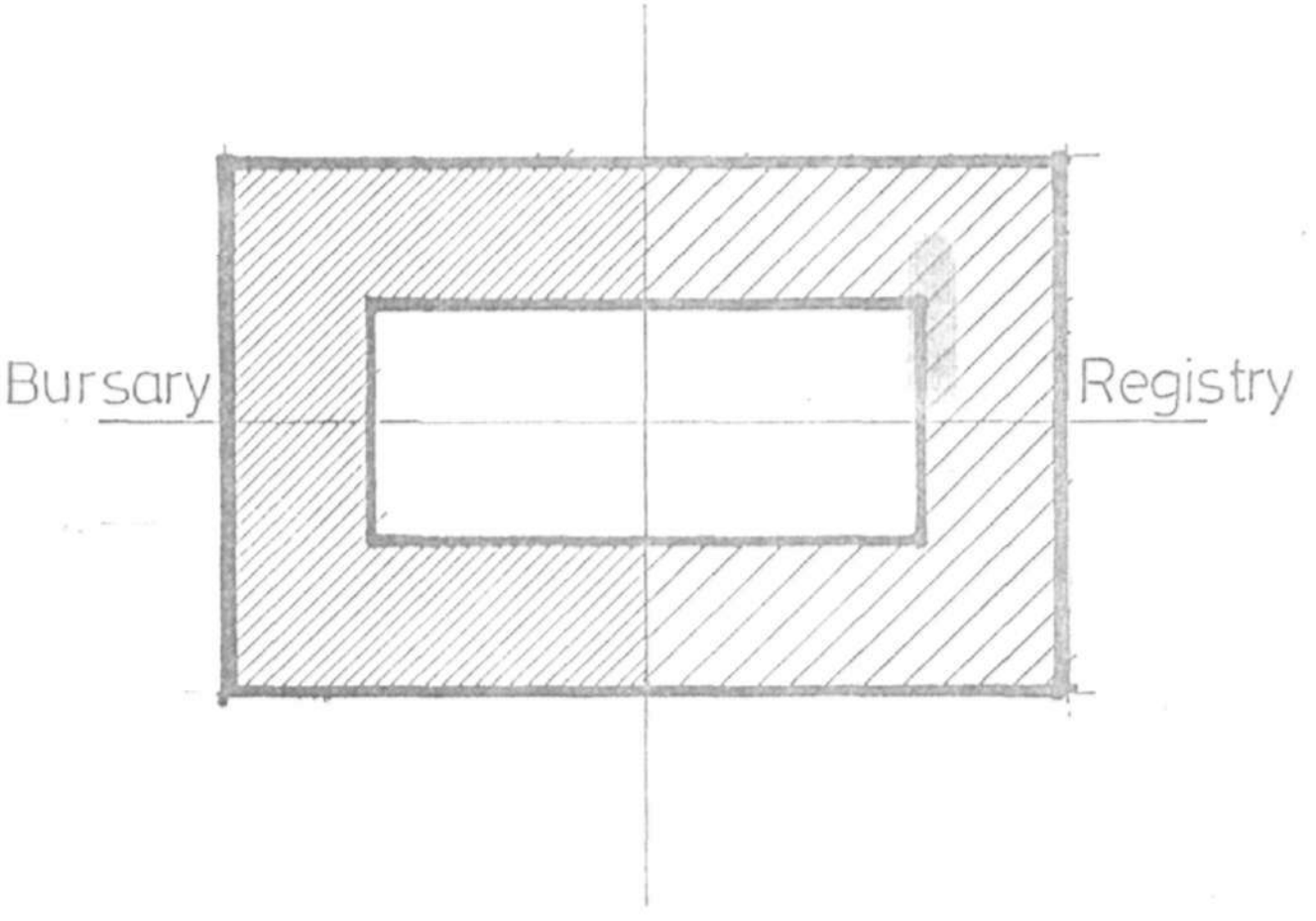


FIG. 3·2 Planning concept of A.B.U. senate building.

SOURCE: A. B. U. MAINTENANCE DEPT. FAC. OF AGRICULTURE

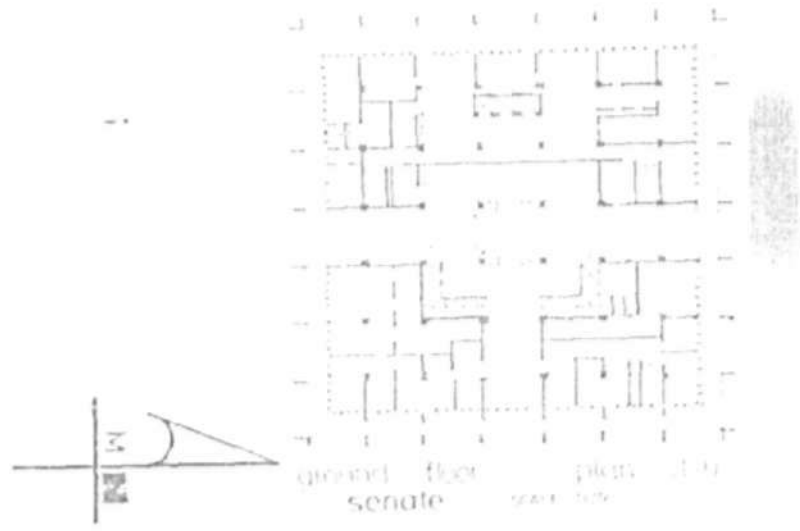


FIG. 3.2.1 GROUND FLOOR PLAN A.B.U. SENATE BUILDING.
SOURCE: A.B.U. MAINTENANCE DEPT. FAC. OF AGRICULTURE

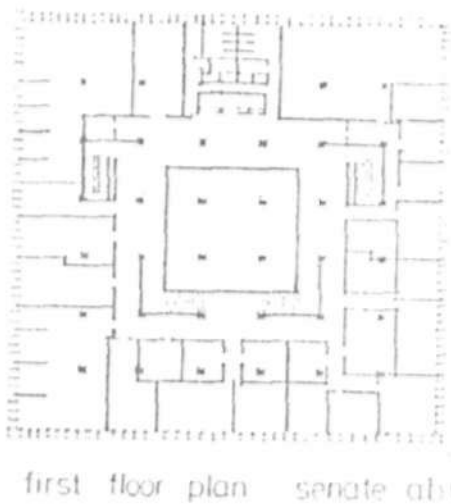


FIG 3.2.1. FIRST FLOOR PLAN
SOURCE: A.B.U. MAINTENANCE

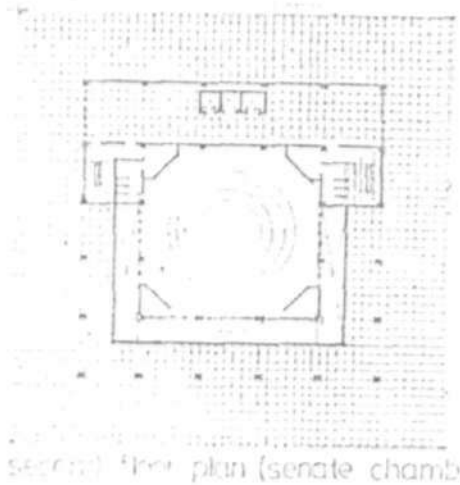


FIG 3.2.3 SECOND FLOOR PLAN
DEPT. FAC. OF AGRICULTURE



PLATE III FACADE OF A.B.U SENATE BUILDING

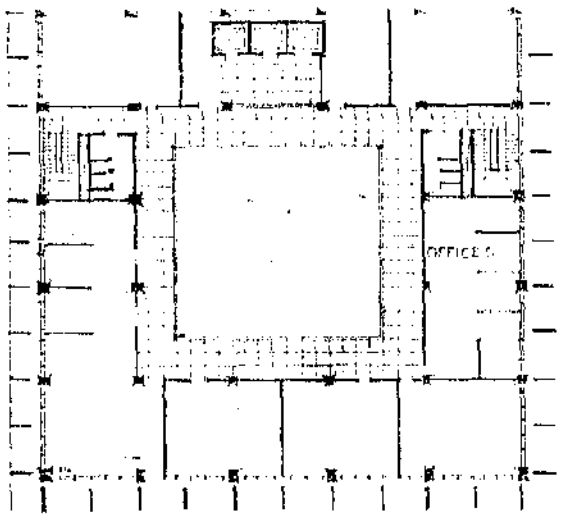


FIG 3.2.4 FOURTH FLOOR PLAN
typical floor
SOURCE: A.B.U. MAINTENANCE DEPT. FAC.OF AGRICULTURE

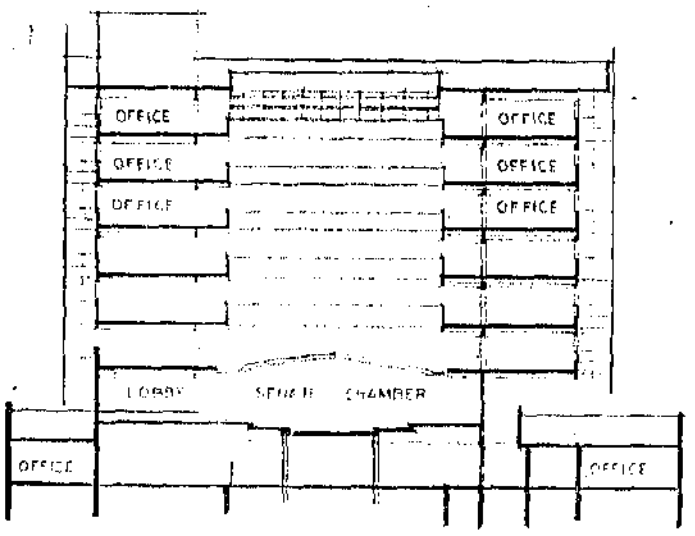


FIG 3.2.5. SECTION THROUGH SENATE BUILDING
SOURCE: A.B.U. MAINTENANCE DEPT. FAC.OF AGRICULTURE

LIBRARY

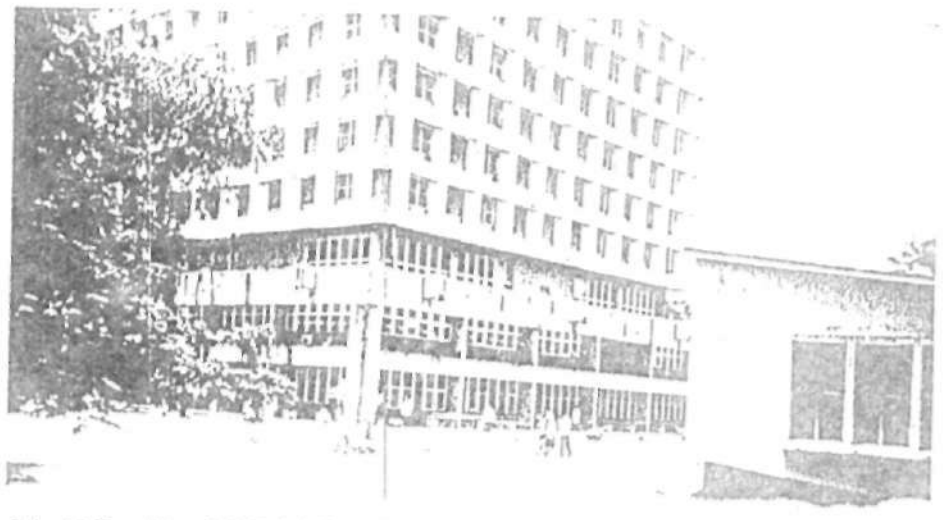


PLATE IV FACADE OF A.B.U. SENATE BUILDING

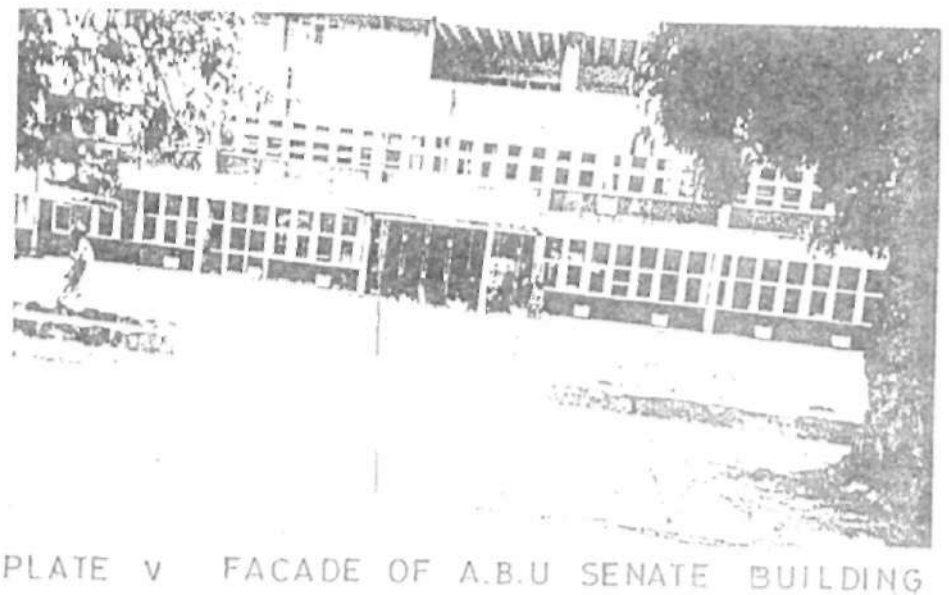


PLATE V FACADE OF A.B.U SENATE BUILDING

3.4 NORTHERN NIGERIA INVESTMENT LIMITED (NNIL) WAFF ROAD KADUNA

Architects: **Archcon Nigeria**

Contractors: **New Nigeria Construction Company (NNCC)**

Sponsor: **Northern States of Nigeria**

Date of Completion: 1983

Description:

The NNIL building is a 7-storey office complex located along Waff road Kaduna. The building is an L shaped form. The longer axis housed offices, goods lift, toilets and fire escape staircases. While the shorter axis housed entrance porch, circulation staircase in the centre, three lifts which aid vertical circulation are located in the reception hall. Toilets and Fire escape stair case are located at the end of this wing. Parking spaces are located at the western and southern facades as shown in fig. 3.3, fig. 3.3.1 and fig. 3.3.2 and as shown in plate VI and VII.

3.4.1 Planning Concept.

The NNIL building is an L shaped form. Central service core housed lifts while toilets are separated at the end of structure.

3.4.2 Services/Circulation

There are two fire escape staircases each located at the end of each wing. The staircase are open to the outside as shown in plate VII. Artificial sun shading devices are used in some parts of the building while in other parts sun shading devices are incorporated in the design.

Aluminium frame windows are used while sliding and flush doors are used in reception hall and in offices.

Three lifts aid vertical circulation while two staircases act as fire escape staircases. The central staircase acts as a vertical circulation aid.

3.4.3 Structure And Type Of Construction

The NNIL building is made up of skeletal frame, beams and columns construction is employed. Partitions walls are non load bearing. The sun shading devices are also non structural elements. The structural grid is 6m x 5m. Planed concrete floor slabs. Wall pattern textured finish, terrazzo floor finish, concrete tiles floor finish.

3.4.4 Merits

- Well defined entrance
- Good Architectural Planning
- Good location of toilets, lifts and staircases
- Ample lighting and ventilation
- Enough parking space for staff and visitors

3.4.5 Demerits

- Toilets are far from offices so time and energy are being wasted
- Toilets are not enough
- Staircase, lifts are far away from offices and combustible partionable material is used in offices partition.



FIG 3.3 SITE PLAN NNTL BUILDING KADUNA SCALE 1:1000
SOURCE: ARCHCON NIGERIA 1983 KADUNA

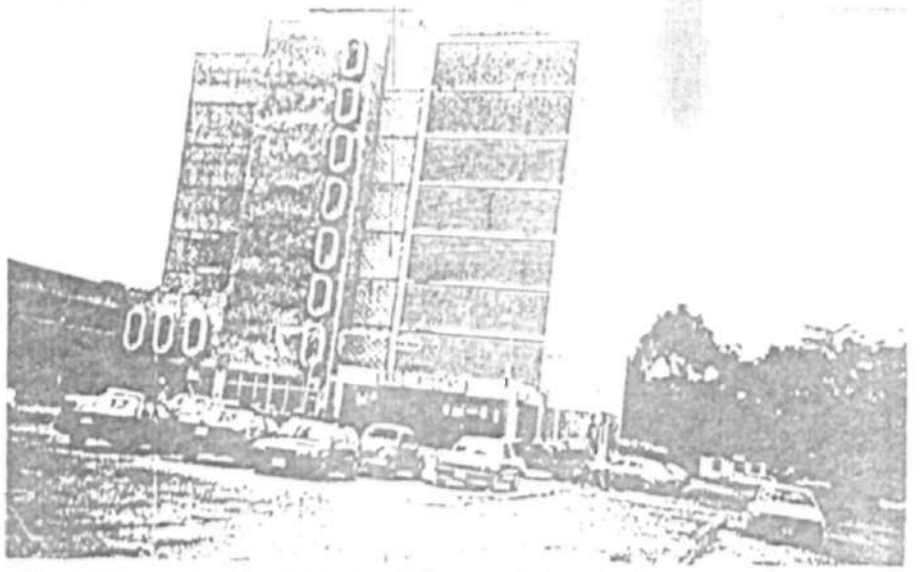


PLATE VI FACADE OF NNTL BUILDING KADUNA

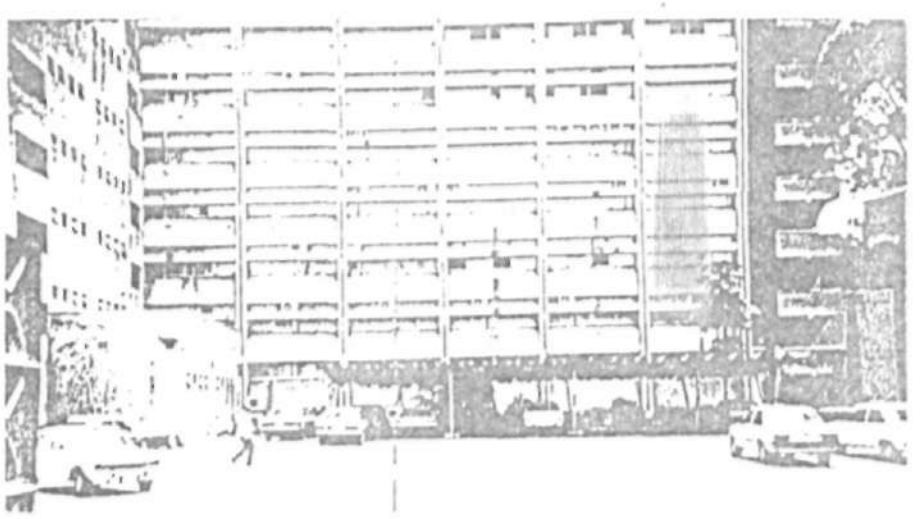


PLATE VII FACADE OF NNTL BUILDING KADUNA

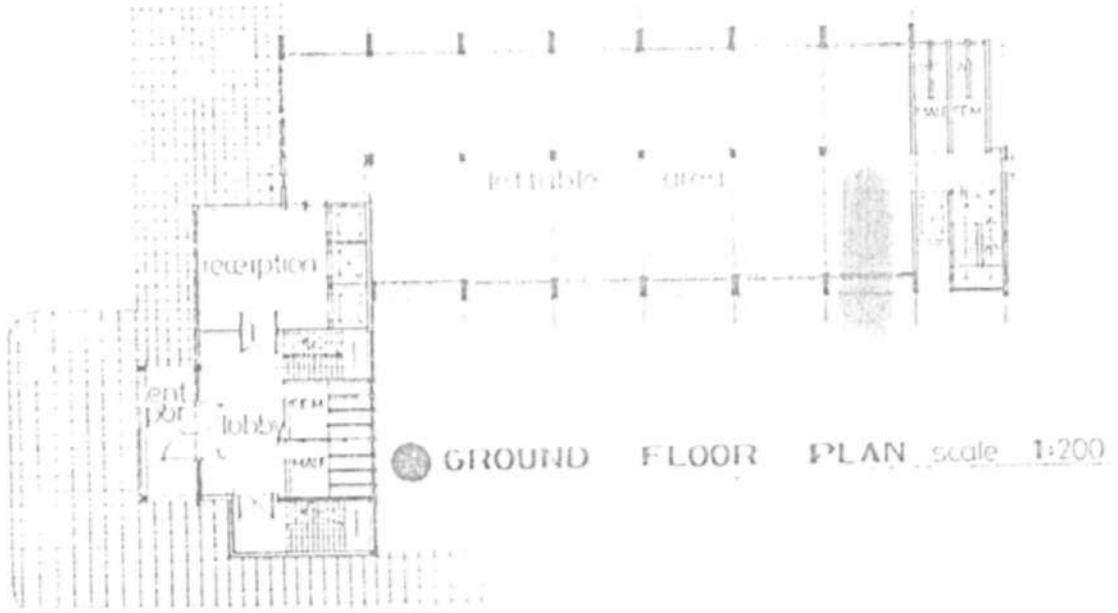


FIG 3.3.1 GROUND FLOOR PLAN
NNIL BUILDING KADUNA
SOURCE: ARCHCON NIGERIA 1983 KADUNA

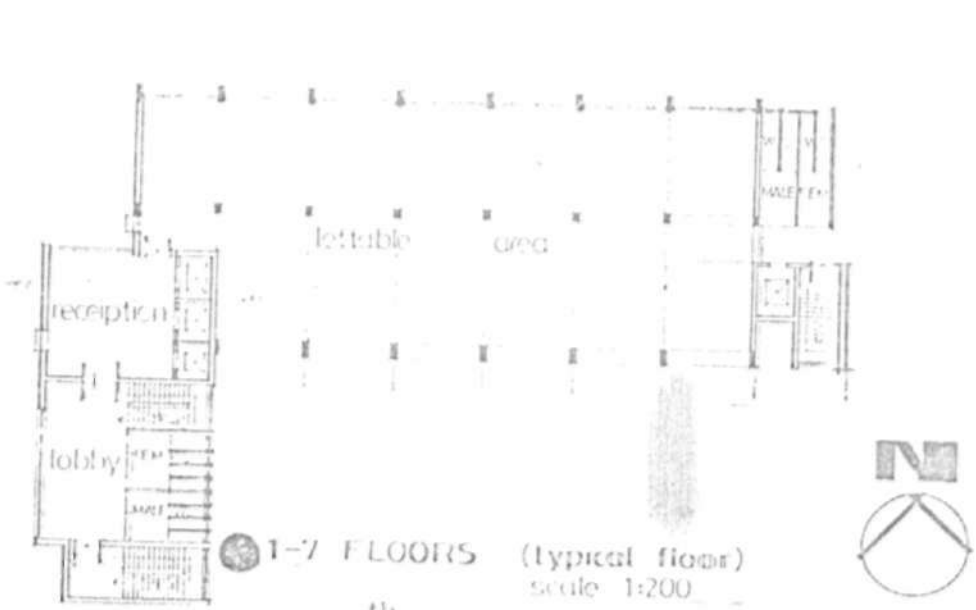


FIG 3.3.2 1 - 7th FLOORS TYPICAL
NNIL BUILDING KADUNA
SOURCE: ARCHCON NIGERIA 1983 KADUNA

3.5 NIGERIA INDUSTRIAL DEVELOPMENT BANK (NIDB) WAFF ROAD KADUNA.

Architects: **Y.M and Partners Arewa Hotels Headquaters Kaduna**

Client: **Government and investors**

Sponsor: **Government and investors**

Date of completion: **July 1984**

Location: **Waff Road Kaduna**

Description:-

The NIDB building is a 7-storey office complex located along Waff road Kaduna. It is rectangular in form. The building entrance is centralized with equal distance from each wing. Three lifts and central staircase aid vertical circulation while the two fire escape staircases are located at the end of each wing. Fire escape staircase is smoke proof. Toilets are centrally located, all the 7-storey are lettable office spaces, parking spaces are located at the entrance façade of the building as shown in fig. 3.4 and 3.4.1 and plate VIII and IX.

3.5.1 Planning Concept.

The NIDB building is a rectangular form which housed lettable office spaces, lifts, toilets and vertical circulation staircase, fire escape staircases are located at the end of each wing (two fire escape staircases).

3.5.2 Services/Circulation

There are two fire escape staircases located at the end of each wing. They are smoke proof and each have a door leading to the outside.

Aluminium frame windows are used while sliding and flush doors are used in reception hall and in offices.

Three lifts aid vertical circulation, while two escape staircases act as fire escape which are smoke proof.

3.5.3 Structure And Type Of Construction

The NIDB building is made up of load bearing walls (block walls) columns and beams construction, this comprises of internal and external walls, decorative facing tiles are used in the external wall finish, as well as white emulsion paint finish, well defined entrance hall.

3.5.4 Merits

- Good spatial organisation
- Aesthetically pleasing building
- Fire escape stairs are adequate and well located.
- Proper location of lifts, toilets and central staircases.
- Cross ventilation is achieved.
- Good site planning and building orientation
- Effective and decorative sun shading devices
- Fire compartmentation in office planning is employed
- Parking spaces well landscaped

3.5.5 Demerits

- Rigid planning negates possible and needable offices expansion
- Long corridor is used

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- Central location of toilets act as source of bad smell when bad this makes the occupants feel uncomfortable.

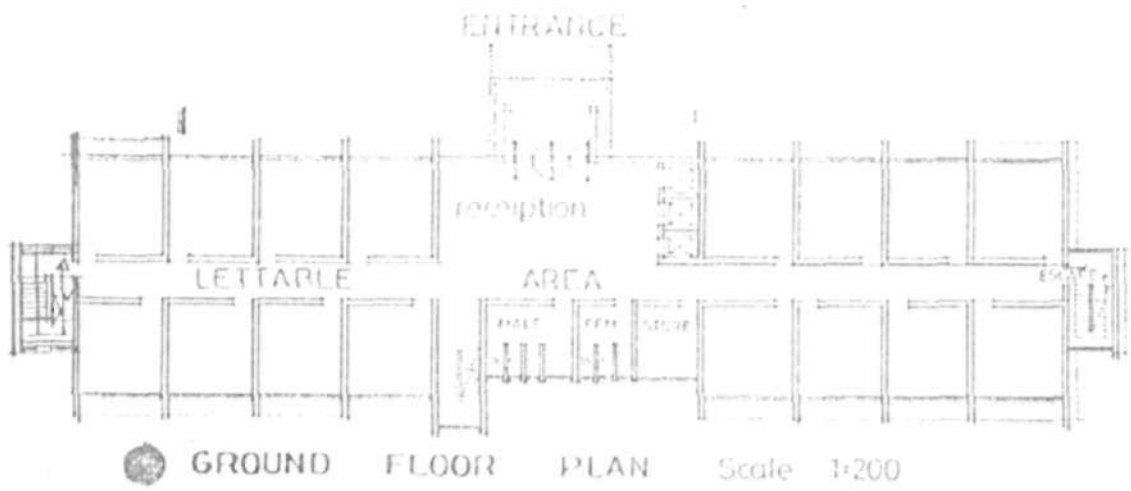


FIG. 3.4 GROUND FLOOR PLAN **NIDB** BUILDING KADUNA
SOURCE: Y.M. AND PARTNERS 1984 KADUNA.

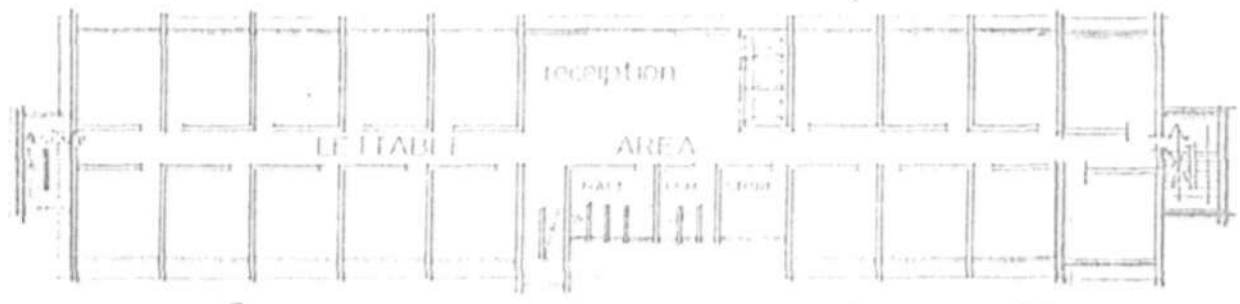


FIG 3.4.1 1-7 FLOOR PLANS **NIDB**, KADUNA
SOURCE: Y.M. AND PARTNERS 1984 KADUNA.



PLATE VIII FACADE OF NIDB BUILDING KADUNA

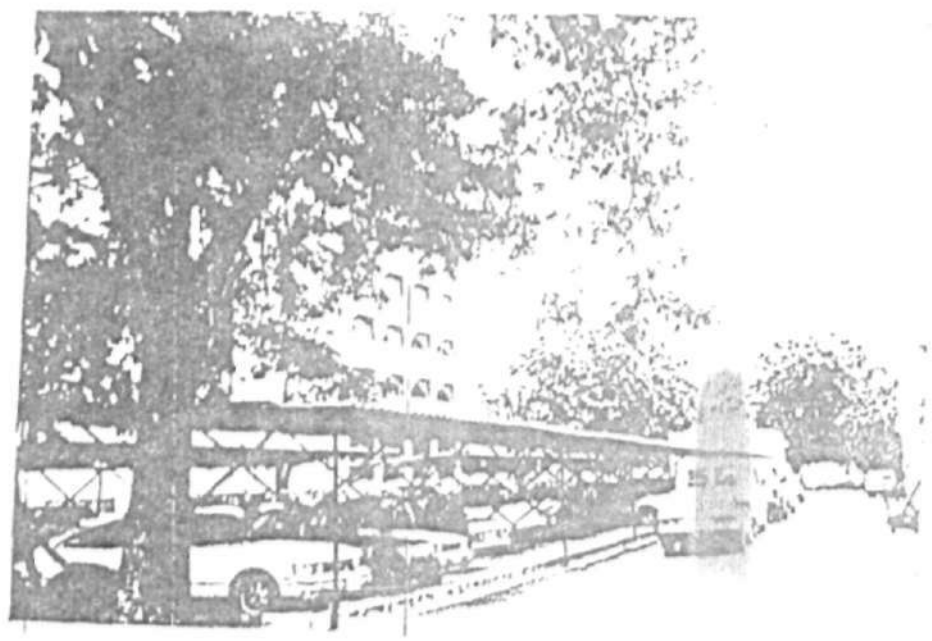


PLATE IX FACADE OF NIDB BUILDING KADUNA

3.6 PLACE VICTORIA OFFICE BUILDING MONTREAL CANADA

Architects: **Luigi movetti with Greenspoon, freelander and Dune**

Civil Engineer: **Pier Luigi Nervi**

Client:

Location: **Central Business district of Montreal**

Description:

Place Victoria complex is located in the central business district of Montreal which covers 200 acres of land. It is located at the northeastern edge of the town centre. The tower covers a height of 624 feet which is 47-storey high and out of which forty-three floors are offices. The offices are peripherally placed and are reached through installations cove as shown in fig 3.5 and plate X.

3.6.1 Design

Place Victoria office building 2-basements, which are lowest and are used as garages. In the upper basements are 35 shops, 5 restaurants, a post office and a large auditorium, which can also be used as a cinema. The mechanical installations are concentrated on the 4^{th}, 18^{th} and 31^{st} floors respectively.

The anti-seismic reinforced concrete structure acts as a remarkable feature. The four columns that are located at the corners in the square core of the building are linked by 2 diagonally placed intersecting concrete slabs which absorb the lateral thrust. In order to obtain additional brazing core and columns are rigidly joined at the 3-mechanical floors by X shaped concrete diaphragm. In this way, lateral thrust in transmitted safely to the vertical elements of the structure.

3.6.2 Services

The service core is centrally located and rigidly joined to these columns at the 3-mechanical floors by X-shaped concrete diaphragms. The building features, 12 passengers lift and 1 good lift with 2 service shafts. Two fire escape stairs with the service core inclusive also are the lavatories.

3.6.3 Materials:

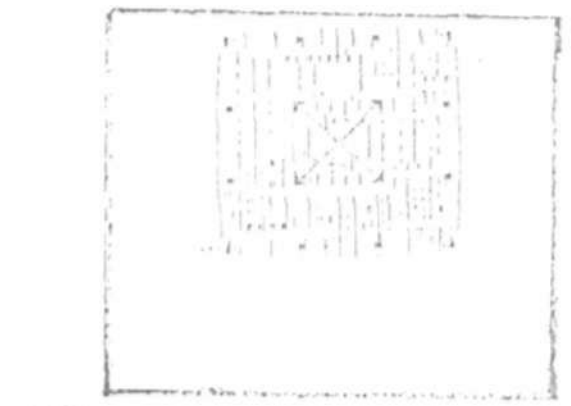
Concrete and steel reinforcement, glass gum aluminium with its continuous vertical mullions marble paved lobbies.

3.6.4 Merits

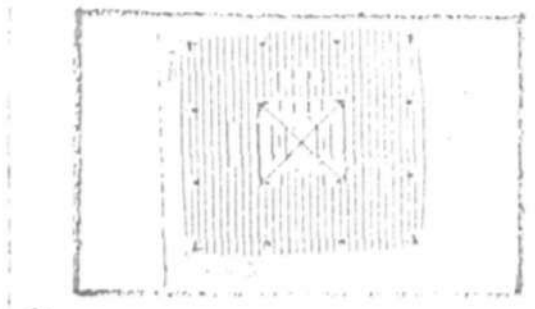
- Good Architectural planning this is in functional layout of offices and other functions housed in the building.
- Good spatial organisation in office layout and flexible design therefore spaces can be reorganize.
- Good and adequate location of lifts, toilets and stair cases.
- Economically sound design for office use and other functions.
- Good locations of central service core.
- The solidity of the structure was achieved by the use of external tapered columns
- The framework of the building allows for re-organisation and reconstruction of the structure.
- Balance and harmony is achieved through simple use of rectangular plane and vertical growth of the building.

3.6.5 Demerits

- Fire escape stair cases act as a death trap during fire, this is because it serve as smoke collection point.
- The central service core may not be good for maintenance especially in developing countries where maintenance culture is poor.
- Deep office planning makes ventilation and lighting inadequate.
- The height of the building makes it very difficult for occupants to escape unaided during fire, this calls for provision of external balconies for temporary refuge during fire, which is lacking.



GROUND FLOOR PLAN



1-47th floors (typical floors)



FIG 3.5 GROUND FLOOR PLAN 1-47th FLOOR PLANS OF PLACE VICTORIA OFFICE BUILDING MONTREAL CANADA.

