# ZARIA RAILWAY STATION

(Redevelopment Scheme)

A THESIS PRESENTED

TO

THE DEPARTMENT OF ARCHITECTURE,

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IN PARTIAL FULFILMENT OF THE REQUIREMENT

FOR THE AWARD OF THE DEGREE OF MASTER

OF SCIENCE IN ARCHITECTURE

BY

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NOVEMEBR, 1999

# DEDICATION

THIS WORK IS DEDICATED TO:

GOD

AND THOSE WHO FEAR HIM

## DECLARATION

I hereby declare that this thesis has been written by me, it is a record of my own research work. It has not been presented in any previous application for a Higher Degree.

All quotations are indicated and the sources of information are specially acknowledged by means of references.



Akowonjo H. O.

5/1/2000
Date

# CERTIFICATION

This Thesis Titled "Zaria Railway Station"

(A redevelopment Scheme) meets the regulations Governing the Award of Degree of Master of Science in Architecture of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literacy presentation.

| | |
|---|---|
| Chairman, Supervisory Committee | 10.3.2000 Date |
| Member, Supervisory Committee | 10/02/2000 Date |
| Head of Department | Date |
| Dean, Post. Graduate School | 09/10/01 Date |

# ACKNOWLEDGEMENT

" I returned and saw under the sun, that the race is not to the swift, nor battle to the strong, neither yet bread to the wise, nor yet favour to men of skill; but time and chance happeneth to them all"

------Ecc. 10" Vs 11

It is true that several individuals have contributed something in one way or the other to the completion of this project, either in cash or kind. To all of such I say thank you. For the want of space I possibly couldn't have been able to enumerate all, I know that the perfect judge shall open the book of remembrance, they shall be rewarded accordingly. Nevertheless I can't but appreciate the following:

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# ABSTRACT

The railways was the single greatest and most far-reaching innovation of the 19th century, re-shaping both towns and countries and transforming societies, the principal task of the railway was, however, moving of raw materials and manufactured goods.

The Nigerian railways, despite the fact that there was relatively high volume of passengers in the stations, it has little or nothing to offer in terms of comfort from the station where journey begins to the destination station.

The poor condition in the stations and in the trains can be described as hell, where bonafide ticket holders have to struggle before boarding the trains, this can be attributed to the poor ticket collection and checking system, coupled with the multi-exit situation in most of the stations. This allow for the indiscriminate presence of hawkers, beggars and sometimes insane fellows in the stations.

The redevelopment of Zaria railway station will be the subject of consideration for the purpose of this thesis, it may suffice to say that the existing structures of the stations are no doubt functionally inadequate and aesthetically bankrupt amongst other attendant problems.

This work is projected at transforming the expression of the structures to be more adaptive without compromising the judicious appropriation of functional spaces, upholding hierarchy and establishing a chaos free circulation pattern within and outside the structural envelope of the station.

It cannot be overemphasized that the spicing of the *'near relics'* on ground will encourage patronage and regain the confidence of the general populace and invariably the Government.

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# CHAPTER ONE

## 1.0 INTRODUCTION

The importance of transportation are quite enormous, it creates avenue for employment, trade and commerce, it promotes recreation, tourism and is the fulcrum on which economy and national development gravitate, for dynamism in the economy of a nation, a low means of transportation is required.

In Nigeria today, it is common knowledge that of all the major means of transportation, namely air, road, sea, rail and even human porterage. The railways are relatively cheaper and has remained the main mode of transportation for industrial goods, agricultural products and several other bulky and heavy freights. It has served as the major means of mass transport of people all over the country.

This thesis however, considers the redevelopment of Zaria Railway Station which is the divisional headquarter of the Northern Region, with the view of integrating it into the urban environment.

## 1.1 MOTIVATION

The motivation that led to the choice of 'redevelopment of Zaria Railway Station for a thesis was due to the need to salvage

the obvious decaying of the station facilities which unfortunately is synonymous to virtually all the stations in the country. The facilities are either inadequate or obsolete.

## 1.2 PROBLEM STATEMENT

The Zaria Railway Station portray a clear case of neglect which has resulted in the gradual deterioration of its structures for more than three decades, hence the need for redevelopment can not be over emphasized.

The existing structures are not sufficient and void of Architectural decency.

This thesis intends to transform the expression of the station, to be more adaptive without compromising the judicious use of functional spaces.

Circulation of goods and human traffic could be chaotic within and outside the structural envelope of the station.

## 1.3 ARCHITECTURAL SIGNIFICANCE

The architectural significance of this work is as follows:

i To integrate the station into the urban environment

ii To present the image of quality and sophistication in Railway Architecture.

iii To introduce by design, facilities that will support and encourage patronage and constant use.

## 1.4 AIM

The main aim of this thesis is the provision of a well planned station and an efficient, attractive, comfortable and functional passenger railway station.

## 1.5 OBJECTIVES

The objectives of this thesis can be summarized as follows:

- To provide an efficient and attractive passenger railway station for Zaria. Integrating the necessary functional spaces for operational convenience
- To ensure comfort by providing necessary utilities, services and facilities.
- To resolve the crises of circulation within and around the station.
- To ensure safety, security and surveillance.
- Finally to initiate a renaissance in Railway Architecture.

## 1.6 SCOPE AND LIMITATION

The scope of this Thesis shall cover the station in terms of planning proposals, but the major rehabilitation will concentrate on the station building.

The Nigerian Railway Corporation is performing at it's lowest at the time of this project, hence, facts and figures are based on previous data.

## 1.7 RESEARCH METHODOLOGY

To adequately assess the extent of need for redevelopment of Zaria Railway Station, it became obvious to collect the following data.

i Existing Accesses and Their implications,

ii Existing parking facilities.

iii Pedestrian circulation in the Station precinct.

iv Appraisal of existing traffic control.

v Efficiency of the Ticket Office.

vi Infra-structural data.

vii Physiographical or climatic data.

viii Case Study of existing Railway Station.

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## 1.8 SOURCES OF INFORMATION

The sources of information include verbal interview of Railway Staff, personal observations, books, magazines and newspapers.

# CHAPTER TWO

## 2.0 BRIEF HISTORY OF RAILWAY S IN NIGERIA

The construction of railways in Nigeria took place between 1898 and 1927. After a long break of thirty-one years, a 640 kilometer route extension from Kuru to Maiduguri was constructed between 1958 to 1964. The prime objective then was economy in the deployment of human and material resources.

It must however, not be forgotten that the purpose of the railway construction in Nigeria between 1898 and 1927, and the subsequent extension in 1964, was partly administrative and partly evacuation of the Country's resources for export. The rail line extension of 1964, completed the 3,505 kilometer of 1,076 mm – narrow gauge, single track railway network existing in Nigeria today.

Administratively, the rail lines provided and maintained a link between the central seat of the Colonial Government in Lagos and other parts of Nigeria. The evacuation of agricultural and mineral resources from the hinterland to the sea ports, was the other major reason for the construction of the Nigerian Railway

system. It was no accident that the rail lines ran diagonally from South – West to North – East and South – East to North – West, with junctions at Kafanchan and Kaduna.

The rail lines no doubts, facilitated the bulk movement of goods and people between the coast and hinterland, while leaving large parts of the country unconnected by the rail.

By 1965, the Nigerian Railway system was operating at the expense of wearing out physical assets without sufficient replenishment or renewal, with exception of the rail mode of transport, the road, water, aviation and even the pipe line modes experienced tremendous growth investment in the 1970's. As a result, the carrying capacity of the rail system declined. The attendant deterioration in its services meant that its capacity to generate sufficient revenue to finance it's operations became increasingly inadequate to finance the operations of the Nigerian Railway systems.

The Nigerian Railway soon got caught in a vicious circle resulting in the following:

i - About the 50% of the 281 railway stations nation-wide, are closed as a result of the mass retrenchment of the workforce and rationalization of duty post between 1988 and 1993.

ii - All the railway station buildings, have for decades remained unkempt and decrepit.

iii - Long stretches of railway bed and many of the bridges are now fatigued, while ballast depths are superficial and unsafe.

iv - The prevalence of severe gradients and series of sharp reverse curves.

v - The existence of old fashioned signaling and telecommunication, dependent on the availability of overhead copper cable and highly susceptible to theft, vandalization, and damage by bush burning or fallen trees.

vi - Steep decline in the quality and frequency of trains on one hand and the frightening frequency of accidents on the other hand served to engender fear, loss of confidence on the railway, by the general public and the Government.

The crisis in the Nigerian railway system stem from three decades of neglect and confusion, the later ranged from poor management and gross under funding, to lack of

maintenance of available but obsolete equipment/facilities, and subsequent dilapidation of existing aging but broken down equipment and infrastructure.

## 2.1 DEVELOPMENT OF RAILWAYS IN NIGERIA.

One of the important Railways of the West Coast is the Nigerian Railway Corporation's line, they are entirely of the present century.

In the past, the produce of the interior, mainly palm oil was brought down the Rivers, principally the Niger and Benue by canoe to the coast. Even to reach the market towns along the riverine areas, goods had probably travelled a long way on someone head. As trade strengthened, the traders penetrated deeper into the country. It became obvious that the Railway would be needed.

The phases of development of Railways in Nigeria can be summarized as follows:-

### 2.1.1 PHASE ONE (1901 – 1911)

The first Railway began in Lagos in the year 1898, opened to Ibadan in 1901 and to Jebba in 1909. In the same year, work on the development of Lagos Port had started. The most significant

route for the limited range of export was through the lower Niger water ways with palm kennel as the only most important.

### 2.1.2 PHASE TWO (1912 – 1919)

It was during this period that the extension of Lagos to Jebba line to Kano and Baro was constructed, with branch line from Zaria to Jos mine around 1927, the line from Port-Harcourt started in 1913 and reached Enugu in 1916. At that time, the most important artery was the Kano to Bukuru route by rail and river with Baro Railway Terminus being a very important port.

### 2.1.3 PHASE THREE (1920 – 1930)

The line from Port-Harcourt was continued to Kaduna in 1926 to join Kano – Lagos Railway line together with a 101 km branch from Kafanchan to the Jos Tin-mines, making a more direct route for their product to Port-Harcourt. With these developments the Minna-Baro-Bukuru route declined, and the traffic in the lower Niger became relatively less. Tin-ore took the more direct route to Port-Harcourt and the Zaria - –Jos branch was devoted mainly for developing cotton.

A branch line was opened from Zaria to Kaura Namoda in 1926 to develop groundnut and cotton cultivation and traffic in hides and skin.

The line from Kano was extended to Nguru in the same year for groundnut and hide and skin traffic.

The Ifaw-Idogo branch not far from Lagos was opened in 1930 to carry vegetables produced to Lagos.

After 1930 economic recession and development of road transport halted new Railway construction. From then onwards there wasn't any new lines. Except Enugu to the cement works at Nkalagu and from Kuru near Jos to Bauchi and Maiduguri to serve the North-East in 1964.

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FIG 1a DEVELOPMENT OF RAILWAYS IN NIGERIA.

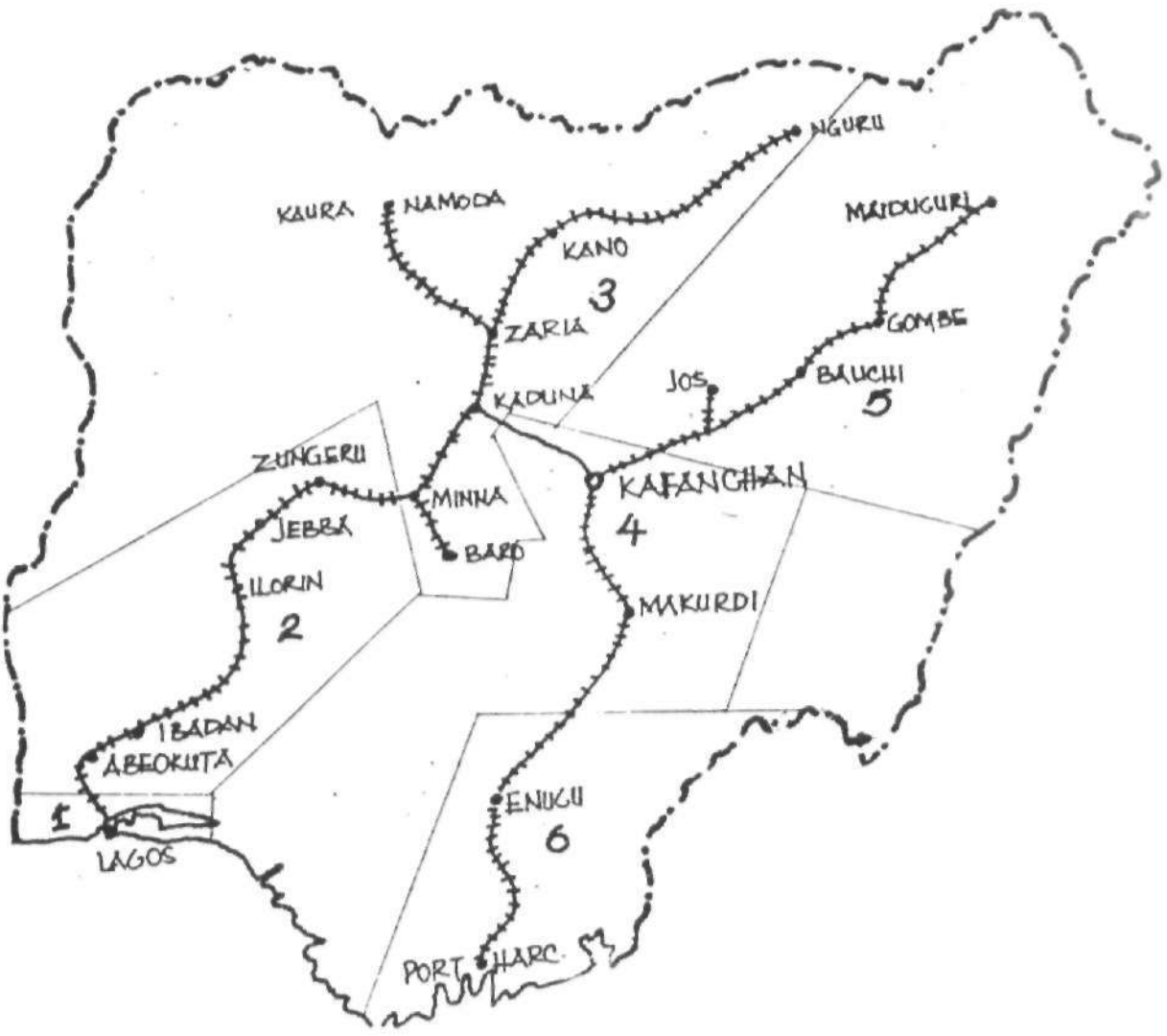



FIG 1b NIGERIAN RAILWAYS PRINCIPAL STATIONS, ROUTES AND SIX DIVISIONS.

# CHAPTER THREE

## 3.0 CASE STUDIES

## 3.1 DENMARK; THE HARESKOV RAILROAD LINE STATIONS,

The Hareskov Railroad line is part of the Urban Rail network in copenhagen. It was electrified in 1977, and to that effect, new stations were built, they differ in size and access conditions, built using identical structural module and functional components. Some of the stations are junctions for bus traffic, and therefore, have large covered areas which also contain various service building and small shops.

The structural module 3mx 6m forms the canopy over the platforms and loading zones. The roof modules can be combined with screen walls. Both buildings and windscreen are black with red fenders. Visible installations are held free of the permanent buildings partly to facilitate replacement and repair lighting fixtures.

A typical station contains the following facilities:

i A small waiting area, partly enclosed.

ii Ticket vending and booking facilities, some stations have automatic ticket vending facilities. In some others, tickets could be purchased from the counter

but vending machine are available near the station building.

iii Toilet

iv Facilities for disabled passengers,

v Taxi and bus stops.

vi Parking areas

vii Shops.

One striking characteristic of the stations on this line is the way the functional components are organized to suit various Site and specific requirements. In all instances, the structural module on which the station is designed is used in multiples to suit specific conditions, in some stations, due to variations in Site Topography these may exist at separate levels platforms and station buildings, Bus shelters, parking spaces, but all of them are efficiently integrated to work as a small unit. Because the elements of the elevations, plan fixtures and other installations are the same, the stations all look alike and could pass for one another.

### 3.1.1 ANALYSIS OF THE DESIGN PROBLEMS,

**i ACCESS TO THE PUBLIC**: Access to any of the stations is either by bus, taxi or foot. This is unrestricted because there exists a pass system and automatic ticket vending systems in the stations.

**ii TRAFFIC SEGREGATION**: Platform are provided to segregate traffic of different routes, and for each station, there exists as many as required. Incoming and outgoing traffic mix on the platforms.

**iii WEATHER PROTECTION**: The stations and their platforms are designed for a tropical climate. In terms of specific site conditions, protection from winds and other elements is inadequate. On the platforms, there are some wind breakers partially covering or enclosing some seats, while others are exposed.

**iv GOODS HANDLING**: These stations are purely passengers station for Urban rail traffic so goods handling facilities only exist in areas where it is seen as necessary. There are elevators capable of handling goods, though mostly used by disabled passengers.

**v TRAVELLERS' CONVINIENCES**: Toilets are located in the main station buildings with signs indicating their directions. Where the station buildings are at a different level from the


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platforms, toilet facilities are incorporated into the platform units. Also there exists small capacity waiting rooms in some stations while in some others, the platforms are the only waiting facilities.

vi **SUPPORT FACILITIES:** Provisions are made for car parks, bicycle and motorcycle parks, restaurants in some stations, shops, but there are no major shopping facilities. Provision are also made for bus and taxi packing. In some large stations, the facilities provided are numerous and may include banking and postal services.

vii **STRUCTURE:** The structures are built on a structural grid of 3m x 6m with every element being detachable and not really influencing the whole structure. The roof is made of space frame and other elements of the buildings are made of wood painted red and black. The platforms are simple flat roofs on tubular steel pipes and are also wooden.

viii **AESTHETICS:** The stations are very beautiful.

3.2 **GERMANY: HAMBURG ALTONA.**

The station at Altona is a terminus for people and luggage. Integrated into the station is a supermarket and the following facilities:

i Post Office

ii Restaurant

iii Express laundry

iv Bakery

v Florist

vi Tobacconist

vii Travel Agencies,

viii Police station

There are four platforms serving passengers going in all directions.

The daily traffic is as follows:

i 800 S-Bahn Trains ( City Express Trains)

ii 300 near and far distance trains.

iii 150,000 passengers.

The platform dimensions are 450m x 7m. The supermarket has an area of 2,000$m^2$

### 3.2.1 ANALYSIS OF THE DESIGN PROBLEMS.

i **ACCESS TO THE PUBLIC**: There are unrestricted access to the railway station by the public. People can access the platforms from the large waiting halls unchecked. The station is accessible by taxis and buses and parking lots are provided.

S – Bahu or city express train, U – Bahu or underground trains. Pedestrians access is direct from street levels and underground walk ways.

ii **TRAFIC SEGREGATION**: Goods are loaded on the platforms by the use of trucks which mix with passenger traffic and obstructs it's flow. Movement from one platform to another is time consuming since they are unconnected. Access to the trains is okay but the passenger has to walk a long distance with his goods on trolley to get on trains.

iii **WEATHER PROTECTION**: On the platforms, roof overhangs shield passenger from rain, sun but not from strong winds. The covered areas of the platform do not cover the entire length of the trains which may be 25 coaches long. On the platforms there are some enclosed seats which protect the patrons from the cold but they are generally inadequate.

iv **GOODS HANDLING**: Facilities are provided for goods storage and handling but they are not frequently used. Goods routine is poor and mixes freely with passengers on the platforms. Facilities are provided for handling unaccompanied luggage.

v **TRAVELLERS CONVENIENCES**: The platforms serves as long term waiting spaces. Though the main hall and waiting halls are large, the existence of numerous commercial activities makes the place very crowded particularly during peak travel hours.

Toilets are located in the basement and on every floor with signs showing access to them.

Also included are a number of goods or luggage lockers and rooms for storing goods.

Though there are no sleeping facilities, offices exist that make arrangements for hotel reservation and other kinds of accommodation.

Passenger seating in the waiting room is inadequate. Though seats are provided on the platforms, they are inadequate and exposed to the wind.

vi **SUPPORT FACILITIES**: Provisions have been made for car parks, restaurants, cafes kiosks in the subway (11 – bahn, S – Bahn) area, and small kiosks in the waiting areas, banks, post office, information, baggage routing services, travel agencies and many other facilities.

**vii STRUCTURE**: The station is built on a rectangular grid of 10m x 10m of steel columns and panel wall facing simulated to give various appearances. The platforms are covered by a flat roof on rectangular hollow steel columns.

**viii AESTHETICS**: The station is beautiful and well landscaped.

## 3.3 NIGERIAN RAILWAY STATION: LAGOS TERMINUS

### 3.3.1 ANALYSIS OF DESIGN PROBLEMS

**i ACCESS TO THE PUBLIC**: Access is unctrolled from the street, the terminus is being used as through – way. The fence around the station provide little or no barrier to tress passers. The station is accessible by taxis and buses and an overhead bridge.

**ii TRAFFIC SEGREGATION**: Incoming and outgoing traffic are not segregated by design but by train schedule. Goods and passengers mix freely and passengers have to take care of their goods.

**iii GOODS HANDLING**: Some offices are provided for goods routing, handling and storage but generally facilities provided are not adequate. Unaccompanied goods generally litter platform floors.

iv **TRAVELLERS CONVINIENCES**: The facilities provided are either inadequate or outdated, for instance, toilets and some other conveniences are out of order.

v **ORGANIZATION OF FACILITIES**: Offices surrounding the main waiting hall. The hall serves as a waiting hall for all kinds of passengers. Ticket vending facilities occupy the central part of the main hall which makes it congested. Generally, facility organization in the terminal is poor.

vi **WEATHER PROTECTION**: The main hall provides ample protection from the weather. The platforms do not provide much protection due to the orientation, hence rain can become a menace.

vii **STRUCTURE**: Open hall with bowstring steel Arches on columns spaced at 4.5m – 4.8m c/o. Total length is about 49.5m. Reinforced concrete columns used, width about 15m.

viii **SUPPORT FACILITIES**: Station Police post, Post Office, Information and Kiosks.

ix **AESTHETICS**: The Aesthetics is not particularly impressive.

## 3.4 ENUGU RAILWAY DEPOT

The Enugu Railway depot is the headquarter of the Eastern

Division of the Nigerian Railways. The depot consist of station buildings and all other facilities necessary for operational convenience such as engineering yard, sidings workshop, carriage and wagon shed and running shed. The depot has a fairly large marshalling yard, a training school, goods shed, central store etc.

### 3.4.1 LOCATION

The depot is located in the core of the city structure between the most important roads, (Ogui road and Okpara Avenue) in the city. To the North East, it is bounded by the stadium and Ogui road, to the West by Okpara Avenue and to the South by the market.

### 3.4.2 ANALYSIS OF DESIGN PROBLEMS:

i **ACCESS**: Vehicular access to the depot is from Ogui road, from this road no special provision was made for pedestrians, this access terminates in a 'sea' of asphalted forecourt which serves as parking lot for vehicles.

ii **TRAFFIC SEGREGATION**: Traffic within the building have been carefully segregated. Access for the passengers to the 200m island platforms is via enclosed underground ramped tunnel. The parcel office and the ticket booths are to the left of person entering. Departing parcels leave to a store beneath the island

platforms through another tunnel. The store is linked to the platform by a goods lift.

iii **SUPPORT FACILITIES**: The station building has toilets, buffet, waiting room for second class and ticket booth and parcels office, all under one roof. Besides the main station building is a post office. Bulky goods such as cars and trucks are loaded from a goods shed which is situated at the other side of the marshalling yard.

iv **ORGANIZATION OF FACILITIES**: At the platform there are dustbins seats and fire extinguisher. All offices strictly for operational convenience are situated on the platforms. The platforms have been planned such that the office block can be described as an 'island in an island'. The platforms are occupied by a proliferation of food and provision kiosks

v **STRUCTURE:** The walls of the main station has screen walls, the roof is of corrugated iron roofing sheets and is gabbled. The subway and the tunnels to and from the platforms are both of reinforced concrete decks and installed with roof lighting at points above ground level. Where the roof is below ground level, artificial lighting is used without special provision for ventilation.

The platforms are roofed with corrugated iron sheets on a mixture of steel rafters and timber purlins . The platform roof is supported from the ground by a central line of steel columns in the ramification of palm trees.

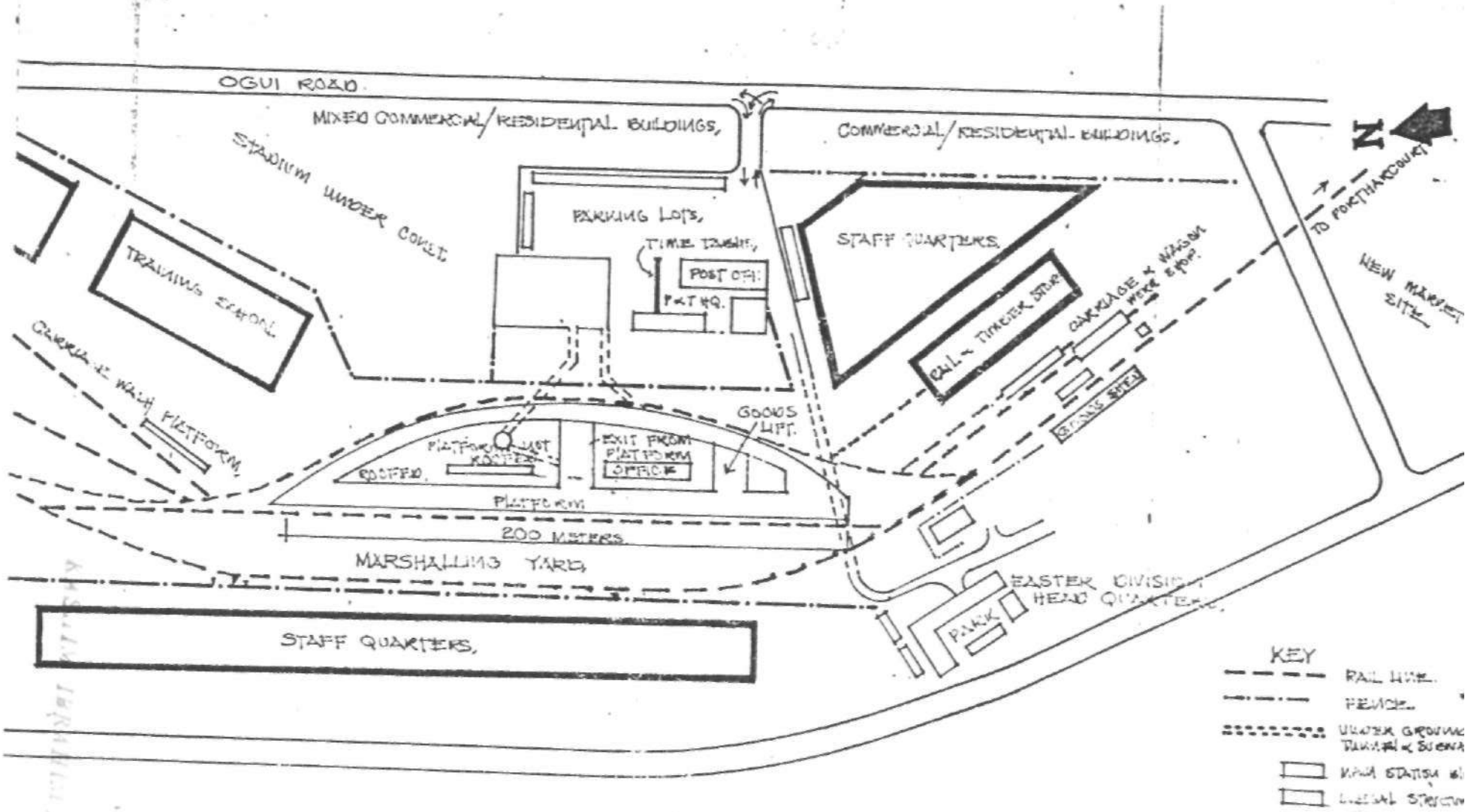



FIG 2a SKETCH LAYOUT OF ENUGU RAILWAY DEPOT.

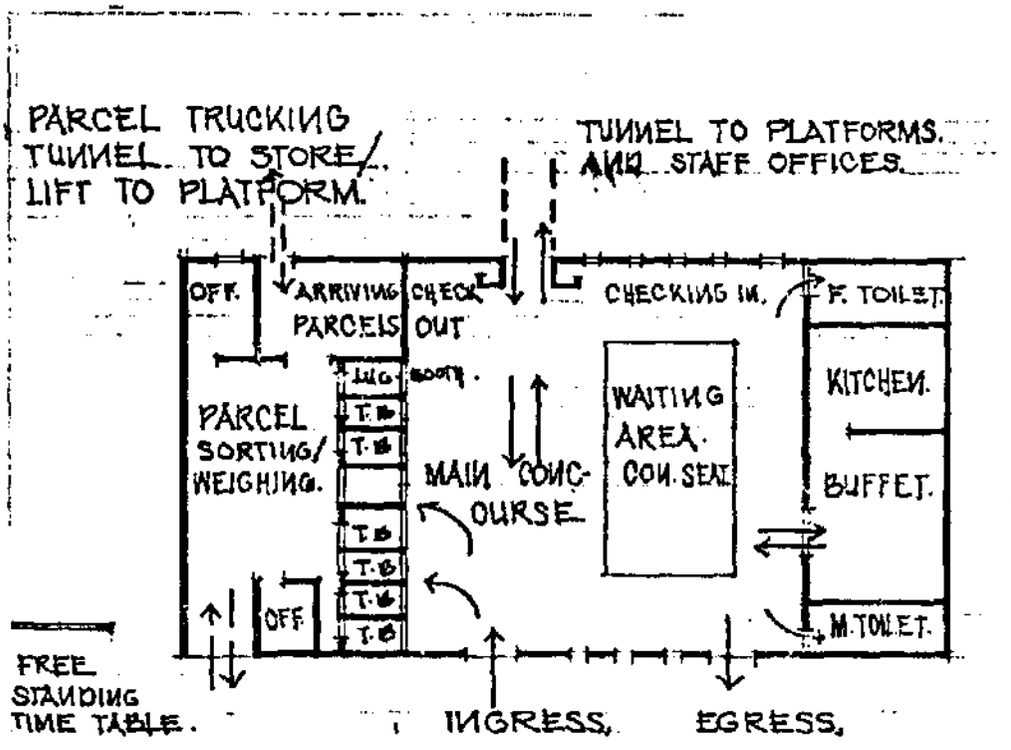



FIG. 2b. SKETCH PLAN OF ENUGU RAILWAY DEPOT MAIN RECEPTION BUILDING.

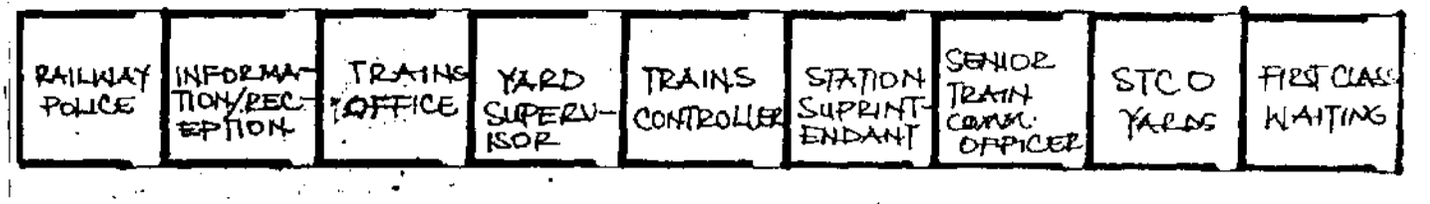



FIG. 2c STAFF OFFICES ON THE PLATFORM LEVEL.

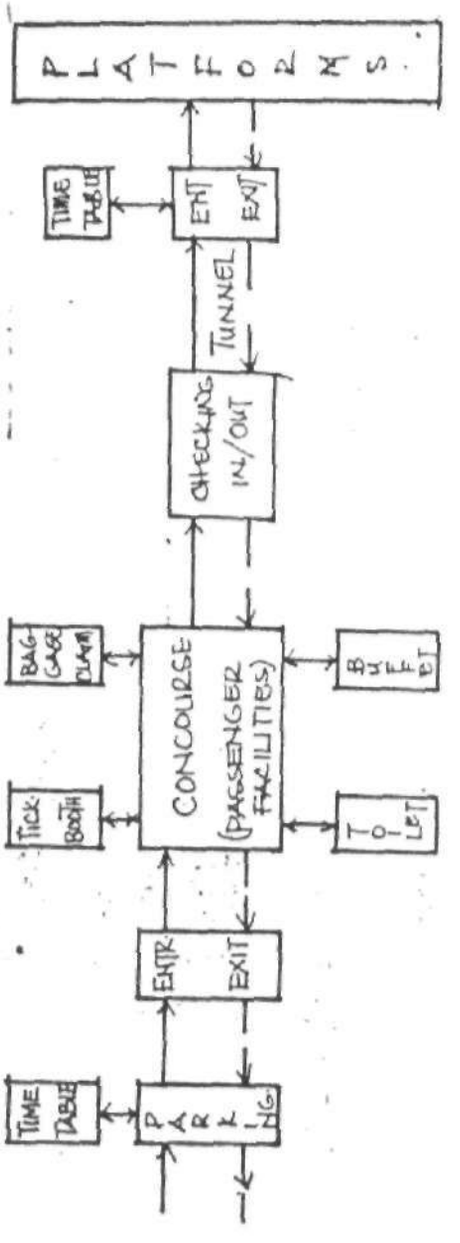



FIG 2d. PASSENGERS FLOW.

## 3.5 KANO RAILWAY STATION

The façade of the Kano railway station is quite interesting, it possess some degree of Architectural decency which reflects the traditional building type which is typical of Hausa cultural heritage.

i **PLATFORMS**: The platforms are similar to that of Zaria Railway station, roofed with open web light steel portal frames cantilevered and inclined in both direction in a butterfly pattern with a central gutter having corrugated metal roof covering, forms the canopy over the platforms.

ii **TRAVELLERS CONVINIENCE**: The first class waiting room is well furnished and quite comfortable with a rest room attached. The second class waiting room was designed to flow into the ticket booths and a mini shop attached. Adjacent the second class waiting room is a block of public toilet.

iii **ORGANISATION OF FACILITIES**: The circulation of passengers within the station building is defined. The entrance is located such that after purchasing ticket passengers moves straight to the platform without crossing rail lines. Departure has been taking into consideration by the provision of a wider exit to accommodate the expected traffic volume.

iv **AESTHETICS:** The aesthetics of the station is quite impressive.

## 3.6 MERITS

i Economical platform shed structure

ii Easy access to train,

iii Relatively secure with define entrances

iv Passengers need not cross rail lines to board trains.

## 3.7 DEMERITS

i Poor zoning between passenger facilities and administrative offices.

ii Retailers and hawkers occupy most of the platform,

iii The platforms offer minimal weather protection,

iv Inadequate waiting rooms for passengers

v Lack of restaurant to serve passengers,

vi Lack of temporary accommodation in case of late arrival of train.




PLATE i THE PLATFORM OF KANO RAILWAY STATION.

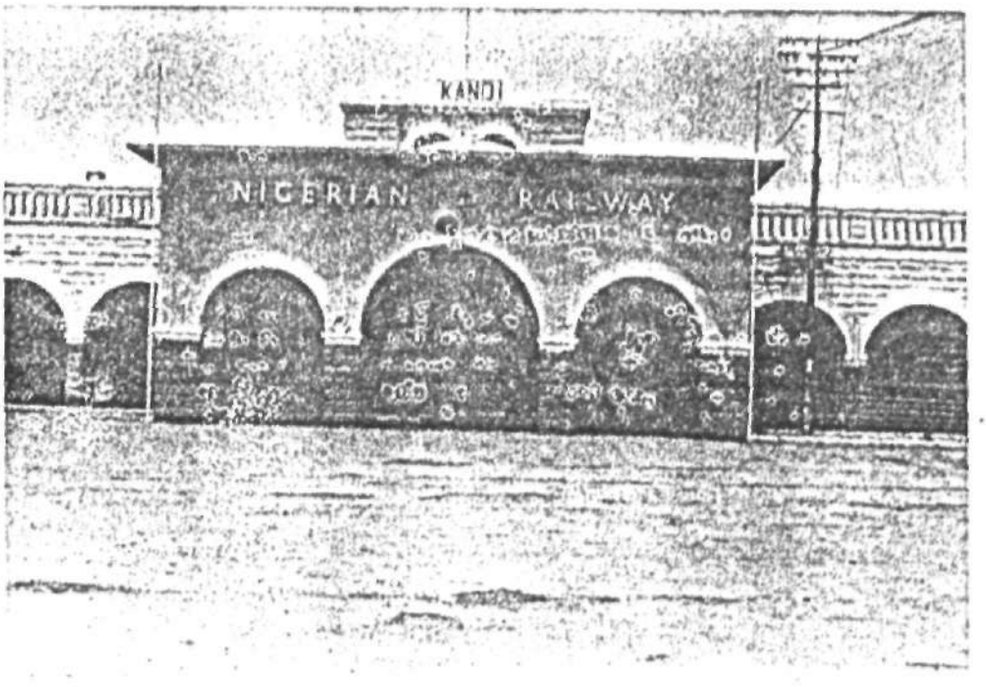



PLATE ii THE FACADE OF KANO RAILWAY STATION.

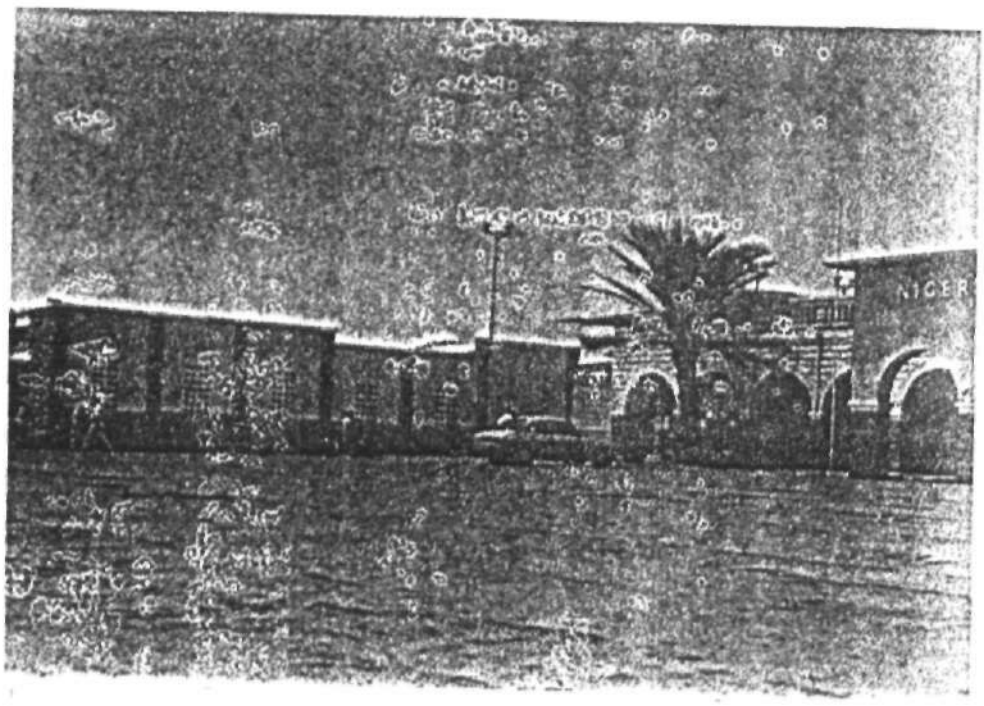



PLATE iii PARCEL OFFICE, KANO RAILWAY STATION.