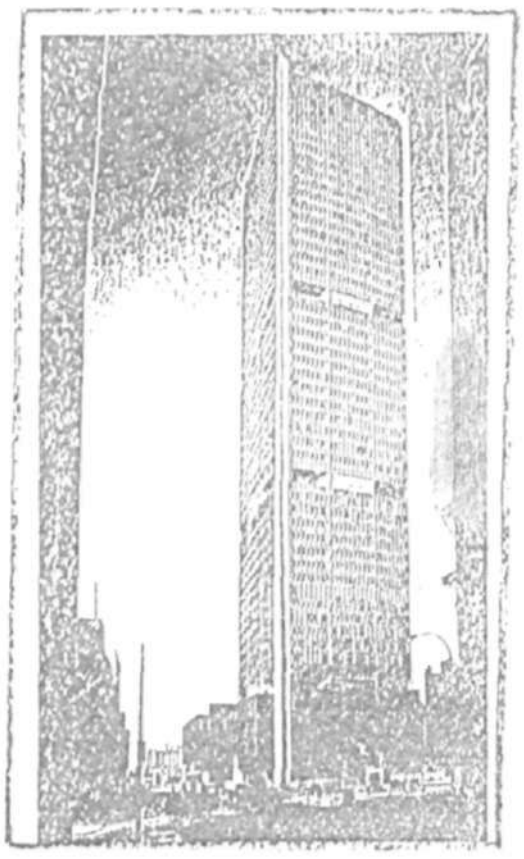


PLATE X PERSPECTIVE VIEW of
Place Victoria office building
Montreal Canada.

3.7 OFFICE BUILDING OF THE CHASE MANHATTAN BANK NEW YORK.

Architects: **Skidmore, O wings and Merrill**

Client: **Chase Manhattan Bank**

Location: **New York Wall Street, New York**

Description:

The new building of the chase Manhattan Bank on a site immediately adjacent to their previous head office in wall street, provides good example for the creative effect of a major building project as central area town planning. The project provides the impetus for the redevelopment of the entire district. The tower is 800ft high in the shape of a regular rectangular parallel piped with continuos aluminium cum glass facades. 30% of the plot area is built above street level. The remaining 70% is used as a revised public plaza with stairs, plantation and pools of water as shown in plate XI and Fig. 3.6.

3.7.1 Design

The first 2-storey serve as a landing for the lifts. Escalators lead to the banking rooms below the plaza. The 3rd basement below the plaza is reserved for gold and shares deal whilst the 3 foundation basement lower down contain cheques and data processing departments and the vault which always contain about 35,000 million dollars. The subsequent floors up to 30th are used for the banks own purposes. On the 33rd floors, half way up, is the telephone exchange. The 34th to 50th and 53rd to 58th floors are let. 59th floor is the "Wall Street club", on 60th floor the both the executive dining suite with a panorama which provides on all the more climatic view of the street canyons.

The steel structure is strong exceptionally at the core inner columns are located on the long sides the aluminium clad columns are outside the façade whilst those on the

short sides are set back behind the curtain wall. The office floors have not entirely symmetric layout with 2 longitudinal corridors and are also divisible.

3.7.2 Services

The service core is centrally located which housed 36 lifts serving different groups of floors. The 11th , 12th, , 31st and 32nd floors as well as the roof storey contain technical installations. The service core contains 4-fire escape stair cases, lavatories, refuse disposal chutes, mail chutes and stores.

3.7.3 Materials

The steel is used as structural framework and strong exceptionally due to the height of the building. The elevations are decorated completely with aluminum cum glass. Concrete is used but little.

3.7.4 Merits

- Good Architectural solution to mixed use problem
- Free flow of spaces is achieved in the design
- Effective ventilation and lighting is achieved in the design
- Security is provided in the design of the complex by effective organization and arrangement of functions.
- Enough fire escape staircases are provided in the central services core
- The structure is solidly design and this gives it the architecture that stands the test of time.

3.7.5 Demerits

- Corridors are too long therefore reaching different functions at the same time may be difficult

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- Central location of service core may be very difficult to maintain
- Toilets act as a source of bad smell when in bad condition therefore this makes bad smell originating therefrom discomforts the occupants.
- Spaces are wasted as service floor area in the first 2-storey, which are used as a landing for the lifts.
- Balconies that act as a refuge area are lacking this makes rescue operations very difficult.
- Helicopter pad is lacking this should have been provided to ease rescue operations so that more lives and properties worth millions of Naira are saved



FIG 3·6 PLANS OF CHASE MANHATAN BANK NEW YORK

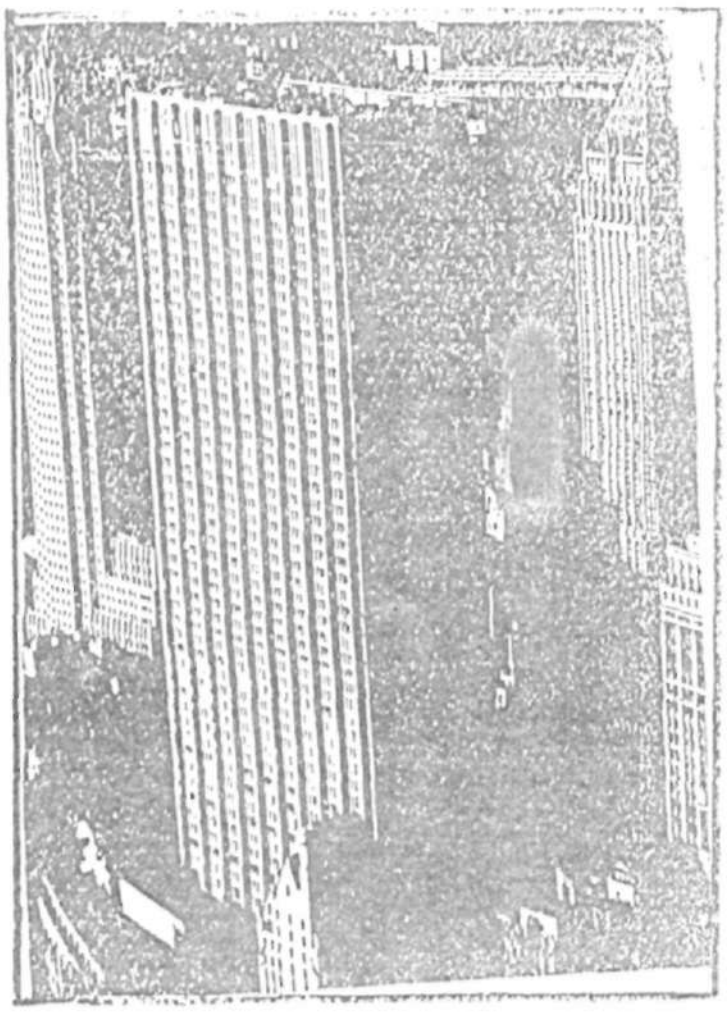


PLATE XI PERSPECTIVE VIEW OF OFFICE
building of Chase Manhattan bank
NEW YORK

REFERENCES

1. Ahmadu Bello University Maintenance office Faculty of Agriculture Samaru Zaria. Project office.
2. Archcon Nigeria, Kaduna project work.
3. Amos O.O (1992) "EKO TOWER" Design of an office complex for Lagos State Development and Property Corporation, Unpublished Msc. Arch Thesis P50 – 60. A.B.U. Zaria.
4. Education Tax Fund Headquarters Abuja temporary office Abuja. (Director of Management and Legal Services schedules of staff).
5. Nigeria Industrial Development Bank NIDB Waff road Kaduna Branch Kaduna.
6. Northern Nigeria Investment Limited NNIL Kaduna Waff Road (Management board).
7. Y.M and partners Arewa Hotels Headquarters Kaduna Project work.

CHAPTER FOUR

4.0 FIRE PREVENTION IN OFFICE BUILDINGS

4.1 INTRODUCTION

Fire outbreak in Nigeria is becoming daily news and an issue of concern, properties worth millions of Naira are being lost during the inferno and a lot of lives are also being lost. As shown in table 4.1.1 shows the incidence of fire from 1989 – 1993 in domestic private fire, factory/industrial fire and others. In 1990 another prominent building NEPA house at Ikoyi Lagos was engulfed by fire and properties worth millions of Naira were lost.

Another fire outbreak occurred at Federal Ministry of Education Headquarters along Moloney Street, Lagos as shown in Fig 4.1. Two floors of the finance department were destroyed and had cost fifty million Naira to rebuild also the eleven storey republic building housing the external and internal affairs ministries was engulf by fire in December 1982, a lot of properties worth million of Naira were destroyed, also importance records were not spared. Two prominent fire incidences were reported to have occurred in Abuja a week later in 1992 December. The first incident occurred at the Accounts department of the federal capital development authority Suleja, Abuja and second at audit department federal capital territory administration Gwagwalada Abuja, properties worth million of Naira were also lost.

The Nigerian External Telecommunications (NET) a thirty seven storey building in Lagos was engulfed by fire outbreak on Monday, 24th January, 1983 which is the

tallest building in west Africa. The fire incidence starts from the seventh floor where a canteen is located and spread to twenty-seventh floor upwards a lot of lives and properties worth million of Naira were lost during the inferno as shown in fig 4.2.

The prominent Cocoa house a twenty five-storey building at Ibadan in Oyo state was also engulfed by fire in January, 1985 two lives and properties worth million of Naira were lost during the inferno as shown in fig. 4.3.

In view of massive destruction of lives and properties in high rise office buildings as enumerated above this problem, need to be revisited and tackle right from the design stage by the Architect provision of latest fire fighting equipment in the premises should be encouraged.

Therefore it is very important for the research of this nature to be undertaken and this justifies this thesis research.

4.2 WHAT IS FIRE?

Fire is the rapid oxidation of combustible materials and gases, producing heat and light. If a combustible material (called "fuel") oxygen, or heat can be removed or prevented from coming together there will be no fire. Three elements of fire: Fuel, Oxygen and Heat are present in the proper ratio and in sufficient quantity to produce heat and light (energy).

The absence of oxygen during fire causes fire to ceases burning, fuel + heat – oxygen = no fire, oxygen + fuel – heat = no fire, oxygen + heat – fuel = no fire, so fire to occurred there must be proper amount of oxygen + heat + fuel (carbonmonoxide, co) and halon gases are used as fire extinguishing agent.

Fuel - Any material liquid, solid and gas that aid fire burning. Solid such as timber, paper, asbestos ceiling, concrete, blocks, soil, rubber and coal is called fuel.

Liquid – paraffin, gasoline, petrol etc

Gases – butane, butylenes and the domestic coal gas. The surface area of solid is large and this encourages quick ignition and burnt swiftly.

a. Heat

Heating and ignition temperature is the minimum temperature to which a material must be heated in air to initiate self sustained burning (combustion).

Liquids are heated to the point of their flammable vapours by the surrounding atmosphere. Flash cover is usually defined, as the sudden and dramatic simultaneous ignition of most combustible materials and gases in a room or area.

In gases heating and ignition takes places in one stage because already they are in the vapour form. The vapours however need a tiny flame to ignite them and some can be ignited with less heat

b. Oxygen

Oxygen is important for oxidation (combustion) to take place, fuels vary in the proportion of oxygen to fuel vapour required for burning. Liquids ceases to burnt if the oxygen content is less than 15% whereas oxygen content less than 6% then solid materials cease to burnt, gases ignite in relations to air supply in the same way as flammable vapours.

4.3 CLASSIFICATION OF FIRE

British standard 45 47: 1970 classify fire into the following:

Class A – Carbonaceous, which included wood, paper, cloth and similar solid materials

Class B - Petrol, oil, grease, fats and similar flammable liquid.

Class C – Electrical fire.

Class D – Combustible metals.

As shown in table 4.1

4.4 INITIAL SPREAD OF FIRE

The availability of sufficient fuel and means of ignition does not warrant fire to occur unless fuel occur in a suitable physical state to continue the burning. Therefore, for a fire to occur the means of ignition must provide a source of heat that will raise a temperature of the immediate adjacent material (fuel) to that at which it will continue to supply sufficient heat from itself to maintained combustion.

a. Fire spread

Fire spreads through conduction, convection and radiation.

i. Conduction – is the transmission of heat energy through a substance it is common to solid fuels only.

ii. Convection – is the transmission of heat energy through a substance by the motion of that substance.

iii. Radiation – is the transfer of heat energy via rays travelling in a straight line from a source.

b. Flash point – The flash point of a liquid is the lowest temperature at which sufficient vapour is given off to form a mixture with air that will ignite near the surface of the liquid.

c. Ignition – means the propagation of flame away from the source of ignition.

The lower the flash point the greater is the danger especially if the ambient temperature is higher than the flash point. This means in effect that the liquid is given off vapour when exposed to the air under normal room temperature and that the vapour will ignite from any spark or flame. A liquid can, of course, be above its flash point and giving off flammable vapour but unless a source of ignition is provided no fire will occur.

d. Self- ignition temperature

Self-ignition temperature is that temperature at which any susbstance (solid, liquid or gas) will take fire when exposed to the air without any external source of ignition. This temperature is not so easy to specify because quite a number of considerations affect it, even the quantity present and the size and shape of the container. Stated self ignition temperature should be used as a guide rather than a definite figure.

e. Explosive Range

If there is sufficient air mixed with a gas or vapour (and a cloud of explosive dust act as cover) ignition will not take place.

If conditions are reversed and there is too little of the flammable content in the mixture, the particles are then too far a part to enable them pass sufficient heat from one to another to enable combustion to take place continuously.

i. Explosive range is the difference between the maximum and minimum is known as the explosive range or flammable range. This varies with the

temperature and pressure and is always given as based upon normal temperature 0°C and normal pressure 760mm.

f. Explosion

The difference between explosion and combustion is generally that in an explosion the whole chemical reaction of burning is completed almost instantaneously, ordinary combustion there is a gradual and continual heating up of the material and a continuing chemical reaction.

g. Vapour Density

Vapour density is the relative density of a gas or vapour compared with that of air, which is taken as 1 vapour densities cannot be expressed for substance which dissociate on heating.

4.5 CAUSES OF FIRE IN OFFICE BUILDING

i. Packing Department

The most common danger in the packing department are pieces of packing materials cut off and dropped loose on the floor, provisions for these to be collected and placed in covered metal bins. Wood wool is a particularly hazardous material being light, very flammable and creating a large quantities of smoke.

It is essential that no loose wood wool should be allowed to remain on packing hence all surplus material being immediately returned to the bin and no parcels containing wood wool allowed to remain uncovered.

Corrugated paper has an additional danger to ordinary packing paper because it has a central space which brings a much greater surface of paper in contact with

air and which can also act as a form of flue to increase the draught and carry fire through the roll.

ii. *Goods inward Department.*

The problem of temporary storage pending removal outside the building. This should be achieved by the use of metal containers. Here the lids should remain closed and opened by foot operation, power assisted if necessary, so that waste packing can be collected continually and held in storage.

iii. The Office

The main dangers in an office are from waste paper baskets and loose electric leads. Loose electric leads are an electrical risk and have already been mentioned. The main hazard is loose paper on the floor dropped outside the waste paper basket.

Special care is needed in printing and duplicating departments large waste paper bins are required. There is additional hazards from cleaning materials.

iv. Old Office Equipment

In almost every office building there will be a store of old office equipment, tables, desks, chairs and the like. This junk store is nearly always in an inaccessible and dangerous place. Combined with old newspapers, magazines, periodicals, old records and even old clothing, overalls etc.

v. Documents and Records

The storage of papers is often haphazard and is often a cause of the spread of fire. An instruction should be given to the head of each department requiring that all documents are to be classified under one of five headings:-

a. Irreplaceable, deeds of property

b. Replaceable but only after considerable research and expenditure

c. Useful but pending destruction copies of goods

d. Of vital importance incoming order

e. Papers that are of no further value out of date acknowledgement

vi. Cause of fire

A survey by the fire protection association shows that the following have been found to be the causes of large fires in the order given

a. Electrical installations and apparatus

b. Malicious or intentional ignition

c. Smoking materials

4.6 FIRE DETECTION

Early detection of fire and alarm warning are essential to prevent loss of life or harm to building occupants.

FIRE DETECTING DEVICES

There are three main methods of detecting fire:

i. Detection of heat conditions

ii. Detection of visible and invisible combustion products

iii. Detection of changes of radiation of Electro magnetic waves

These can be sub divided as follows:

1. HEAT DETECTORS

a. The melting of fusible materials which again may be:-

i. Low melting point metals

ii. Thermo plastic materials

b. The Expansion of

i. Solids

ii. Liquids

iii. Gases

c. Laser Beams

d. Thermo couples

i. Current generation

ii. Change of electrical resistance

2. DETECTORS OF VISIBLE AND INVISIBLE COMBUSTION PRODUCTS

a. Optical

i. Light obstruction

ii. Light scatter effect

b. Ionization detectors

3. OBSERVATION OF RADIATION OF ELECTRO MAGNETIC WAVES

a. Infra-red

b. Ultra – violet

The above mentioned detectors are shown in fig. 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.10.1

Manual call point is used for effective communication even after power failure as shown in fig. 4.5.1

i. THE CHOICE OF DETECTORS

The choice of a detector depends largely on the type of fire that can be expected and to a number of false to be tolerated.

If the fire is a slow burning fire, producing quantities of smoke, light sensitive detectors might be the choice. If it is clean burning fire, ionization detectors would be better than light sensitive detection. Fires that would produce heat quickly would best be detected by heat detecting devices. For lofty buildings and the open air infrared detectors or possibly a light sensitive beam detector could be used.

ii. AUTOMATIC FIRE DETECTORS IN GENERAL

Some detectors are self -indicating when they have operated but others reset themselves when conditions return to normal.

iii. SITUATION OF HEAT DETECTORS

Tests have proved that heat and smoke form a layer just below ceiling level and to obtain the quickest effects, the sensing element of the detector is spaced not less than 25mm nor more than 150mmm below ceiling level.

iv. SITTING AND SPACING DETECTORS

The essential detail of siting is to ensure that every part of the building is protected, and this includes all small enclosed spaces.

In general, rules for siting and spacing detectors are given in CP 1012:1972. The installing engineers must take into consideration the following points.

a. Floor area maximum to be covered by one detector $50m^2$
b. Maximum distance between detectors 10m in corridors
c. Maximum horizontal distance of centres from walls or partitions 3.5m in corridors 7.5m fig. 4.10.2.

v. EFFECTIVENESS OF HEAT SENSITIVE POINT DETECTORS.

British standard BS 3116 part 1:1970 provides a method of measuring the effectiveness of heat sensitive detectors. According to the results described in the standard the detectors can be grouped into three grades

Grade I Green

Grade II Yellow

Grade III Red

In service the action of the detectors is determined largely by the height of the ceiling so that detectors with the best grading can be used in rooms with the highest ceiling.

The limiting height of rooms for particular grades of detector are given in code of practice CP 1019 1972 and are outlined below.

Subject to any special conditions Grade I detectors should not be fitted at a height of more than 9m from floor level.

Grade II detectors should not be so fitted at a height exceeding 7.5m

Grade III not more than 6m from floor boards. The rules of the fire office committee (FOC) limit the height of all heat detectors to 6m and smoke detectors to 10.6m. There is exception that small sections not exceeding 10 percent of the total ceiling area may exceed this height and a second exception where the fire brigade can make a very quick attendance.

4.7 ORIENTATION AND TRAINING OF STAFF IN EDUCATION TAX FUND (ETF) HEADQUATERS ABUJA

LIBRARY

Active fire suppression apparatus (automatic: heat detectors, smoke detectors, flame detectors, sprinklers and manual extinguishers) can likely fail without notice and this can cause serious and tremendous lost of lives and properties, to tackle this untimely failure of these apparatus orientation and training of staff in ETF is proposed.

Every organization no matter how small should have preconceived plan for fire fighting. The first few seconds of the fire are the most vital time for action. Every staff of this organization (ETF) is given proper orientation about the building premises.

ORIENTATION OF STAFF

It is a legal requirement that every employee should be familiar with the exit routes from a building and this can only be done by organizing an evacuation scheme leading to regular (quarterly) evacuation practices of both the primary and secondary ways out of the building. The evacuation scheme involves means of giving warning in the case of fire, and the escape of fire, and the escape routes and doors through which the occupants must pass. The general organizer who is the head of the organization will be responsible for putting into effect the decision of the committee and in the event of a fire will be the incident controller as well.

TRAINING

The organizer will invite some staff from public fire brigade to train new and old staff of the organization (ETF) on how to tackle fire incident in the building using active fire suppression apparatus each staff will be shown the following: How to use manual alarm points, How to use fire extinguishers, How to use hose reels pipes and How to disconnect power supply from the main supply in case of electrical fire.

4.7 ACTIVE FIRE SUPPRESSION

Active fire suppression involves manual and automatic operation of fire fighting equipment to suppress the fire during its early stage in a building. The following devices are sued for active fire suppression

i. Automatic alarm systems installation: alarm signaling

ii. Automatic fire detection installations

iii. Portable fire extinguishers. Installations

iv. Automatic sprinklers installation

i. Automatic alarm systems installation: alarm signaling.

An alarm receiving station is the point at which action is taken to secure the attention of the fire fighting service, when fire breaks out people have to be warned at an early stage in order to escape freely.

a. Types of Alarm Signaling

This system is the most common method of signaling fire alarms in use today. It gives both fire alarms signals and automatic warning of a line fault.

b. The 999 dialler

This is a tape recorder and is started by an electrical impulse delivered from a detecting source. It is used for any detector type that will produce the impulse.

BASIC PARTS OF ALARM SYSTEM

1. Fire alarms
2. Intruder alarms
3. Supervisory services
4. Command services
5. Status service

ii. AUTOMATIC FIRE DETECTION INSTALLATIONS

Installations of fire detecting devices is very important, fires start from a small origin and gradually grow to incipient fires, pre flash over and fully developed fires. The alarm signal to building occupants should be well above the background noise. Audible alarm device (e.g. bells, buzzers, chimes, horns, generally should produce a sound level in decibels of at least 85DBA at 10ft away from the detector.

Automatic fire detection installation gives early warning of fire, sensitive thermostatic detector heads are installed on the ceilings not more than 150mm below ceiling level. This is connected electrically to bells, buzzers, chimes and horns outside the building.

iii. PORTABLE FIRE EXTINGUISHERS INSTALLATION

1. Siting: Extinguishers should be sited as near as possible to exists. They should be easily reached and be placed in conspicuous locations along normal paths of protected egress away from potential fire hazards. Extinguishers should never be fixed more than 30m apart and there should be never less than two together.
2. Mounting Height

   Portable fire extinguishers are mounted within the reach of the user (5ft above the floor and a gross weight of 40lb and not more than three and half above the floor as shown in fig 4.10.3.
3. Types of Extinguishers
   a. Water types
   b. Foam types

c. Vaporizing liquid extinguishers

d. Dry powder extinguishers

e. Carbon dioxide (CO2)

f. Halon gas

4. Maintenance

All portable extinguishers should be recharged immediately after use, recharges are provided amply two per extinguisher in small premises.

Water and foam extinguishers are well washed out with ample supply of water. Dry powder extinguishers are kept dry.

Internal inspection of openable extinguishers are made every six months. Water acts as a substitute for chemical liquids.

A drop of liquid is allowed to fall in order to test chemical foam extinguishers. The drop of liquid falls off outside the inner container on to the ground when it is lifted out for inspection.

iv. AUTOMATIC SPRINKLERS INSTALLATION

In December 1968 a new edition of the rules for automatic sprinkler installation was issued by the fire offices committee. The new edition was the twenty ninth edition of the rules these came into operation after 1 July 1969.

Automatic sprinkler installations are designed to hold a fire in check and give warning of the dangerous situation as shown in fig. 4.10.4, fig.4.10.5, fig.4.10.6, fig.4.10.7, fig.4.10.8 and fig.4.10.9.

a. Sprinklers are classified according to the type of fire hazards they served.

1. Extra Light hazard applies to non-industrial occupancy.
2. Ordinary hazard for commercial and industrial occupancy.
3. Extra high hazard for commercial and industrial occupancy having abnormally high risks.

1. Extra light hazard – this is for the lightest risks such as hospitals, hotels, office buildings, attics, basements, boiler rooms, kitchens, laundries, storage areas, work rooms. In parts of premises
2. Ordinary hazard class – there are four subdivisions in this hazard class

   Group I – light ordinary hazards such as breweries, cement works and restaurants.

   Group II – medium ordinary hazards such as bakeries, confectionery, manufacturers, light engineering works, medium sized retail shops (under fifty assistants).

   Group III – High ordinary hazards such as boot and shoe manufacturers, corn mills, large departmental stores.

   Group IV – Special- These include risks as cotton mills, film studios, flax, jute and hemp mills, match factories and oil mills.
3. Extra high hazard class these are subdivided into two types of risks.
   a. Process risks such as aircraft hangers, fire lighter and fire work manufacturers, foam plastic and foam rubber manufacturers, paint and varnish manufacturers and wood wool manufacturers.
   b. High piled storage risks

4.8 PASSIVE FIRE SUPPRESSION

Passive fire suppression is achieved through architectural, structural and environmental design this is achieved through the following ways:

a. SITE PLANNING

The building site plan should provide adequate driveway widths, turning radii and parking space level surface for fire apparatus, fire apparatus turning radii typically vary from 28ft to 40ft and a vehicle length from 40ft to 65ft for ladder trucks and from 20ft to 40ft for pumpers.

b. PROPER LOCATION OF ESCAPE ROUTES

Escape routes for linear corridors should be located at ends of the corridor and a distance of not more than 30m from fire origin to escape stair should be adopted.

c. BUILDING HEIGHT

The building height of the building should not be more than 30m (10-storey height). This is the maximum height that the available fire apparatus can reach.

d. PROVISION OF HELICOPTER PADS

At the top of the last floor provision is made for helicopter pads for rescue operation to be carried out during fire in high rise buildings.

e. REFUGE BALCONIES

These act as a temporary escape and refuge areas during fire, there enough ventilation is provided from the open air.

f. ESCAPE STAIRCASE

An enclosed fire escape staircase should be provided to ensure that the occupants are free from smoke from burning parts of the building.

g. USE OF FIRE COMPARTMENTATION

The building should be divided into what is called fire compartment this is to confine areas, so in case of any fire outbreak in one area it will not spread to other areas.

h. IDENTIFICATION OF HIGH RISK AREAS

High Risk areas in a building should be identified and be given special structural treatment. In office building high risk areas are finance department, computer room, control room, stores and machine room. These areas should be constructed with high fire rated walls to discourage fire spread within the building.

i. FIRE STOP APPLICATION

Openings above fire rated walls and partitions should be "fire stopped" to form a tight seal with the floor slab above.

Fire stop materials are

a. Spray-on Insulation undercoating

b. Intumescent mastic coating on the conduit

c. Heat shields

j. FIRE HYDRANTS APPLICATION

Adequate water flow in gallons per minute to fire hydrants is required to provide sufficient water to suppress fires. Adequate water pressure in pounds per square inch is needed to enable hose streams to reach every part of the buildings to be protected.

k. HOSE REELS APPLICATIONS

Hose reels should be installed on each floor and this is connected to the nearest water supply, which may be a branch from a wet riser.

l. SOURCE OF WATER

The requirements for water supplies for automatic sprinklers are very stringent and though the following notes are given for guidance, the latest edition of the fire office committee rules must always be consulted.

4.9 FIRE PREVENTION

1. GOOD HOUSEKEEPING

Fires do not often occurs or spread in an organize environment. The office should be well organized, the main dangers in an office are from waste paper baskets and loose electric leads. The main hazard is loose paper on the floor dropped outside the waste paper basket.

Documents and records.

The storage of papers is often haphazard and is often a cause of the spread of fire. Therefore proper office keeping should be ensured.

a. Irreplaceable. Deeds of property

b. Replaceable but only after considerable research and expenditure

c. Of vital importance. Incoming orders

d. Useful but pending destruction copies of goods dispatched

e. Papers that are of no further value out of date acknowledgements.

Protections of Document and Records

Vaults – this can give six-hour protection if they are built to the following standard.

1. Situation – on solid ground above water level on ground floor if sufficient strength can be obtained.
2. Walls – solid brick or reinforced concrete not less than 230mm thick
3. Roof and floor – Reinforced concrete slab not less than 175mm thick
4. Doors – double steel or metal covered doors separated by the thickness of the wall and fitted to FOC standards.
5. Windows – No windows permitted
6. Lighting – Electric in metal conduit and preferably no conduit inside the vault. No flexible leads and fittings to be of the bulkhead type.
7. Racks – To be of incombustible material
8. General conditions – combustible materials other than stored documents to be kept to a minimum - No highly flammable liquids to be kept in the vault. No smoking permitted storage to be above possible flood level.

a. Filing Rooms – Filling rooms are usually larger than vaults and a lower standard of fire protection can generally be accepted.

b. Safes - Safes are difficult to assess but generally if they are over twenty five years old they should be suspect.

c. Fire Resistant Steel Filing Cabinets - Specially designed modern steel filing cabinets use for keeping documents. They are resistant to fire, heat and smoke and also resistant to the impact of the fire brigade jets of cold water and of falling from a height.

d. Ordinary Steel Furniture - Ordinary metal office furniture including filing cabinets and cupboards have no resistance to the effects of fire, heat, smoke or water they make no contribution of combustible material to a fire.

e. Filing Cabinets on Wheels - Prime documents should be exposed to the hazard of fire for as short a time as possible and the use of wheeled metal cabinets that can be placed beside a machine is to be strongly recommended.

4.9.1 ARCHITECTURAL DESIGN APPROACH

A lot of lives and properties are being lost during fires in Office buildings, most of these fires occur from arson trying to cover fraud. Therefore it is mandatory to tackle this matter right from the design stage in order to reduce fire spread and eventual reduction of lost of lives and properties fire compartmentation is employed in the design.

Fire compartmentation tend to confine the fire to a particular area and reduce its spread to other parts of the building.

In an office building different functional units are all enclosed but each function is confined in order to limit fire spread within the complex. Enclosed areas such as escape staircase are needed to ensure maximum safety during escape and refuge operation. Balconies act as temporary refuge area from which rescue operation is conducted.

CLASSIFICATIONS OF FIRES

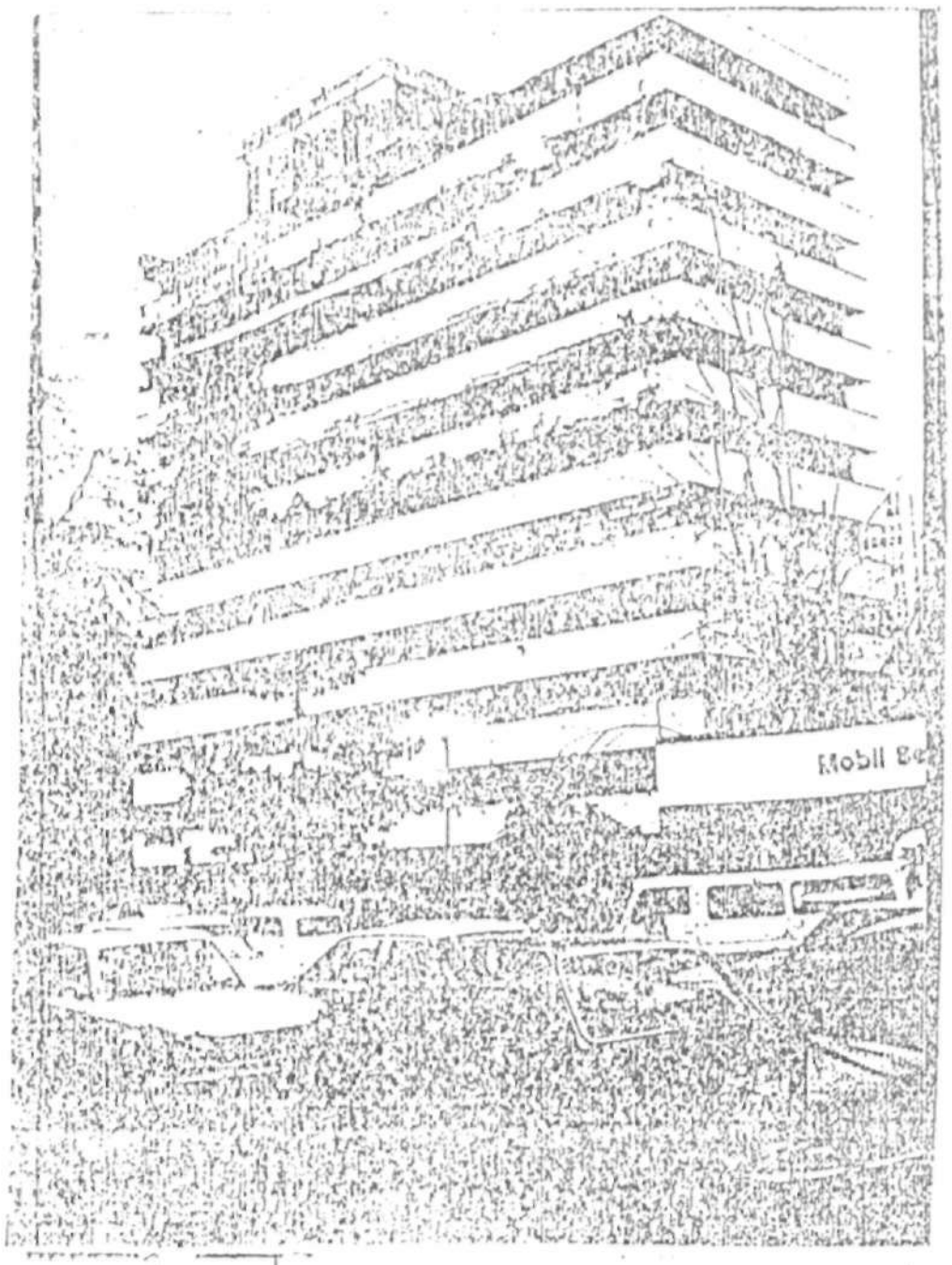
The National Fire Protection Association classifies portable fire extinguishers according to the types of fires for which they are designed. Portable fire extinguishers are designed only to suppress small fires. For example, the maximum discharge time span generally is about 8 to 90 seconds for typical portable units. Reference standard is "Portable Fire Extinguishers," NFPA No. 10, 1975.