PLATE IV. FORECOURT OF KANO RAILWAY STATION.

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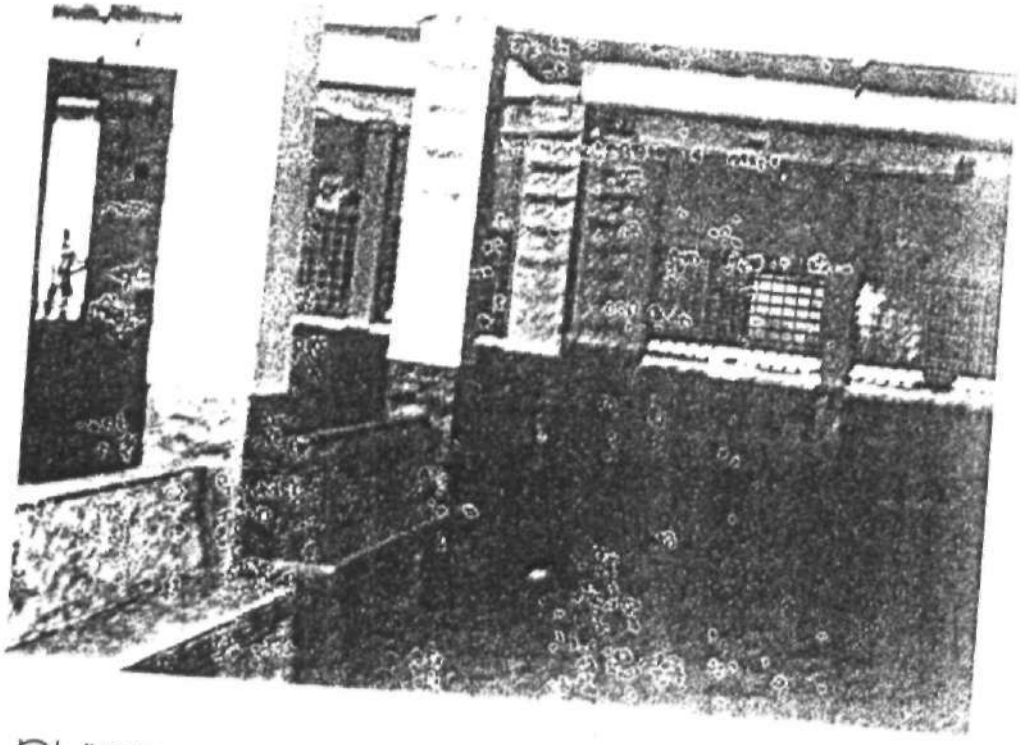


PLATE V SECOND CLASS WAITING ROOM, KANO RAILWAY STATION.

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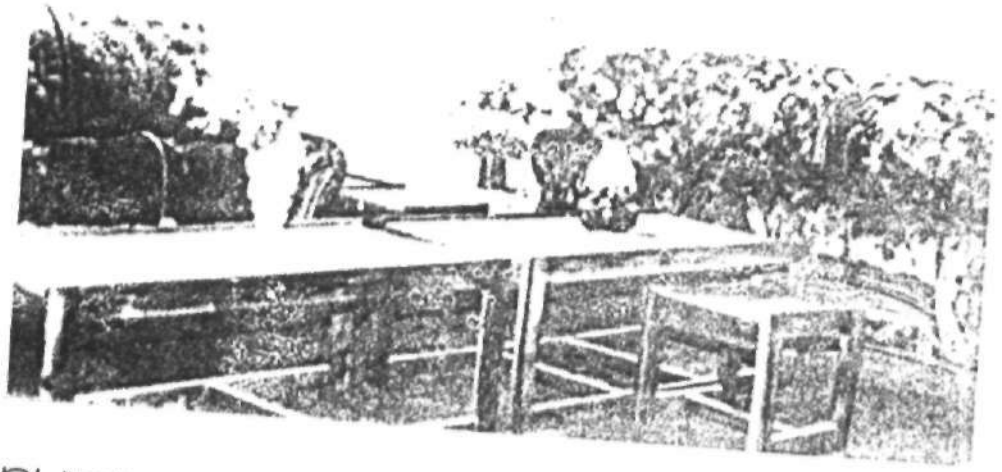


PLATE VI. FIRST CLASS WAITING ROOM, KANO RAILWAY STATION.

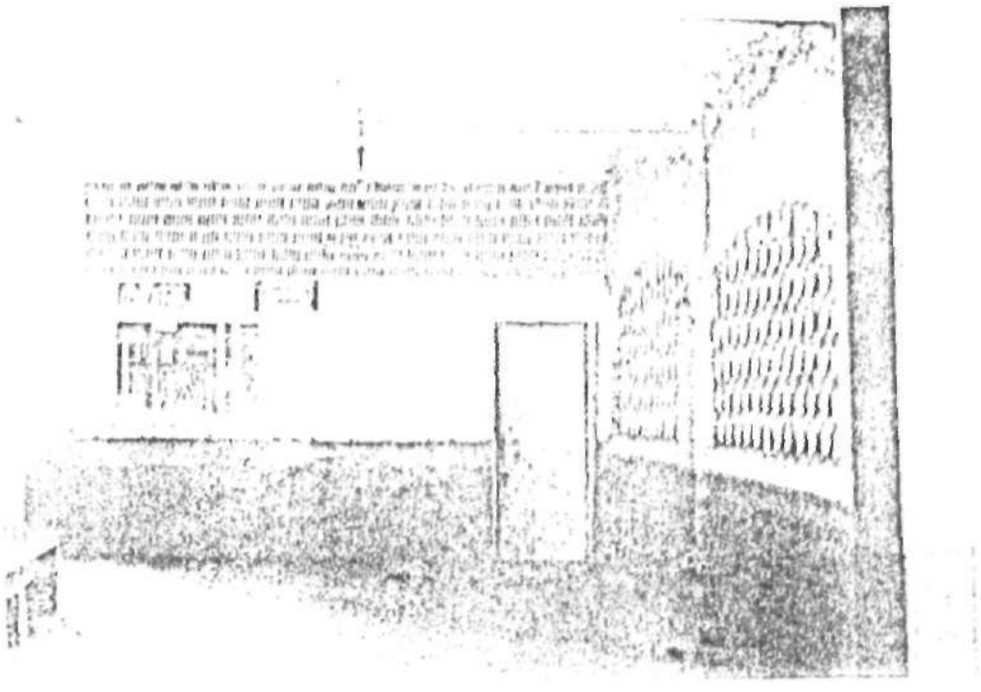


PLATE VII SECOND CLASS WAITING ROOM, KANO RAILWAY STATION.

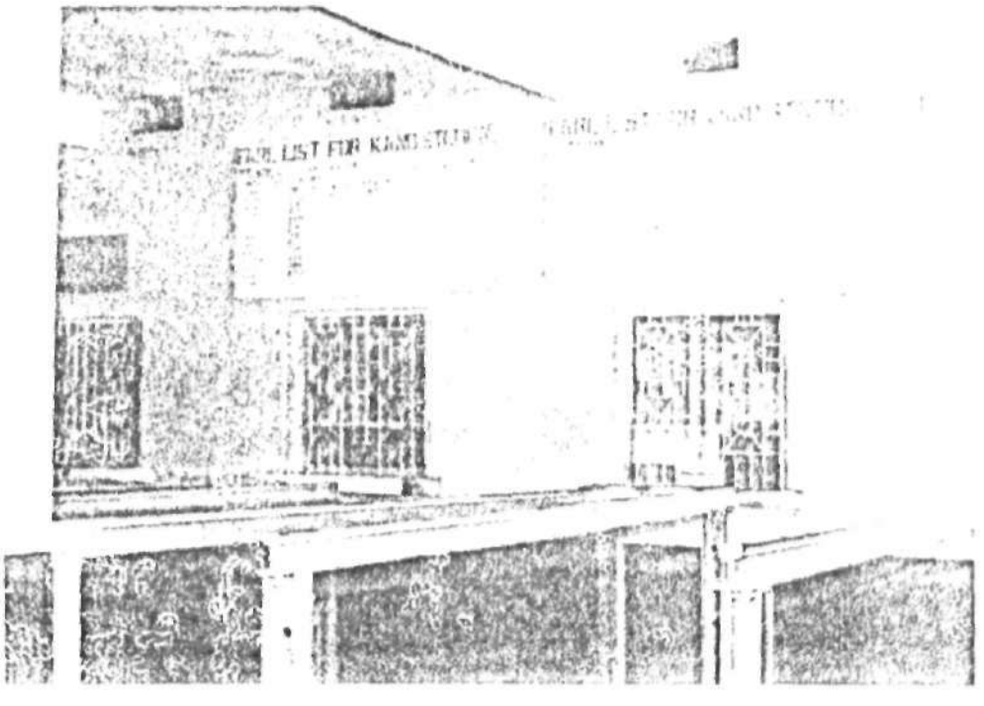


PLATE VIII TICKET WINDOWS SEPERATED BY RAILS, KANO RAILWAY STATION.



PLATE IX. KIOSKS AND STANDS ACCROSS KANO RAILWAY STATION.

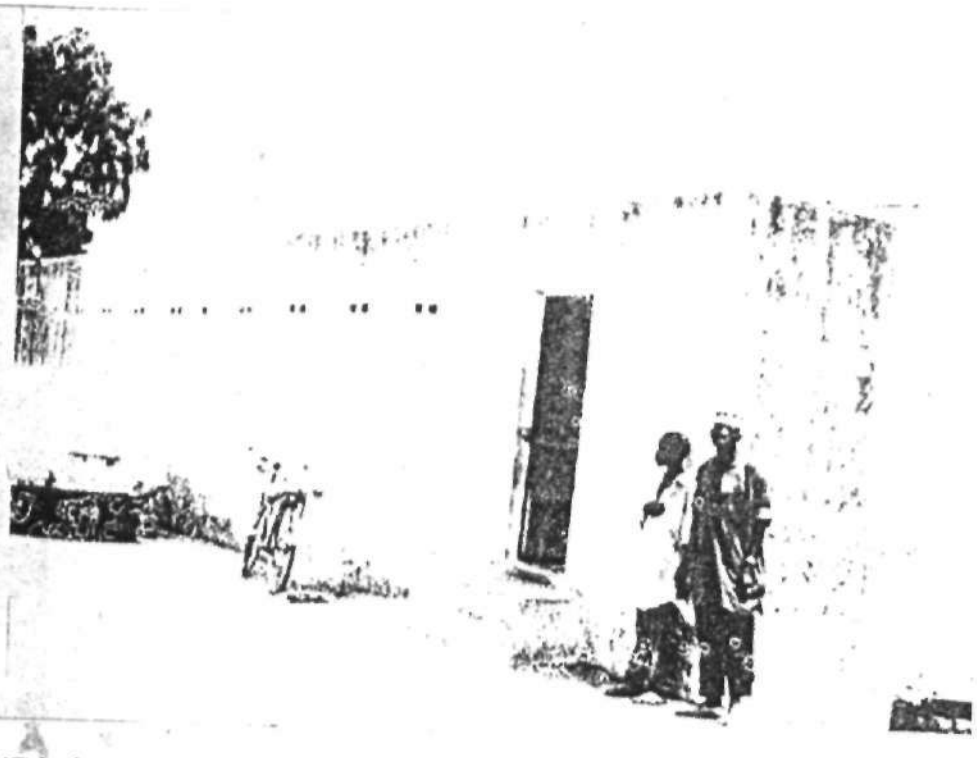


PLATE X. A BLOCK OF PUBLIC TOILET ACCROSS THE MAIN STATION BUILDING.

# CHAPTER FOUR

## 4.0 ZARIA RAILWAY STATION

## 4.1 EXISTING FACILITIES

The existing station building consist of the following: Ticket office, luggage office, store, parcel office, exhauster room/carriage and wagon, examiners office, it also accommodates district inspector's office, chief station master's office, train [illegible] station superintendent's office, commercial traffic inspector's office second class waiting room, First class waiting room communication and signal section.

Apart from the station building, the station also consists of workshops loco sheds and good sheds. The good shed which are three in number handles wagon loads only.

The facilities of the station are grossly inadequate to cope with the increasing traffic generated by rail transportation especially with respect to passenger shuttles between Zaria and some neigbhouring towns.

## 4.2 MERITS

i The station is located in the central business district area of Sabon Gari

ii The platform shed is economical

iii Maximum use of island platform

## 4.3 DEMERITS

i. **ACCESS TO THE PUBLIC**: Access to the station uncontrolled from all directions. The station serves a cut for through traffic. It is accessible by taxi to g station buildings, passengers have to cross rail lines. other main point of indices is from is from the city ta from which a road is provided.

ii **TRAFFIC SEGREGATION**: Incoming and out mix freely on the platforms. Goods and passenger also.

iii **GOODS HANDLING**: For passengers, no facilities provided for goods handling and routing. Passenger take care of their luggage. For bulky goods, facilitie provided. Facilities are provided for unaccompanied but they are not kept in a clean state.

iv **TRAVELLERS' CONVINIENCES**: Toilets are provid but they are not properly maintained. Waiting room

provided. The first class waiting room is fairly clean but the second class waiting room is unkempt.

v. **SUPPORT FACILITIES**: The station is void of facilities such as shops/offices to let, restaurants, saloons, supermarkets, adequate parking space, lockers, washing facilities, temporary accommodation, telephone booths, bookshops etc. Rather hawkers run the affairs of the station.

vi. **CROSSING OF RAIL LINES**: Passengers are compelled by design to cross the rail lines to get to the platform due to the location of the ticket office.

vii. **ORGANIZATION OF FACILITIES**: The arrangement of facilities is poor, the ticket office is isolated, beside its distance from the station building, the operation interrupts the traffic through the office.

viii. **WEATHER PROTECTIOIN**: The first class waiting room is fair, provides ample protection from the weather. The second class waiting room is out of use. This leaves the passengers with no choice but the platform which are exposed and unprotected from weather.

ix. **STRUCTURE:** The structure is composed of simple open web light steel portal frames cantilevered and inclined in both directions in a butterfly pattern with a central gutter having a corrugated roof covering, forms the canopy of the platforms, yet travelers are at the mercy of the weather.

The station building is a load bearing wall structure built in separate units and integrating an older building. The new office is a storey high building with R.C. columns spaced at about 4.0m c/c.

x **AESTHETICS:** The aesthetics is not impressive.

## 4.4 PROPOSED SOLUTIONS

### i UNCONTROLLED ACCESS

The provision of site boundaries will go a long way to control human and vehicular circulation within the station precinct. Users should be segregated from non-users, and limit shooting be established so that only travelers are allowed on the platforms.

ii **TICKET VENDING AND COLLECTION SYSTEM**

The provision of the following will alleviate the disorderliness in ticket vending and collection system if not solved completely.

- Provision of adequate ticket booth and vendous
- Provision of booking facilities,
- Provision of ticket checking facilities
- Provision of goods routings facilities

iii **WAITING ROOMS**

Waiting rooms should be located to one side of the line of travel, but near to the passenger's concourse and adequately equipped with bulleting boards, clocks, and other information devices, so that passengers will be contented to remain in the waiting rooms and not hang around the concourse unnecessarily

iv **TICKET OFFICE**

The ticket office should be located adjacent to the line of travel. But should be arranged so that passengers wishing to obtain ticket will not interfere with general flow of traffic

v **OFFICES**

In planning and Designing for station buildings, office ... required for operating staff of the station and offices rentage should be considered.

vi **TOILETS**

Ample facilities should be provided adjacent to the waiting rooms for public use. Additional toilets facilities ... provided for the office and train personnel.

vii **PLATFORMS**

The platforms should be protected from weather

viii **CROSSING OF RAIL LINES**

The crossing of rail lines could be very hazardous and should be discouraged. Platforms should therefore be linked by ... subways or an overhead bridge.

ix **GOODS AND PASSENGER SEGREGATION**

The segregation of goods and passengers can be achieved by employment of the following:-

- Creation of goods routing facilities
- Creation of service floor for goods handling,
- Provision of separate luggage wagon,

- Provision of separate ramp for goods routing

- Provision of transit lounges

x **LUGGAGE STORAGE**

- Provision of storage closet and lockers for [illegible]
  to generate revenue.

- Provision of bank storage facilities,

xi **SHOPPING FACILITIES**

The station has been polluted by hawking, since the [illegible] the station can't be guaranteed by their activities, hawking should be discouraged by the following measures:

- Making provision for concession stands

- Providing adequate shopping facilities,

- Providing functional flexible spaces for hire

xii **SUPPORT FACILITIES**

- Adequate parking space should be provided

- Auxiliary power supply should be provided for the effective running of the station

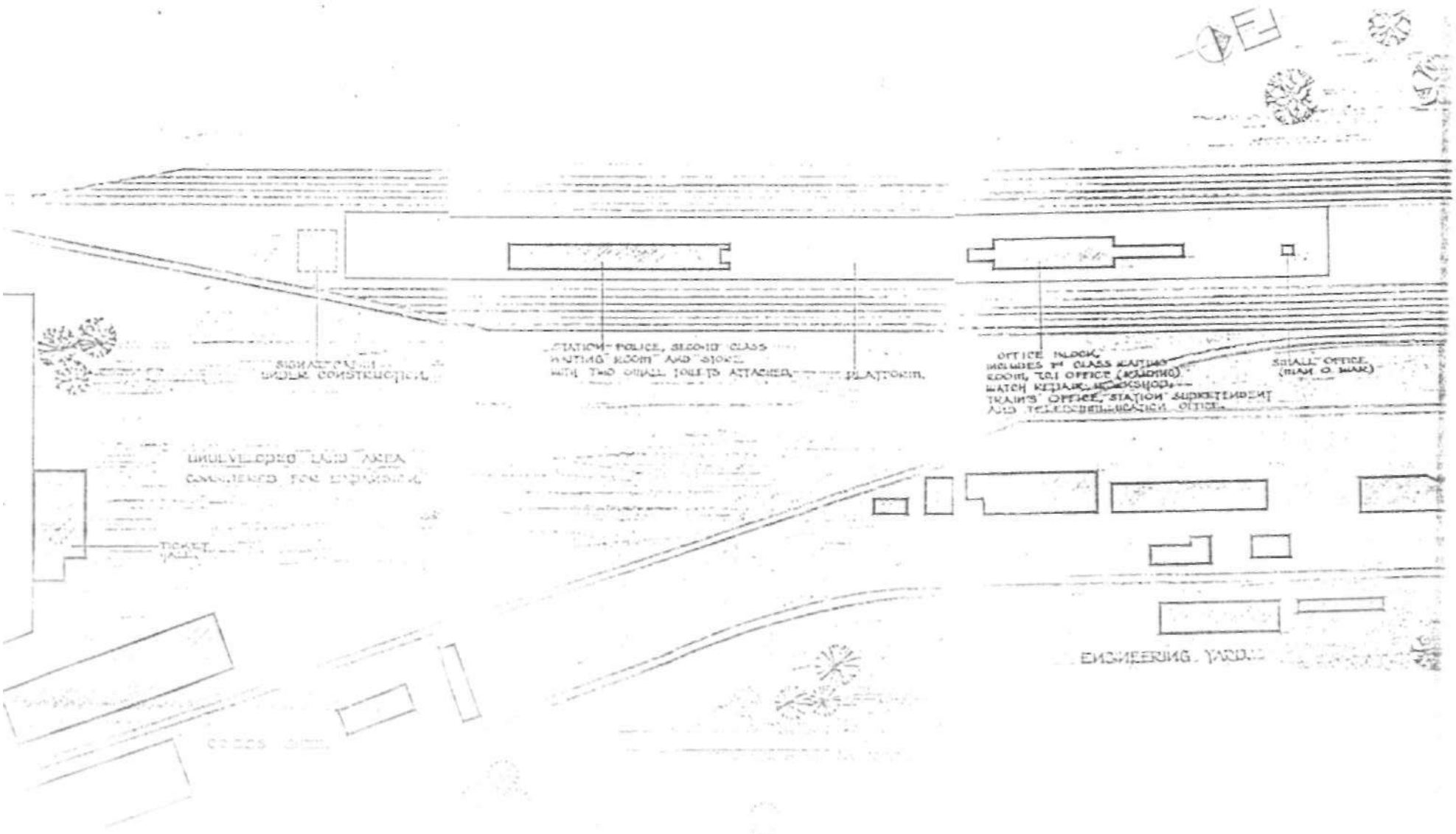



FIG. 3. SITE LAYOUT OF ZARIA RAILWAY STATION.

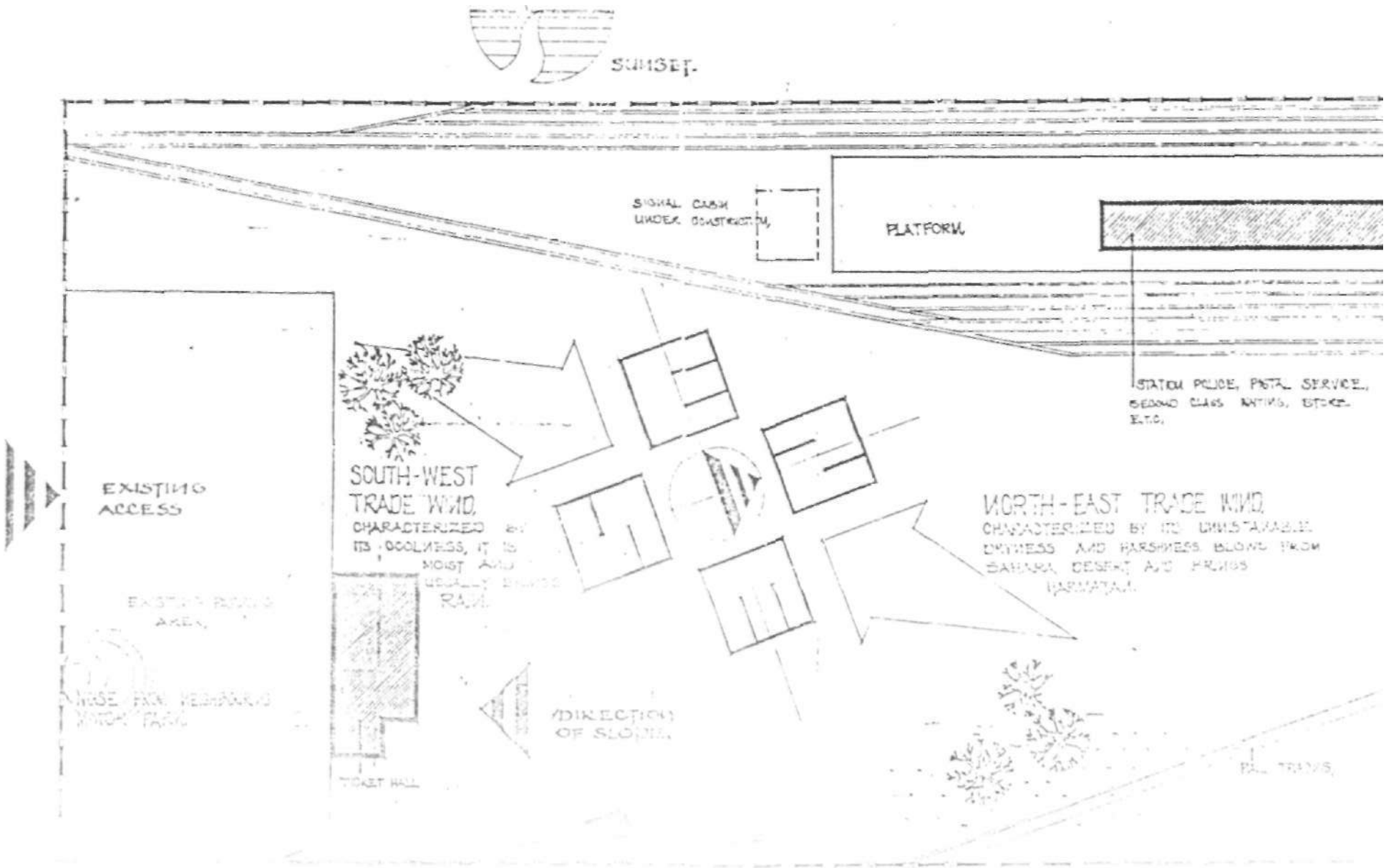



FIG.4a. SITE ANALYSIS.

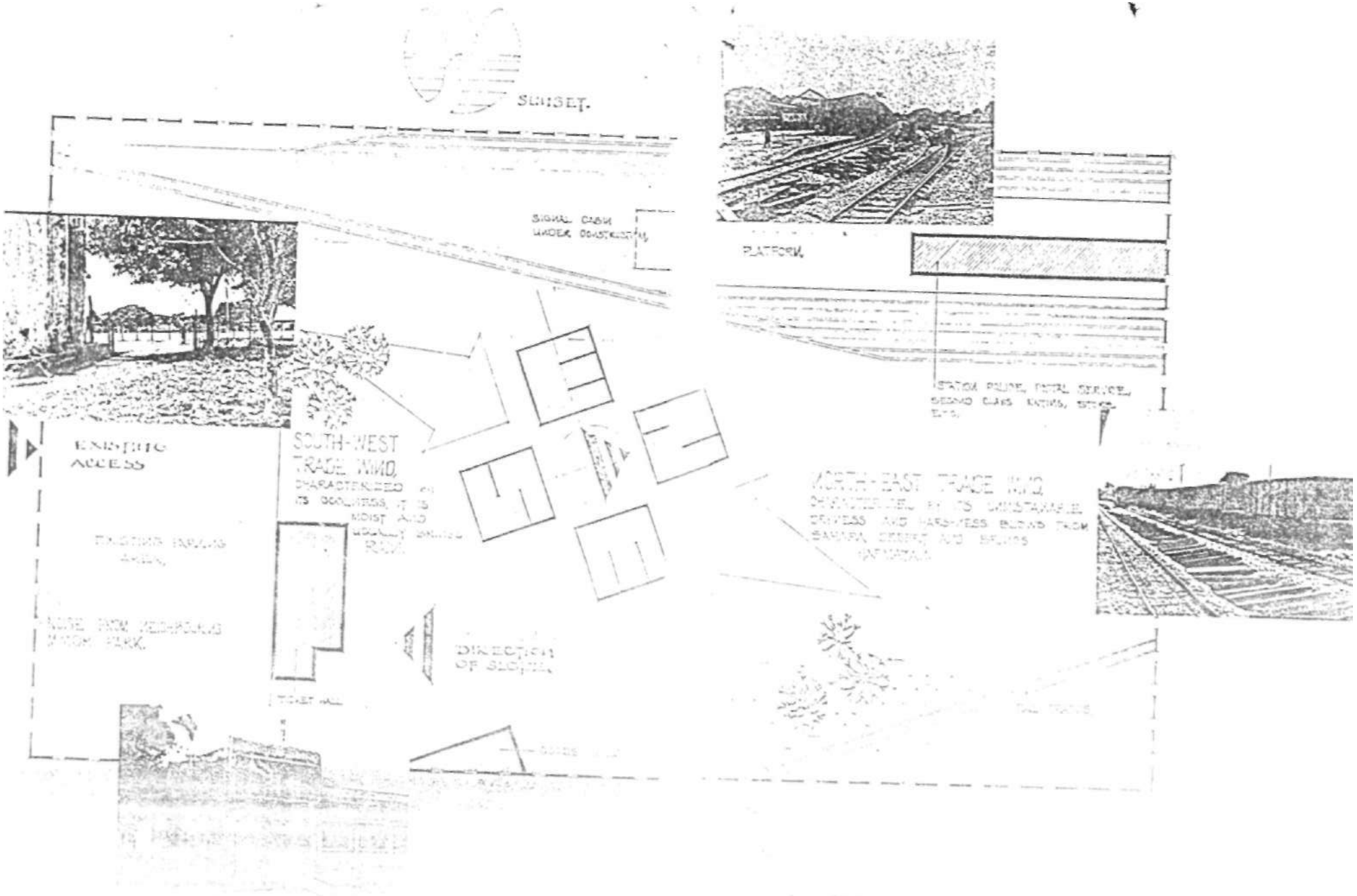



FIG. 46. SITE ANALYSIS.

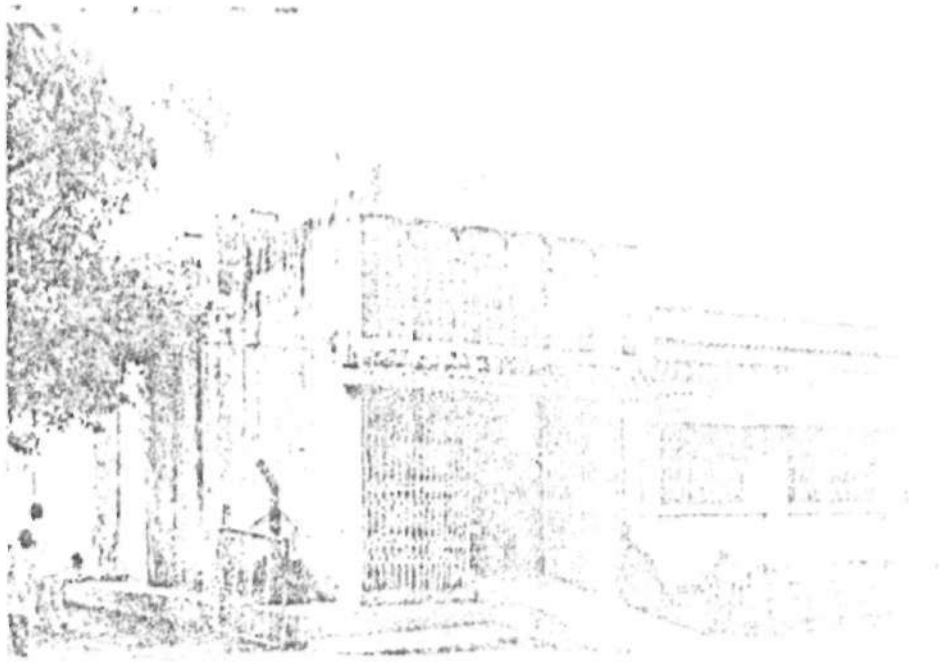


PLATE XI APPROACH OF TICKET OFFICE ZARIA RAILWAY STATION.



PLATE XII. SIDE ENTRANCE, ZARIA RAILWAY STATION.

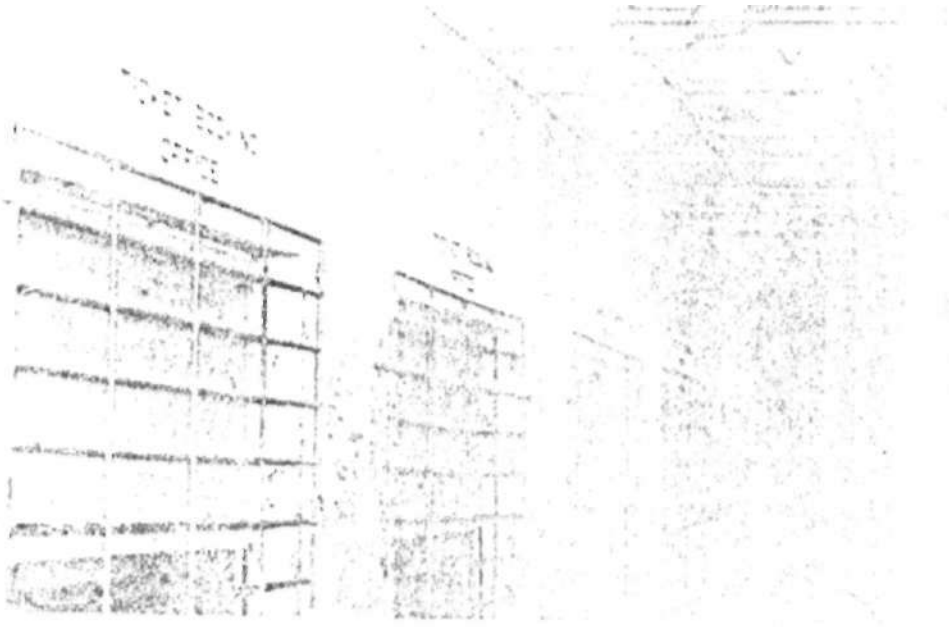


PLATE XIII TICKET BOOKING WINDOWS, ZARIA RAILWAY STATION



PLATE XIV PLATFORM AND RAIL LINES IN PERSPECTIVE

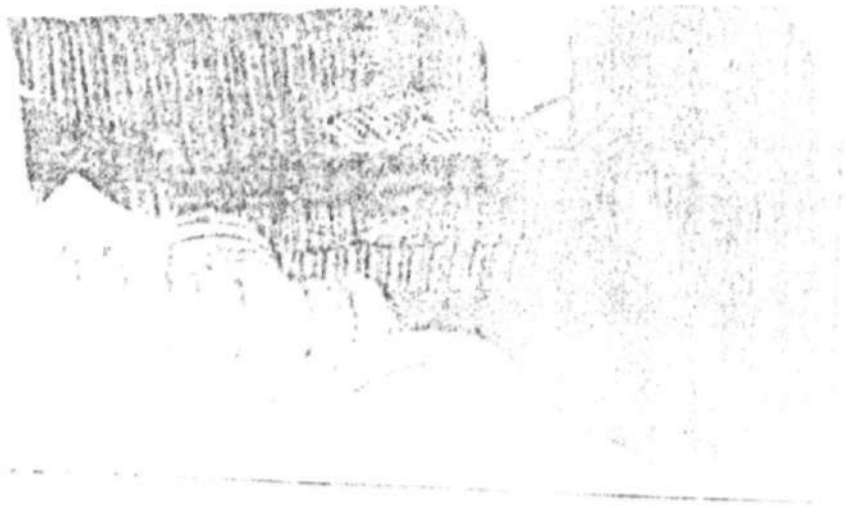


PLATE XV FIRST CLASS WAITING ROOM
ZARIA RAILWAY STATION.

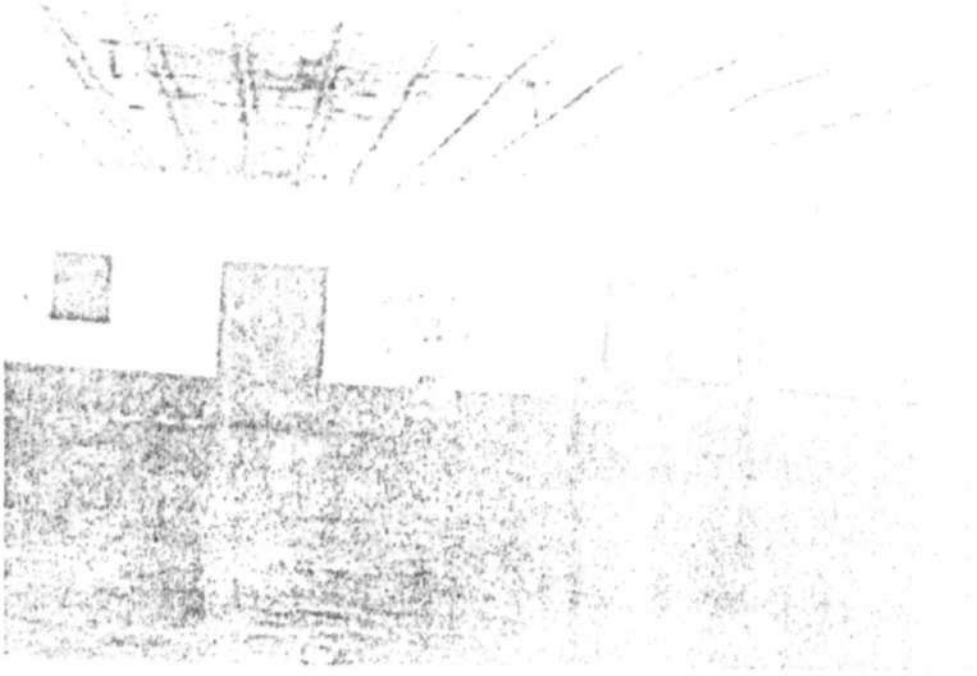


PLATE XVI SECOND CLASS WAITING ROOM
ZARIA RAILWAY STATION.

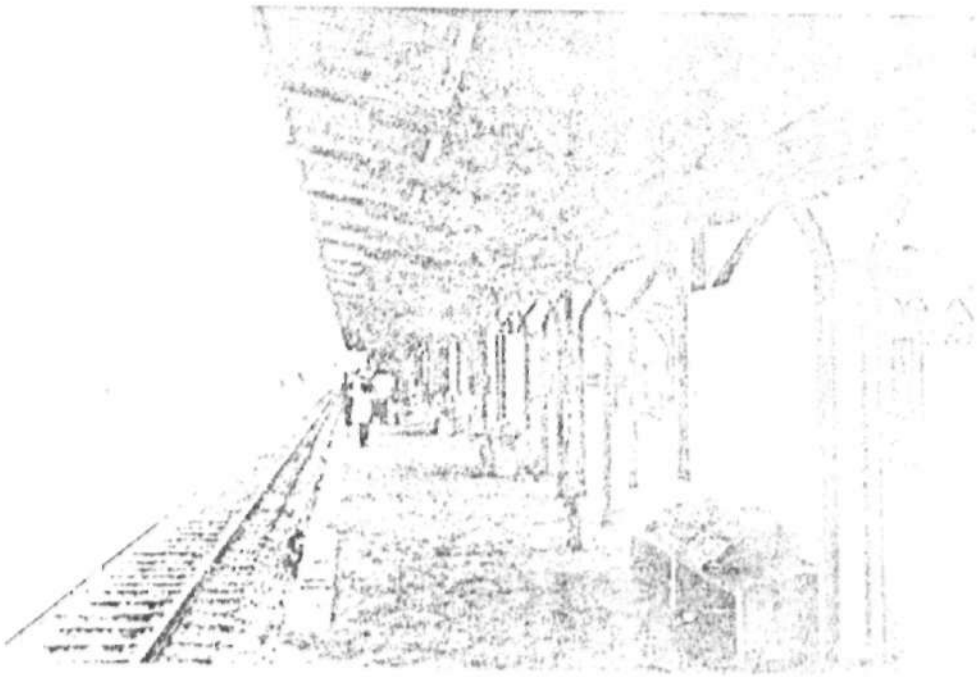


PLATE XVII PERSPECTIVE OF THE PLATFORM
ZARIA RAILWAY STATION.