Classification Symbol (and Label Color in Parentheses)	*Type of Fire*	*Description (and Method of Suppression in Parentheses)*	*Typical Extinguishers*
 (GREEN)	Ordinary combustibles	Materials such as wood, paper, cloth, fiber, rubber, and many plastics (can be quenched and cooled by water)	Water base, foam, soda acid
 (RED)	Flammable liquids	Liquids such as paint, paint thinner, gasoline, oil, tar, solvents, fat, and so on; flammable gases, greases, and similar materials (requires blanketing and smothering)	Dry chemical, foam, carbon dioxide
 (BLUE)	Electrical equipment	Energized electrical equipment such as overheated fuse boxes and other electrical sources, and wiring. Classification refers to source of ignition rather than to fuel as fires are classes A and B in terms of fuel (requires nonconductive extinguishing agent)	Dry chemical, carbon dioxide
 (YELLOW)	Combustible metals	Metals such as magnesium, titanium, zirconium, sodium-potassium alloys, and so on (requires smothering)	Dry powder with sodium chloride or graphite base

TABLE 4.1 CLASSIFICATIONS OF FIRES
SOURCE: M. DAVID E. 1978 CONCEPTS IN BUILDING, FIRE SAFETY NEW YORK.

ITEMS	1989	1990	1991	1992	1993
DOMESTIC PRIVATE FIRE					
Number of Calls	622	468	1,173	,412	358
Number of lives saved	94	82	256	301	46
Number of lives lost	16	29	56	209	29
Estimated value of goods lost (N'000)	55,670	56,032	239,377	1 6,781	2,558,613
FACTORY/INDUSTRIAL FIRE					
Number of Calls	55	59	13	26	11
Number of lives saved	1	-	-	-	-
Number of lives lost	-	-	-	-	-
Estimated Value of goods lost (N'000)	62,407	33,395	-	-	30,578
OTHERS:					
Number of Calls	513	473	200	282	498
Number of lives saved	1,885	2,011	155	4	1
Number of lives lost	31	2	8	-	18
Estimated Value of goods lost (N'000)	940,582	41,902	59,527	194,101	144,450

TABLE 4.1.7 FIRE OUT BREAK IN NIGERIA
SOURCE: FEDERAL FIRE SERVICES



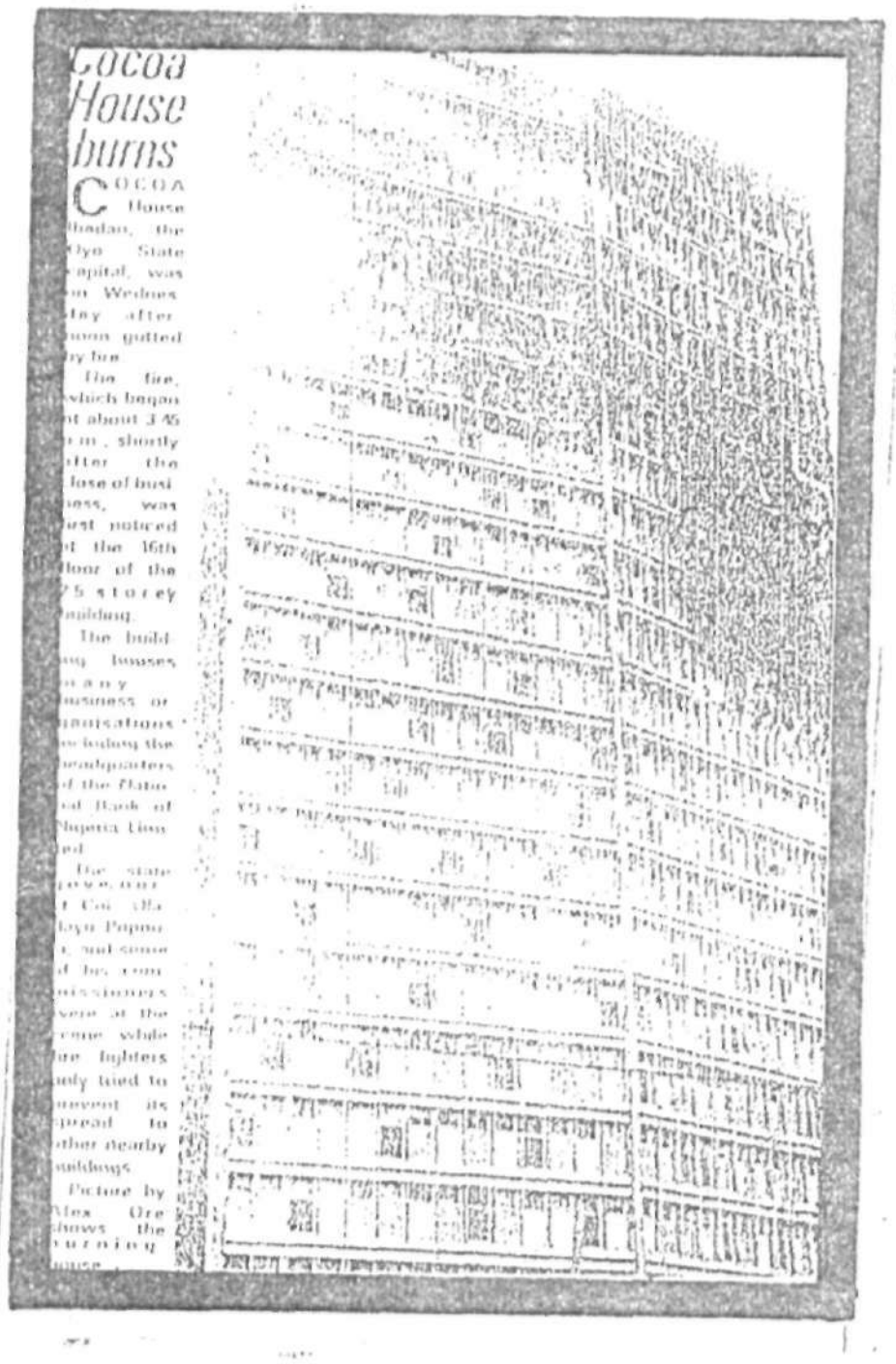
FORMER (THE FED. MINISTRY OF EDUCATION BUILDING)

The former Ministry of Education Building which was attacked by fire. Several governmental records and properties were destroyed. Again, this structure did not disintegrate like the Republic Building.

FIG 4.1 FEDERAL MINISTRY OF EDUCATION HEADQTRS ALONG MOLONEY STREET LAGOS.
SEPT. 1980
SOURCE: THE DAILY TIMES



FIG. 4.2 NIGERIAN EXTERNAL TELECOMMUNICATIONS BUILDING LAGOS DEC. 1982 SOURCE: THE DAILY TIMES


Cocoa House burns

COCOA House Ibadan, the Oyo State capital, was on Wednesday after gutted by fire.

The fire, which began at about 3.45 p.m., shortly after the close of business, was first noticed at the 16th floor of the 25 storey building.

The building houses many business organisations including the headquarters of the National Bank of Nigeria Limited.

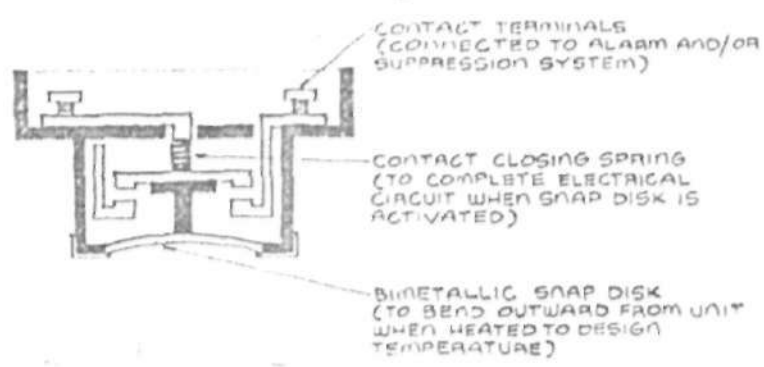
The state governor, Chief Bola Ajibola Papoola and some of his commissioners were at the scene while the fighters only tried to prevent its spread to other nearby buildings.

Picture by Alex Ore shows the burning house.

FIG 4.3 COCOA HOUSE IBADAN
WED. JANUARY 1985
SOURCE: THE DAILY TIMES

Heat Detector

To detect fire, heat detectors use the physical or electrical change of a material caused by exposure to heat. For example, detectors using a bimetallic disc (as shown below) alarm at elevated temperatures when the snap disc bends completing an electrical circuit. Bimetallic materials are made of two metals, with different thermal expansion characteristics, bonded together so they will bend when heated. "Fixed temperature" detectors alarm when the temperature of the operating element reaches its design level (usually 135°F). "Rate-of-rise" detectors alarm when the rate of temperature change exceeds about 15°F/minute which indicates a rapidly developing fire. Expansion of air in a chamber with a calibrated vent can be used to detect temperature rise.

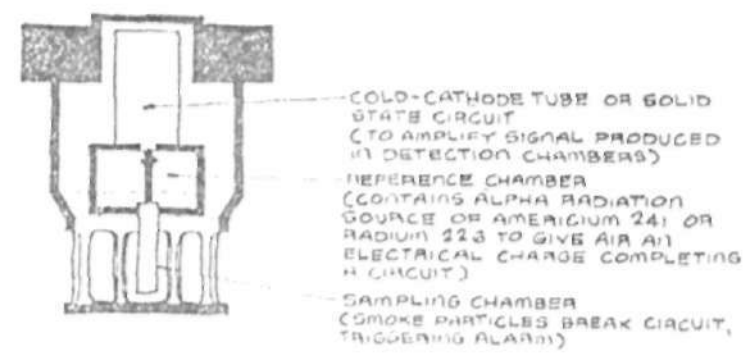


Note: Combination rate-of-rise units to detect rapidly developing fires and fixed-temperature units to detect slowly developing, smouldering fires also are available.

FIG 4.4 HEAT DETECTOR
SOURCE: UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND.

Smoke Detector

To detect smoke, ionization detectors use the interruption of a small current between electrodes in the ionized sampling chamber (containing Americium 241 or Radium 226 source). In a dual-chamber detector, the reference chamber (exposed only to air temperature, pressure, and humidity) reduces false alarms caused by changing ambient conditions. Ionization detectors, with a single chamber, are also commercially available.



Note: In the photoelectric smoke detector, smoke causes a light beam from an incandescent lamp source to be scattered into the view of a photocell.

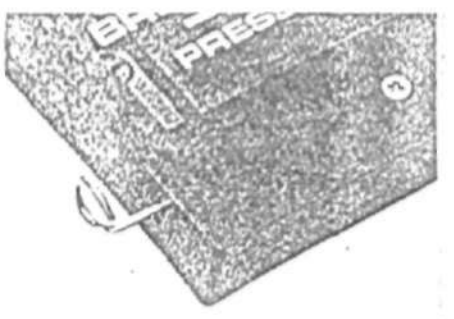
FIG 4.5 SMOKE DETECTOR
SOURCE: UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND



THE KAC MANUAL CALL POINT
(KAC Alarm Company)



4- THE GLASS IS BROKEN IN A KAC MANUAL CALLPOINT
The switch has dropped below the edge of the glass
(KAC Alarm Company)



THE TEST PROBE IN POSITION IN A KAC MANUAL CALLPOINT
When pressed the glass moves and allows the switch to operate
(KAC Alarm Company)

FIG 4.5.1 MANUAL CALL POINT
SOURCE: UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND



FIG 4•7

INTERNAL LAYOUT OF THE COMPENSATING HEAT DETECTOR
(Chubb Fire Security Ltd)

SOURCE : UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND.



FIG 4•6

EXTERNAL APPEARANCE OF THE COMPENSATING HEAT DETECTOR
(Chubb Fire Security Ltd)

SOURCE : UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND



FIG 4.8

EXPANSION OF METAL-FIXED TEMPERATURE HEAT DETECTOR
(Chloride Pyrotector Ltd)

SOURCE : UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND

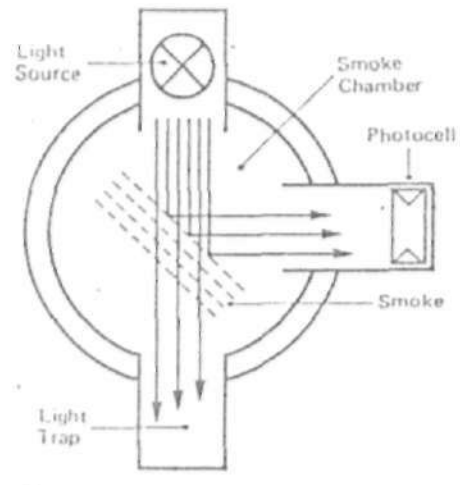


FIG 4.9

TYPICAL SPOT TYPE OPTICAL SMOKE DETECTOR
(Chloride Pyrotector Ltd)

SOURCE : UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND

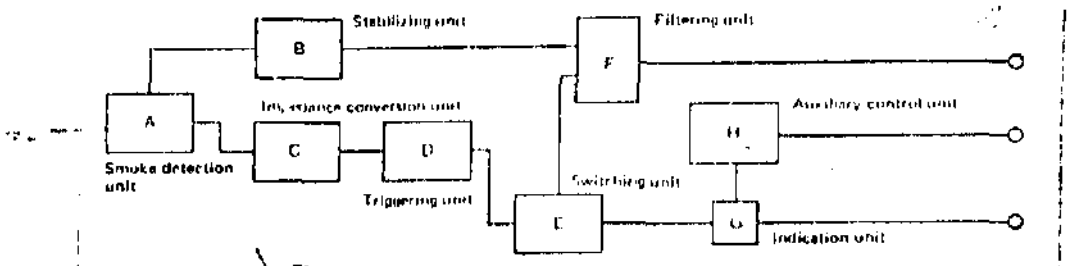


FIG 4.10
BASIC CIRCUIT OF AN IONISATION DETECTOR
(Nittan (UK) Ltd)

SOURCE : UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND

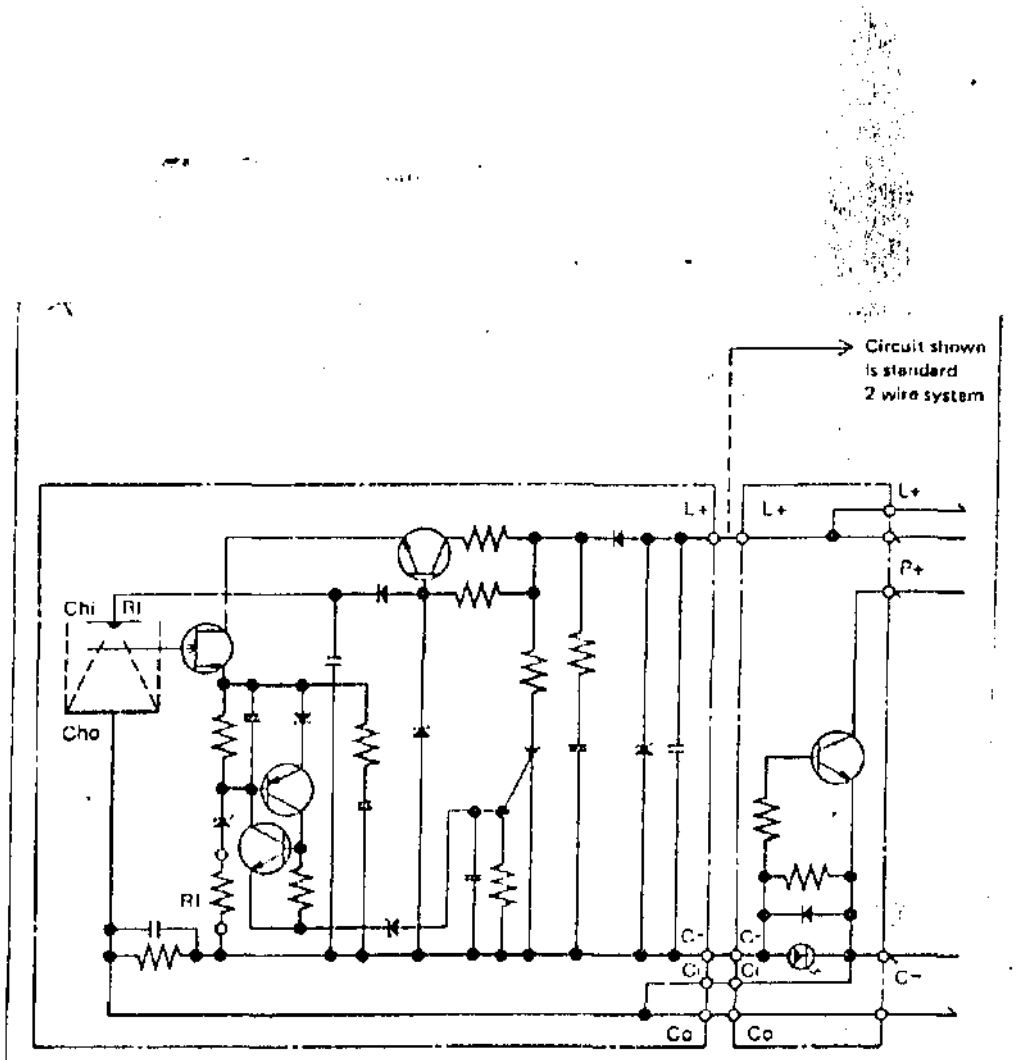
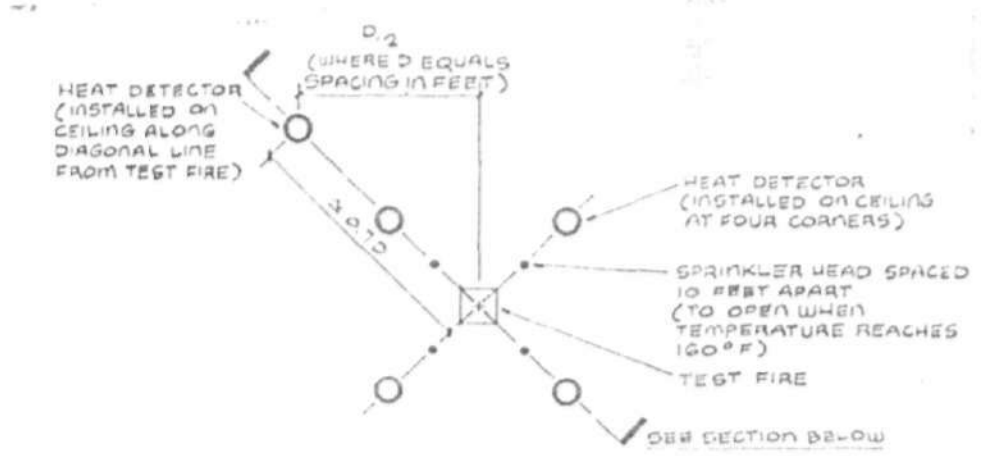


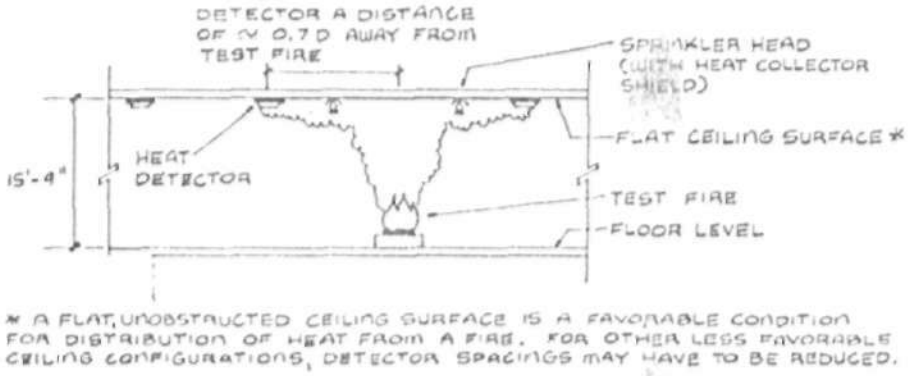
FIG 4.10.1
BLOCK DIAGRAM OF THE CIRCUITS WITHIN THE IONISATION DETECTOR
(Nittan (UK) Ltd)

SOURCE : UNDERDOWN (1979) PRACTICAL FIRE PRECAUTIONS ENGLAND

IM IBRAHIM LIBRARY



Section View



* A FLAT, UNOBSTRUCTED CEILING SURFACE IS A FAVORABLE CONDITION FOR DISTRIBUTION OF HEAT FROM A FIRE. FOR OTHER LESS FAVORABLE CEILING CONFIGURATIONS, DETECTOR SPACINGS MAY HAVE TO BE REDUCED.

Note: Smoke detectors can be evaluated in a small chamber containing an air circulation system and a smoke density meter to measure the light obscuration by smoke from a cotton wick test fire at the moment of alarm (cf., "Photoelectric Type Smoke Detectors for Fire Alarm Service," UL 168).

FIG 4·10·2 HEAT DETECTOR SPACING

SOURCE: M.DAVID E.(1978) CONCEPTS IN BUILDING FIRE SAFETY NEW YORK

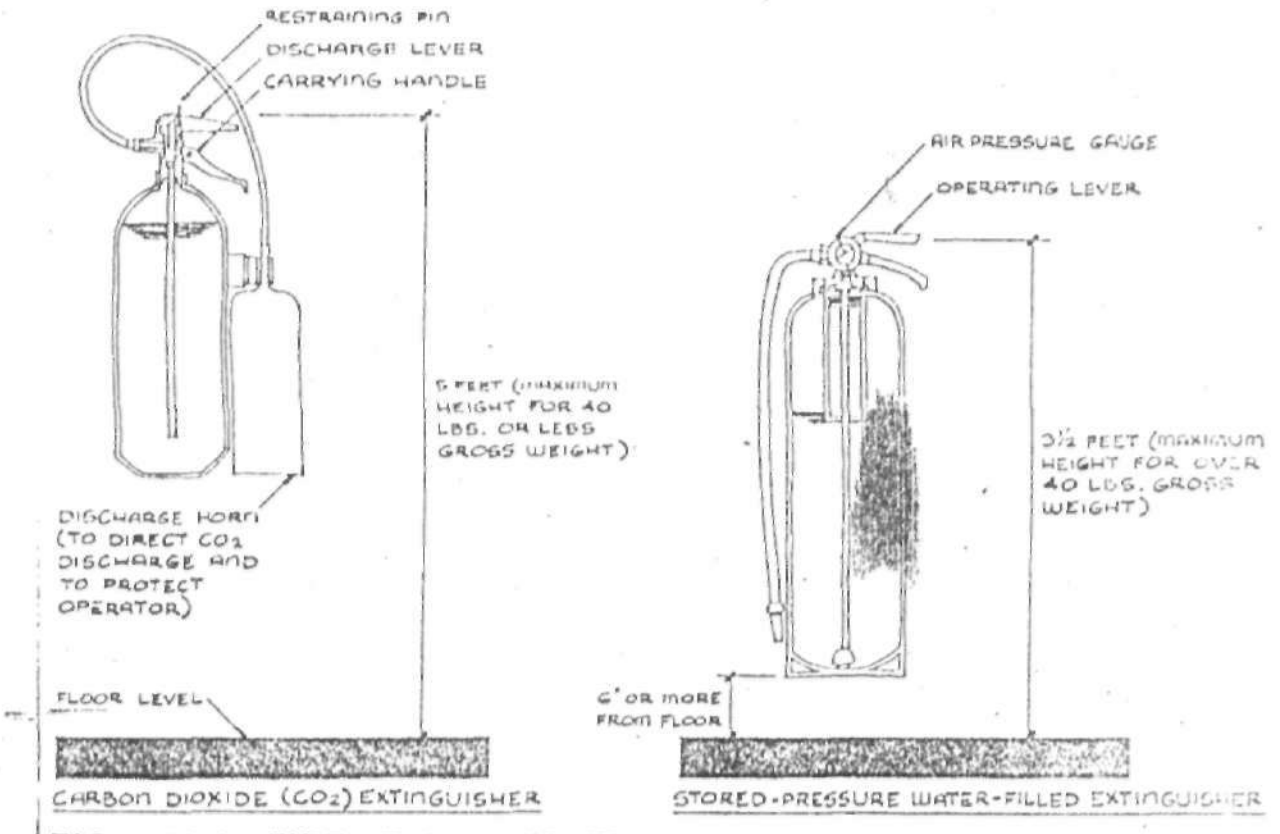


FIG 4.10.3 FIRE EXTINGUISHER MOUNTING HEIGHT
SOURCE : M. DAVID E. 1978 CONCEPTS IN BUILDING FIRE SAFETY NEW YORK

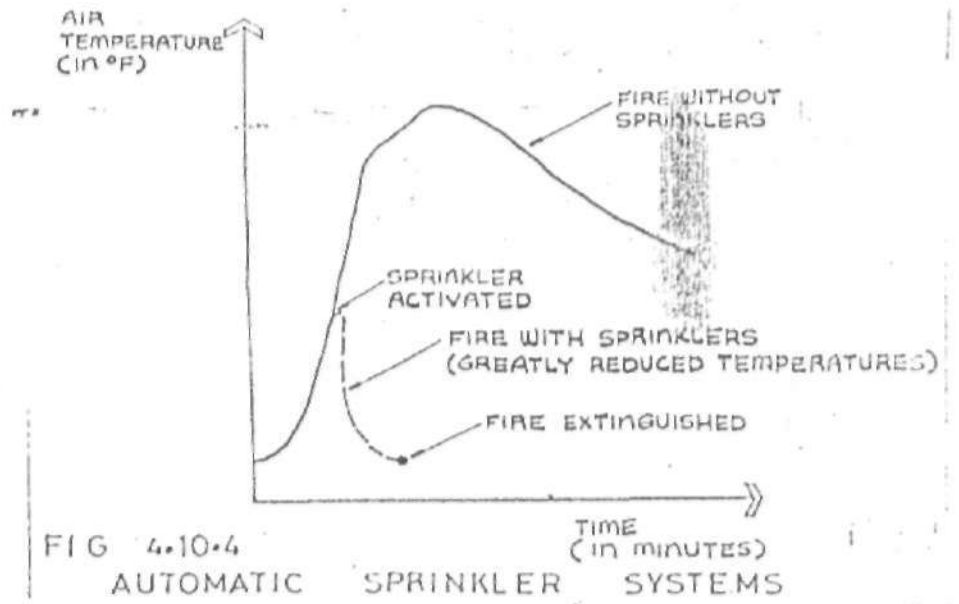


FIG 4.10.4 AUTOMATIC SPRINKLER SYSTEMS
SOURCE : M. DAVID E. 1978 CONCEPTS IN BUILDING FIRE SAFETY NEW YORK.

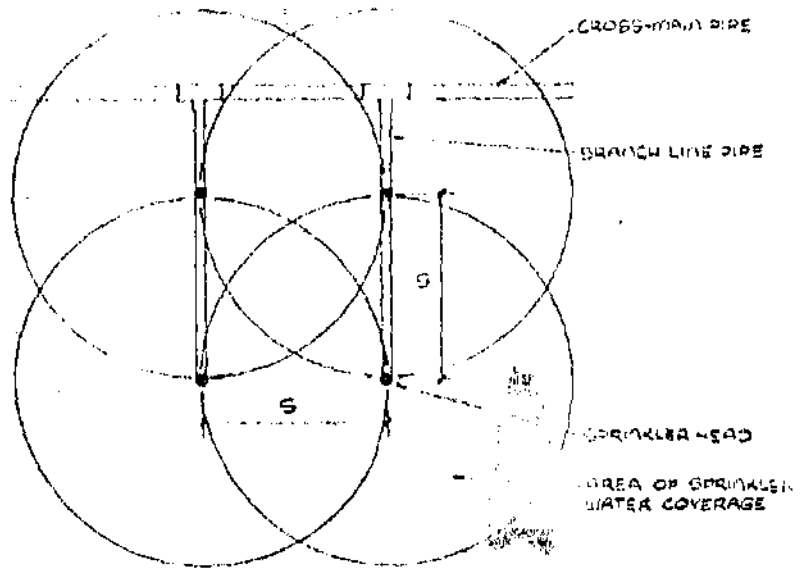


FIG 4.10.5 SPRINKLER LAYOUT
SPRINKLER HEADS
SOURCE M.DAVID E.(1978) CONCEPTS IN BUILDING FIRE SAFETY NEW YORK

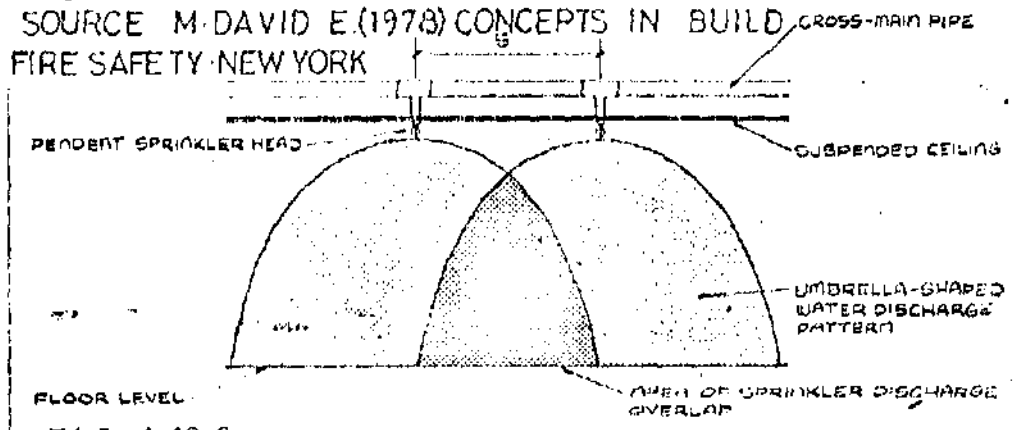


FIG 4.10.6 SPRINKLER DISCHARGE PATTERN
SPRINKLER COVERAGE AREA
SOURCE : M.DAVID E (1978) CONCEPTS IN BUILDING FIRE SAFETY NEW YORK.

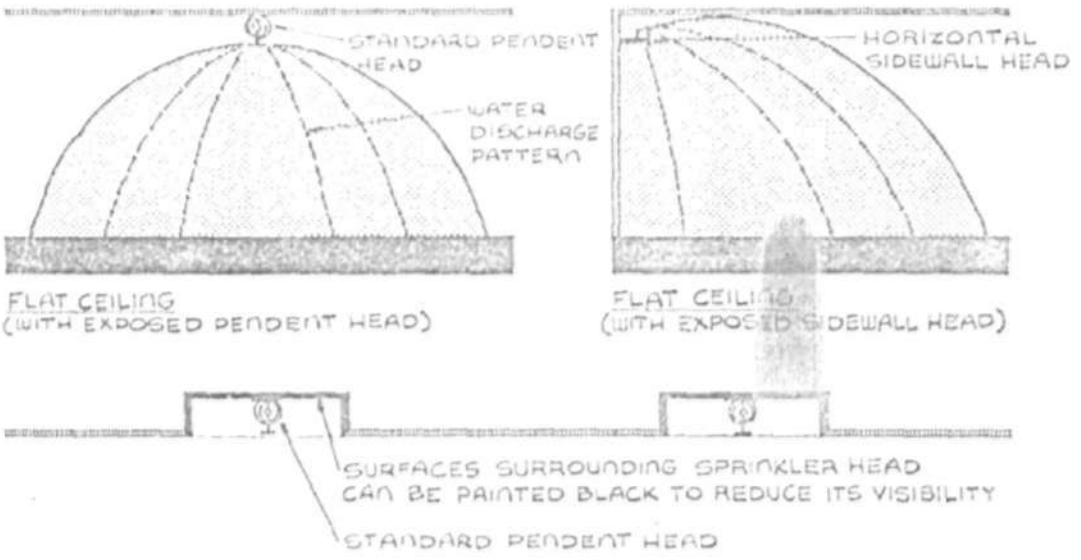


FIG 4-10-7 CEILING CONFIGURATIONS

Note: Lighting systems (e.g., perimeter or central cove) can be arranged so the visibility of sprinkler heads will be low.

SOURCE M-DAVID E.(1978)CONCEPTS IN BUILDING FIRE SAFETY NEW YORK.

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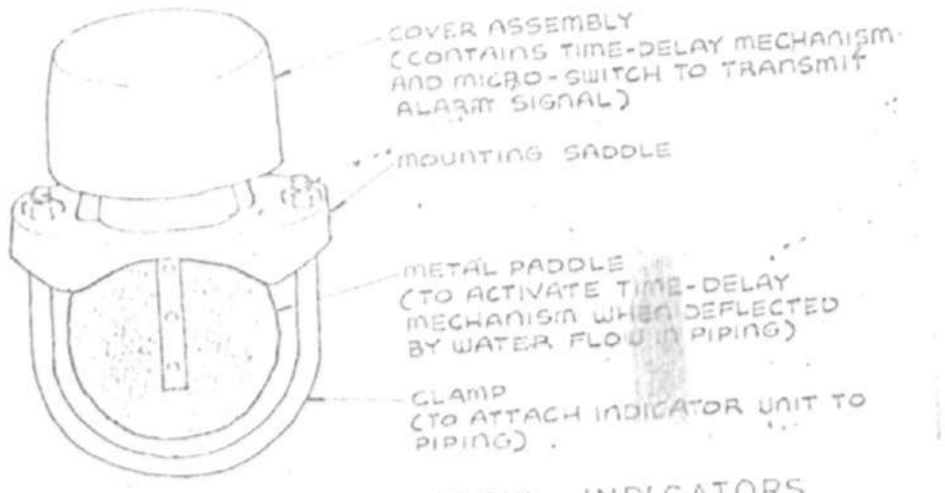


FIG 4·10·8 WATER FLOW INDICATORS
SOURCE: M. DAVID E (1978) CONCEPTS IN BUILDING FIRE SAFETY
NEW YORK.