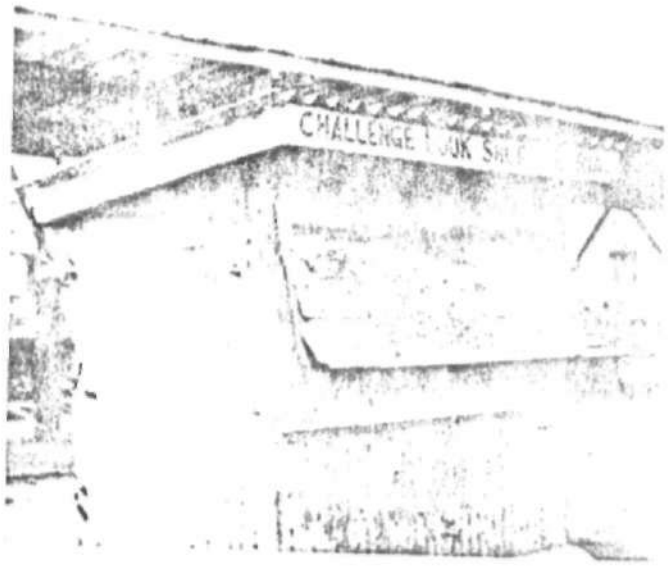



PLATE XVIII CHALLENGE BOOKSHOP
ZARIA RAILWAY STATION

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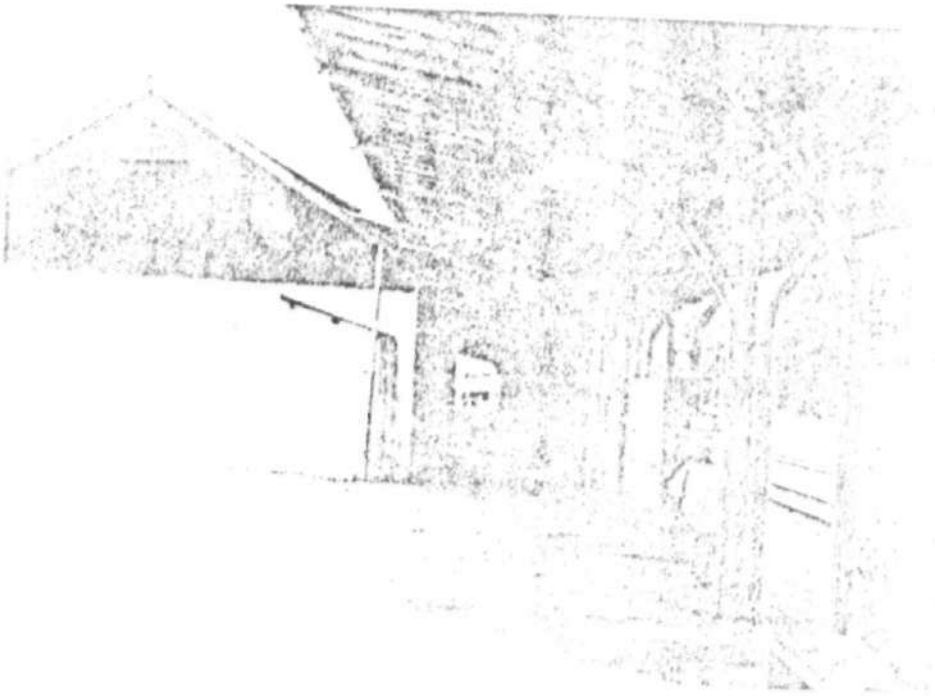


PLATE XIX STORE ATTACHED TO THE SECOND CLASS WAITING ROOM.

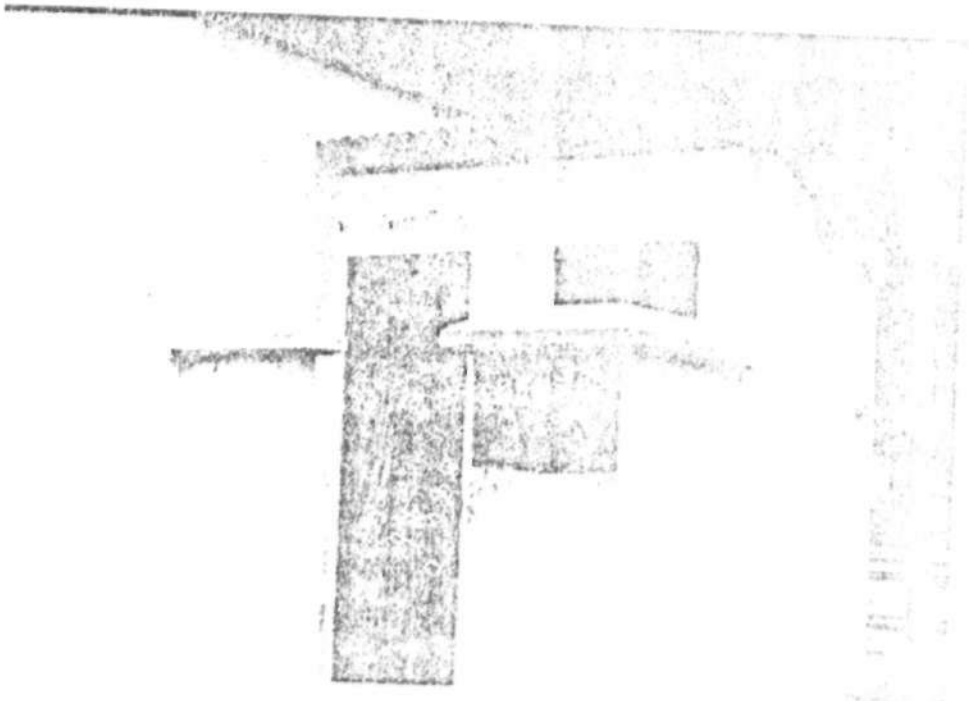


PLATE XX. GENTS TOILET ON THE [illegible] ZARIA RAILWAY [illegible]

# CHAPTER FIVE

## 5.0 FOCUS ON RAIL TRANSPORT

There are practically four important elements to every mode of transport, viz:- The way, terminal, the unit of carriage and the unit of propulsion.

### 5.01 THE WAY

This is basically the route along which the traffic travels. Some ways are controlled by a framework of rules or laws laid down for the mutual benefit of all travelers or road users such as one way system. Other ways are controlled either physically or by the use of automatic signaling device such as on a very busy junction.

### 5.02 THE TERMINAL

This is a point where one transport network ends and another begins.

### 5.03 THE UNIT OF CARRIAGE

This is the part of the transport system that accommodate goods or passengers, the flexibility and adaptability of the unit of carriage greatly influences the efficiency of the mode of transport.

## 5.04 THE UNIT OF PROPULSION.

The unit of propulsion refers to the engine that drives the vehicle in use, since every vehicle must be driven. The choice of propulsion will depend on the strength of the vehicle, the required speed available fuel and frequent services made.

## 5.1 CHARACTERISTICS OF RAILWAYS

Railways consist of a track which is made of two parallel metal strips which gives a smooth hard surface. In the past, rail were made of wood and later of iron, but at the moment, rails are made of steel. The smooth surface provides little resistance to rolling.

It is important to note that railways present major engineering problems during their construction, it is essential that gradients are minimized and the problem of overcoming terrain are serious.

At the moment, railways do not provide door to door services unlike the car, except to very large industrial firms through track rail called 'sidings '.

## 5.2 TYPES OF RAILWAY JOURNEYS

Railway Journeys can be classified into three types, long distance, short distance and sub-urban services.

### 5.2.1 LONG DISTANCE JOURNEY

This type of journeys require comfortable carriages insulated from inside against atmospheric conditions, the number of access doors should be few, usually at the ends of the carriage and in the centre for easy alighting of passengers. Access door to toilets and restaurants require a flexible connection between carriages from one end of the train to the other, stopping points are limited.

### 5.2.2 SHORT DISTANCE JOURNEY

This type of journey require a relatively less comfortable environment within the carriage with fewer comfort. Facilities like that of the long distance journey.

### 5.2.3 SUB-URBAN SERVICES

This type of journey requires more frequent stopping points and consequently a greater need to drop passengers. This requires door to every bank of seats instead of at the ends of coaches only.

## 5.3 ROLE OF RAILWAY IN NIGERIA

The Nigerian Railway has contributed greatly to the economic, social, political and cultural development of the nation in retrospect. It influenced new sources of supply for consumers, new market for producers of various types of goods and services.

ushered in new development as regards towns, industries, commerce and agricultural production, land values also increased.

The role of railways transcends the developments of internal trade and commerce but as well as external trades in terms of expanding export trade by evacuation of agricultural products and transporting imported heavy duty materials and equipment.

The railways is known to provide services for student excursion and holiday trips. It also provides annual service for mass evacuation of pilgrims to Mecca from the Southern part of the country to some other parts of the north for air lifting. It also serves various organizations and governments during national and international sport meeting and festivals.

## 5.4 QUEST FOR MODERN RAILWAY SYSTEM.

At the inception of railways, the main objective was to provide a means that could transport the country's product from the hinterland to the coast for export abroad.

The provision of railway for the social advancement and convenience of passenger traffic was rather relegated.

It can not be over-emphasized that it is essential to keep gradient to minimum due to the difficulty of overcoming terrain

because the present railway system follow terrains that offer less resistance which reduces the spead of train to about 30km/h which will eventually drag on the social, political and economic development of the country. The above mentioned short-comings and a host of others demands for the need of modern railway system.

## 5.5 FUTURE DEMAND FOR RAIL TRANSPORT

The rehabilitation of the steel industry will no doubt have an impact in the industrial and commercial development in the nation particularly on the railways which is an important and relatively efficient means of transport.

## 5.6 REQUIREMENTS FOR MODERN RAILWAY SYSTEM

For operational convenience of a railway system, some facilities are needed which are not available in the present Nigerian railway system, they include the following:-

i Terminal equipped with facilities for quick operation,

ii Fast moving trains,

iii Reasonably comfortable coaches

iv Provision of installations which will allow entry and exit of trains simultaneously .

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v Standard track gauge 1.52m ( 4' 8½") instead of the 1.12m (3`6`` ) gauge on the main lines.

vi Elimination of curves and gradients along rail line for better speed and efficiency.

vii The employment of safety installations and Telecommunication system, and the use of Radio for shunting purposes at big stations instead of hand flag which is being used today.

## 5.7 ADVANTAGES OF RAIL TRANSPORT:

i. The rail transport relieves the overburdened system on road and air, both in mass transit and freight haulage at a relatively lower cost.

ii. Unidirectional traffic per line with less crisis crossing of lines.

iii. Reduce accident and relative safety

iv. Transport provides avenue for socialization with more people.

v. It reduces the need for individual transportation and resulting pollution and congestion problems in urban areas.

vi. The rail transport offers large freight handling capacity and capability.

# CHAPTER SIX

## 6.0 RAILWAY STATION BUILDING

## 6.1 PASSENGER FACILITIES AT STATION

A look at the Railway Stations in Nigeria shows that none has a standard station building that has the required functions and passengers comfort facilities.

Waiting rooms are either absent or inadequate, passengers and those who accompany them are some times forced to hang around on the open platforms.

In most of the stations, it is not difficult to notice that the four basic flows are not properly defined, a chaotic scene prevails when the flow of passengers, public, staff and goods mix freely on platforms.

## 6.2 TRENDS IN RAILWAY STATION BUILDING DESIGN

In the past, two schools of thought prevailed in the design of railway stations, namely:- Picturesque and functionalism. Though at that time the design of railway station was attributed more to engineers than Architects.

### 6.2.1 PICTURESQUE SCHOOL OF THOUGHT:

The deciples of this school were of the view that a station building should look very attractive, and emphasis should be on the form or visual qualities. Picturesque in it's totality is not a style but rather a method of combining styles.

The characteristic qualities of picturesque buildings are as follows :-

i **VARIETY** - The Varying silhouette in a building which is achieved through surface treatment .

ii **MOMENT** - The building elements blends with the natural landscape.

iii **IRREGULARITY** – The breaking and variation of forms within a building .

iv **INTRICACY** - The relationship of the building parts is very complex and not easy to discern immediately, this intricacy increases the aesthetic intensity of the observers experience.

In retrospect, the doctrine of the picturesque school of thought lay emphasis on the visual appeal and psychological comfort of passengers rather than the physical comfort facilities which is essential in an ideal railway station building.

### 6.2.2 FUNCTIONALISM SCHOOL OF THOUGHT:

The disciples of this school of thought were of the view that a station building should be designed in such a way that it provides effective function to the passengers, employees and unit of propulsion in a very conducive atmosphere.

The building of such station must be strong and durable enough to stand the test of time. And should satisfy the practical purpose for which it was built for. They stressed the adaptation of Architectural forms of the building purposes and to it's environment. It is obvious that this doctrine is more relevant to railway station building design, though aesthetics can not be completely overlooked.

## 6.3 RAILWAY STATION BUILDINGS IN THE PAST

Early stations were classified according to arrangement for entering and leaving them. There were four types namely:- Head type, two sided (twin), 'L' type and one sided combination.

i **HEAD TYPE -** arriving and departing passengers are handle in single building across the end of the track.

ii **TWO SIDED (TWIN)** - The arriving and departing passenger are handled on opposite sides of tracks, the aim was that arriving trains did not hold up departing ones.

iii **'L' TYPE -** arriving passengers are handled at the ends of track while departing passengers at one side or Vice-versa.

iv **ONE SIDED COMBINATION** – This type of structure has arrival and departure passengers handled on one side of the track. The aim was to save passengers arriving or departing from either direction from crossing the tracks.

It can be deduced that early railway stations were basically void of passenger comfort facilities.

## 6.4 RAILWAY STATION BUILDING AND FACILITIES TODAY:

6.4.1 **FACILITIES** - Accessible to the public and passengers and those willing to forward goods.

- Comfortable facilities for the arriving and departing passengers.

6.4.2 **STATION** - In the recent time stations are classified according to the orientation of the building with respect to rail track.

### i THROUGH RAILWAY STATION:

The station building is situated on one side of the rail and the trains are either going on the rail platform, above the level of the station, on the same level with the station building or under the station building.

### ii END TERMINAL STATION

The station building is at the end of the rails, the train either stops or starts from there. The rails and buildings are on the same level.

### iii ISLAND TYPE

The station building is between the rails with underground passage to the Island platform under the rail.

### iv BUILDING ACROSS THE RAIL

The station building is above the track or under the rail track.

## 6.5 INTERNATIONAL SUBDIVISION OF RAILWAY STATION BUILDING ACCORDING TO FREQUENCY OF PASSENGER PER HOUR

| STATION BUILDING | PEAK FREQUENCY OF PASSENGERS PER HOUR |
|---|---|
| SMALL | UP to 500 |
| MEDIUM | UP to 1000 |
| BIG | UP to 1500 |
| CENTRAL | MORE THAN 1500 |

Table 6.1

# CHAPTER SEVEN

## 7.0 SITE LOCATION

The Zaria railway station is the headquarter of the Northern division. It is located almost in the heart of Sabon Gari quarters of Zaria. The railway station and its immediate vicinity which constitute the railway station precinct forms the central part of Sabon Gari quarters which is incidentally in terms of functional specialization is presently acting as the central business district of Zaria.

The station precinct is bounded towards the West by the regional Samaru – Sokoto road along which there are some major public and semi-public buildings such as the general post office, NEPA office, Ministry of Works and Housing, Ministry of Agriculture, Banks and Petrol station.

On the South-Eastern side, the railway station is bounded by the Crescent road which leads to Sabon Gari market, the road and main street bound up a large proportion of buildings characterized by mixed use development of overlapping commercial, residential and offices along the main street is also the regional motor park, Bank and the main access to the railway station.

The North-Eastern part of the railway station is bounded by an area of Sawmill workshop and Kaduna State Government Quarters.

## 7.1 DEVELOPMENT

Historically when the railway station was located in Zaria in 1911, development shifted from the Zaria walled City to Sabon Gari which literally translates into 'New Town' commercial and public use developments sprang up around the railway station.

## 7.2 SITE ANALYSIS

### 7.2.1 GEOLOGY AND SOIL

The predominant soil type in Sabon Gari where the Zaria Railway station is located is undifferentiated older alluvium and younger laterite with the bed rock exposed in places,

The main feature of the soil here is a typical profile of accumulated clay between the depth of 3.6 and 11.9m

### 7.2.2 WATER

The water table is lowest in the dry season at the depth of 4.0m and highest in the wet season at the depth of 2.0m. This is very important in the choice of design of foundation for building in the area during the redevelopment process.


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### 7.2.3 TOPOGRAPHY

The Zaria railway station precinct slopes very gently from the West to the East towards the Sabon Gari market. The rail lines are aligned carefully almost parallel to the contour lines.

### 7.2.4 RAINFALL

The mean annual rainfall is 86.60cm with 2/3 of the rains falling between July and September and dry dusty cold season setting in as early as October.

**DEDUCTIONS**: (i) Buildings should be oriented with respect to driving rain

(ii) Drainage should be given adequate Consideration

(iii) Building materials should be carefully chosen

### 7.2.5 TEMPERATURE

Daily maximum temperature shows a peak in April, about 35.9°c and a minimum of about 13.5°c in December.

**DEDUCTION-** (i) Shading devices could be employed.

(ii) Building orientation should be along N-S where possible.

(iii) penetration by conduction and convection should be employed.

7.2.6 **WINDS**

Zaria is affected by two district air masses. The North-East trade winds which is dry dusty and continental in nature and the South-Westerly which is moist, cool and maritime in nature.

7.2.7 **DEDUCTIONS:-** - Building should be orientated for maximum ventilation.

- Attention should be given to building details.

7.3.1 **HUMIDITY**

During dry season, the humidity is usually very low, largely due to the effect of harmattan winds, falling well below 10% at noon, the monthly mean goes beyond 85%

7.3 **ENVIRONMENTAL IMPACT ANALYSIS**

7.3.1 **RESIDENTIAL**

Dwelling units in the railway station precinct are mainly of the town house variety. The recently erected houses are typically the two storey shop/residence mixed use type which are located in

the business district, most of the houses are occupied by few average income earners and many low income earners.

### 7.3.2 COMMERCIAL

It is observed that there exist in Sabon Gari little functional differentiation by sub-districts which is characteristic of modern central districts warehouses and retail shops are scattered in various locations off the oblique axis of Sokoto – Samaru road and the main street.

Commercial land uses in the station precinct include banks, cold stores, permanent shops, whole sale and road side kiosks.

### 7.3.3 INDUSTRIAL

The area consist of many enterprises which are engaged in printing, painting, dry cleaning, electrical repairs, motor cycle repairs, all of which constitute the small scale industries in Sabon Gari in general.

It is also important to note that the major saw mill workshop in Zaria is located in the Railway station precinct. The saw mill workshop which started on the site in 1972 has the advantage of railway sidings which was tapped to facilitate delivery of planks from the Southern part of the country. The workshops

accommodate functions ranging from saw milling through carpentry works to painting.

The cotton and Agric processing factory on the Eastern part of the railway station is not functioning at present and the factory buildings are dilapidated.

### 7.3.4 PUBLIC AND SEMI-PUBLIC

The railway station corporation occupies a lot of land in this area, some of which has been leased out to the Government for public use.

Almost in the heart of the station precinct, is located a motor park which serves as the major inter-regional motor park for Zaria.

### 7.3.5 TRAFFIC AND TRANSIT

The railway station precinct is by-passed by the regional route (Sokoto Road) there also exist series of primary and distributor roads which from a 'criss-cross' road network which makes it appear very complex.

Traffic is usually very heavy in the mornings between 8.00am and 10.00am and in the evenings between 3.00pm and 7.00pm.

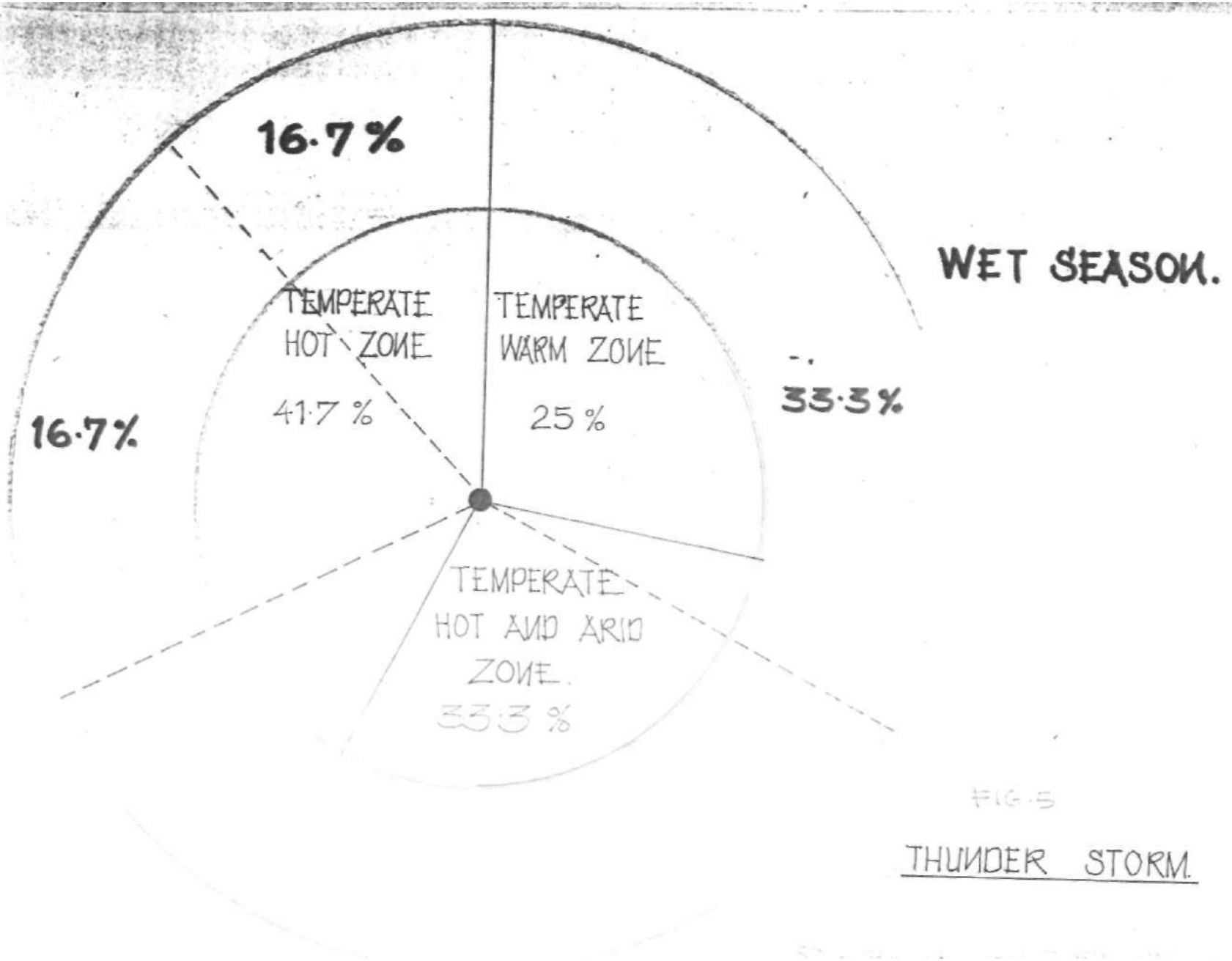
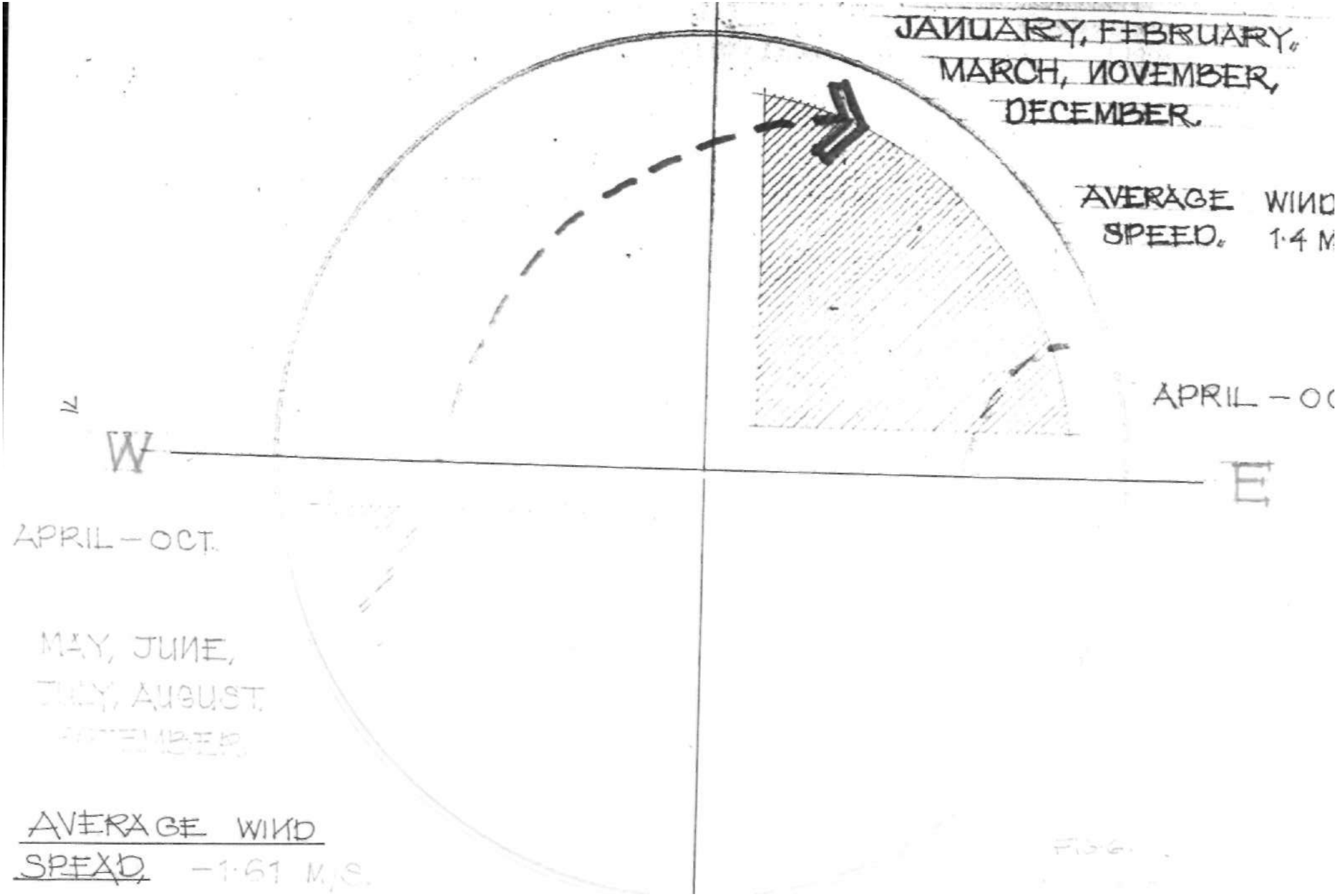



FIG-5

THUNDER STORM.


JANUARY, FEBRUARY,
MARCH, NOVEMBER,
DECEMBER.
AVERAGE WIND
SPEED, 1·4 M
APRIL – OC
N
W
E
APRIL – OCT.
MAY, JUNE,
JULY, AUGUST,
AVERAGE WIND
SPEED, – 1·61 M/S.

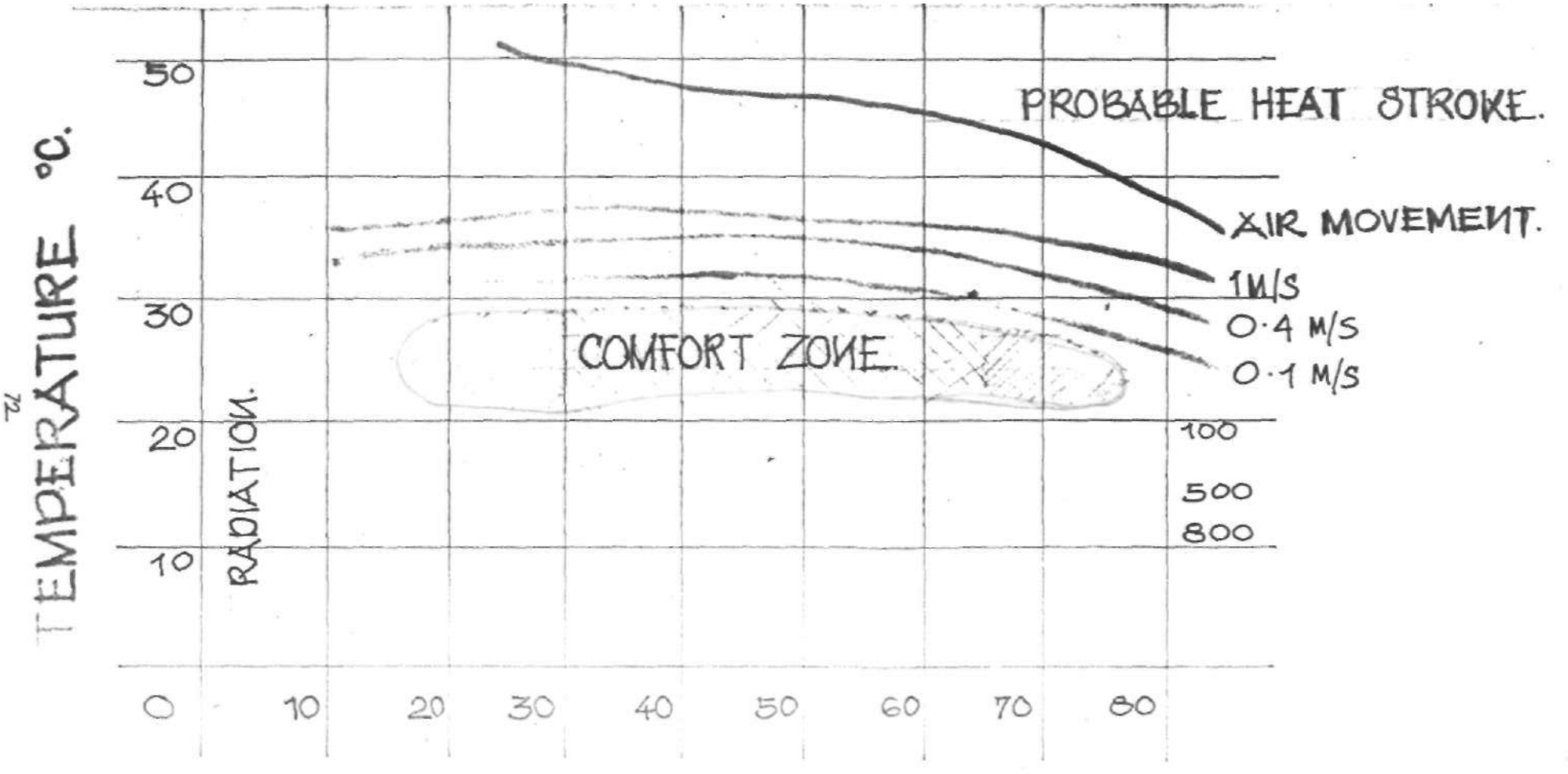



FIG 7 BIO-CLIMATIC CHART ANALYSIS.

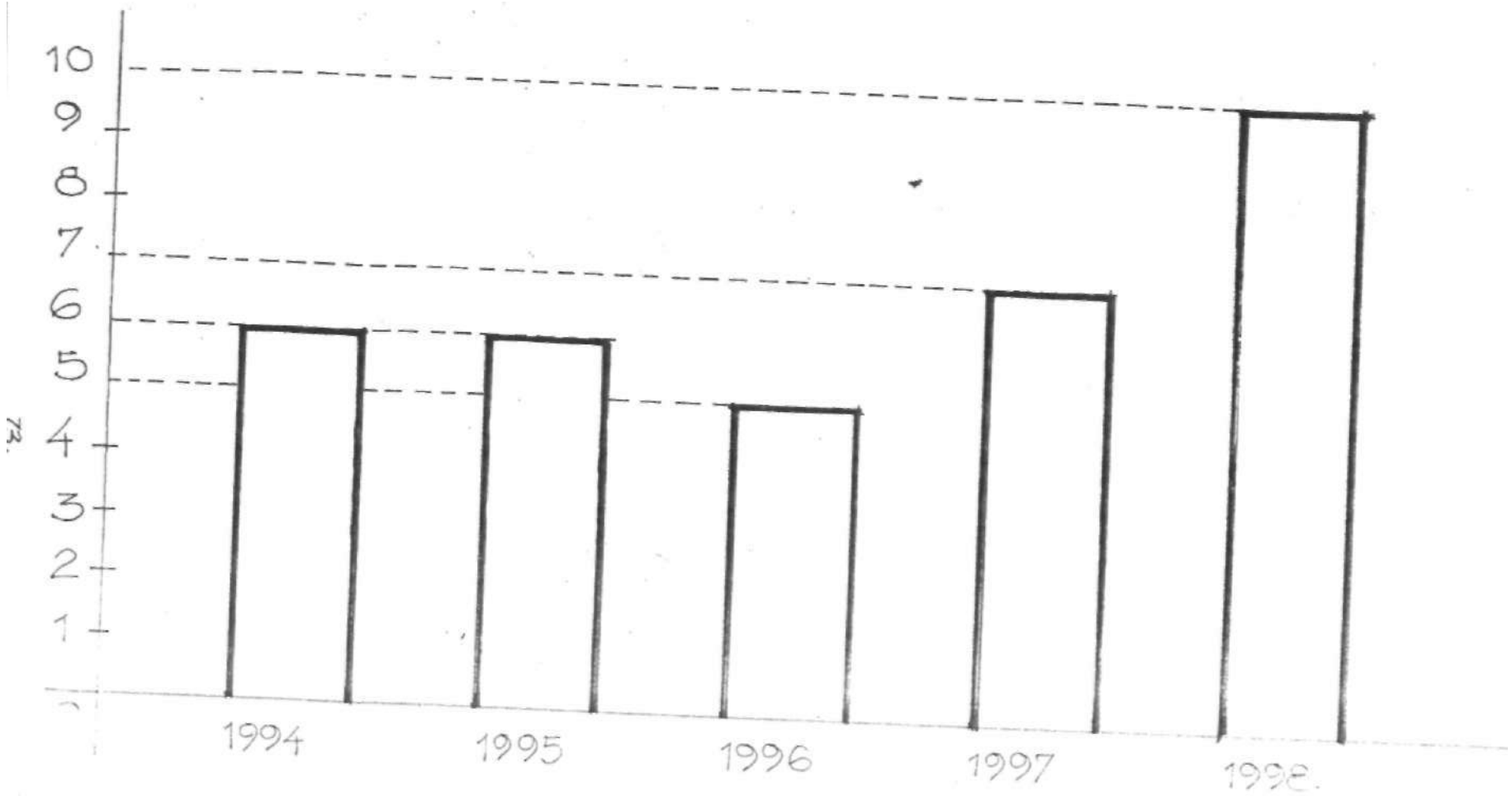



FIG. 8.

AVERAGE SUNSHINE HOURSE.

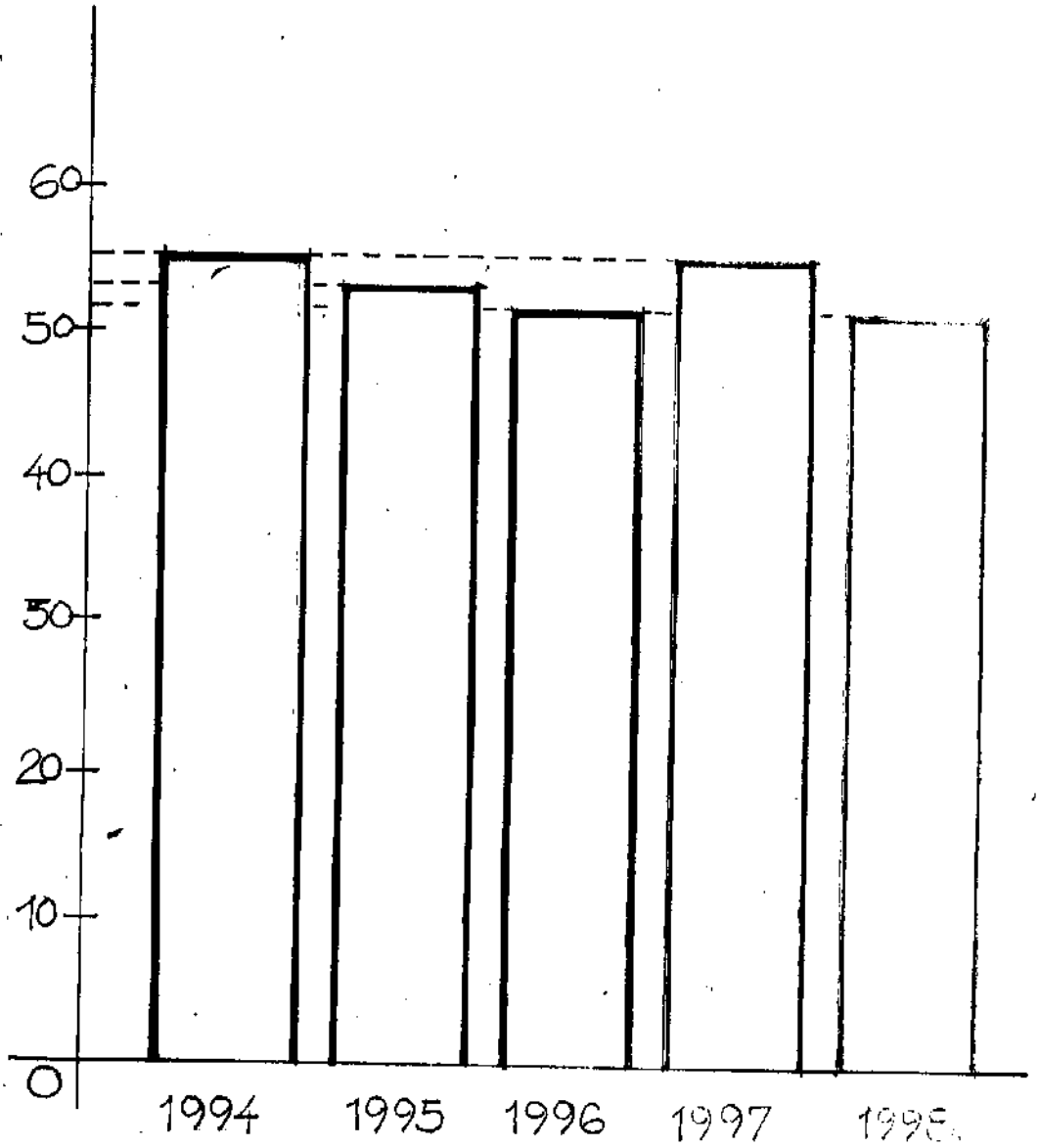



FIG. 9. RELATIVE HUMIDITY %

SOURCE: I.A.R. ABU ZARIA AND I.C.A.T. ZARIA.

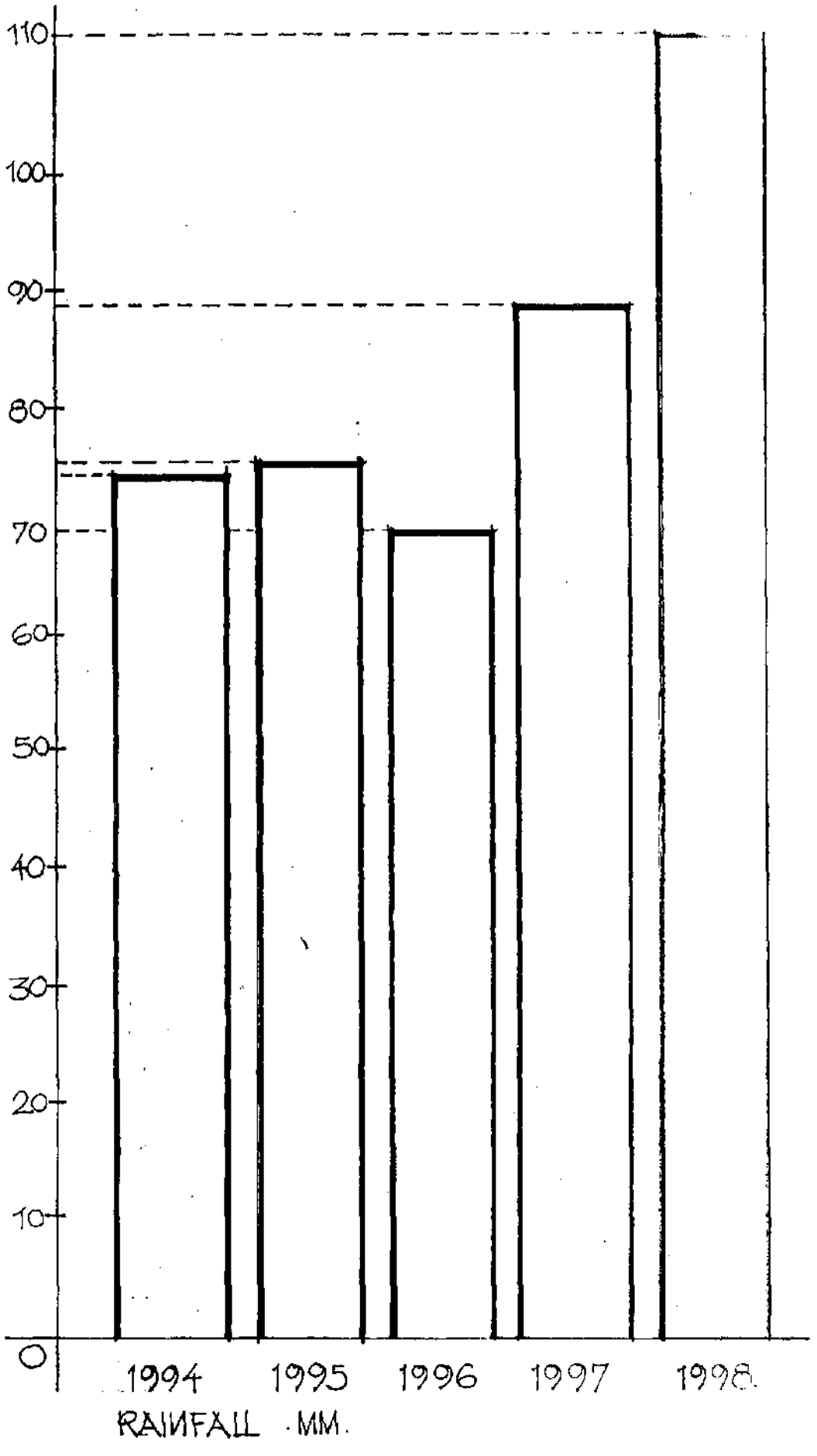



FIG. 16. AVERAGE RAINFALL FOR ZARIA.