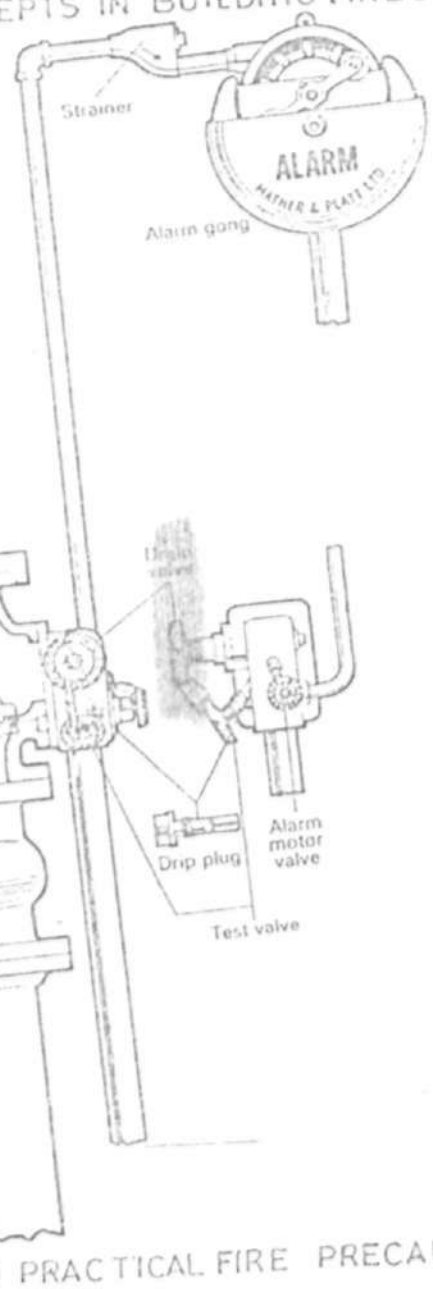


FIG 4·10·9
DIAG. OF THE CONTROL VALVES OF A TYPICAL WET SPRINKLER INSTALLATIONS
SOURCE: UNDERDOWN (1979) PRACTICAL FIRE PRECAUTION
ENGLAND

REFERENCES

1. Anonymous (1982) A.J Information Library: Thinking about Fire, Architects Journal PP 32, 176.
2. Development Control Strandards and Regulations (1996) FCDA, Abuja, Nigeria. Pp. 11-12.
3. Egan M.D. (1978) Concepts in Building Fire Safety. Wiley and Sons Press, London (UK) PP. 38 – 49, 112 – 117, 125 – 132.
4. Federal Republic of Nigeria Annual Abstract of Statistics (1995) Edition: Federal Office of Statistics Lagos P. 156.
5. Olajide B.O (1990) ONDO STATE UNIVERSITY Senate House. Ado Ekiti unpublished Msc. Arch Thesis A.B.U Zaria, Nigeria. PP 36 – 38.
6. Under-down (1979) Practical Fire Precautions, Gower Press, London (UK) PP. 79, 109-124, 247 – 260 277-294, 325 – 341, 359 – 386.

CHAPTER FIVE

5.0 THE SITE

5.1 INTRODUCTION

The headquarters of the Education Tax Fund (ETF) site is located in Wuse 2 district it was surrounded by Afri Project consortium (A.P.C) inland revenue board, National primary education commission (NPEC) family support library, Alhassan Hospital. The site is located in the district centres where control height is minimum 4 floors maximum 6 floors. Fire service is also located in the same district as shown in fig. 5.1

The headquarters proposed only one site which is located as mentioned above.

5.2 SITE CONSIDERATION (MERITS)

5.2.1 Good Location:-

The site is located on steep slope this enhances effective drainage, nice views and good load bearing soil. It is located in Wuse Zone 4 district in District centre in Federal Capital Territory Abuja.

5.2.2 Proximity

The site is located in Wuse District and can be reached through arterial N18 and collectors.

5.2.3 Federal Capital Territory Development Control:-

Federal Capital Territory Development Control proposed district centres for offices, commercial offices, shopping complex and related uses development.

5.2.4 Fire Office, Police Station

Fire Office, Police Station, Afri Projects consortium (APC) inland revenue board, National Primary Education Commission (NPEC) are located within the same neighbourhood and this enhances mutual services provision.

5.2.5 Height Control

Height control the maximum height allowed in district centres is six floors and this is within Education Tax Fund (ETF) brief requirements.

5.2.6 Accessibility

The site can be reached through arterial N18 and collectors.

5.2.7 Drainage

Drainage foul and sewage treatment plant located at Asokoro District through inspection chambers through access road, arterial and collectors.

5.2.8 Services

Services the federal capital territory is served by 330KV/132Kv service from National Electricity grid. Supply cable rating all feeders cables are 5Mva water sources are Guarara and lower Usuman River.

5.2.9 Communication Facilities

The Federal Capital Territory is surrounded by a ring road, trunk highways, arterial and collectors which act as links. There are four major roads. Kaduna - Abuja, Keffi - Abuja, Minna - Abuja, Bidda – Abuja and Abuja - Lokoja, no rail services, international airport is located along Lokoja road in the north.

5.2.10 **Favourable Micro and Macro Climate**

The climate of Abuja is favourable, the harsh (north-east trade winds) are partially shielded by Abuja Hills and vegetation.

5.3 SITE LOCATION

Abuja is the federal capital territory and the new federal capital of Nigeria planned as a new town by the Kenzo Tenge consultants and the plans were being interpreted by the Federal Capital Development Authority (FCDA) In form of development regulations regular updating of these regulations is being carried out by FCDA after some time (four - five year) interval.

The federal capital territory having an area of 8000km2 is surrounded by Kaduna, Kogi, Niger, and Nassarawa States. It is located in the southern guinea Savannah the area lies above Niger/Benue river trough.

5.3.1 **Site**

It is located in Wuse district Zone 4 in District centre of the phase one development map. It covers an area of 560m^2 (80mx70). It is bounded by arterial road N18, collectors, Afri Project consortium (APC), Inland revenue board, national primary education commission headquarters, family support library, Alhassan Hospital, Fire station NEPA station and police station. This enhance maximum security and mutual services provision.

5.4 SITE ANALYSIS

5.4.1 Physiography

The site is located in Wuse district zone 4 just opposite Afri Projects Consortium (APC) Inland Revenue Board, National Primary Education Commission (NPEC) and family support library, the site rises from 483mm – 489mm steep round top hill. Wuse district is characterized with undulating plains, small rocks outcrop effective drainage is ensured due to steep nature of the site all drainage should be channel to central drainage through arterial, collector and access roads.

Steepy nature of the site encourages good views from neighbouring environment. Accessibility is a achieved from all nooks and crannies of Abuja through arterial roads, collectors and access roads. The site has a gentle slope of 1 in 6.5 (9^0) tan 1/6.5 = 0.1538 tan –1 0.1538 = 9^0 distance from highest point to lowest point 489mmm to 483mm is 39m and contour difference is 6mm.

Therefore site slope is 39/6 = 6.5, 1 in 6.5 hence slope is 1/6.5 = tan 0

$\theta = 9^o$ site slope.

5.4.2 GEOLOGY

The federal capital territory is characterized by out crops of rocks. igneous rocks, sedimentary rocks and metamorphic rocks and plains these are mostly found in ASO hills, Zuma, Bwari and Gwagwa plains. The site is located on sedimentary rock and the rock structure of the site does not present any geo-technical problem the rocks found are medium in strength and easily crushable fig. 5.4

5.4.3 SOILS

Wuse district is characterized by outcrops of rocks and plains derived from granite gneiss and metamorphic rocks, the soil is good for foundation and does not pose any construction problem.

5.4.4 VEGETATION

Abuja vegetation is parkland Savannah with thick forest and trees, tall grasses with tall trees, with riverine plains surrounded by shrubs grasses and tall trees.

There are a lot of small riverine forest that occurs throughout A buja, woodland occurs along rivers and park Savannah vegetation. In north central around district centre and city centre around Sheraton and neighbourhood centre depression occurs running from north-east to south-west patches of trees and grasses occur along the valley, another valley occurs around Wuse district near the site this gives the site good view and good micro climate which also acts as a buffer against harsh weather posed by North-East trade winds which blows from Sahara desert from November to April carrying dust along with it causing harmattan. Aso hills that lies in the north-eastern part of the FCT provided effective shield against harsh weather to FCT by north-east trade winds other hills around also help in reducing the harsh weather. It can be undoubtedly ascertain that Education Tax Fund Headquarters is endowed with suitable site that is bless with good accessibility, good views, good macro and micro climate. There are few trees and little out growth in the site, the vegetation virtually does not present any development constraints well drainage pattern and well accessible from all nooks and

crannies of the FCT Abuja as shown in fig. 5.5. Comfort zone as shown in fig. 5.6 can be achieved through design and well landscaped environment.

5.4.5 TEMPERATURE – HUMIDITY

In dry season we experience highest temperature due to low cloud cover, temperature raises to 35°C in rainy season in June temperature raises to 37°C, relative humidity is as low as 20% in November and December lower than 20% in January and February temperature drops in July, August, September and October due to low cloud cover and heavy rainfall as shown in fig. 5.7

Design Implications

According to Abuja climatic charts the comfort zones are hardly achieved this is due to intense heating in dry season and heavy rainfall in rainy season. The comfort zones conditions are temperature 21°C – 30°C and relative humidity 30% - 65% percent. Since these conditions could hardly, be achieved good building orientation, landscaping and large window openings will alleviate the climate for thermal comfort (comfort zone) as shown in fig. 5.6

5.4.6 RAINFALL

In Abuja rainfall starts in April to October falls heavily in June, July, August, September and October with heavy showers accompanied with heavy wind. This gives rise to high relative humidity in April, October especially in the morning and low relative humidity in November – March as shown in fig. 5.7.

Design Implications

Since much rain falls in Abuja provision of adequate and effective drainage for surface and foul waters is proposed. Sewage is disposed through central sewers to

sewage treatment plant for recycling to maintain hygiene in Abuja all drainage are covered.

5.4.7 winds

There are two major air masses sweeping over Abuja North – East trade winds and South – West trade winds, North – East blows from Sahara desert, dusty causes harmattan as it passes inland. South – West blows from coastal regions to inland it carries moisture and causes rainfall. North – East start from November to March, South – West starts from April to October. as shown in Fig. 5.8.1

5.4.8 SERVICES

Abuja is served with various roads networks through trunk highways, ring roads, arterial roads and collectors. Rainfall is drain through effective, covered drainage to public sewers tapped through collectors, arterial roads (collectors, arterial N18) to sewage treatment plant located at Asokoro district for recycling.

Electricity is tapped and control from NEPA station along arterial N18 through collector to the SITE (ETF headquarters) supply cable rating are 5Mva and national electricity grid serving the FCT is 330Kv/132Kv.

5.5 F.C.D.A DEVELOPMENT CONTROL REGULATIONS ABUJA

The Federal capital development authority, (FCDA) development control regulations Abuja, governing land development proposed district centres for the following development: Commercial offices, Offices, Libraries, Post and Telegraph Office, Police and Fire Offices, related uses are permitted in the centre.

The site is located in the district centre:

i. Accessibility- The site is accessible through arterial N18 and collectors

ii. Set back: Front: 6m)
Back: 4m) District Centre
Sides: 4m)

iii. Plot Coverage (%)

Maximum	50
Minimum	25

iv. Parking space – One car park for every 75m^2 of floor area of office floor

v. Height Control

A minimum of 4 floors)
A maximum of 6 floors) District Centre

Permitted in the district centre of the Federal Capital Territory Abuja.

5.6 SITE VIABILITY

The site is centrally located, within the federal capital territory in Wuse district in district centre, this enhances easy accessibility from all nooks and crannies of the FCT through trunk highways, arterial roads and collectors (arterial N18 C) to the site. Infrastructure and security facilities are all provided. Infrastructural facilities are: Alhassan Hospital, Fire Office, Police Office, NEPA Office, Federal Inland Revenue Board, National Primary Education Commission, Afri – Project Consortium (APC) etc are all bounding the site for mutual services.

5.6.1 SITE TERRAIN

The site is gentle with a slope of 9° which means 1 in 6.5mm that means for every 6.5mm horizontal distance there is a rise of 1mm vertically. This facilitates effective drainage of surface water, foul water and sewage all these are channeled through drainage to public sewer to sewage treatment plant. As shown in fig 5.3.

5.6.2 WINDS

There are two major air masses sweeping over Abuja North – East trade winds which blows from Sahara from November – March with speed of 1.99m/s causing harmattan and dusty. While the South-West trade winds blows from the coastal regions in April – October with speed of 2.6m/s causes rainfall as it crosses inland regions.

The harsh weather poses by North-East trade winds can be shielded by planting buffer of trees and plants, good landscaping, building orientation, longer axis should faces North and South axis while shorter axis should faces East and West axis.

The comfort weather poses by South – West trade winds can be fully utilized by orienting longer axis towards south-west axis, wide window openings, good thermal absorbing construction. Reinforced concrete floor and roof will have adequate pitch slope for easy drainage of roof water. Silver line for easy reflection and re-radiation of sun radiation this enhances building durability and easy maintenance of the overall structure.

5.6.3 RAINFALL

In Abuja rainy season begins in April – October it is hot-humid high relative humidity, heavy rainfall and high cloud cover. Therefore, effective and adequate

drainage systems are necessary for easy drainage of large volume of water as surface waters. Roofs in staircases will be of reinforced concrete floor slab this in addition to well design fire escape stair cases, lobbies, corridors and offices help to prevent fire spread in the headquarters (ETF) Abuja.

5.6.4 TEMPERATURE HUMIDITY

In Abuja heavy rainfall is experience during the months of June – September and little rainfall in January, February, November and December. In rainy season there is high relative-humidity while in dry season there is low relative-humidity, dry season (high temperature, low relative humidity) rain season (low temperature, high relative humidity) as shown in fig 5.7. It can be inferred that comfort zone can hardly be achieved as such the following elements can be used to achieve comfort zone conditions ($21^{o}C - 30^{o}C$, 30% - 65%)

- Good building orientation longer axis south – west, North shorter axis East and West this enhances effective lighting and ventilation
- Wide window openings for ample air movement which enhances cross ventilation.

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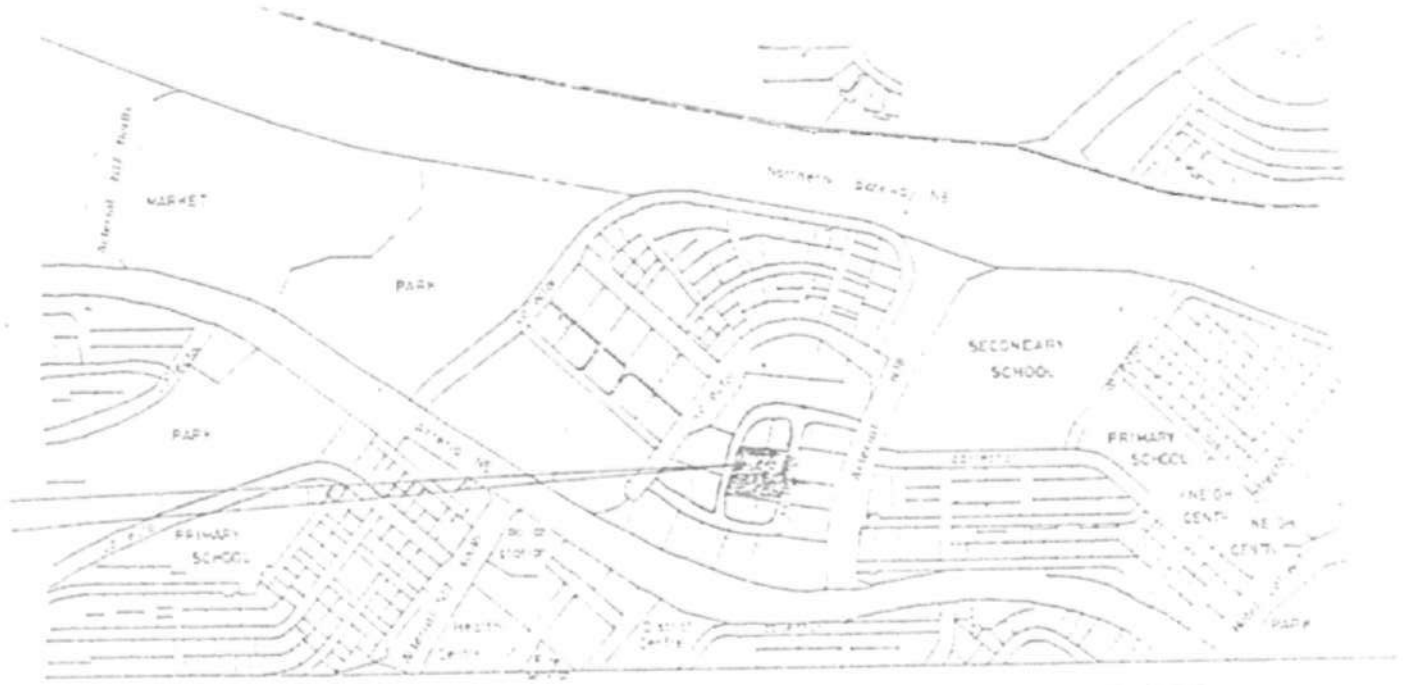


FIG 5:1 ETF SITE AT WUSE ZONE FOUR (A4) DISTRICT CENTRE

SATTEC(NIG) LTD
in cooperation with
SATMAP GmbH D8960 Cube
Updating April 1992

SOURCE : ABUJA MASTER PLAN PHASE 1 1992.



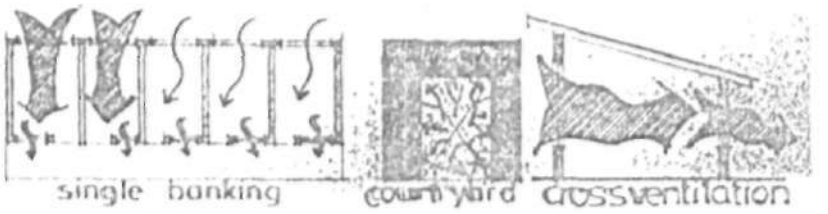


FIG 5·8 COURT YARD SYSTEM OF PLANNING AND SINGLE BANKING

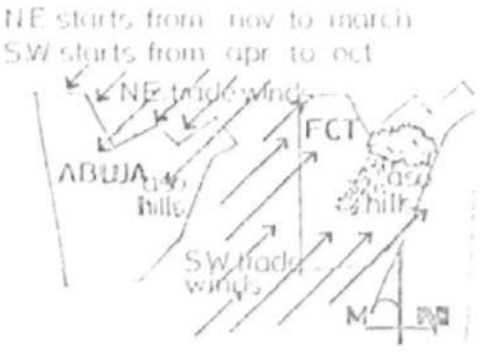


FIG 5·8·1 TRADE WINDS N.E. AND S.W.

MAP OF NIGERIA WITH 36 STATES AND THEIR CAPITALS



FIG 5·8·2 MAP OF NIGERIA SHOWING F C T ABUJA
SOURCE: DEPT OF GEOGRAPHY A.B.U. ZARIA 1998

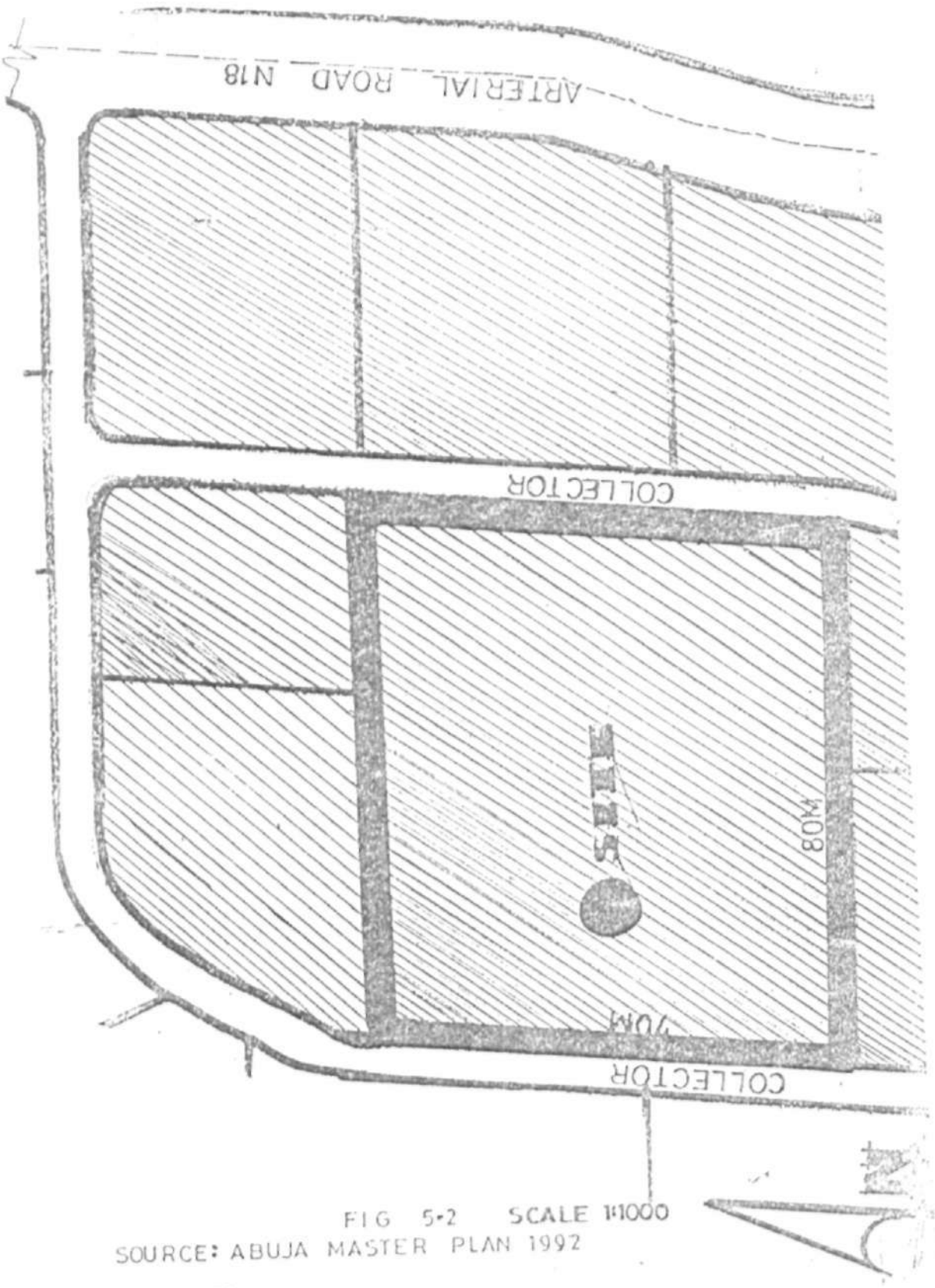


FIG 5-2 SCALE 1:1000

SOURCE: ABUJA MASTER PLAN 1992

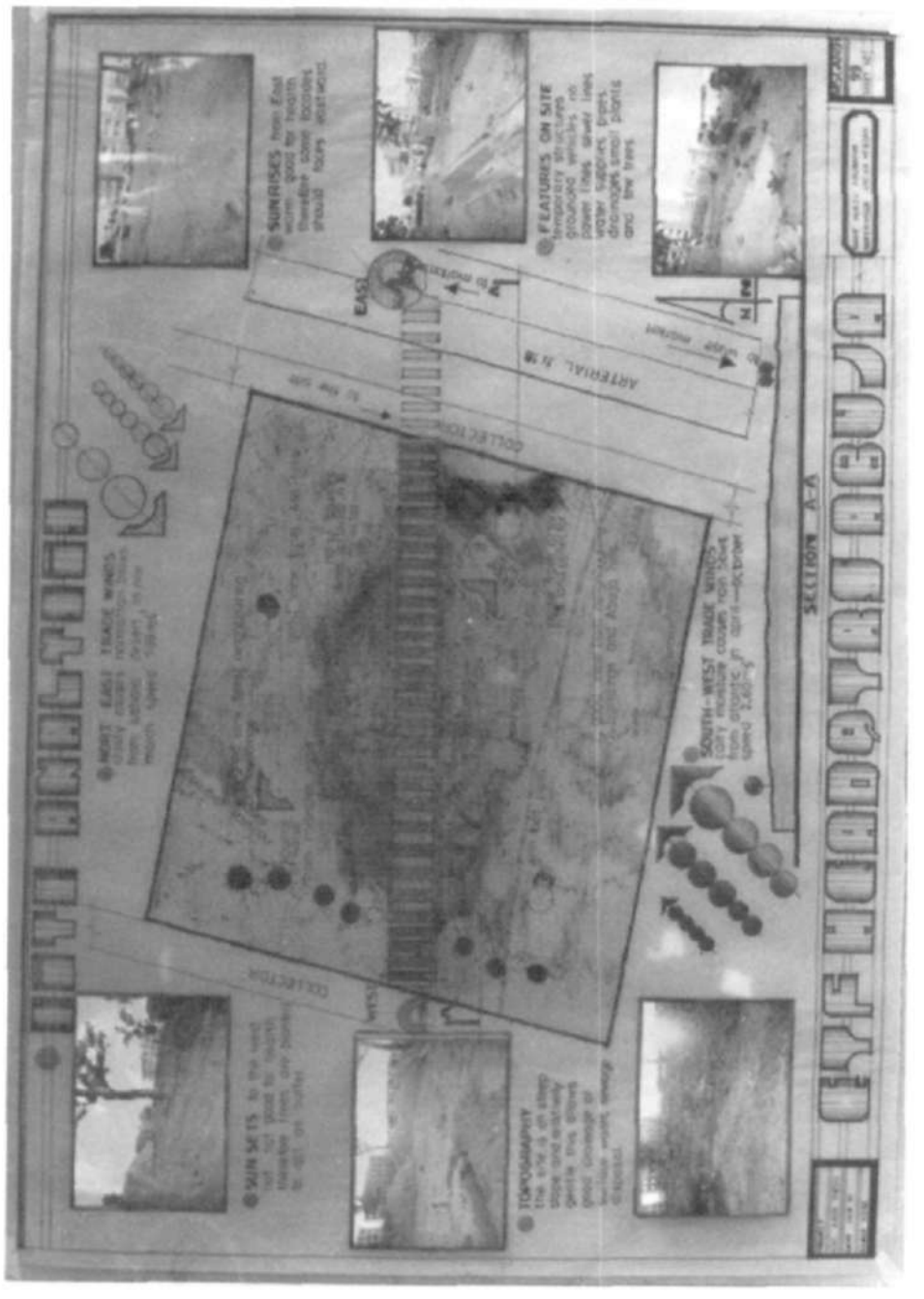


Figure – 5.3: Site and Section

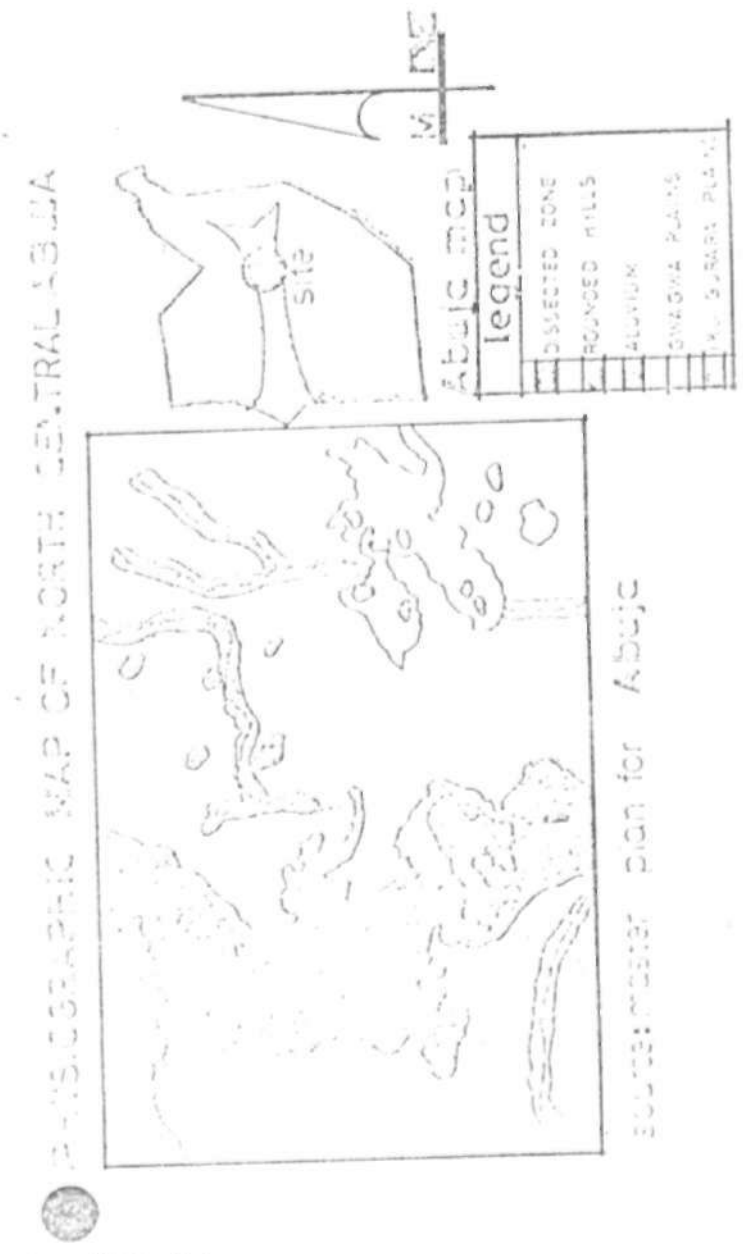
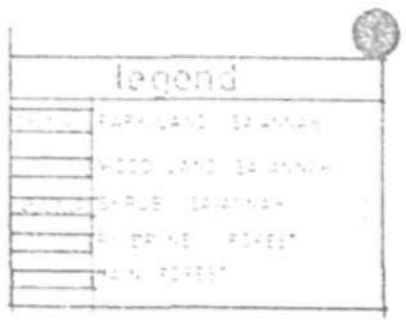
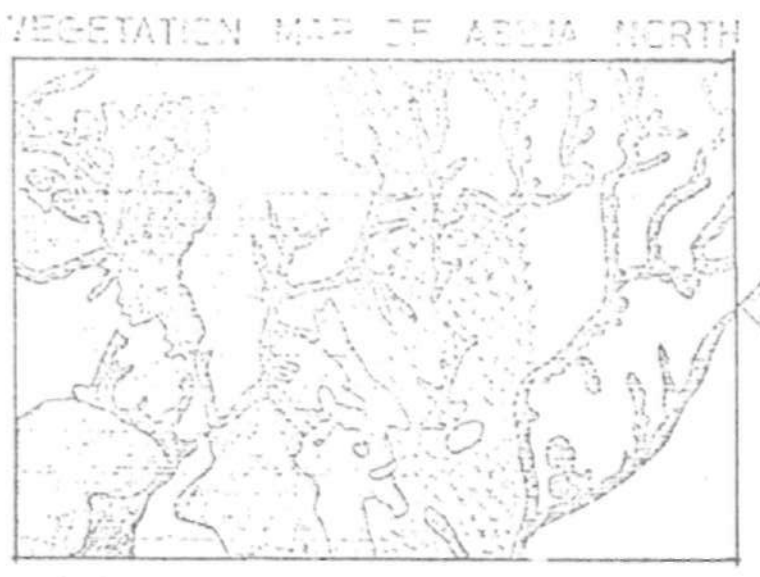

TOPOGRAPHIC MAP OF NORTH CENTRAL NIGERIA
Site
Abuja area
legend
DISSECTED ZONE
ROUNDED HILLS
ALLUVIUM
SHAGAMU PLAINS
KUJAMA PLAINS
Boundary of master plan for Abuja

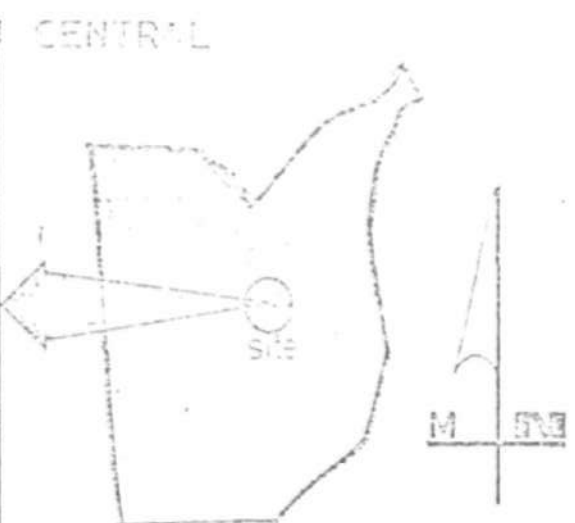
FIG 5·4

FIG 5.5

VEGETATION MAP OF ABUJA NORTH CENTRAL







Abuja map

SOURCE: ABUJA MASTER PLAN 1992

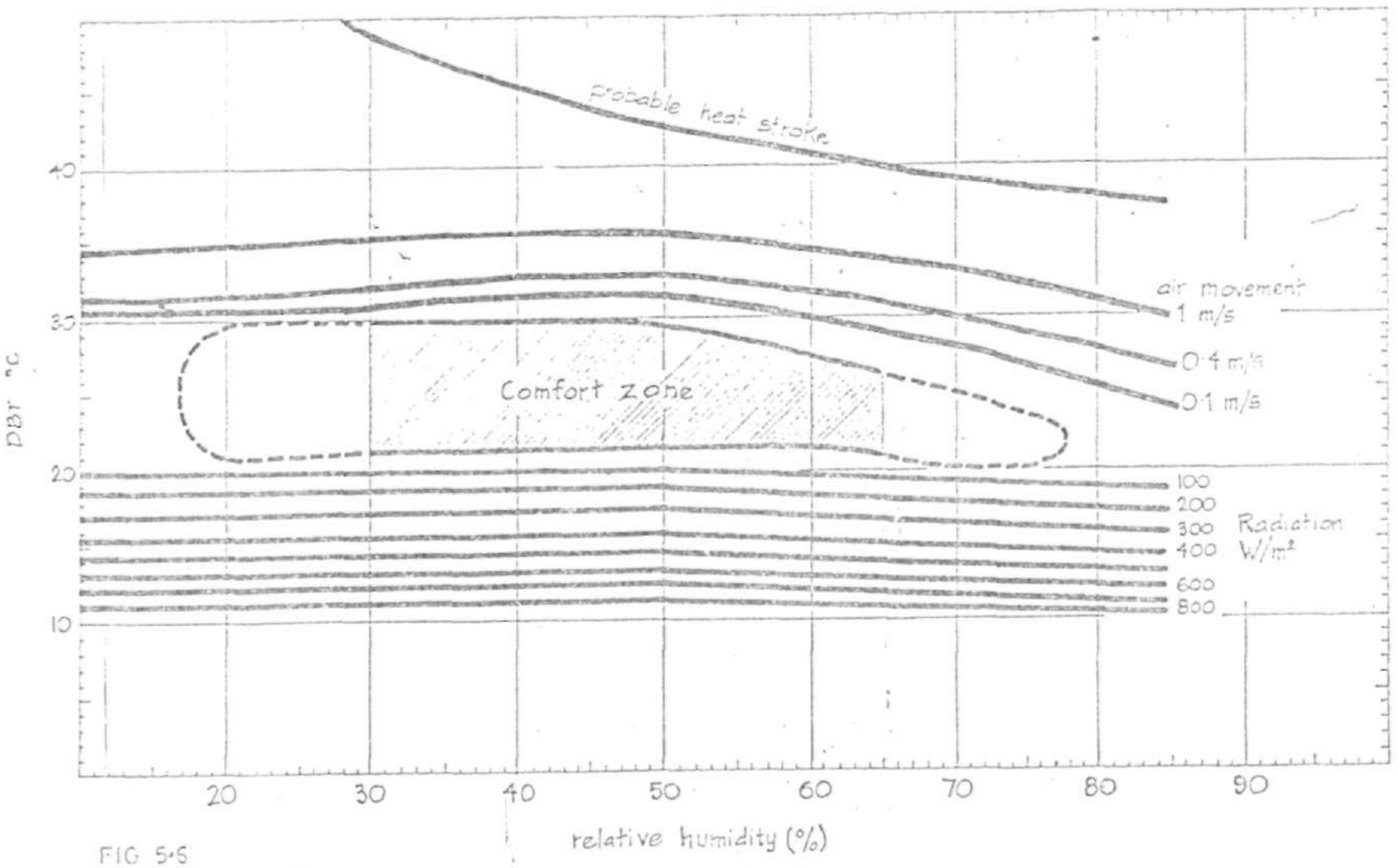


FIG 5·5
The bioclimatic chart SOURCE: DR.O.O OGUNSUTE (1991) INTRODUCTION TO BUILDING CLIMATOLOGY ZARIA.