SOURCE: I.A.R. A.B.U ZARIA AND [illegible]

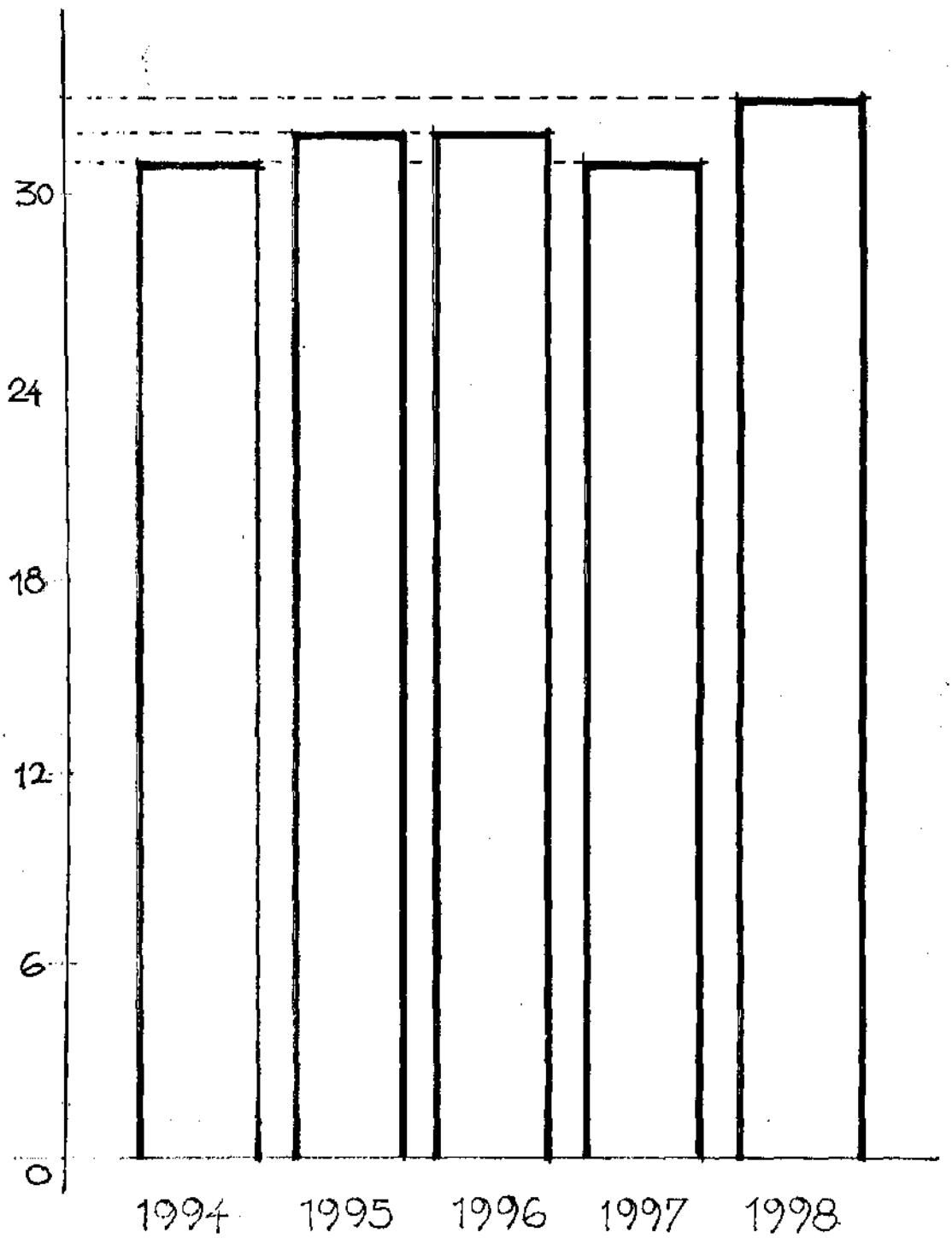



FIG 12 MAXIMUM TEMPERATURE °C.

SOURCE: I.A.R A.B.U ZARIA AND N.C.A.T ZARIA

# CHAPTER EIGHT

## 8.0 SPECIAL REQUIREMENT AREA DIMENSIONS

### 8.0.1 GENERAL CONSIDERATION

The facilities required in a station for operational convenience are quite numerous, their sizes are also dictated by variation due to local conditions, class of traffic, type of service and the usual rush hour business handled.

### 8.02 EGRESS AND INGRESS:

They are supposed to be planned to minimize congestion of pedestrian and automobile traffics. The egress should be approximately the width of the platforms to eliminate bottle neck

### 8.03 SUB-URBAN PASSENGER MOVEMENT

This movement would require the following:

i Turnstiles of 1.60m in diameter allowing 50 passengers per minute.

ii Single swinging doors of 0.9m wide allowing 77 passengers per minute.

iii Double swinging doors of 1.80m width allowing 117 passengers per minute.

## 8.04 DIMENSIONING:

The dimensions of the public areas in the building depends on the working day frequency. Station where there are special flow suit as holiday resorts, recreational places, etc. The Sunday and holiday frequencies should be considered.

## 8.05 DISPERSAL FIGURES:

Passengers will be dispersed to various sections of the whole sections and a rough estimate of their percentage dispersal is needed to design the sizes of the facilities. The following dispersal figures are considered ideal:-

ii 50% in the waiting part of the departure hall

ii 2.5% waiting room for relatives

iii 2.5% waiting room for second class passengers

iv 1.5% waiting room for first class passengers

v 11% restaurant

vi 20% buffets.

From the dispersal figures above, the basic number of passengers for the calculation of floor areas will be taken as follow:-

i 50% in the waiting part of the departure hall

ii 65% of the 15% in the waiting room for relatives

iii 100% of the 2.5% in the waiting room for second class passengers

iv 100% of the 1.5% in the waiting room for first class passengers.

v 65% of the users of the restaurant

vi 30% of the users of the buffets

The active part of the departure hall is dimensioned mostly in the same extent as the waiting part. Movement part of the departure is mostly 3m-6m.

8.06 **FLOOR AREA PER PASSENGER**:

| | | |
|---|---|---|
| i | Waiting part of departure hall | $0.85m^2$ |
| ii | Waiting room for relatives | $1.0\ m^2$ |
| iii | Waiting room for second class passengers | $1.0\ m^2$ |
| iv | Waiting room for first class passengers | $2.0\ m^2$ |
| v | Restaurants | $1.3\ m^2$ |
| vi | Buffets | $1.0\ m^2$ |

8.07 **WAITING ROOMS**:

In a passenger station, waiting rooms should be designed for maximum normal occupancy and not for peak frequency.

i **AREAS:** Ones the maximum occupancy has been determined, the area of the waiting room can be calculated by applying the rule-of-thumb design factor of 1.21$m^2$ of floor area per person. From experience this factor may be modified depending on the number of people to be accommodated, between a range of 0.12-1.39 $m^2$ per person.

ii **CODES:** Though the rule-of-thumb factor has proven to be dependable method of calculating required waiting room areas, local building codes should be consulted for possible conflicting requirements.

8.08 **LUGGAGE SPACE**:

The floor area for luggage are dimensioned according to the number of luggages transported in 24 hours. At the average for one ton of luggage it is approximately 50 pieces of luggage, 18$m^2$ of the floor area including circulation space and operations should be allowed.

8.09 **TICKET OFFICES**:

The design of ticket office area can be developed on the basis of the use of standard cabinet units, allowing sufficient space for ticket stock traffic, telephones and other communication equipment.

The luggage checking and storage areas should be properly oriented to the ticket area for the convenience of the patrons and to facilitate the installation of luggage conveyor equipment. The number of ticket windows required should be based on the normal number of rush-hour passengers.

## 8.1.0 NUMBER OF WINDOWS FOR NORMAL NUMBER OF RUSH-HOUR:

| PASSENGER NORMAL RUSH-HOUR | NUMBER OF WINDOWS REQUIRED |
|---|---|
| 1 – 74 | 1 |
| 75 – 148 | 2 |
| 150 – 249 | 3 |
| 250 – 324 | 4 |
| 325 –449 | 5 |
| Over 450 | Additional window for every 250 passengers |

TABLE 8 : 1

To determine the area required for the ticket office, a rule-of-thumb of 12.08m$^2$ per ticket window is ideal.

8.1.1 **WCs AND TOILET FACILITIES:**

8.1.2 **SMALL STATIONS:**

i Up to 50 passengers, one Wc for males and one for females.

ii Additional `100 passengers, one Wc for males and 1.4 Wc for females,

iii For every Wc, two urinals should be provided

iv For additional 6Wcs, one wash hand basin should be provided

8.1.3 **BIG MEDIUM AND STATIONS**:

i For up to 50 passengers, one Wc for males and 14 Wc for female.

ii For additional 200 passengers, one Wc for male and 1.4 Wc for female are required.

iii Two urinals should be provided for each Wc.

iv A wash hand basin should be provided for additional six Wc.

**8.1.4 PLATFORMS:**

Station platforms should be of sufficient length to provide access to all head-end cars as well as to passenger-cars on the longest trains that will be serviced from the platform.

The amount of platform space utilized by passengers when moving in compact mass, but without congestion are as follows:

i For through passengers - 1.39$m^2$ passenger

ii Suburban passenger - 0.93$m^2$ per passenger

The capacity of platforms in discharging passengers are as follows:

i Through passengers - 49.5 passengers per metre per minute

ii Suburban passengers - 98.4 passengers per metre per minute

An approximately 4.0m exclusive passenger platform is the minimum width sufficient to accommodate the passengers from arriving train and one line of travel for passengers to departing train.

Exclusive trucking platform for normal conditions allowing space on the platform for one loaded truck should be at least 5.5m wide

### 8.1.5 PASSAGES TO PLATFORMS:

Passages to platforms are dimensioned according to frequencies. In small stations, a passage of three metre width is sufficient. In the stations, where there is overlap of the time in departing and arriving trains to separate passages should be provided. In case where the buildings is over the rails, it should be

at least six metres above the rails. Passages should be protected from the rains and sunshine and dusty winds by covered walkways.

In central stations, the platforms and rails are under large space cover where trains stay.

### 8.1.6 RAMPS:

The gradients of ramps should not exceed 10% for passengers and 6.5% for trucking.

Minimum clear width for trucking ramps are as follows:-

i For one line of traffic, the width should be 1.8m

ii For two lines of traffic, the width should be 3.05m

### 8.1.7 STAIRS:

The carrying capacity decreases with increase height. For a height of 6.1m, the carrying capacity with traffic in one direction is as follows:-

i Through passengers – 33 passengers per minute

ii Sub-Urban passengers – 59 passengers per minute

### 8.1.8 ELEVATORS AND ESCALATORS

For height less than 7.62m, under normal condition, passengers elevators and escalators are not recommended as to individual passengers platform.

They may be desirable as supplements to stairs for the use of the aged or disabled.

Escalators have a carrying capacity of approximately 108 passenger per metre width per minute. They are well adapted to suburban service

A single escalator should not be relied on as the only means of approach to a station platform.

8.1.9 **CONCOURSE**

The required width of passenger concourse depends upon the character and amount of traffic and number of entrances and exits to the concourse.

A width of about 6.096m for a train concourse is adequate it is not used extensively for trucking

The concourse should be sufficiently broad to permit the gathering of a full train load at the gate.

8.2.0 **OFFICES**

The areas containing offices or leased space should be designed to meet railway or tenant requirements. Consideration should be given to the use of movable partitions to provide for flexibility.


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### 8.2.1 COMMON AREAS

These have functions common to departure and arrival areas. They include railway staff, police and other security departments, luggage and many other passenger facilities.

# CHAPTER NINE

## 9.0 DESIGN PARAMETERS

## 9.1 CIRCULATION

The success of a station building solely depends on the efficiency of the circulation pattern as regards vehicular, pedestrian and goods routing. The following factors can not be over emphasized:

i - Segregation of various traffics,

ii - Definition of flow of luggage, and passengers. iii

- A logical flow of passengers traffic from ingress through processing mode, waiting areas and to platform without difficulty and mis-direction .

A major problem of planning circulation of a station building is handling of passengers to ensure efficiency and comfort. The following should be considered as solution:

i - Easily identifiable routes,

ii - Easily Visualized spaces

iii - Interesting views should be captured

iv - Flexible space partitioning

v - Station operation efficiency.

## 9.2 FUNCTIONALITY:

i - Passengers facilities should be easily visible and accessible and should be arranged in a logical progression from entrance of station building to the platforms.

ii - Queues should not be allowed to interrupt effective circulation.

iii - Display boards should be placed in the visibility of ticket office and concourse, such information as train arrival – departure, railway marketing facilities etc.

iv - A big railway station should provide an avenue for sales outlet of railway corporation to give customers a wide range of comprehensive services including booking advance travel functions, ticket reservations, motivational markets and facilities that will encourage rail travel.

v - Facilities for the disabled should be considered

vi - Tickets booth located to serve departing passengers should allow for ample space so that queuing does not

obstruct the traffic flow and preferably located to the right.

vii - Provision should be made for storage of trolleys and maintenance equipment at platform level.

## 9.3 SAFETY

One of the major hazards of a public building like the railway station is fire outbreak, hence, it should be given adequate attention. It could be controlled through active and passive means.

### 9.3.1 ACTIVE FIRE CONTROL

i - Access should be easily located

ii - Fire escape routes should be provided

iii - Alarms, fire extinguishers and fire hydrants should be provided.

### 9.3.2 PASSIVE FIRE CONTROL

i - Selective use of fire resistant materials,

ii - Use of fire retardant materials,

iii - Fenestrations, floors and walls should be properly positioned to resist spread of fire,

## 9.4 CLIMATIC CONTROL

This is a very important factor in design for comfort and to expected life span of the building,

## 9.5 SECURITY

The railway police currently provides physical security cover for the railways. However, judging by the high rate of pilfering and vandalization it is obvious that the railway police can not cope. There is need for the railways to contract a guard firm if life and property of the corporation as well as passengers must be safe guarded. The fencing of the station should also be considered

## 9.6 LIGHTING

### 9.6.1 NATURAL

Natural lighting require quantitative and qualitative variety, manipulated to give varying effects by controlling the quantity of the transmission medium and direction of incident light. Public buildings should be well lighted and the fenestrations should be large enough and well orientated.

### 9.6.2 ARTIFICIAL

This source of light is man-made or indirect, using ceiling reflectors or diffusion through translucent membrane.

Public halls and concourse should be adequately illuminated all day.

## 9.7 VENTILATION

Natural cross-ventilation is highly required in a public building, where not achieved, artificial means can be used, e.g, fans, air-conditioners, coolers e.t.c.

## 9.8 AESTHETICS

A branch of philosophy which tries to make clear the laws and principles of beauty, elegance, impressiveness and sophistication to the structural envelope. It involves the use of form compositions and construction materials.

# CHAPTER TEN

## 10.0 THE DESIGN BRIEF

## 10.1 THE COMPONENTS OF THE DESIGN

From the cases studied, an ideally planned and designed railway station should consider the four basic flow of activities, Flow of departing passengers, flow of arriving passengers, flow of transit passengers and express goods.

### 10.1.1 FLOW OF DEPARTING PASSENGERS

The departure hall serves as the basic flow elements and give access to all other important flows within the station building. The area of the hall is subdivided into –

i Active Area

ii Movement axis

iii Waiting area.

#### i ACTIVE AREA

These are rooms of intermediate relations to both departing and arriving passengers, such rooms include sales of tickets, registration of luggage, storage of luggage, information about train movement and other social facilities.

ii **MOVEMENT AXIS**

This is the shortest circulation area on which departing passengers follow before the railway station platform

iii **WAITING AREA**

The spaces or rooms where prospective travelling passengers sit comfortably while waiting for their trains arrival or departure related rooms or functions are attached to this area. In stations with high frequency such as big and central stations, facilities like small cultural centre, small cinema hall are provided. Sometimes shopping precinct is available.

### 10.1.2 FLOW OF ARRIVING PASSENGERS

International classification of stations shows that small and medium stations do not require a separate arrival and departure hall, but only straight flow of passengers from the platform to outside is provided. While such sub-divisions in departing and arriving hall exist only in big frequency stations.

### 10.1.3 FLOW OF TRANSIT PASSENGERS

The facilities in the station building are specially for the exclusive use of the passengers. The frequency of passengers

influences the dimension of waiting spaces which invariably affect the size of the whole station.

### 10.1.4 FLOW OF LUGGAGE AND EXPRESS GOODS

The flow of luggage and express goods is another integral element in the design of railway station building, in essence, due consideration should be given to this flow to avoid crossing with passengers flow, though is attached to passenger flow.

In medium and big station, luggage is conveyed by separate tunnels to the platform but sometimes over head bridges are used.

## 10.2 FUNCTIONAL GROUPING OF ACTIVITIES

### 10.2.1 DEPARTURE AXIS

i - Sales of tickets

ii - Registration of luggage and parcels

iii - Storage of luggage

iv - Information and inquiry

v - Social facilities

vi - Post office

vii - Shops

viii - First class waiting room

ix - Second class waiting room

x - Restaurants

### 10.2.2 ARRIVAL AXIS

i - Luggage claim

ii - First aid room

iii - Social facilities

iv - Car rentals

v - Travel center

vi - Hotel representative

vii - Relatives waiting room

### 10.2.3 COMMON SERVICES

These have functions common to both the flow of arrival and departure. They include the following:

i - Railway staff office

ii - Railway police and security services,

iii - Luggage storage and transfer to platform.

## 10.3 GROUPING OF ACTIVITIES INTO LEVELS

### 10.3.1 GROUND FLOOR

- Entrance/exit lobby
- Information/inquiry
- Local craft shop

- Booking office
- Foreign craft shop
- Records office
- Ticket booths
- Toilets
- Car rentals
- Travel centres
- Hotel representative
- Post office
- Security check
- Administrative offices
- Parcel office
- Claim counter
- First aid
- Medical director
- Luggage registration
- Weighing area
- Departing luggage
- Store
- Arriving luggage

- Arriving luggage store
- First class waiting room
- Second class waiting room
- Station bank/Insurance
- Lettable offices
- Pharmacy
- Supermarket
- restaurant
- Shops
- Transit lounge
- Kiosks
- Police post/inquiry
- Left luggage
- Male cell
- Female cell
- Goods store
- Lockers
- Parking

### 10.3.2 FIRST FLOOR

- Security office
- Conference room
- Store
- Kitchenette
- Common room
- Toilets
- Kiosks
- Counter
- Male Lockers
- Female lockers
- Janitor
- Kitchen/store
- Catering office
- Restaurant
- Relative waiting room
- Supermarket
- Foreign goods
- Local goods
- Temporary accommodation

- Janitor
- Staff offices.