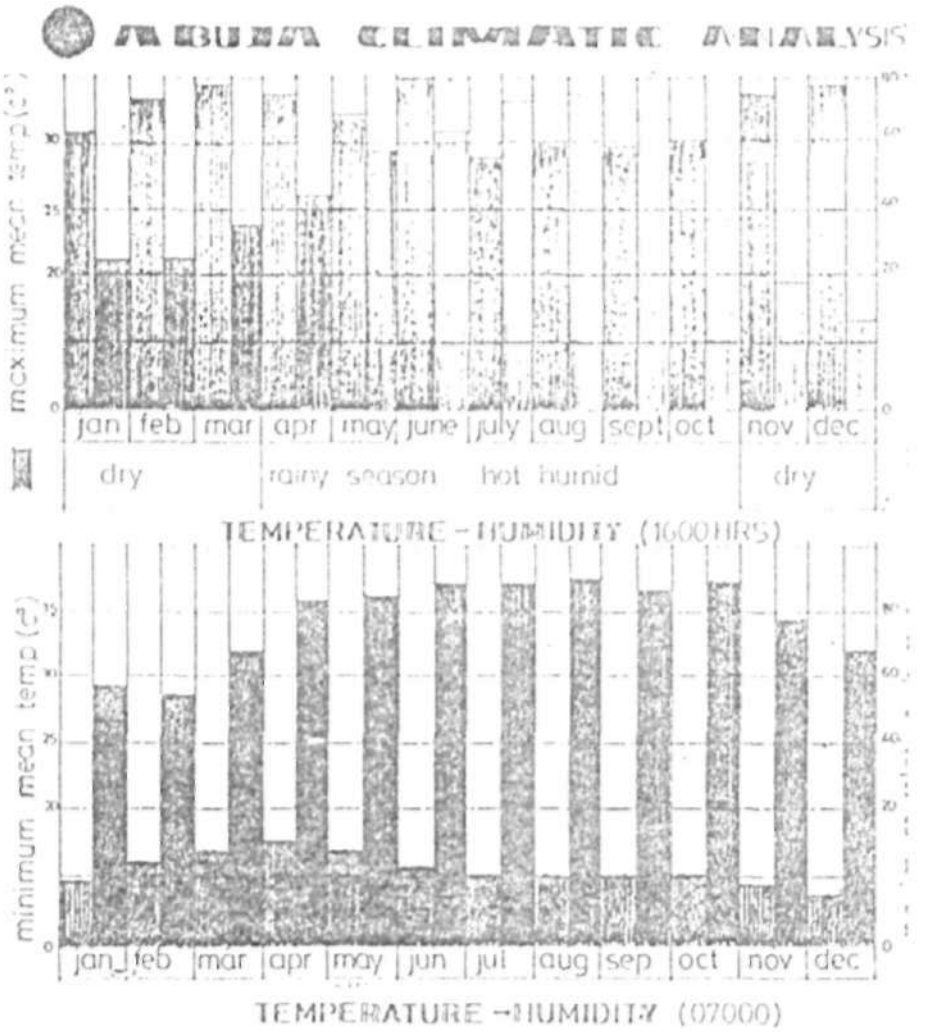


FIG 5·7·1 TEMPERATURE–HUMIDITY
SOURCE FED REPOF NIGERIA ANNUAL ABSTRACT OF STATISTICS (1995) LAGOS

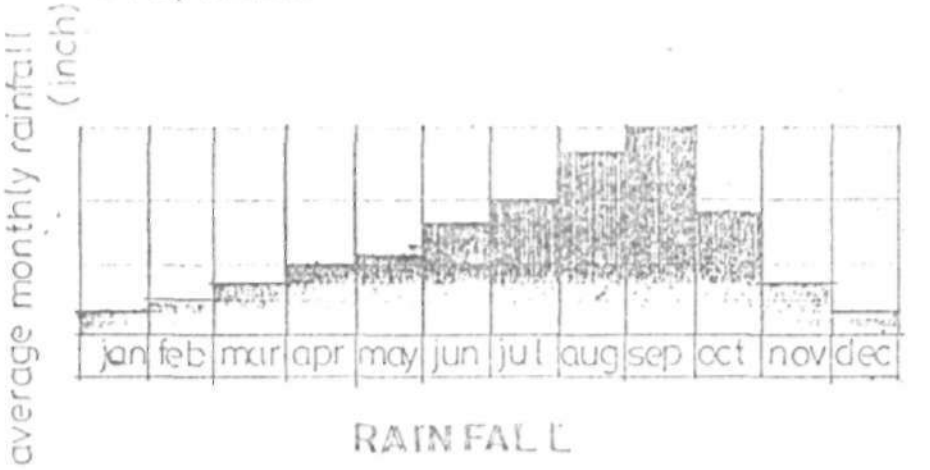


FIG 5·7 ANNUAL MONTHLY RAINFALL
SOURCE: FEDERAL OFFICE OF STATISTICS (1995) LAGOS

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REFERENCES

1. Abuja Master Plan the New Federal Capital Territory of Nigeria (1991) FCDA, Abuja, Nigeria.

2. Adesanya T.O. (1991) University of Abuja Unpublished M.Sc. Arch. Thesis pp 1-8.

3. Development Control Standards and Regulations (1996) FCDA, Abuja, Nigeria pp. 11-12, 6-17, 36-40, 59-60, 66-67.

4. Education Tax fund Headquarters, Management Board. (E.T.F) No. 27 Azores Street Maitama Abuja.

5. Ogogo, L.A. (1990) National Primary Education, commission Headquarters, Abuja Unpublished M.Sc. Arch Thesis A.B.U. Zaria.

CHAPTER SIX

6.0 THE EDUCATION TAX FUND

6.1 HISTORICAL BACKGROUND

Education Tax Fund (ETF) is founded by ASUU (Association of Staff Universities Union) in 1990 headed by professor O.O. Akinkugbe provost of College of Medicine University of Ibadan. ASUU demanded that a body should be set up and fund should be raised. The demands of ASUU are: Improve conditions for staff and Universities, better conditions of service, provision of equipment in Universities. Then an adhoc committee was set up to look into the problems. The then head of service Mr. Gray Longes was the chairman, the committee proposed the following recommendations.

The committee recommended that ETF should be established also other institution include in the fund beneficiaries are Primary Schools, Secondary Schools, Polytechnics, Federal Colleges of Education and Universities. The recommendations were handed over to the Federal Government and a decree 7 of 1993 is promulgated of the federal republic of Nigeria backing the establishment of ETF. Since then the Federal Inland Revenue board has been collecting Tax for ETF from 2% of annual profit of all companies registered in Nigeria as limited liabilities.

The Federal Government set up board of trustees on the 3rd November, 1998. The inauguration came against the background of the nationwide clamour by well meaning citizens, including University Teachers and Students, for government to take concrete action to reverse the excruciating, dilapidation and decay which have been the lot of the nation's education sector for many years now. Indeed the federal government was subjected to intense pressure to constitute the board of trustees of ETF to enable the

Education Fund which had accumulated since 1994 and was laying idle in the central Bank's vault to be utilized to salvage education in Nigeria.

In the six months since its inauguration, the Board of Trustees of the ETF has recruited the pivotal staff, secured the transfer of ETF funds from the central Bank of Nigeria to its own accounts, rented temporary offices and worked out a comprehensive plan for its operations. In addition, the first round of disbursements of the Education Fund to beneficiaries has been successfully effected and projects have been commenced in the rehabilitation of Educational Institutions in all nooks and crannies of this country.

The Board of Trustees consist of 7 member Board headed by Professor Ime Ikiddeh Executive Secretary Tajjani Abdulkadir ETF is the only Government Parastatal inaugurated by the Federal Government in 1998.

6.2 FUNCTIONS OF THE FUND

The Board of Trustees of the Education Tax Fund ETF is responsible for the disbursements of the fund to the beneficiaries. The fund will be used for the rehabilitation of educational institutions in all nooks and crannies of this country.

In the six months since its inauguration, the board of trustees of the ETF has recruited the pivotal staff, secured the transfer of ETF funds from the central bank of Nigeria to its own accounts, rented temporary offices and worked out a comprehensive plan for its operations. In addition, the first round of disbursement of the Education Fund to beneficiaries has been successfully effected and projects have been commenced in the rehabilitation of educational institution in all nooks and crannies of this country.

6.3 NATIONAL POLICY ON EDUCATION

Nigeria advocates equal and quality education for all its citizens. All levels primary, secondary and tertiary both inside and outside the formal education system. The philosophy of education is based in Nigeria is geared towards integration of the individual into a sound and useful individual, in view of Nigeria being the most populated black nation in the world as shown in table 6.1

The educational system helped in inculcating the following values:

a. Training of the mind
b. Acquisition of professional, technical and allied skills that assists individual to achieve his daily needs, and for the development of the country.
c. Well train individual to respect his country
d. Shared collective responsibility for the development of the country
e. Ability to act rationally
f. Improve emotional, physical and physiological health of Nigerian children.
g. Towards collective achievement of national unity and development
h. To respect the dignity of labour

6.3.1 THE POLICY OUTLINED THE FOLLOWING LEVELS OF EDUCATION

i. Pre-primary education
ii. Primary education
iii. Secondary education
iv. Higher education
v. Tertiary education

vi. Adult and non formal education.

6.4 EDUCATION IN NIGERIA

The role of education tax fund (ETF) can be best described by giving a brief history of education in Nigeria. Education in Nigeria had being going through a phenomenal changes since its introduction by missionaries.

6.5 METARMORPHOSIS AND PRESENT TREND

Western education in Nigeria was introduced by the missionary bodies. In Abeokuta and Badagry in 1842 the first mission stations were established. Also the first missionary school was opened in Badagry in 1842 this marked the first missionary activity in Nigeria.

The missionary demands were too revolutionary this acts as a hitch for the acceptance of Western education in Nigeria. The ex-slaves who were newly returned and settled in Badagry, Abeokuta and Lagos who were Sierra-Leoneans help in propagating the gospel (western education).

During the early stage of western education missionaries take the responsibility of educating the people, it was later that Government decided to intervene. In 1882 the first Education ordinance was promulgated for Lagos and Gold Coast. Education department and Education code for the southern Nigeria were also promulgated in 1900. Similar things were established in 1910 by the Northern Nigeria. The two separate entities were merged in 1929.

The autonomy which each region enjoyed in Nigeria resulted to unequal development in education in Nigeria as shown in the tables below. Table 6.2

6.5.1 PRESENT TREND

Before Nigeria become independent in 1960 education planning was according to Clark (1963) " a disjointed set of individual projects grouped together under departmental heading which reflected the administrative structure of the colonial government rather than any co-ordinated sectoral division of the economy" This trend changed when Nigeria became a sovereign state. A federal ministry of Education was established as a co-ordinating mechanism for national education planning NPEC (National Primary Education Commission) governed primary education NSEC (National Secondary Education Commission) governed Secondary Education NBTE (National Board for Technical Education) governed Polytechnics and Federal Colleges of Education. NUC (National Universities Commission) governed University Education. All these are under Federal Ministry of Education.

The role of Education to the national development cannot be overemphasized as noticed by the Federal Government of Nigeria this has been proved in November 3rd 1998 when the Board for Education Tax Fund is established to disburse the accumulated fund so far since 1993 in order to restore the lost glory of our education system in Nigeria, as shown in table 6.2. 6.3, 6.4, 6.5, and chart 6.1, 6.2.

6.6 DEPARTMENT IN HEADQUATERS

1. OFFICE OF THE EXECUTIVE SECRETARY

This is the centre of the chief executive and accounting officer is housed here. He coordinates the activities of the commission in liaison with the board. The legal unit and audit units are contained here. The Directors of all the other departments relate with the

Executive Secretary in the performance of their duties in their respective departments number of staff are 16.

2. DEPARTMENT OF CORPORATE AFFAIRS

This department consist of 15 staff and it relates with other cooperate bodies, headed by a Director.

3. DEPARTMENT OF MANAGEMENT AND LEGAL SERVICES

This department consist of 29 staff headed by a Director. In this department management and legal matters concerning the fund (ETF) in relation to Government and Educational Institutions is carried out.

4. DEPARTMENT OF FINANCE

This department consists of 31 staff headed by a Director. In this department all financial matters of the fund is being handled in this department. Disbursement of the fund is also prepared in this department.

5. DEPARTMENT OF PROJECT DEVELOPMENT

This department consist of 60 staff headed by a Director All projects matters in all education institutions are carried out in this department.

6. DEPARTMENT OF MONITORING AND EVALUATION

This department consists of 33 staff headed by a Director. Regular disbursement of fund and proper utilization of the fund is monitored in this department. This department regularly inspect finished and ongoing projects in order to ensure effective monetary spending and maximum value of money. The financial development proposals from educational institutions are assess objectively and regular auditing of personnel staff and fund disbursed ensures progress of work.

7. DEPARTMENT OF ZONAL OPERATIONS

This department consist of 9 staff headed by a Director. The country is divided into six zones viz. North-Central, North-East, North-West and South-South, South-East, South -West. There are six zonal offices representing each zone in ETF operation, this is to ensure justice and equity in ETF operations. This six zonal offices will be coordinated and monitored by Department of zonal operations.

B. BOARD OF TRUSTEES

The education tax fund is run by Board of trustees headed by

a. Chairman and six members appointed by the Head of State.

b. The Executive Secretary by the virtue of his position.

c. Permanent secretaries of the following ministries

i. Federal Ministry of Education Ex-officio

ii. Federal ministry of finance Ex-officio

6.7 DETAILED STAFF BREAKDOWN

The detailed staff breakdown in the Fund (ETF) headquarters is shown below

1. Office of The Executive Secretary

Executive Secretary	1
Personal Assistant (P.A) to ES	1
Personal Secretary	2
Legal adviser	2
Secretary	4
Computer operator	4
Clerical assistance	2

2. DEPARTMENT OF CORPORATE AFFAIRS

Director	1
Secretary	2
Personal assistant (PA)	1
Assistant Director	1
Personal assistant (PA)	1
Secretary	2
Computer operator	4

3. DEPARTMENT OF MANAGEMENT AND LEGAL SERVICES

Director	1
Personal Assistant (PA)	1
Secretary	4
Computer Operator	2
Assistant Director	1
Chief Personnel Officer	2
Finance Officer	2
Public Relation Officer (PRO)	2
Chief Protocol Officer	1
Caterer	3
Store	1
Kitchen	1
Drivers	6
Messenger	1

Security	3
Restaurant	1

4. DEPARTMENT OF FINANCE

Director	1
Secretary	2
Personal Assistant (PA)	1
Computer Operator	2
Store Keeper	1
Assistant Director	1
Secretary	2
Personal Assistant (PA)	1
Finance Officer	2
Funds Officer	2
Chief Accountant	2
Assistant Chief Accountant	1
Senior Accountant	2
Accountant	2
Store Keeper	1
Management Information Officer	3
Auxiliary Staff	4
Messenger	2

5. DEPARTMENT OF PROJECT DEVELOMENT

Director	1
Personal Assistant (PA)	1
Secretary	2
Computer Operator	3
Assistant Director	1
Personal Assistant (PA)	1
Secretary	2
Store Keeper	2
Management Information Officer	3
Chief Planning Officer	1
Chief Internal Auditor	1
Secretary/Computer Operator	4
Zonal Auditor	6
Chief Architect	1
Personal Assistant (PA)	1
Secretary	2
Assistant Chief Architect	1
Personal Assistant (PA)	1
Secretary	1
Drawing Office	6
Engineering Section	2

	Quantity Surveyor	3
	Principal Planning Officer	4
	Research Officer I & II	2
	Education Officer	6
	Store	1

6. DEPARTMENT OF MONITORING AND EVALUATION

	Director	1
	Secretary	2
	Personal Assistant (PA)	1
	Assistant Director	1
	Secretary	2
	Personal Assistant (PA)	1
	Chief Monitoring Officer	2
	Assistant Chief Monitoring Officer	2
	Monitoring Officer	2
	Principal Monitoring Officer	4
	Senior Monitoring Officer	4
	Monitoring Officer	4
	Messenger	2
	Administrative Secretary	2
	Computer Operator	4

7.	**DEPARTMENT OF ZONAL OPERATIONS**	
	Director	1
	Secretary	2
	Personal Assistant (PA)	1
	Assistant Director	1
	Secretary	1
	Personal Assistant (PA)	1
	Computer Operator	2
	Public Relation Officer (PRO)	2
	Driver	1

STAFF BREAKDOWN

1.	Officer of the Executive Secretary	16
2.	Department of Corporate Affairs	15
3.	Department of Management and Legal Services	30
4.	Department of Finance	30
5.	Department of Project Development	60
6.	Department of Monitoring and Evaluation	33
7.	Department of Zonal Operation	10

B. BOARD OF TRUSTEES

a. Chairman and six member appointed by the Head of State

b. The Executive Secretary by virtue of his position

c. Permanent Secretaries of the following ministries

KASHIM IBRAHIM LIBRA

i. Federal Ministry of Education ex-officio

ii. Federal Ministry of Finance ex-officio

According to FCDA development control regulations standards

Class II- Commercial/Office

Commercial/Office space requirements

S/No:	Space Definition	Basic Minimum	Desirable Minimum
1	Entrace Hall	$20m^2$	$30m^2$
2.	Office	$12m^2$	$15m^2$
3.	Parking spaces	One Parking Space	per $75m^2$ floor area
4.	Toilets	$1.5m^2$	$1.8m^2$
5.	Staircase width	$1.2m^2$	$1.5m^2$
		Riser 150mm	Riser 175mm
		Tread 230mm	Tread 300mm
6.	Conference/Meeting Rooms	$0.65m^2$ per person	$0.85m^2$ per person
7.	Cafeteria/Restaurant	$0.65m^2$ per person	$0.85m^2$ per person

LIFT CAR PASSENGER CAPACITY

LIFT CAPACITY KG	MAX PASSENGER CAPACITY	NORMAL PASSENGER LOAD PER TRIP
1200	16	13

RECOMMENDED LIFT SPEED 1.0 METER PER SECOND

In office buildings a population density of one person per $10m^2$ of net floor area is assumed and this is used as a guide for the minimum number of lifts.

In offices one lift for every three floors.

TABLE 64 1991 POPULATION OF NIGERIA BY STATE AND SEX

State	Male	Female	Total
Abia	1,108,357	1,189,621	2,297,978
Adamawa	1,084,824	1,039,225	2,124,049
Akwa Ibom	1,162,430	1,197,306	2,359,736
Anambra	1,374,801	1,393,102	2,767,903
Bauchi	2,202,962	2,091,451	4,294,413
Benue	1,386,402	2,394,996	2,780,398
Borno	1,327,311	1,269,278	2,596,589
Cross River	945,270	920,334	1,865,604
Delta	1,273,208	1,296,973	2,570,181
Edo	1,082,718	1,077,130	2,159,848
Enugu	1,482,245	1,679,050	3,161,295
Imo	1,178,031	1,307,468	2,485,499
Jigawa	1,419,726	1,410,203	2,829,929
Kaduna	2,059,382	1,909,870	3,969,252
Kano	2,858,724	2,773,316	5,632,040
Katsina	1,944,218	1,934,126	3,878,344
Kebbi	1,028,334	1,037,892	2,066,226
Kogi	1,056,964	1,043,082	2,099,046
Kwara	790,921	775,548	1,566,469
Lagos	3,999,528	3,686,253	7,685,781
Niger	1,290,720	1,191,647	2,482,367
Ogun	1,144,907	1,193,663	2,338,570
Ondo	1,958,928	1,924,557	3,884,485
Osun	1,079,424	1,123,592	2,203,016
Oyo	1,745,720	1,743,069	3,488,789
Plateau	1,645,730	1,637,974	3,283,704
Rivers	2,079,583	1,904,274	3,983,857
Sokoto	2,158,111	2,234,280	4,392,391
Taraba	754,754	725,836	1,480,590
Yobe	719,763	691,718	1,411,481
Abuja	206,535	172,136	378,671
Total	44,544,531	43,969,970	88,514,501

Source: National Population Commission.

Table 5·2 Primary School Enrolment Figures and Geographical Agency

1) Southern Nigeria (1912)[3]

	Agency	No of Primary Schools	No of Pupils
(a)	C. M. S.	27	11,372
	United Free Church of Scotland	19	
	Methodist	6	
	R. C. M.	36	
	Qua Iboe	1	
	United Native African Church	2	
(b)	Government Unassisted Schools	59	3,984
		?	20,000
(c)	Qur'anic School	?	50,000

2) Northern Nigeria (1913)[4]

	Agency	No of Schools	No of Pupils
(a)	C. M. S.	13	?
	Sudan United Mission	4	63
	Sudan United	1	176
	Sudan Interior Mission	7	?
	Mennotite Brethren in Christ Roman Catholic	1	60
(b)	Government Schools	12	527
(c)	Qur'anic Schools	19,073	143,312

SOURCE: FEDERAL MINISTRY OF EDUCATION LAGOS

TABLE 6.3 NUMBER OF TECHNICAL AND VOCATIONAL SCHOOLS BY STATE

State	1983	1984	1985	1986	1987
Akwa-Ibom	-	-	-	-	9
Anambra	21	5	5	21	18
Bauchi	9	10	10	11	9
Bendel	13	13*	21	86	9
Benue	n.a	12	12	10	3
Borno	n.a	n.a	n.a	12	11
Cross-River	23	23*	22	8	2
Gongola	17	18	17	20	18
Imo	14	14	14	10	97
Kaduna	5	5*	n.a	1	5
Kano	22	13	13	13	16
Katsina	-	-	-	-	-
Kwara	9	9*	10	9	7
Lagos	n.a	n.a	20	28	3
Niger	12	12*	8	14	14
Ogun	8	8	8	8	7
Ondo	11	11	11	31	-
Oyo	36	36*	6	6	6
Plateau	1	4	4	1	2
Rivers	5	5	5	5	4
Sokoto	n.a	4	4	6	n.a
Abuja	-	-	-	-	-
Total	208	(202)	(190)	(300)	(240)

Source: Federal Ministry of Education, Lagos.

n.a not available.
- Nil
() Incomplete Total

TABLE 6·4 NUMBER OF TEACHERS IN NIGERIAN UNIVERSITIES BY MAJOR DISCIPLINES

Number

Discipline	1989	1990	1991	1992	1993*
Administration	408	371	404	461	282
Agriculture	941	937	1,049	1,110	904
Arts	1,704	1,697	1,812	1,736	1,425
Education	1,595	1,496	1,482	1,108	1,068
Engineering and Technology	962	989	1,081	1,102	1,060
Environmental Design	456	448	534	549	453
Law	340	363	376	383	325
Medicine/Health Sciences	1,304	1,320	1,422	1,395	1,632
Pharmacy	203	195	222	211	354
Sciences	2,121	2,382	2,679	2,790	2,719
Social Sciences	1,053	1,197	1,133	1,132	1,139
Veterinary Medicine	231	245	295	279	310
Others	600	649	1,156	673	360
Total	12,118	12,289	13,645	12,927	12,031

Source: National Universities Commission.

Note: *Federal Universities only.

Table: 6·4·1
UNIVERSITIES STUDENT - TEACHER RATIOS IN NIGERIAN

Number

Discipline	1989	1990	1991	1992	1993*
Administration	21:1	30:1	32:1	34:1	1:45
Agriculture	10:1	12:1	11:1	12:1	1:13
Arts	14:1	14:1	14:1	16:1	1:16
Education	18:1	20:1	24:1	28:1	1:29
Engineering and Technology	15:1	15:1	17:1	19:1	1:21
Environmental Design	12:1	13:1	12:1	13:1	1:17
Law	28:1	26:1	25:1	30:1	1:30
Medicine/Health Sciences	8:1	8:1	9:1	10:1	1:10
Pharmacy	10:1	12:1	12:1	13:1	1:14
Sciences	12:1	13:1	13:1	14:1	1:15
Social Sciences	19:1	18:1	22:1	27:1	1:21
Veterinary Medicine	6:1	6:1	5:1	6:1	1:7
Others	17:1	10:1	4:1	13:1	-

Source: National Universities Commission.

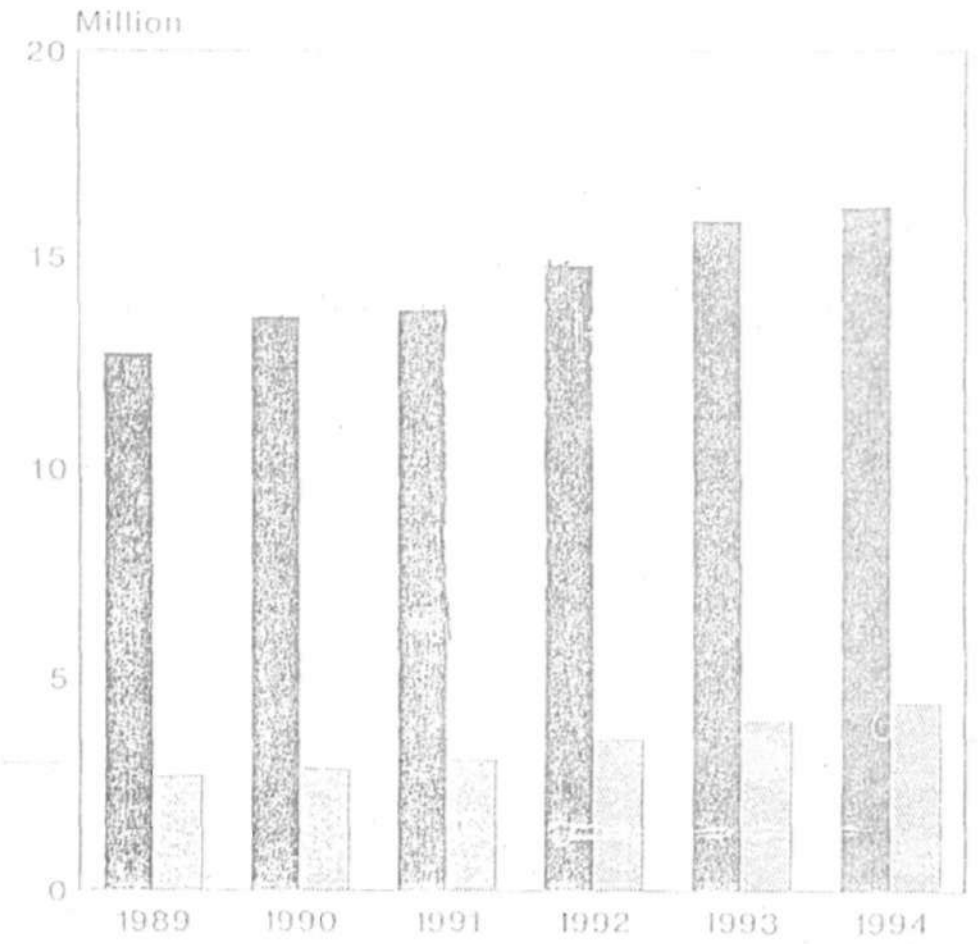
Note: *Federal Universities only.

TABLE 6.5 TOTAL STUDENT ENROLMENT IN COLLEGES OF EDUCATION BY STATE AND INSTITUTION

STATE	No of Institution	1987/88	1988/89	1989/90	1990/91	1991/92
Abia	–	–	–	–	–	–
Adamawa	2	1,004	1,709	1,758	1,609	373
Akwa Ibom	1	–	–	–	–	649
Anambra	3	6,165	6,509	7,197	5,681	594
Bauchi	2	2,590	3,662	2,262	11,038	3,821
Benue	1	2,146	2,256	2,774	3,134	684
Borno	3	1,486	1,822	2,009	2,382	1,257
Cross River	2	547	1,063	679	3,311	2,408
Delta	3	2,162	2,411	3,125	3,795	1,575
Edo	1	1,177	1,082	144	2,200	1,504
Enugu	2	356	368	539	847	248
Imo	1	3,527	3,634	2,805	4,223	5,711
Jigawa	1	1,143	2,200	2,524	3,141	1,086
Kaduna	2	3,420	3,956	4,398	4,959	3,615
Kano	2	1,032	1,331	1,285	1,456	1,831
Katsina	1	1,826	1,374	1,517	1,456	976
Kebbi	–	–	–	–	–	–
Kogi	2	2,965	3,152	3,581	3,907	2,073
Kwara	2	2,054	1,981	2,675	2,666	2,082
Lagos	3	3,481	3,379	3,419	2,900	2,835
Niger	2	1,740	1,914	1,800	2,377	2,255
Ogun	2	3,864	3,983	4,224	4,237	4,406
Ondo	2	3,956	3,961	3,839	4,601	6,043
Osun	2	5,231	4,876	6,077	6,947	4,735
Oyo	2	3,830	4,078	5,738	6,607	7,301
Plateau	3	1,575	1,425	1,392	1,443	2,549
Rivers	2	2,415	3,239	3,796	3,303	7,141
Sokoto	2	1,236	1,300	1,181	1,617	1,720
Taraba	1	661	592	836	1,323	343
Yobe	2	121	498	951	1,066	798
Abuja	–	–	–	–	–	–
Total	54	60,324	67,755	72,525	92,670	70,613

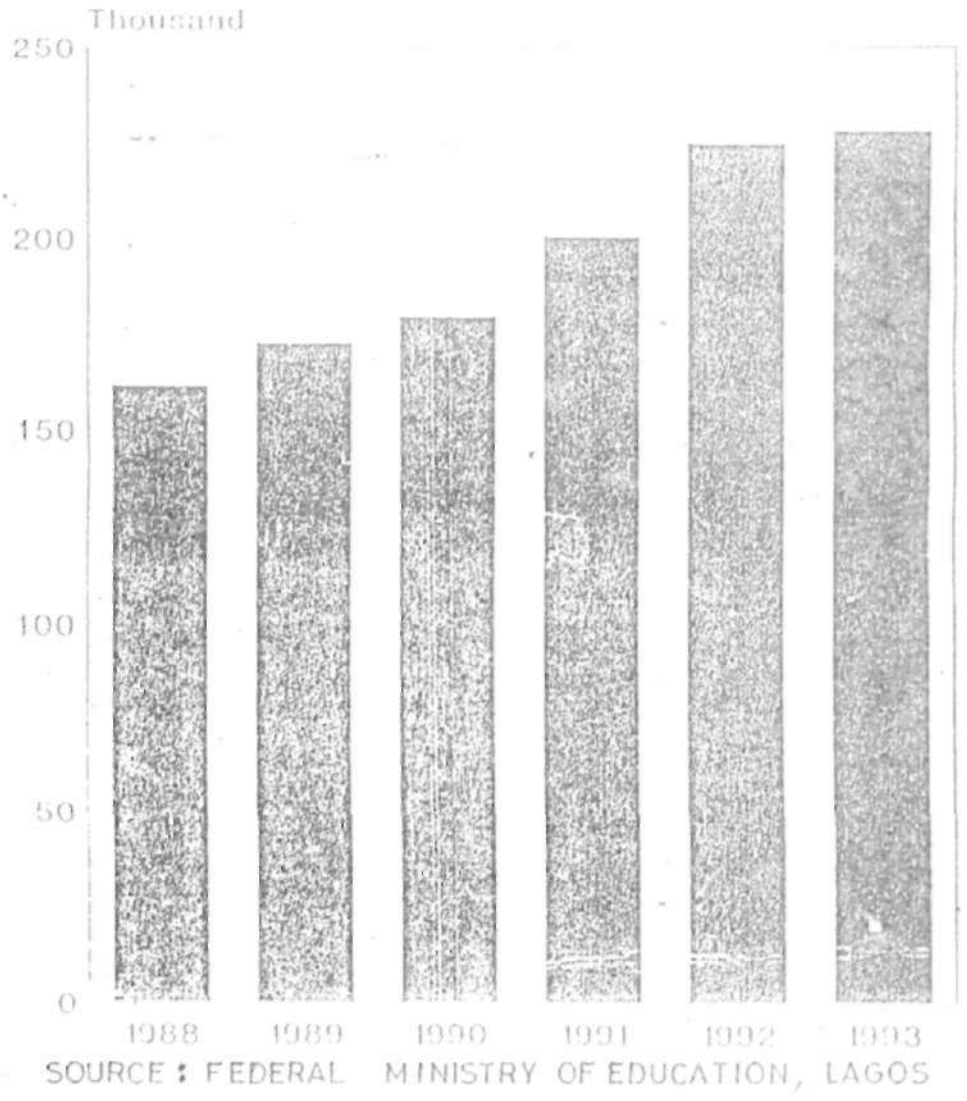
SOURCE: FEDERAL MINISTRY OF EDUCATION, LAGOS

CHART 6·1 TOTAL ENROLMENT IN PRIMARY AND SECONDARY SCHOOLS



SOURCE: FEDERAL MINISTRY OF EDUCATION, LAGOS

CHART 6·2 TOTAL ENROLMENT IN NIGERIAN UNIVERSITIES



SOURCE : FEDERAL MINISTRY OF EDUCATION, LAGOS

KASHIM IBRAHIM LIBRARY

MANAGEMENT STRUCTURE

FOR EDUCATION TAX FUND HEADQTRS(ETF)ABUJA

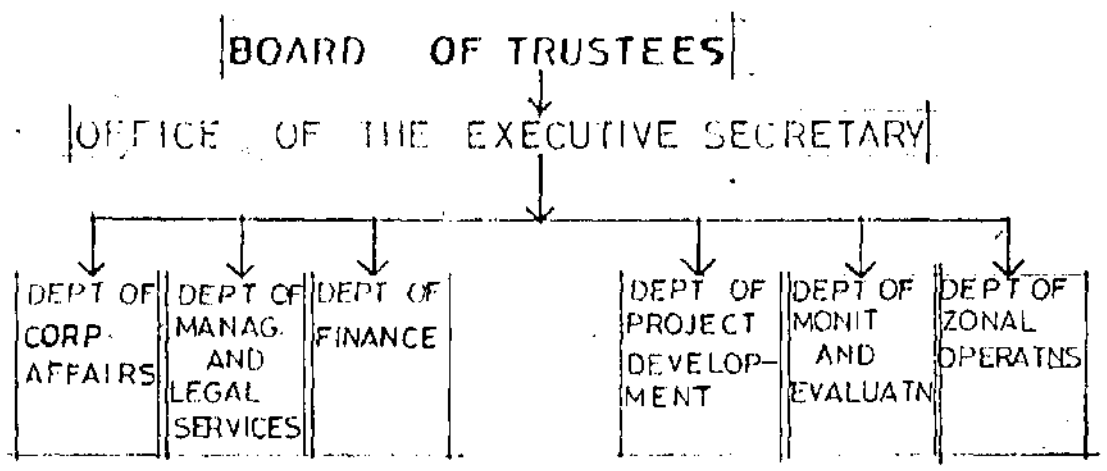


CHART 6·3 MANAGEMENT STRUCTURE OF **ETF** ABUJA
SOURCE: EDUCATION TAX FUND MANAGEMENT DEPT. ABUJA.

PERSONNEL STRUCTURE

FOR EDUCATION TAX FUND HEADQTRS(ETF)ABUJA

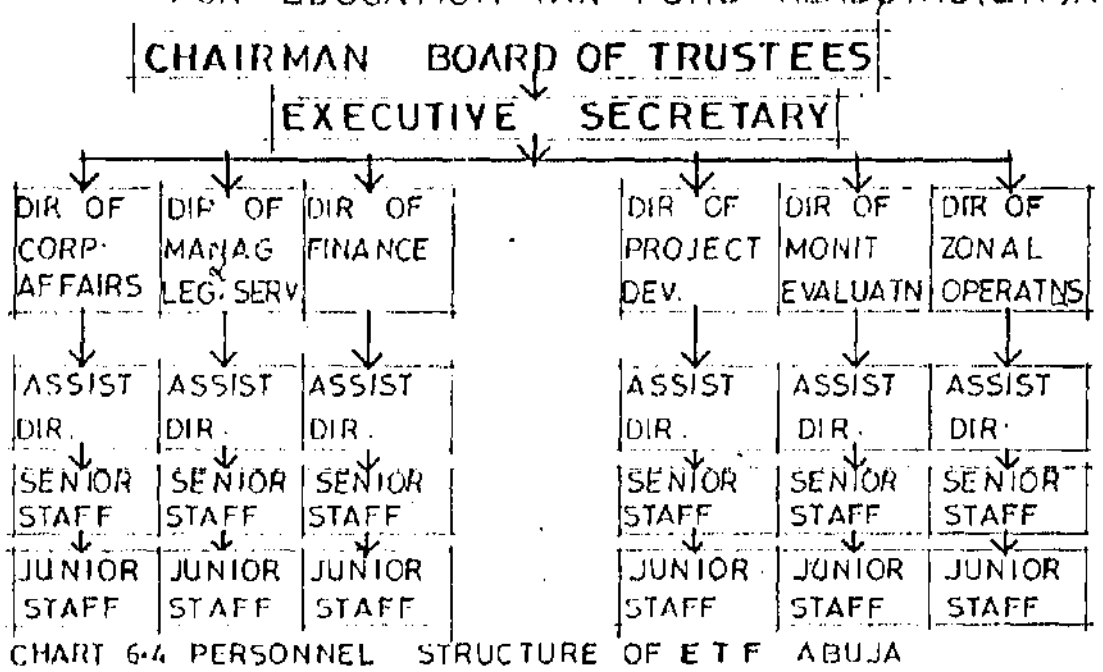


CHART 6·4 PERSONNEL STRUCTURE OF **ETF** ABUJA
SOURCE: EDUCATION TAX FUND MANAGEMENT DEPT. ABUJA.

PERSONNEL STRUCTURE

FOR EDUCATION TAX FUND HEADQTRS(ETF)ABU.

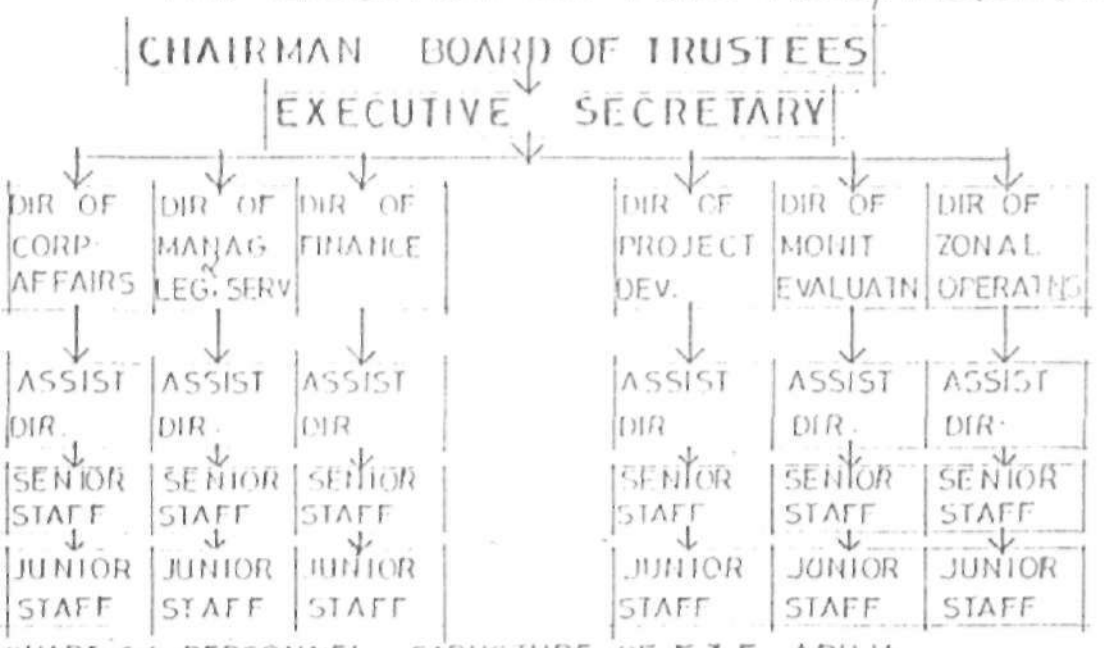


CHART 6.4 PERSONNEL STRUCTURE OF E T F ABUJA

SOURCE: EDUCATION TAX FUND MANAGEMENT DEPT. ABUJA.

REFERENCE

1. Education Tax Fund Headquarters No: 27 Azores Street Maitama, Abuja. (Temporary Office) Management Board.
2. Ogogo, L.A (1990) "National Primary Education Commission Headquarters Abuja" Unpublished Msc. Arch. Thesis, A.B.U. Zaria.

CHAPTER SEVEN

7.0 DESIGN INFORMATION

7.1 PLANING CRITERIA

Education Tax Fund headquarters Abuja consist of seven departments headed by the office of the Executive Secretary, which is located in the last floor. The headquarter consist of 6 storey building located in Zone 4 Wuse district in the district centre other departments are department of management and legal services in the ground floor department of project development on the first floor, department of corporate affairs and finance on the second floor, departments of monitoring and evaluation and zonal operations on the third floor, Fourth and fifth floors are lettable spaces, which are as well use for future expansion. The money generated from the lettable spaces can used for maintaining the headquarters, maintenance office, underground reservoir and generator room are also provided.

The entire complex is designed in such away that it will be difficult for fire to engulf the whole complex this is achieved through fire compartmentation of functions, use of parapet walls to compartment the roof at various location and levels. This is in line with the research topic (Fire prevention in office buildings).

Simple forms were used with courtyard system of planning this is to enhance effective ventilation and lighting, recesses were used to act as fire breakers and sun shading devices.

7.1.1 *CONCPET DEVELOPMENT AND OTHER PLANNING CRITERIA*

The concept is developed from hose reels connection from water hydrant the projection which looks like letter C was placed in either ends brought closer to form a courtyard which was eventually used in the design. Single banked corridors are used. The courtyard help to provide good micro climate within the complex. As shown in fig. 7.1

There are three lifts and a central circulation stair this enhance effective circulation, one of the lifts can be used both for passengers and goods depending on which is highly demanded. Fire escape stair cases which are two in number are located at opposite end of the complex and are completely detached from the building, air lock and refuge lobby are provided this is to ensure life safety of the occupants. Fresh air is admitted from the horizontal open spaces on either side of the refuge lobby so once an escapee is in the refuge lobby he is automatically saved.

The occupants should be able to leave the building within 30 minutes after warning, because of fire compartmentation and active fire suppression (Sprinklers, extinguishers) you find out that before fire reaches smouldering stage the occupants already escape. Automatic heat, flame and smoke detectors are installed in each function and automatic sprinkler, water, CO^2 and halon gas are installed CO^2 and halon gas are used in computer room or any function whose contents could be spoilt by water, floor drains are located in various functions in all floors this drains water immediately.

The headquarters has heavy patronage and induces noise in the complex. To reduce this problem various departments are located from ground floor to 3rd floor 4th – 5th are lettable spaces mostly rented by insurance companies, government parastatals or any organisation, on the 6th floor, the office of the executive secretary and members board of trustees offices, these are the highest cadre of the ETF management within the headquarters.

7.1.2 SITE CONCEPT

Site concept defined staff parking, public/staff parking, service route and fire apparatus route.

7.1.3 SITE PLANNING

The site is planned according to FCDA development controls and regulation 1996 edition the following are located within the complex

- The Complex (EFT Headquarters Abuja)
- Staff parking
- Staff – public parking
- Service route to the maintenance section and generator house
- Underground reservoir
- Fire hydrants
- Fire apparatus parking space

The planning system enhances effective fire suppression both active and passive means. The site is access through N18 arterial road N18 via collectors which surrounded the site as shown in the site plan separate parking space for fire apparatus is provided to

enhance smooth and effective rescue operations and fire fighting, separate route for fire apparatus is tapped to ensure easy access thereby enhancing effective fire fighting.

Building orientation

The headquarters is oriented North-South with long axis facing North and south while the shorter ones face East and West this enhanced effective lighting and ventilation this enhances effective utilisation of Abuja climate

7.2 SCHEDULE OF ACCOMMODATION

The headquarters consists of the following

i. The office of the executive secretary and board of trustees

ii. Department of management and legal services

iii. Department of project development

iv. Department of corporate affairs

v. Department finances

vi. Department of monitoring and evaluation

vii. Department of zonal operations

Auxiliary facilities are:

i. Executive lounge

ii.. Restaurant

iii. Maintenance section

iv. Generator room

v. Store

SCHEDULE OF ACCOMMODATION

1. OFFICE OF THE EXECUTIVE SECRETARY AREA M2

Executive Secretary	$64m^2$
Computer Room	$28m^2$
Personnel Assistant PA	$16m^2$
Secretary I	$16m^2$
Legal Adviser	$16m^2$
Personal assistant PA	$16m^2$
Secretary I	$16m^2$
Committee room	$64m^2$
Achive	$20m^2$
Management information service	$28m^2$
Kitchnette	$9m^2$
Executive lounge	$64m^2$
Executive chairman	$48m^2$
Secretary I	$16m^2$
Personal assistant	$16m^2$
Member of the board office	$20m^2$
Conference office	$96m^2$
General reception/waiting	$92m^2$
Staff toilets 10	$64m^2$
Staff toilets 10	$64m^2$

DEPARTMENT OF CORPORATE AFFAIRS

Director	$48m^2$
Secretary I	$16m^2$
Personal assistant PA	$16m^2$
Assistant Director	$30m^2$
Personal Assistant PA	$24m^2$
Secretary I	$16m^2$
Achive/Computer Unit	$40m^2$
Management information service	$16m^2$
Committee room	$32m^2$
General office	$32m^2$

DEPARTMENT OF MANAGEMENT AND LEGAL SERVICES

Director	$64m^2$
Secretary I	$16m^2$
Personal Assistant PA	$16m^2$
Assistant Director	$40m^2$
Personal Assistant	$16m^2$
Secretary	$16m^2$
Achive	$16m^2$
Management Information service	$16m^2$
Finance Office	$24m^2$
Transport Office	$16m^2$
Secretary I	$16m^2$

Public relation officer	16m^2
Secretary	16m^2
Chief protocol officer	48m^2
Committee room	232m^2
Secretary	16m^2
Personal assistant PA	16m^2
Achive/computer room	24m^2
Legal adviser	24m^2
Kitchen	18m^2
Store	18m^2
Restaurant	96m^2
Reception/waiting	92m^2
Male changing	4m^2
Female changing	4m^2

DEPARTMENT OF FINANCE

Director	48m^2
Secretary I & II	16m^2
Personal Asisstant	16m^2
Assistant Director	32m^2
Secretary I	16m^2
Chief Accountant	32m^2
Secretary	16m^2

Legal Adviser	40m^2
Assistant Legal Adviser	20m^2
Finance Officer	28m^2
Funds Officer	20m^2
Secretary	16m^2

DEPARTMENT OF PROJECT DEVELOPMENT

Director	64m^2
Secretary	16m^2
Personal Assistant	16m^2
Assistant Director	30m^2
Personal Assistant PA	20m^2
Secretary I	16m^2
Achive	20m^2
Research Office	32m^2
Management Information Services	16m^2
Chief Planning Officer	28m^2
Chief Internal Auditor	20m^2
Secretary I	16m^2
Zonal Auditor	20m^2
Secretary/Computer Operation	16m^2
Chief Architect	48m^2
Secretary	16m^2
Personal Assistant (PA)	16m^2

Assistant Chief Architect	$20m^2$
Personal Assistant (PA)/Secretary	$16m^2$
Drawing Office	$72m^2$
Engineering Section	$32m^2$
Education Officer	$16m^2$
Quantity Surveyor	$32m^2$

DEPARTMENT OF MONITORING AND EVALUATION

Director	$64m^2$
Secretary I	$16m^2$
Personal Assistant (PA)	$16m^2$
Assistant Director	$30m^2$
Secretary	$16m^2$
Personal Assistant (PA)	$24m^2$
Achive	$20m^2$
Management Information Service	$16m^2$
General Office	$32m^2$
Chief Monitoring Officer	$28m^2$
Assistant Chief Monitoring Officer	$20m^2$
Secretary I	$16m^2$
Principal Monitoring Officer	$20m^2$
Secretary I	$16m^2$
Computer Room	$20m^2$
Committee Room	$32m^2$

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DEPARTMENT OF ZONAL OPERATIONS

Director	$48m^2$
Secretary	$16m^2$
Personal Assistant (PA)	$16m^2$
Public Relation Officer (PRO)	$20m^2$
Secretary	$16m^2$
Assistant Director	$32m^2$
Secretary	$16m^2$
Personal Assistant (PA)	$16m^2$
Management Information Service	$16m^2$
Achive	$16m^2$
General Office	$20m^2$
Research Office	$16m^2$
Legal Adviser	$20m^2$

7.3 DESIGN REPORT

The modular system used for the design of the headquarters is 4m x 8m grids with little deviation in toilet, lifts and general reception the complex is 6-storey height with Machine room, water tank and escape staircase.

7.3.1 CIRCULATION

Circulation is enhances using separate vehicular and pedestrian passages right from the entrance and this continue within the complex as shown in parking spaces in the site plan.

Circulation pattern within the complex is both horizontal and vertical. Horizontal circulation is enhance via corridors and lobbies, courtyard system of planning ensures short walking distance to each function via covered corridors, vertical circulation is aided by stair cases and lifts the number of lifts are in cognizance with the user's requirement as specified in FCDA development control regulations, two escape staircases are located at opposite ends of the complex and this falls within 30m which is the fire office committee standards for fire escape stair location.

7.3.2 FLOOR PLANS

The courtyard system of planning is employed which runs from ground floor to 6^{th} floor water is drain via drainage from the service route in the ground floor 4m x 8m modular grids is used for the design. There are ground floor, first – 6^{th} floor plans the modular layout is the same from ground floor to 6^{th} floor with partitions which is used to demarcate spaces from each function, recesses were used to discourage fire spread outward this is done by extending floor slab (1.2m) and height 1.2m thickness 150mm

7.3.3 ELEVATIONS

The composition of the elevation is done to discourage vertical/horizontal spread of fire, use of vertical element piers and horizontal elements beam strips as shown in the elevations are used for aesthetics purpose and prevention of fire spread.

The building height is 29m including machined room with water tank. East (approach) elevation, which is well defined with entrance porch, which can also be used as drop off for higher cadre of people in the headquarters. West elevation which is the rear elevation, fire apparatus entrance is tapped via collector road to the complex. North

and south elevation are longer this is done to enhances low heating and effective utilization of south-west trade winds.

7.3.4 SECTIONS

Two sections were cut across the complex section A-A and section B-B both shows lifts, ducts and staircases details vertical and horizontal circulation is shown.

7.3.5 LANDSCAPING

The interior courtyard is well landscaped this improves interior micro climate. Buffer of trees are planted in north-east, west and south facades this acts as a buffer zone against harsh North-East trade winds and heavy driving rain, shrubs are also planted along the walkway this gives feelings of security, privacy and comfortably.

7.3.6 SERVICES

Various services are provided these include: Electrical services (Generator room and switch room) water services, overhead tank, underground reservoir and service route. Maintenance office all surface water and foul water is connected to public sewer via ducts, inspection chambers and private sewer. Public treatment plant is located in Asokoro district FCT Abuja for treatment and recycling. The headquarters is connected to NEPA via underground power transmission cable. The complex enjoys the proper location and neighbourhood existence with Federal Inland Revenue Board, Fire Station, Post Office, Police Station, National Primary Education Commission (NPEC) Afri Project Consortium (APC) NEPA station and Alhassan Hospital.

7.3.7 CONSTRUCTION MATERIALS/FIRE PREVENTION

Modular grids is used 4m x 8m with partition walls. The fire resistance of the walls, concrete floors, doors, windows and other openings is 2 hour this is to conform

with the fire office committee standards of construction and this minimize fire spread to other compartment. The beam is extended horizontally and vertically (1.2m x 1.2m) this provides enough spandrel distance to discourage fire spread. As shown in fig. 7. 4, Fig. 7.5. All floors finishes, walls finishes are of fire resistance, as shown in table 7.1, table 7.2 and table 7.3.

The roofs are compartmented with parapet walls, which discourage fire spread. Roof covering is a corrugated aluminium roofing sheet on steel roofing frames, the steel frames are painted with fire resistant paint.

On top of machine room and fire escape staircases concrete is used for roofing system over head tank is placed on top of machine room (7m x 7m x 3m) 147m^3 tank capacity.

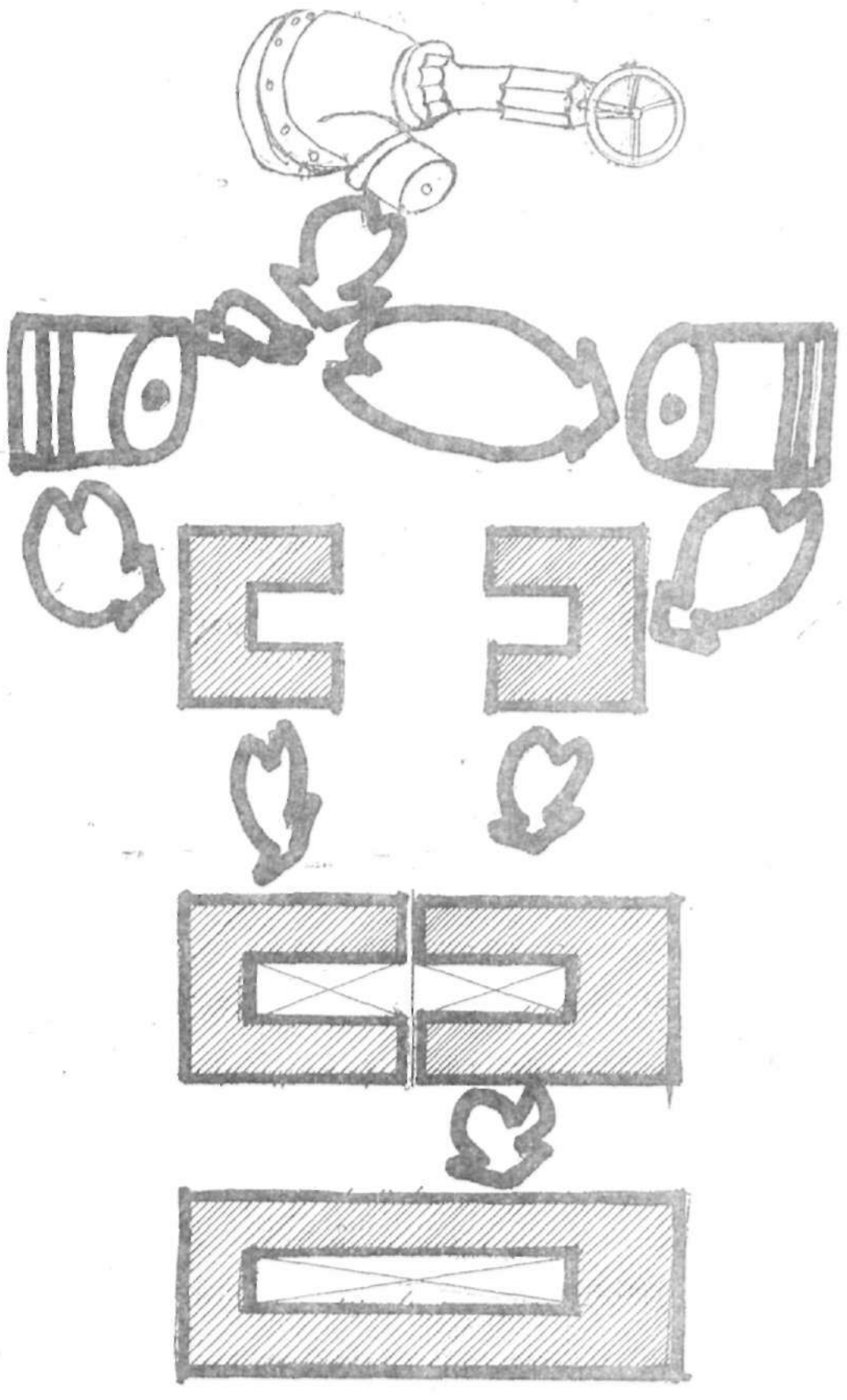


FIG 7·1 CONCEPT DEVELOPMENT

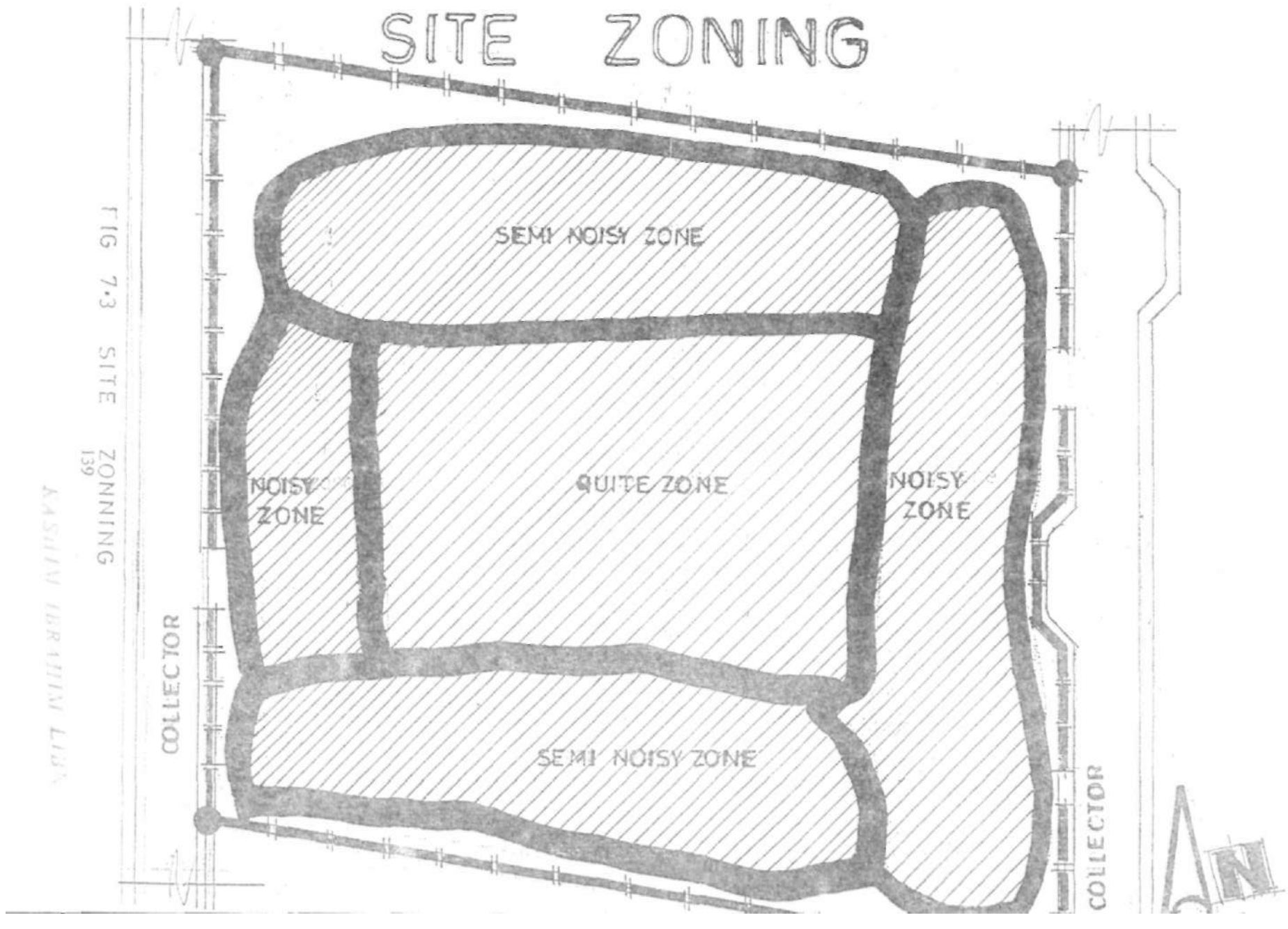


FIG 7.3 SITE ZONNING

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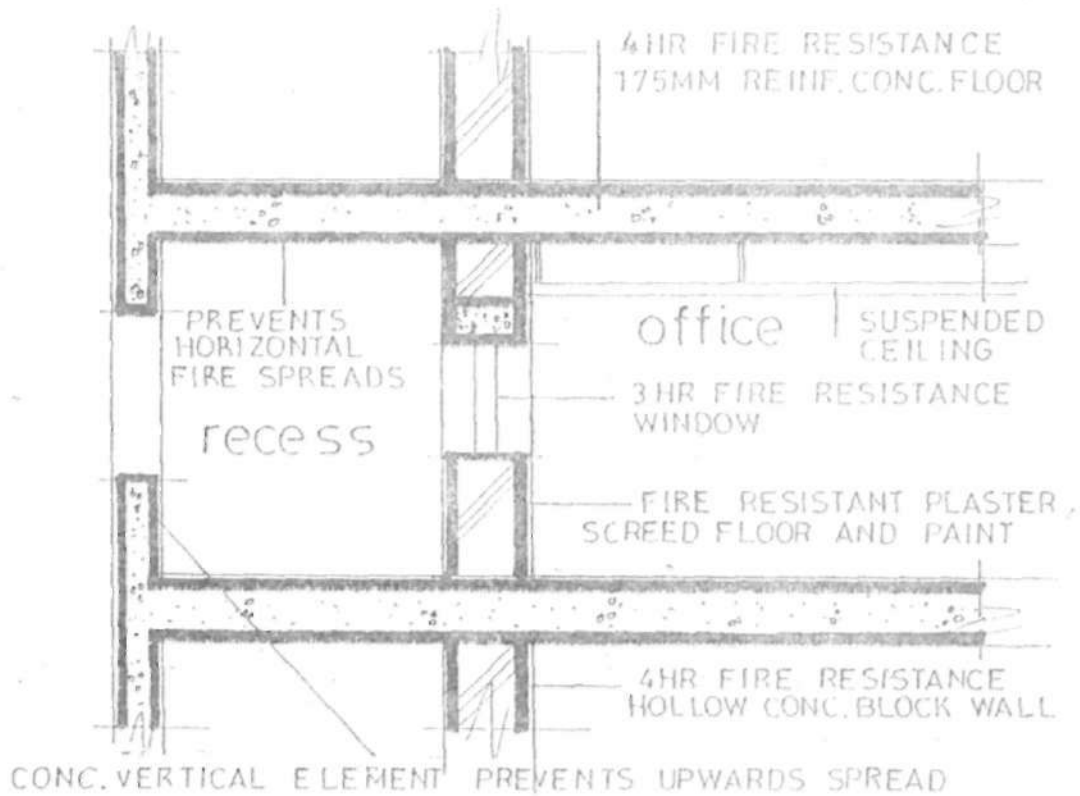


FIG 7·4 USE OF HORIZONTAL AND VERTICAL ELEMENTS FOR EFFECTIVE PREVENTION OF FIRE SPREAD.

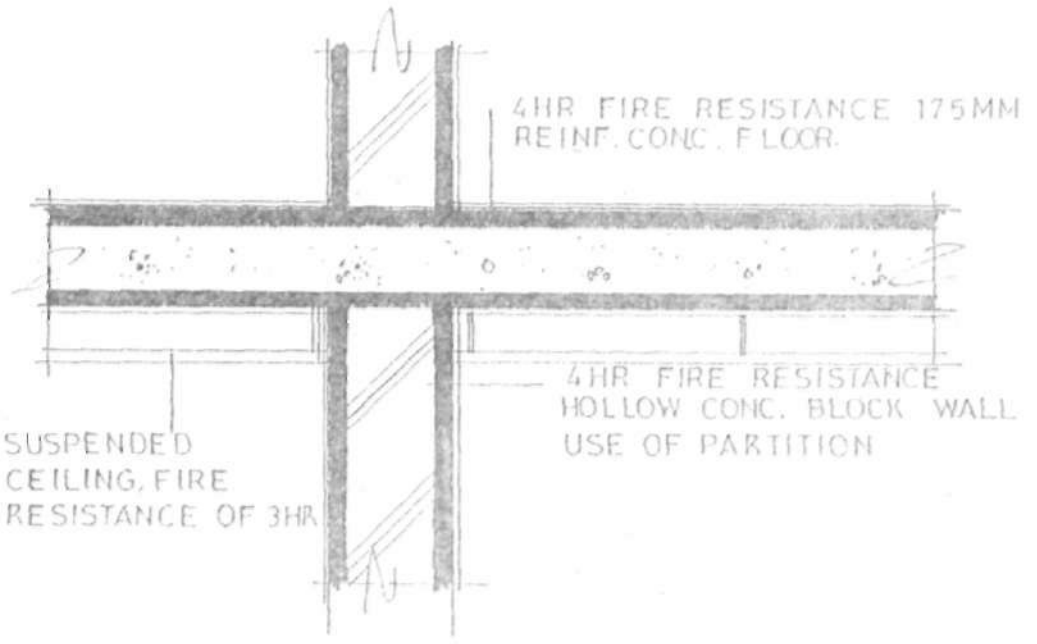


FIG 7·5 PARTITIONING METHODS AND MATERIALS THAT DISCOURAGE FIRE SPREAD WITHIN THE BUILDING

TABLE 7·1

WALLS AND PARTITIONS: FIRE RESISTANCE GRADINGS

Construction and Materials		Grade A 6 hrs.	Grade B 4 hrs.	Grade C 2 hrs.	Grade D 1 hr.	Grade E ½ hr.
		Minimum thickness in inches exclusive of plastering to attain indicated grade				
Solid bricks of clay, concrete or sand-lime	Solid wall. No plaster	8½	8½	8½	4½	4½
	Solid wall plastered on both sides	8½	8½	4½	4½	4½
	Cavity wall. No plaster (2 in. cavity)	10½	10½	10½	—	—
Solid concrete blocks (conforming to B.S. 492)	*Class 1 (a) Aggregates.* Solid wall. No plaster	—	—	4	3	2½
	Solid wall plastered on both sides	—	4	3	2	2
	Class 1 (b) Aggregates. Solid wall. No plaster	—	—	4	3	2½
	Solid wall, plastered on both sides	—	—	4	2½	2
	Class 2 Aggregates. Solid wall. No plaster	—	—	—	4	3
	Solid wall plastered on both sides	—	—	4	3	2
Reinforced concrete†	Class 1 Aggregates	8	6	4	3	3
	Class 2 Aggregates	9	7	4	3	3
Hollow clay blocks	All plastered ½ in. thick on both sides					
Shells not less than ¼ in. thick	1 cell in thickness; not less than 50% solid	—	—	—	4	3
	1 cell in thickness; not less than 30% solid	—	—	—	6	—
	2 cells in thickness; not less than 50% solid	—	—	5½	4	—
	2 cells in thickness; not less than 45% solid	—	—	—	6	—
Hollow concrete block (conforming to *B.S.S. 728* or 934)	Plastered ½ in. thick on both sides 1 cell in wall thickness					
	Class 1 (a) Aggregates	—	8½	4	2½	—
	Class 1 (b) Aggregates	—	8½	4½	3	2½
	Class 2 Aggregates	—	—	—	6½	3
Solid blocks of gypsum (Not readily available)	No plaster	—	—	4	3	2
	½ in. plaster both sides	—	—	3	2	2

WALLS AND PARTITIONS: FIRE RESISTANCE GRADINGS

Construction and Materials		Grade A 6 hrs.	Grade B 4 hrs.	Grade C 2 hrs.	Grade D 1 hr.	Grade E ½ hr.
		Minimum thickness in inches exclusive of plastering to attain indicated grade				
Hollow blocks of gypsum not less than 70% solid (Not readily available)	No plaster	—	—	4	3	2
	½ in. plaster both sides	—	—	3	2	2
Solid wood wool slabs	½ in. plaster both sides	—	—	3	2	2
Solid plaster	Central reinforcement of metal lath on steel rods or studs	—	—	—	2	2
Plasterboard supported top and bottom edges in steel channels	½ in. gypsum plaster on both sides	—	—	—	½	—
Glass blocks	Not exceeding 5 ft. × 5 ft. with expansion joint	—	—	—	4	—
Hollow Partitions		*Grade of Fire Resistance (Hours)*				
Plaster on expanded metal on steel or timber studding	Gypsum, Portland cement or cement lime plaster ½ in. thick on each side				½	
	¾ in. thick on each side				1	
Plaster on wood lathing on timber studding	Gypsum, Portland cement or cement lime plaster ¾ in. thick on each side				½	
Plasterboard with or without gypsum plaster on timber studding	½ in. plasterboard with thin. neat plaster				½	
	½ in. plasterboard with no plaster				½	
	½ in. plasterboard with ½ in. plaster ½ in. plasterboard				1	
Fireboard on timber studding	½ in. fireboard with ½ in. plaster				1	

Note Class 1 (a) Foamed slag pumice, Class 1 (b) Blast furnace slag, crushed

TABLE 7·2 FLOORS AND ROOFS

Fire Resistance Gradings

...uction and Materials ...g.	Grade A 6 hrs.	Grade B 4 hrs.	Grade B 2 hrs.	Grade D 1 hr.	Grade E. ½ hr.
	Minimum thickness in inches for indicated gradings				
...floors or roofs					
...r joist. Maximum spacing ...sts as allowed for struc...l requirements. Any ...egate,					
...mum slab thickness ...mum cover on flanges of ...s:	7	6	5	4	3½
Top	—	1	1	—	—
Bottom	—	1	1	½	½
...reinforced concrete slab					
...mum slab thickness	7	6	5	4	3½
...ow tile					
...mum thickness of in...ustible material, i.e., ...ness of concrete slab and ...id material in tiles	—	1	1	1	1
...mum cover to steel	—	1	1½	¾	½
...rs or roofs					
...boards on wood joists ...2 in. (nominal)					
...and G. boarding with ...lath and plaster ceiling					
...nin edge boarding with ...lath and plaster ceiling	—	—	—	—	½ in. (minimum thickness of plaster)
...and G. boarding with ...lath and plaster ...with 3 in. ashes ...th practice)					

TABLE 7·3 STEEL COLUMNS AND BEAMS

Protection Required

...nforcement suitable for reinforcing concrete protection is 6 in. by 4 in. ...W.G. wire. Wire reinforcement may consist of ½ in.-13 S.W.G. iron ...wire loosely bound round the steel at 4 in.-6 in. pitch.

...tion and materials	Grade A 6 hrs.	Grade B 4 hrs.	Grade C 2 hrs.	Grade D 1 hr.	Grade E ½ hr.
	Minimum thickness in inches of protection outside steel for indicated gradings				
...tion					
...ete of ...portion ...regate	4	3	2	1	—

TABLE 7·3 (*continued*)

STEEL COLUMNS AND BEAMS

Concrete					
Not leaner than 1 : 2 : 4 : Mix. Reinforced centrally with steel mesh or with wire	Class 1 aggregates	4	2½	1½	1	—
	Class 2 aggregates	4	2½	2	1	—
Gypsum concrete (7 parts *gyp*sum, 1 part wood chips, poured *in situ*) (A)		3	2	1½	1	—
Hollow clay tile with interior filling of concrete—thickness of solid material		—	—	—	—	1½
Foamed slag blocks with interior filling of concrete or blocks and mortar. Wire reinforcement in every horizontal joint		4	2½	2	2	—
Gypsum blocks with interior filling. Wire reinforcement in every horizontal joint (Not readily available)		3	2	—	—	—
Sprayed asbestos		—	2	1	½	½
Hollow protection						
Brickwork or solid clay blocks with wire reinforcement in every horizontal joint		—	4½ (Reinforced every fourth joint)	3	2	—
Foamed slag blocks with wire reinforcement in every horizontal joint		4	3	2	2	—
Gypsum blocks with wire reinforcement in every horizontal joint (A) (Not readily available)		—	3	2	2	—
Moulded asbestos held in position with nichrome wire		3½	2½	1½	1	—
Plaster on expanded metal lathing wired to joist with wire netting over first coat		—	—	—	1	—
Plaster on expanded metal lathing		—	—	—	—	½
Gypsum plaster on plasterboard with wire binding		—	—	½ in. plaster on ½ in. board	½ in. plaster on ½ in. board	½ in. plaster on ½ in. board

SOURCE : PLANNING FOR FIRE SAFETY IN BUILDINGS FIRE PROTECTION ASSOCIATION (19) ENGLAND

CHAPTER EIGHT

8.0 CONCLUSION

The usual approach to the design of high rise office buildings includes wide office planning which is partition with low fire resistance materials in the event of fire the whole complex could be engulfed.

Therefore in view of this, fire compartmentation is used each function is compartmented and in the event of fire outbreak the fire is confined only to the affected compartment, this helps to save life and properties. Fire compartmentation is employed, in the roofing system where parapets walls are used to compartment each roof this discourages fire spread within the complex.

The spread of fire vertically is discourage by the use of fire resistance concrete floors, concrete elements that extend vertically and horizontally, fire resistance finished also play a vital role. The composition of the elevations that shows horizontal and vertical elements throughout the complex help to discourage fire spread.

The courtyard system of planning helps to improve micro climate within the interior and also disseminate smoke and heat to the outside which would otherwise concentrate and raised the temperature of the interior thereby killing more people and set ablaze more functions.

Fire escape staircases are properly located with escape lobby open to the outside, this ensures ample air within the lobby and this help to resuscitate the suffocating escapee.

Active means of fire suppression employed within the complex: This includes automatic heat, flame, smoke and intruder detectors. Automatic sprinklers (water

carbondioxide and halon) water hydrants, vertical wet riser, hose reels connected on each floor.

Under ground reservoir is located in maintenance section and can be access via service route this could be used for fire fighting as well as other uses. Water hydrants are located at strategic locations, separate parking space for fire apparatus is provided within the complex, also performance specification for access roads is employed as shown in fig. 8.0.

The importance of Education Tax Fund (ETF) headquarters cannot be over emphasized considering the important records being kept in its custody fire ravage should not be allow to happen. Even if it does. An architect through design should tackle this problem and this is done through passive means (site planning, architectural, structural and environmental) in addition, active fire suppression means is also employed, the application of passive and active means of fire suppression will play a vital role towards preserving this complex, overall development in educational sector is enhanced and will be reflected in other aspects of human development.

Performance specification for access roads

For pumping appliances:

Roads (which may be public roads)
Width 12 ft 0 in [3.65 m] minimum.
Clearance height 12 ft 0 in [3.65 m] minimum on level ground.
Gate widths 10 ft 0 in [3.04 m] minimum.
Bends must take a turning circle of 55 ft [16.7 m].
Roads, manhole covers, and service pits must take a loaded weight of 10 tons [10,000 kg].
Position of the vehicle in relation to the building is not critical.

For turntable appliances

Roads (which may be public roads).
Width 12 ft 0 in [3.65 m] minimum.
Clearance height 12 ft 0 in [3.65 m] minimum on level ground.
Gate widths 10 ft 0 in [3.04 m] minimum.
Bends must take a turning circle of 62 ft [19.0 m].
Roads, manhole covers and service pits must take a loaded weight of 12 tons [12,000 kg].
Position of vehicle:
To allow the jacks to be positioned and the ladder to reach its full effective height, there must be a road or hardstanding so that the vehicle can stand not less than 16 ft [4.9 m] and not more than 33 ft [10 m] from the building.

For hydraulic platforms

Roads (which may be public roads).
Width 12 ft 0 in [3.65 m] minimum.
Clearance height 13 ft 0 in [3.96 m] minimum on level ground.
Gate widths 10 ft 0 in [3.04 m] minimum.
Bends must take a turning circle of 66 ft [21.0 m].
Roads, manhole covers and service pits must take a maximum loaded weight of 18 tons [18,000 kg].
Position of vehicle:
To allow the jacks to be positioned and the platform to reach its full effective height, there must be a road or hardstanding 16 ft [4.88 m] wide (because of the spread of its jacks i.e. 4 ft [1.22 m] on either side of the vehicle) so that the nearer edge of the hardstanding is not less than 6 ft [1.835 m] or its further edge not more than 24 ft [7.34 m] from the face of the building.

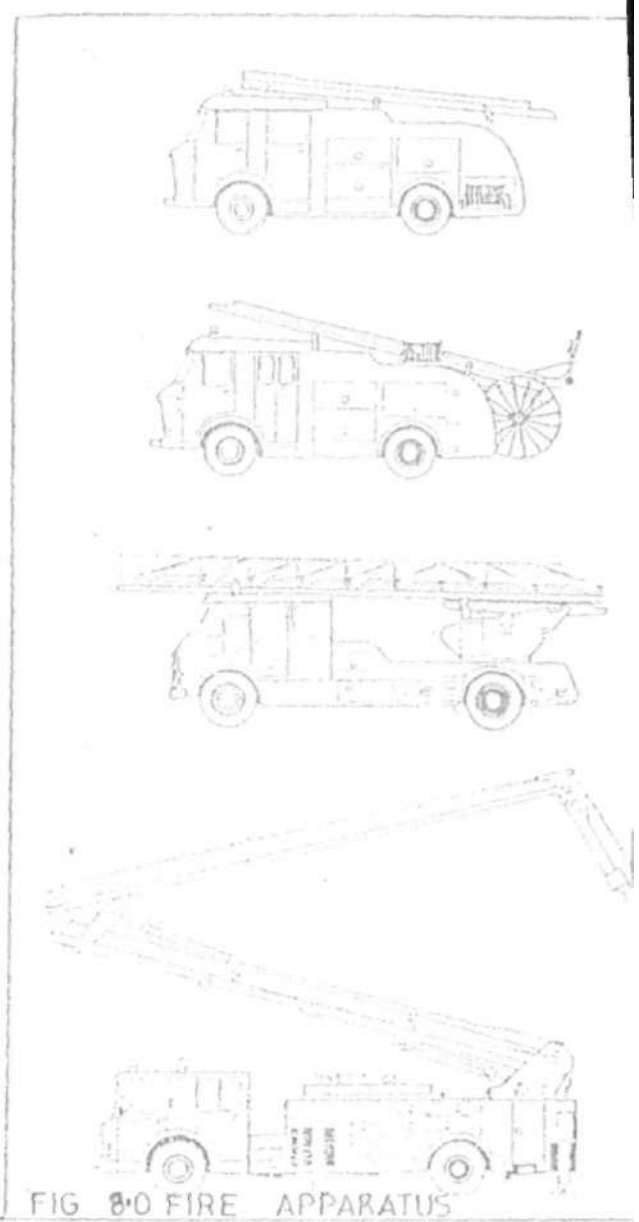


FIG 8·0 FIRE APPARATUS

SOURCE : PLANNING FOR FIRE SAFETY IN BUILDINGS
FIRE PROTECTION ASSOCIATION (19) ENGLAND

BIBLIOGRAPHY

1. Building Research Establishment (1972) Annual Report London.

2. Federal Capital Development Authority (1996), Development Control Regulations for Federal Capital Territory ABUJA.

3. Fire Protection Association. (1968) Planning for fire Safety in Buildings 4th Edition. Published in London, (UK)

4. Federal Republic of Nigeria Annual Abstract of Statistics (1995) Edition; Federal Office of Statistics Lagos.

5. Hall, F. (1979) Building Services and Equipment, Volume 2 Longman, London.

6. Nsima Akpan (1999) Education Tax Fund In the Punch Friday May 14th. (Punch Nig. Ltd) Ikoyi, Lagos.

7. Nduka, O. (1964) Western Education and the Nigerian cultural Background Oxford University Press, London (UK).

8. Olajide, B.O (1990) Ondo state University Senate House ADO- EKITI Unpublished M.Sc. Arch Thesis A.B.U. Zaria.

9. Ogogo, L. and Huoiza A. (1990) National Primary Education Commission Headquarters Abuja. Unpublished M.Sc. Arch. Thesis A.B.U. Zaria.

10. Popoola, T.S. (1983) Relevance of Education on a Nations Development Nigerian Herald, March 3rd. (Herald Nig. Ltd.) Ikeja – Lagos.

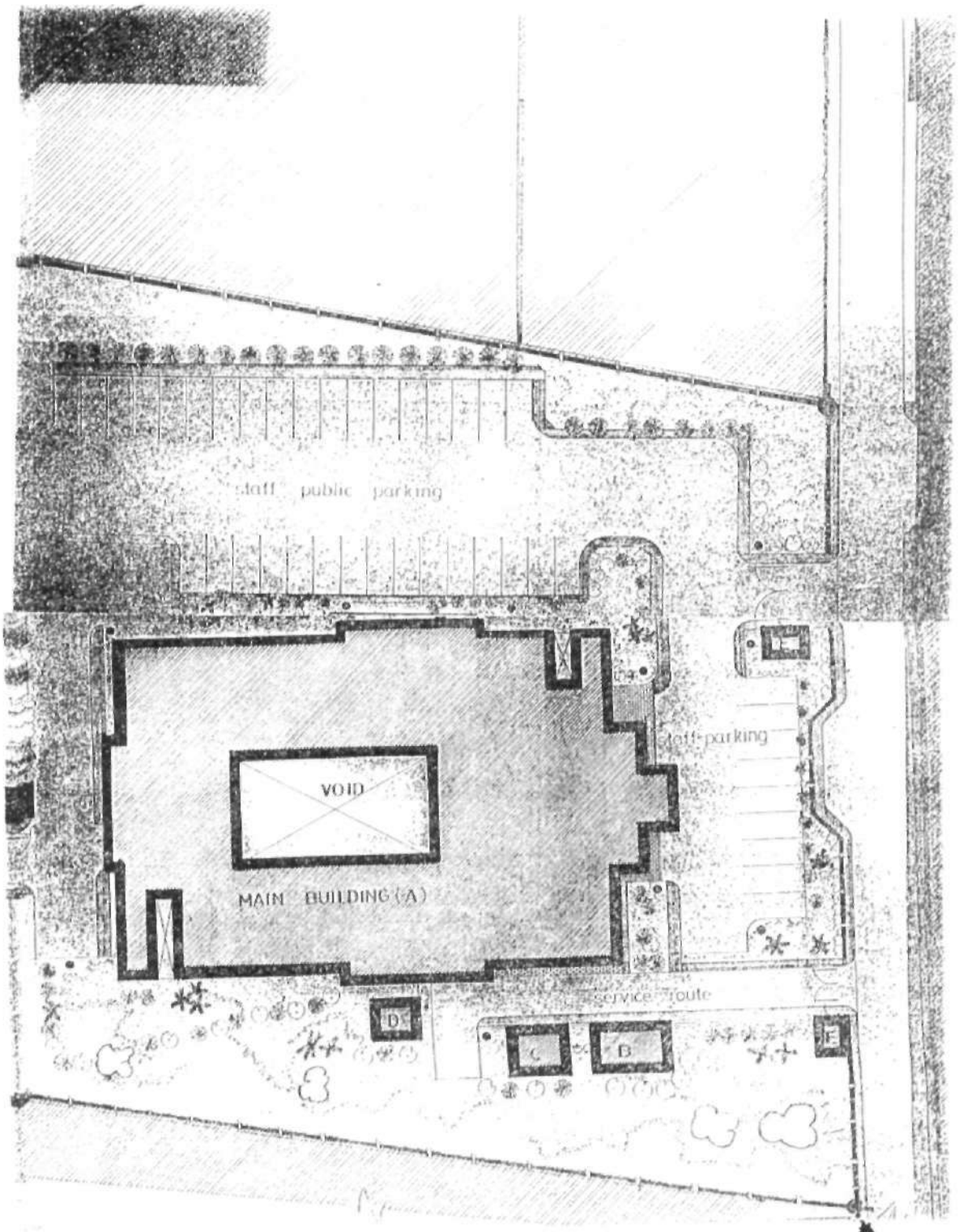
11. Smith/Harmathy (1979) Design of Buildings for Fire Safety Baltimore, MD.

12. Seminitari I. (1999) NITEL Fire Ikeja Tell February 15th.(Tell Nig. Ltd) Ikeja Lagos.

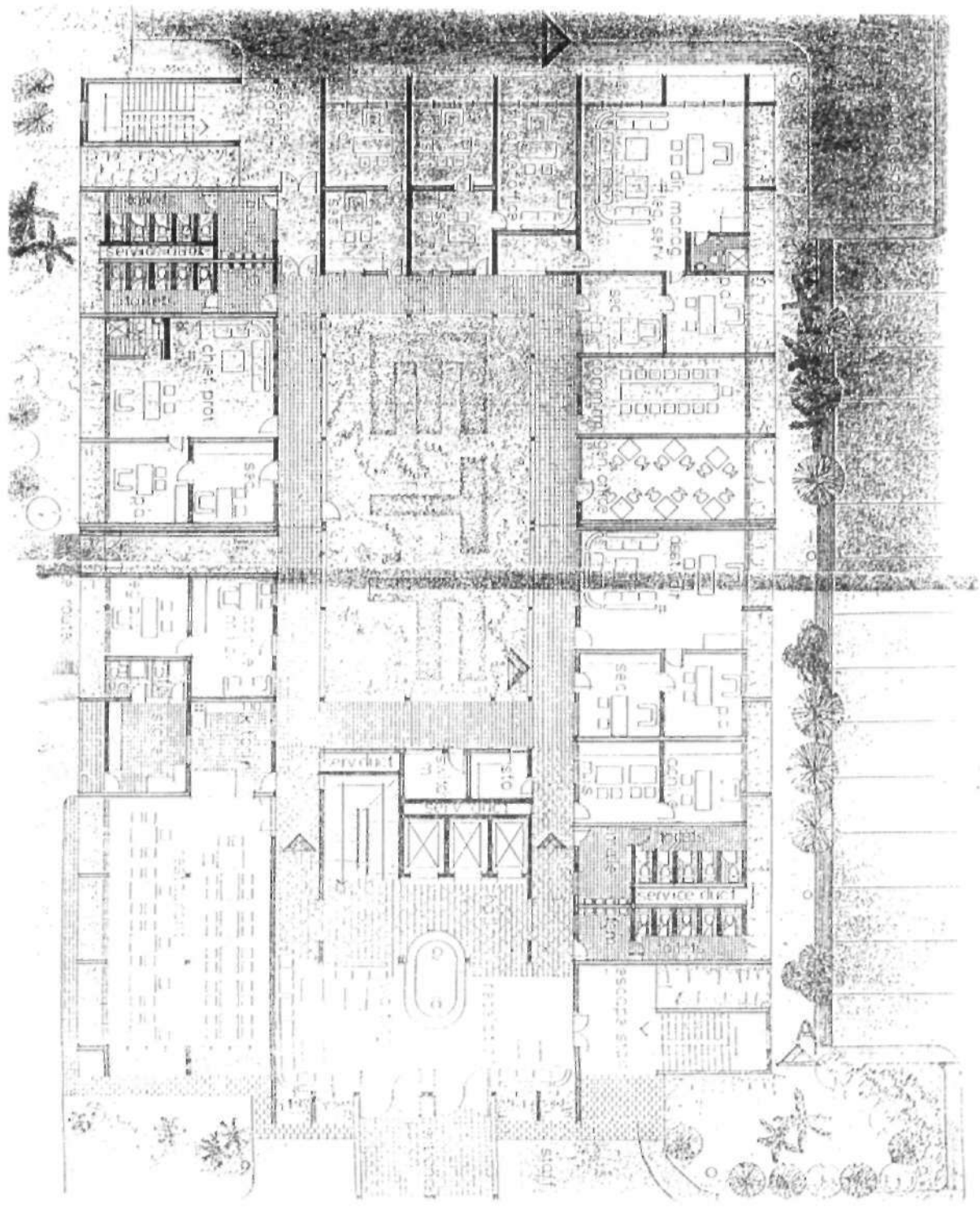
13. Taylor J. and Cooks G. (1978) The Fire Precautions Act in Practice the Architectural Press London.

14. Underdown (1979) Practical Fire precautions Gower Press, London. (UK).

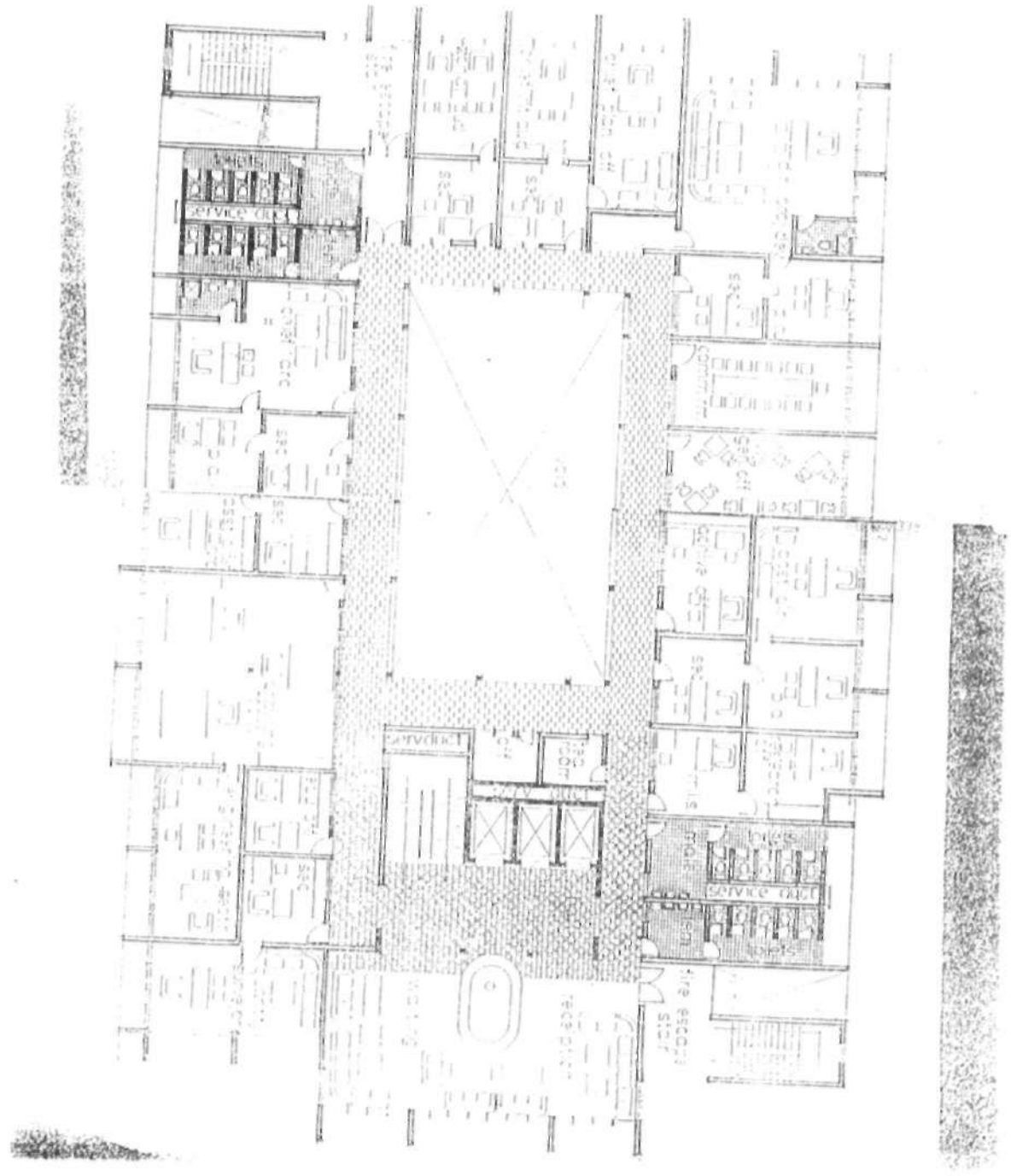
15. William K.B. (1978), Introduction to Fire Science and Fire Protection. John Wiley and Sons New York. (U.S.A).



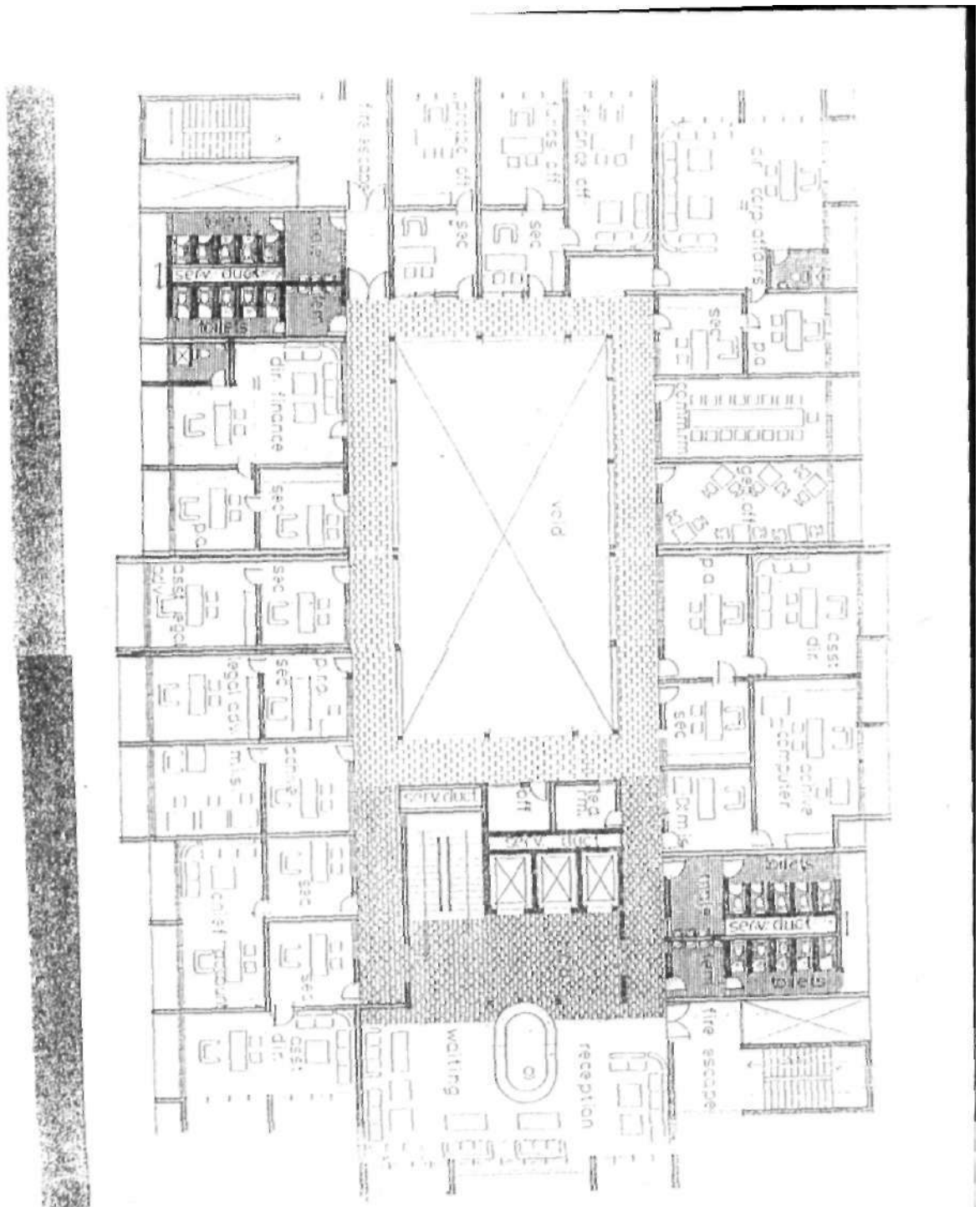
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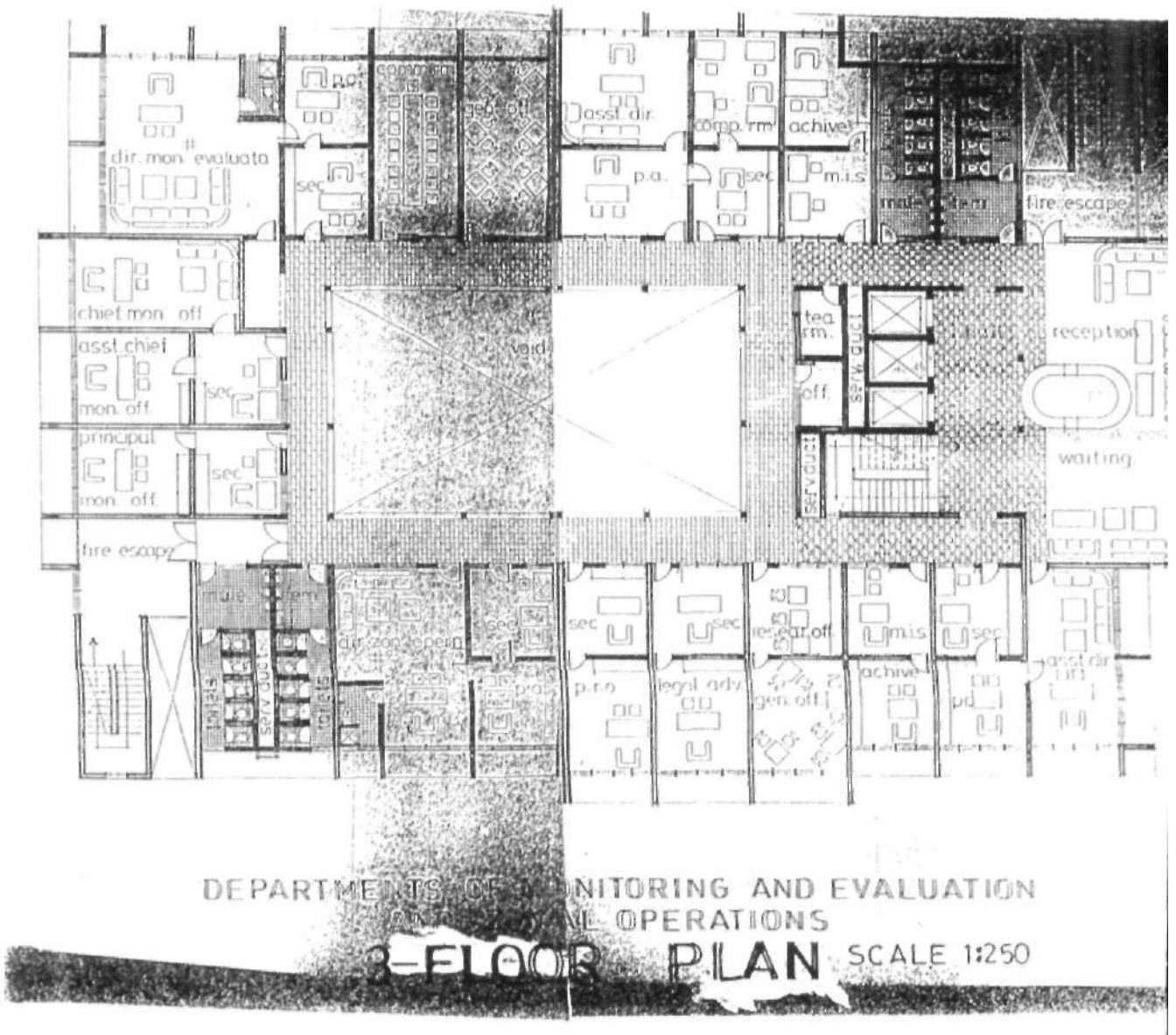
GROUND FLOOR PLAN

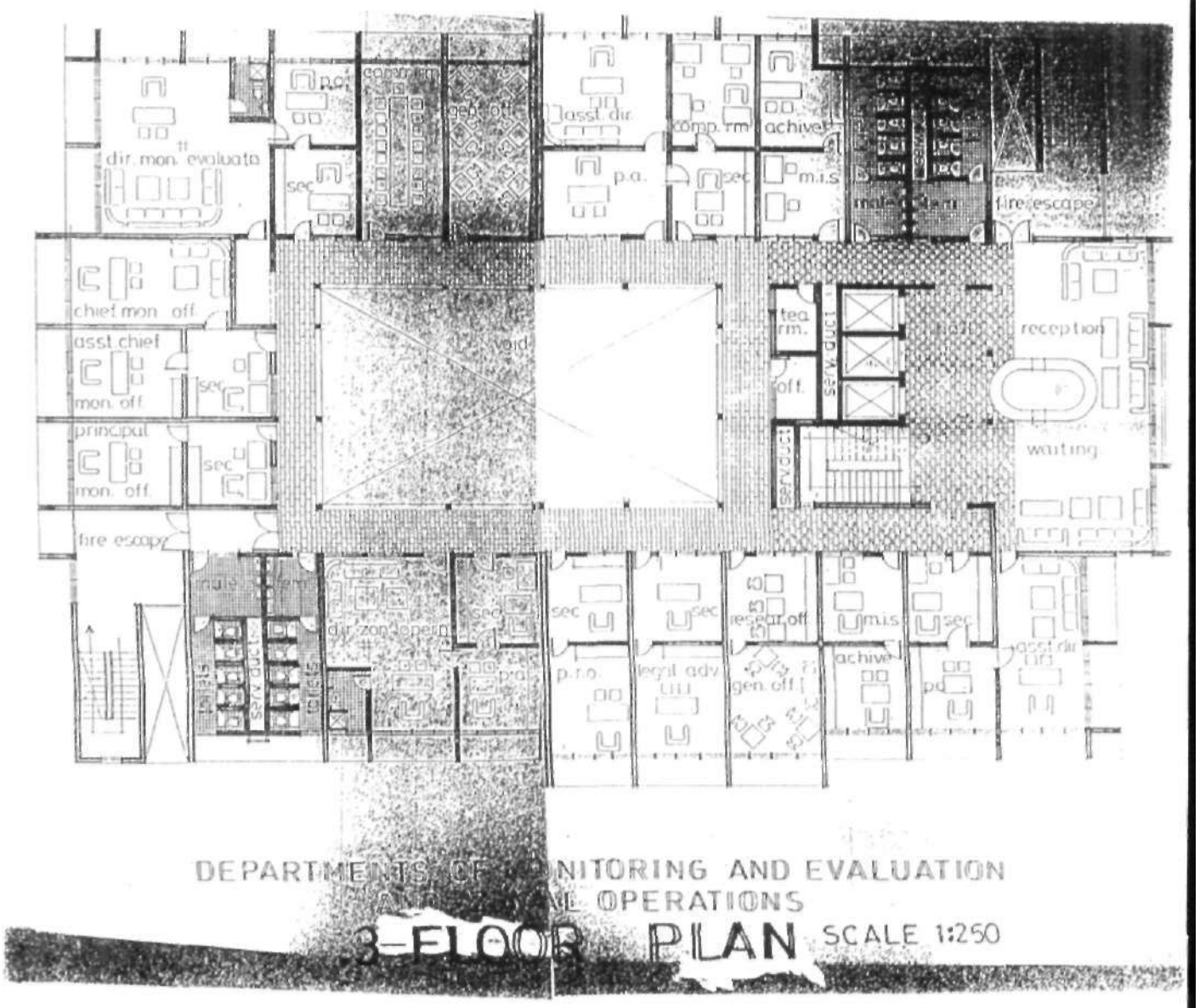


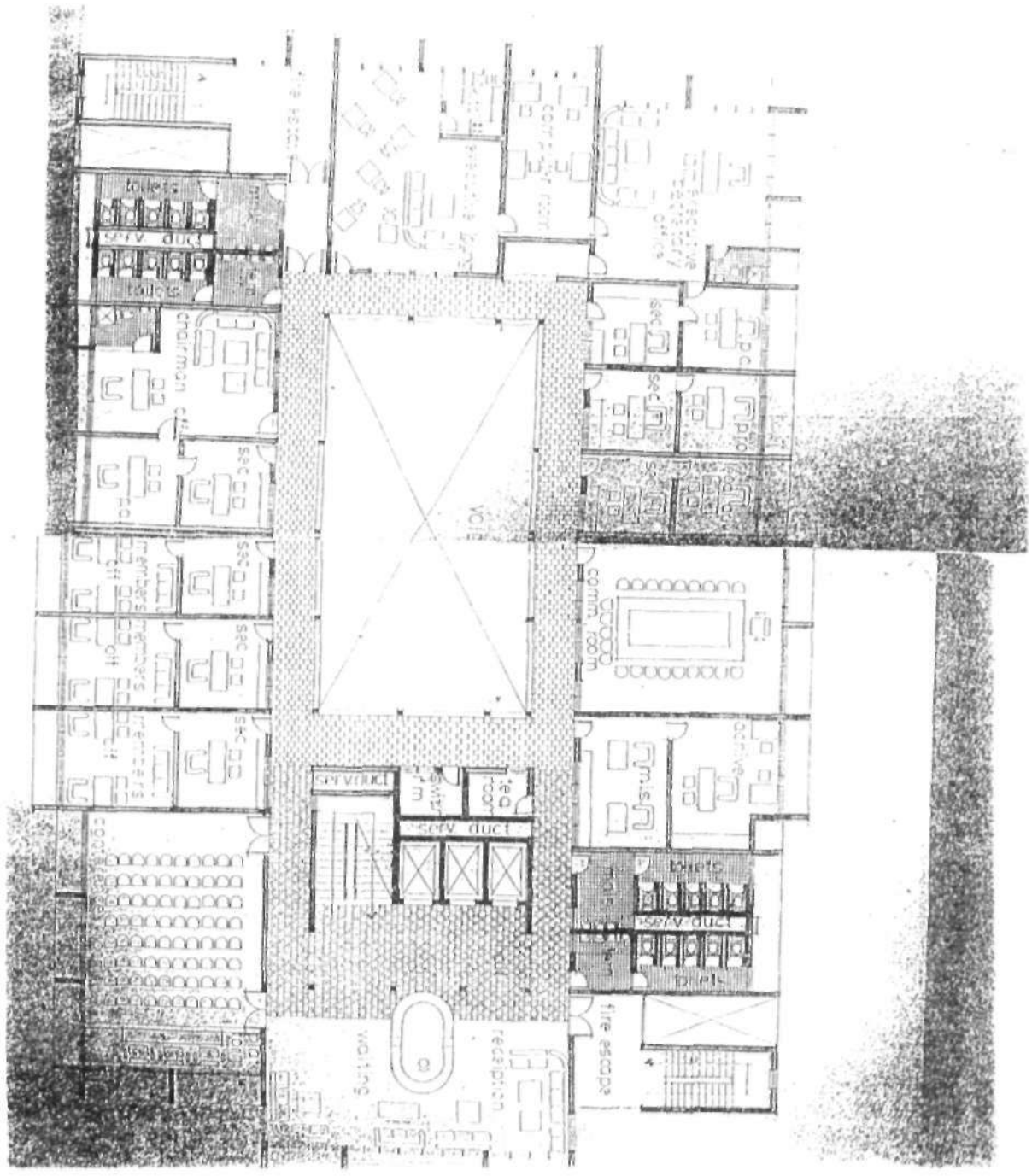
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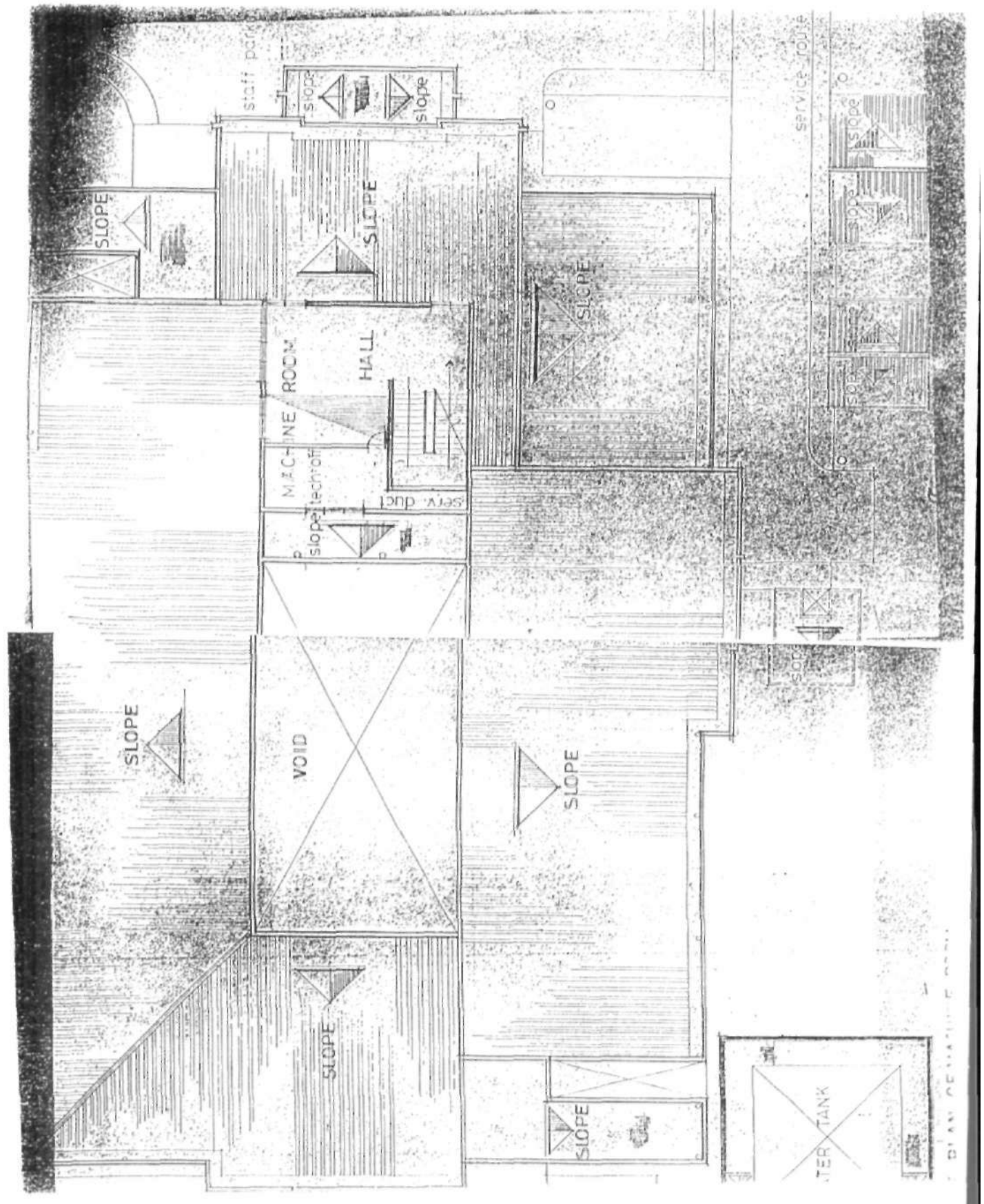
2nd FLOOR PLAN


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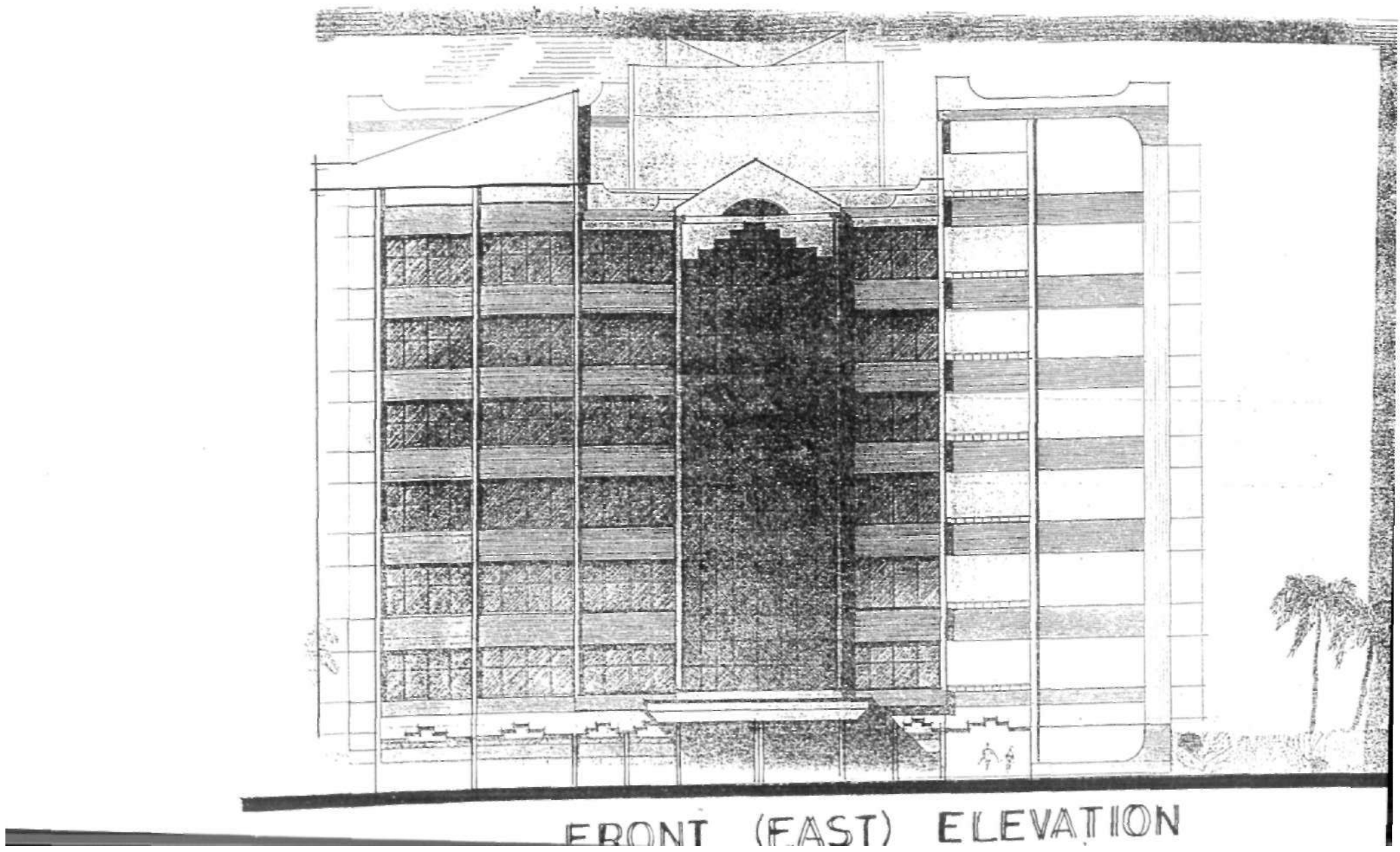

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6th FLOOR PLAN SCALE 1:250



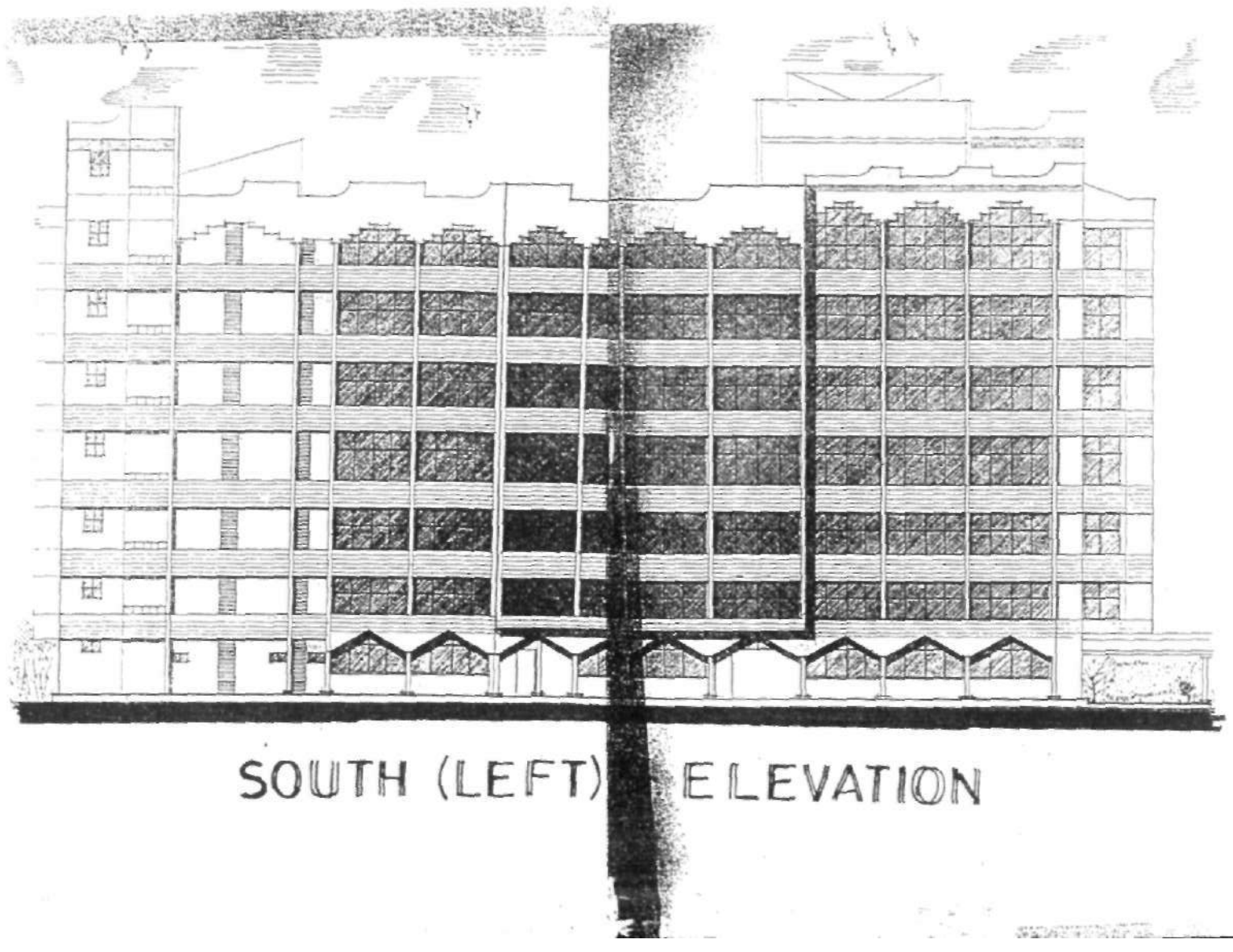
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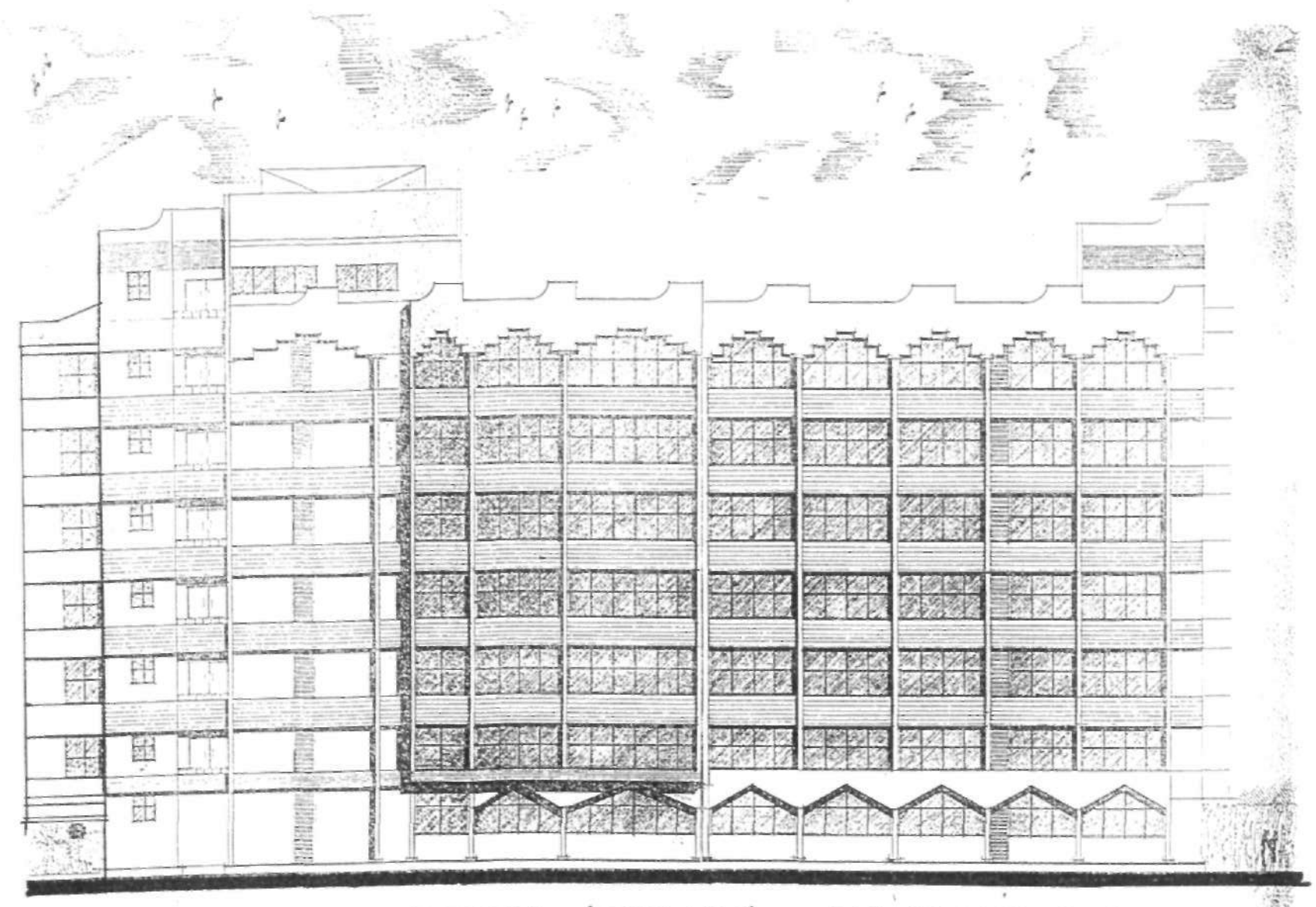
FRONT (EAST) ELEVATION



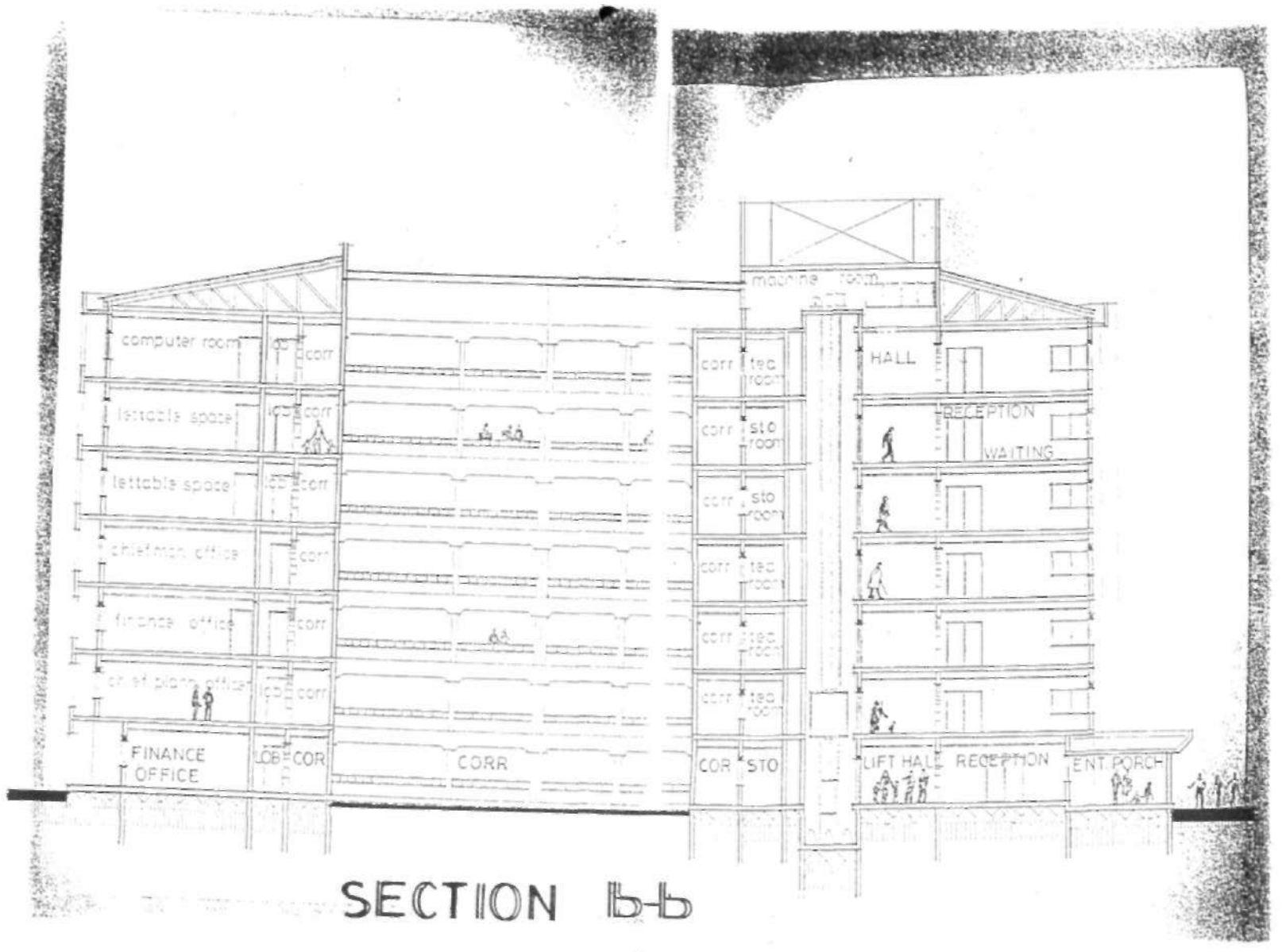
REAR (WEST) ELEVATION



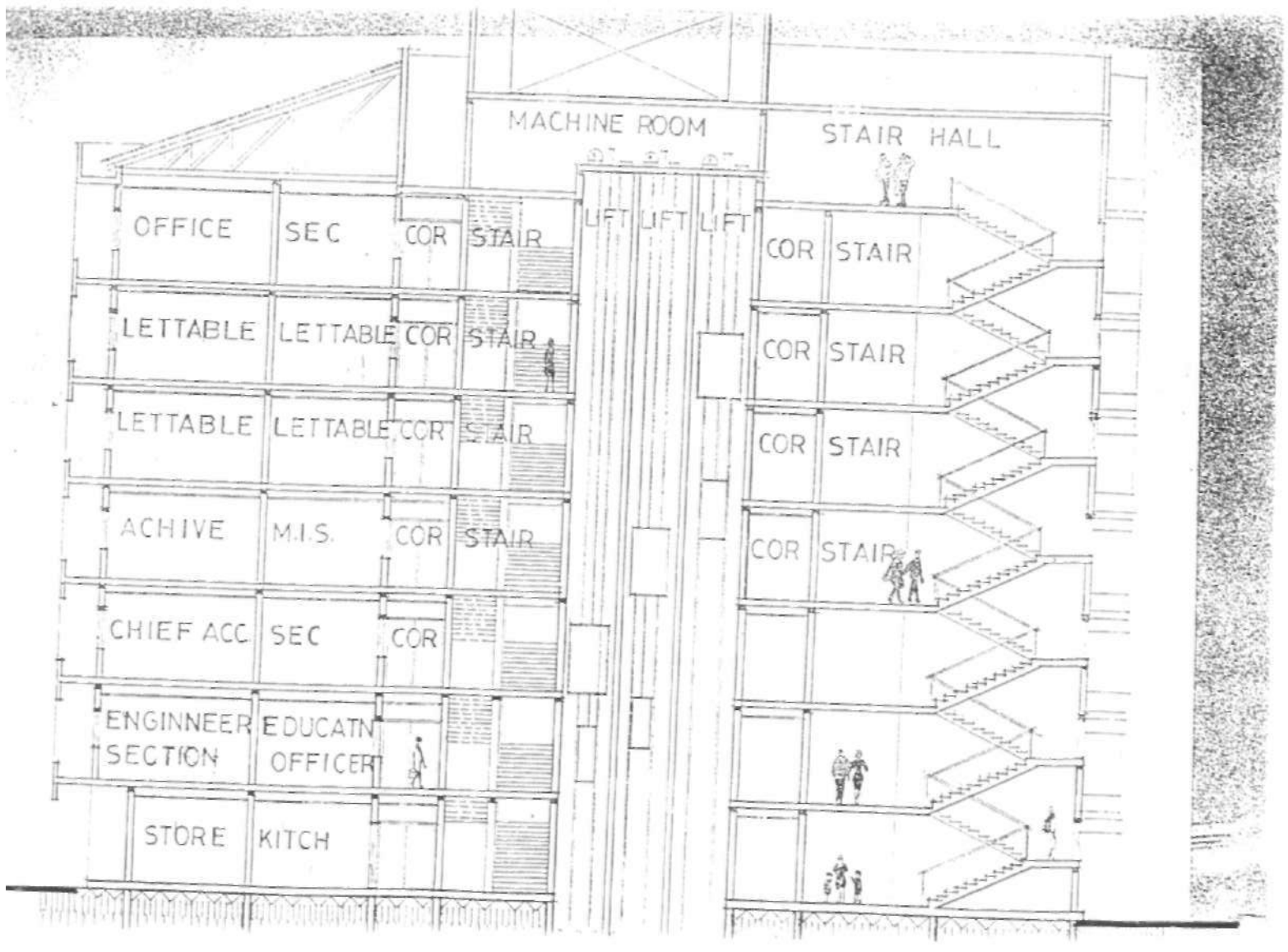
SOUTH (LEFT) ELEVATION



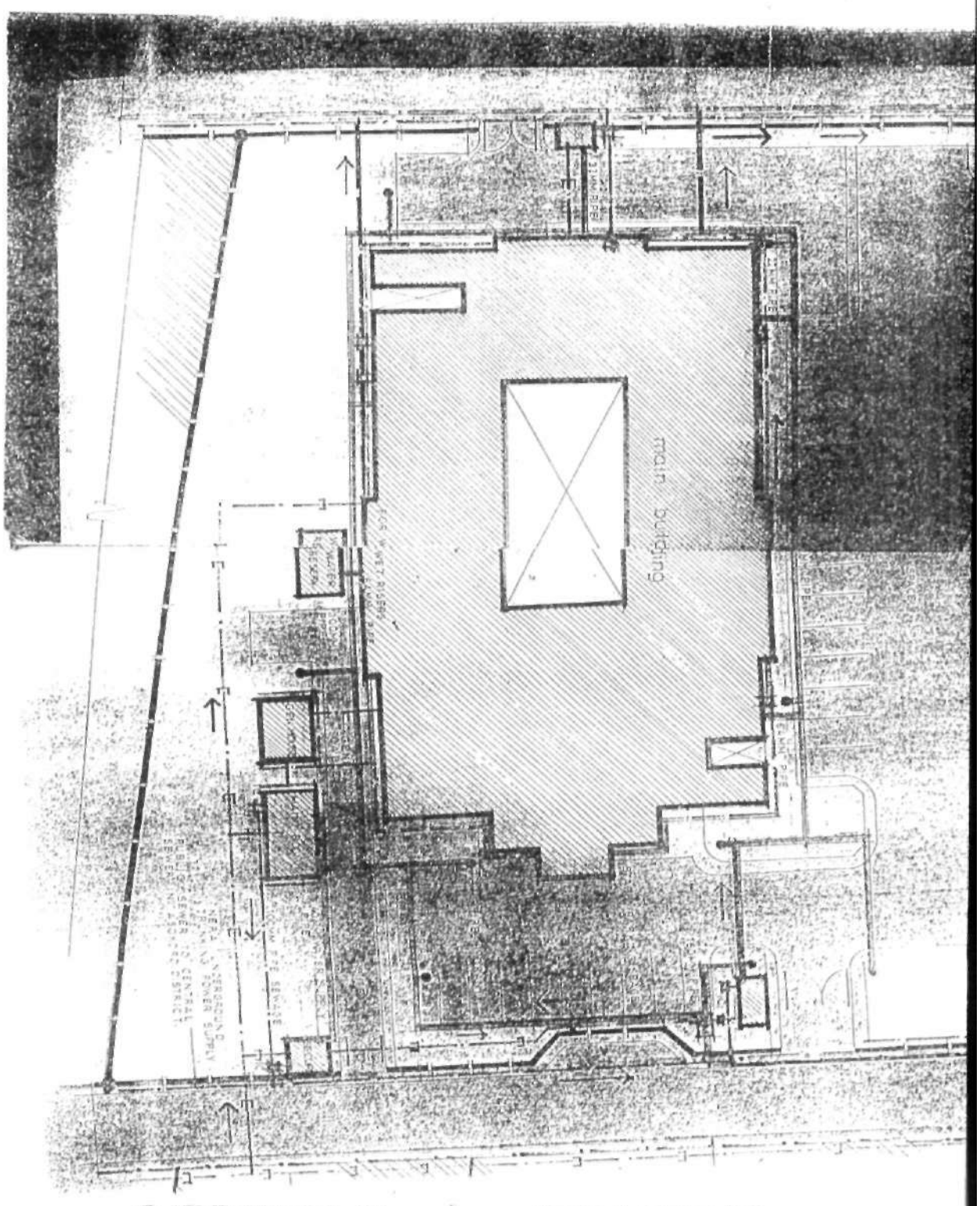
NORTH (RIGHT) ELEVATION


computer room
corr
lettable space
lettable space
chairman office
finance office
FINANCE OFFICE
LOB
COR
CORR
machine room
corr
tea room
sto room
HALL
RECEPTION
WAITING
COR
STO
LIFT HALL
RECEPTION
ENT. PORCH

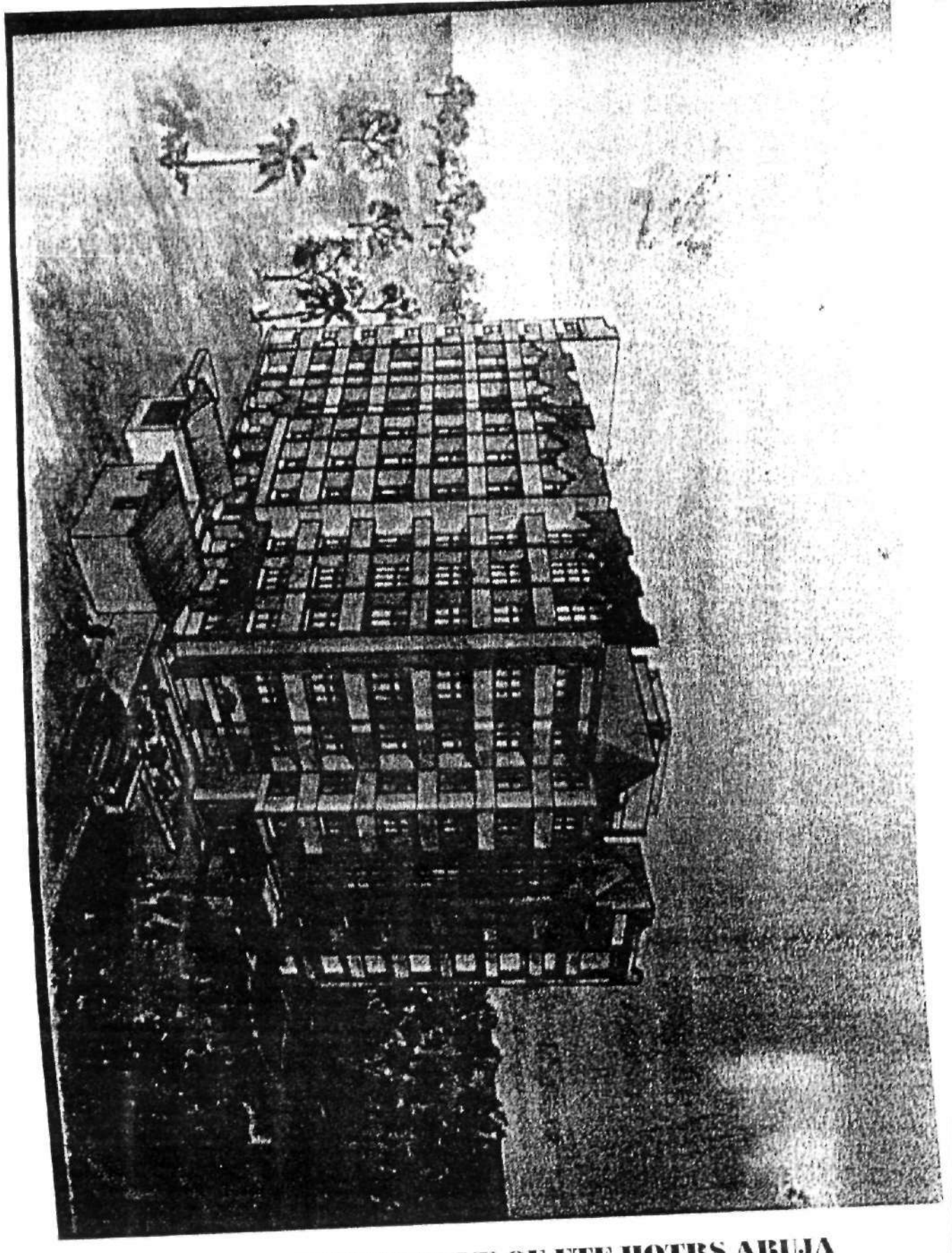
SECTION b-b



SECTION A-A SCALE 1:250



SERVICES DRAWING SCALE 1:500



AERIL PERSPECTIVE OF ETF HQTRS ABUJA