### 10.3.3 SECOND FLOOR

- Staff offices

## 10.4 SCHEDULE OF ACCOMMODATION

### 10.4.1 GROUND FLOOR - main station building

| Spaces | (Square metre) |
|---|---|
| - Entrance/exit lobby | 30 |
| - Information/inquiry | 15 |
| - Car rentals | 16 |
| - Travel centre | 20 |
| - Hotel representative | 20 |
| - Post office | 20 |
| - Local craft shop | 28 |
| - Booking office | 20 |
| - Foreign craft | 36 |
| - Ticket booths (6nos) | 30 |
| - Record office | 20 |
| - Pharmacy | 25 |
| - Supermarket | 42 |

| | | |
|---|---|---|
| - | Security check | 10 |
| - | Shops (4nos) | 80 |
| - | Restaurant | 65 |
| - | Public toilets | 50 |
| - | Station bank/Insurance | 50 |
| - | Lettable offices (8nos) | 170 |
| - | Parcel office | 20 |
| - | Claim counter | 10 |
| - | Medical director | 12 |
| - | First aid | 8 |
| - | Luggage registration | 20 |
| - | Arriving luggage/storage | 152 |
| - | Weighing area | 91 |
| - | Departing luggage store | 117 |
| - | Store | 20 |
| - | First class waiting room | 171 |
| - | Second class waiting room | 285 |
| - | Main concourse | 1,325 |
| | | Auxiliary |
| - | Store | 15 |



| | | |
|---|---|---|
| - | Toilets | 40 |
| - | Lockers | 31 |
| - | Kiosks (2nos) | 20 |
| | | Platform |
| - | Police post | 25 |
| - | Inquiry/left luggage | 32.5 |
| - | Male cell | 24 |
| - | Female cell | 12.5 |
| - | Trains office | 50 |
| - | C & W store/lockers | 50 |
| - | Equipment store | 50 |
| - | Good store | 150 |
| - | General office | 40 |
| - | Toilets | 35 |
| - | Restaurant | 120 |

### 10.4.2 FIRST FLOOR

| | **Spaces** | **Main station building** |
|---|---|---|
| - | Security office | 20 |
| - | Kitchen/store | 32 |
| - | Restaurant | 98.5 |

| | | |
|---|---|---|
| - | Catering office | 7 |
| - | Toilets | 20 |
| - | Foreign goods shop | 35 |
| - | Supermarket | 65 |
| - | Local goods shop | 50 |
| - | Relative waiting room | 175 |
| - | Lockers (2nos) | 50 |
| - | Kiosks (2nos) | 21 |
| - | Janitor | 10 |
| - | Common room | 135 |
| - | Conference room | 285 |
| | | **Auxiliary** |
| - | Security Check | 9 |
| - | Janitor | 6 |
| - | Toilets | 30 |
| - | Temporary accommodation | 129 |
| | | Platform |
| - | Staff lounge | 80 |
| - | Station Superintendent | 40 |
| - | Waiting/secretary | 40 |

| | | |
|---|---|---|
| - | Commercial Traffic Inspector | 40 |
| - | Assistant Station Master | 40 |
| - | Senior station master | 40 |
| - | Chief Station Master | 40 |
| - | Changing/wc | 48 |
| - | Machine room | 42 |
| - | Store | 40 |

10.4.3 **SECOND FLOOR**

| | **Spaces** | **Platform** |
|---|---|---|
| - | Exhauster examiner | 40 |
| - | Tele H.T.O.S. | 40 |
| - | Gen. Office Tele. Comm. | 30 |
| - | Com. H.T.O.S. | 40 |
| - | Account clerks | 40 |
| - | Waiting/secretary | 40 |
| - | Cabin Operators | 40 |
| - | Changing/wc | 48 |
| - | Chief Cabin operator | 56 |
| - | Store | 40 |

| EXTERNAL SPACES | (metres) |
|---|---|
| - Platform length | 270 |
| - Platform width | 20 |
| - Height from track level | 0.68 |
| - Height of shed | 3.5 |

## 10.5 CONCLUSION

An ideal station is that which has gone through an architectural surgery, the design must take cognizance of the spatial organization of its facilities for passengers comfort and operational convenience.

The circulation pattern of passengers, staff and goods must be clearly defined to avoid chaos. It is envisaged that the introduction of facilities such as lettable offices, flexible spaces, station bank, supermarkets, restaurants, pharmacy, shops and other auxiliaries will doubtless attract people to the station precinct which will eventually help to generate revenue to maintain the station.



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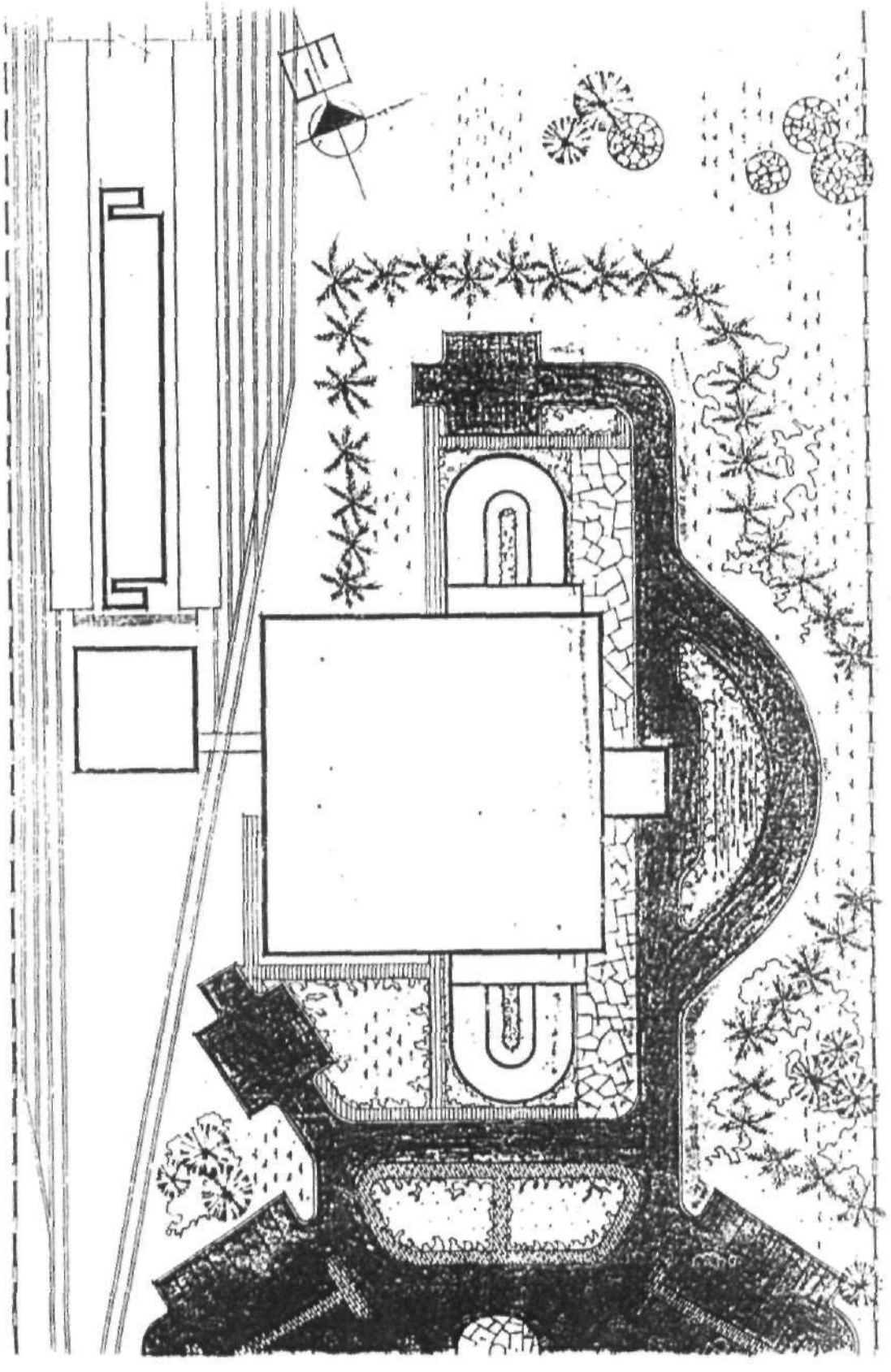
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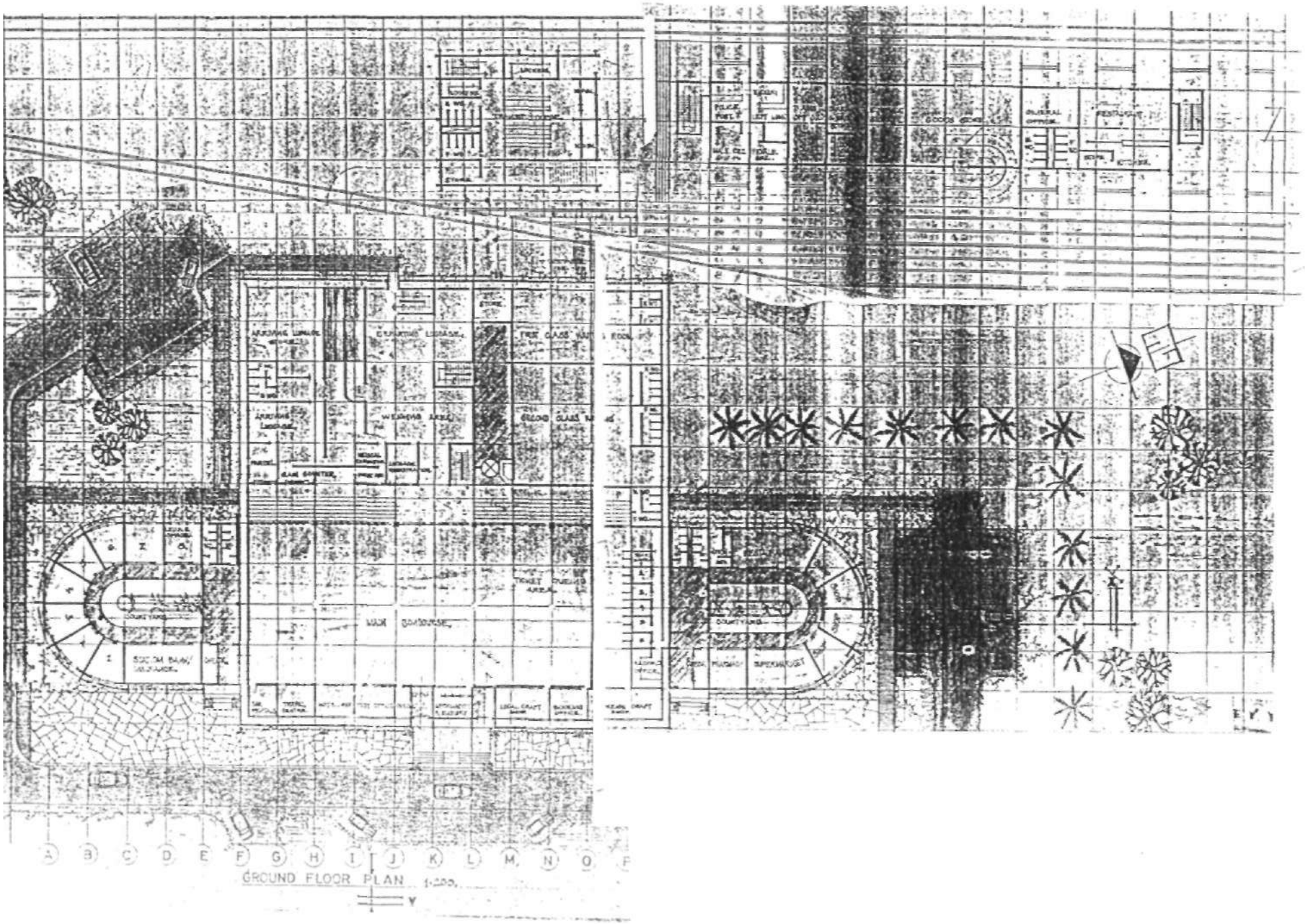
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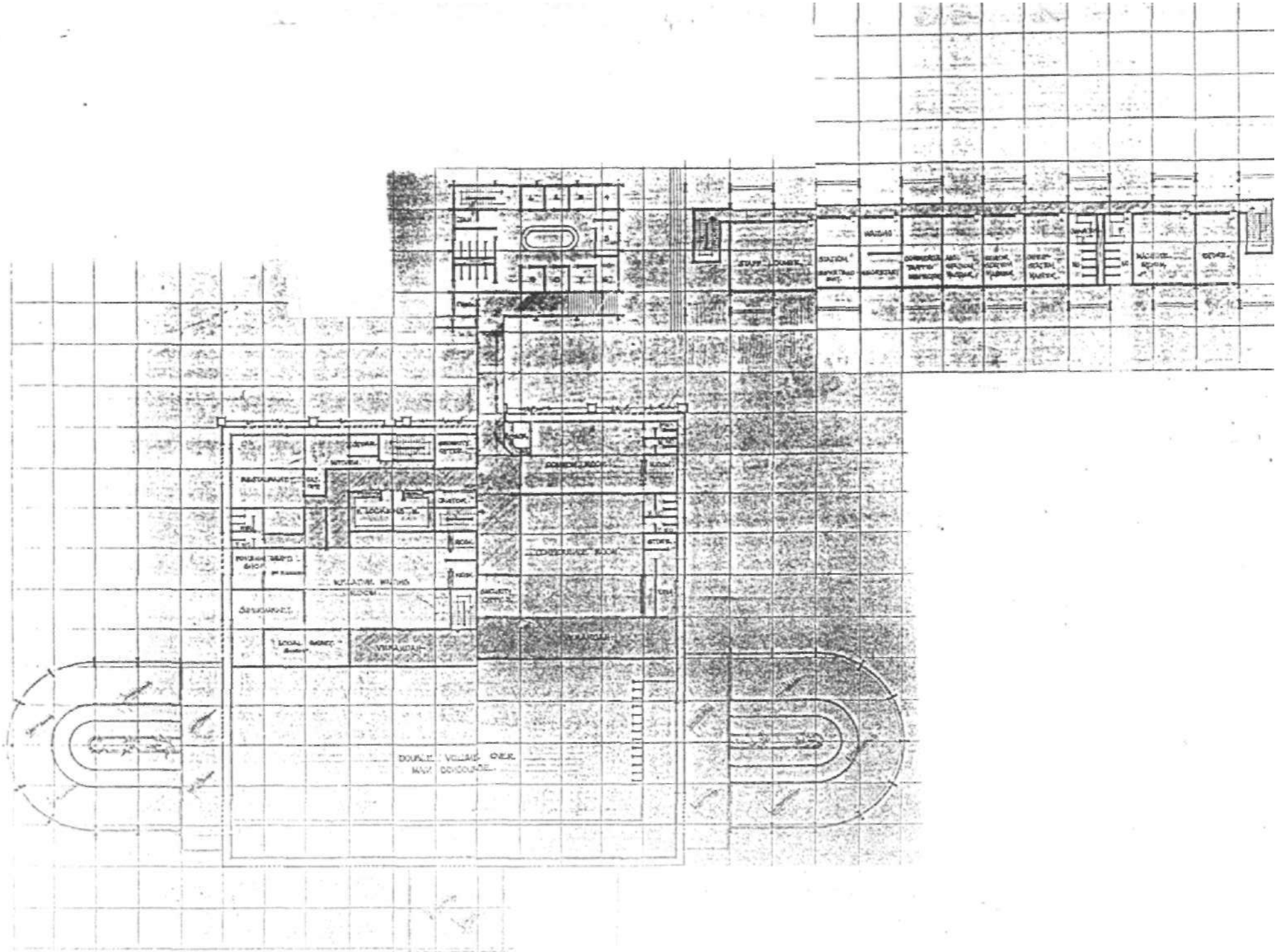
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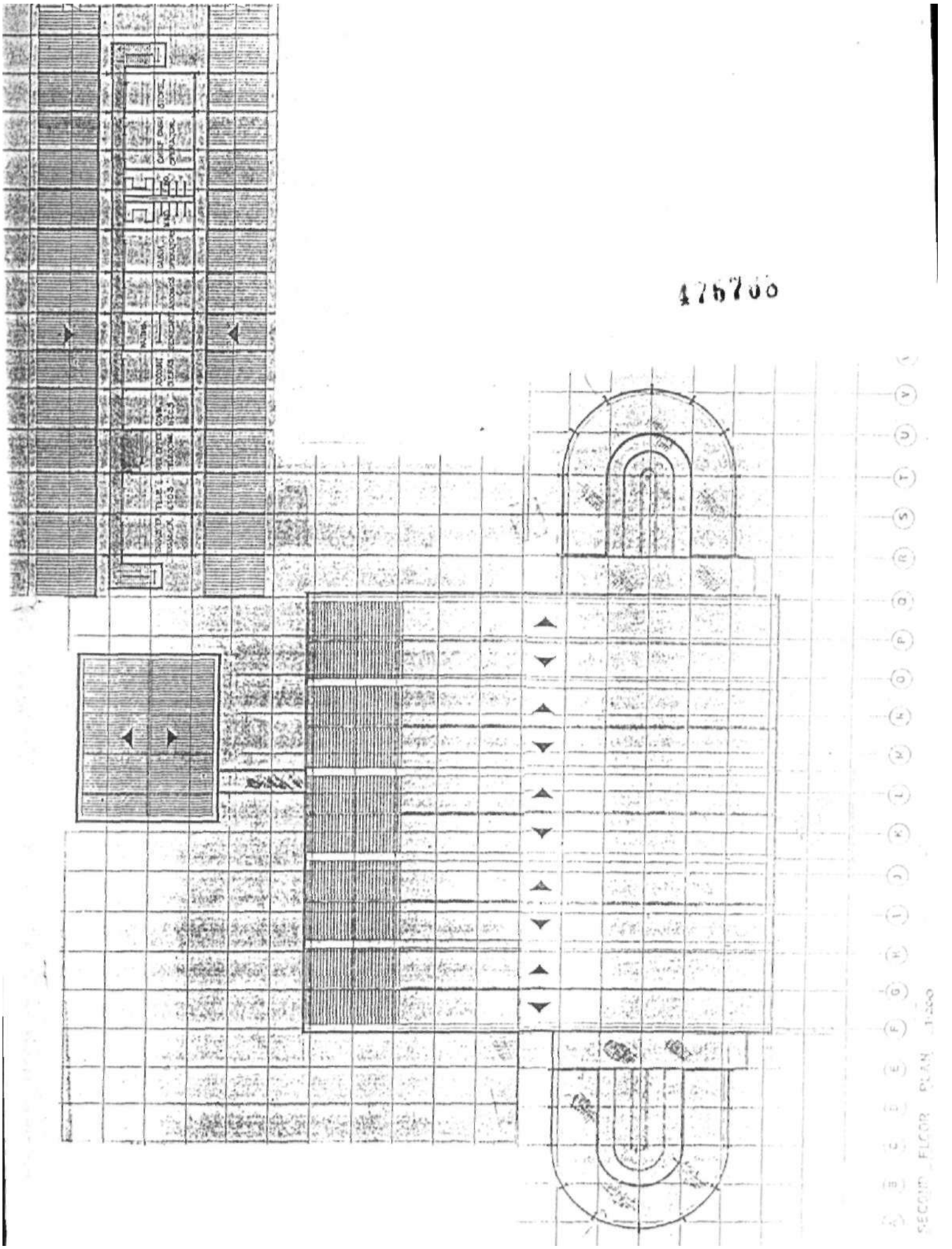
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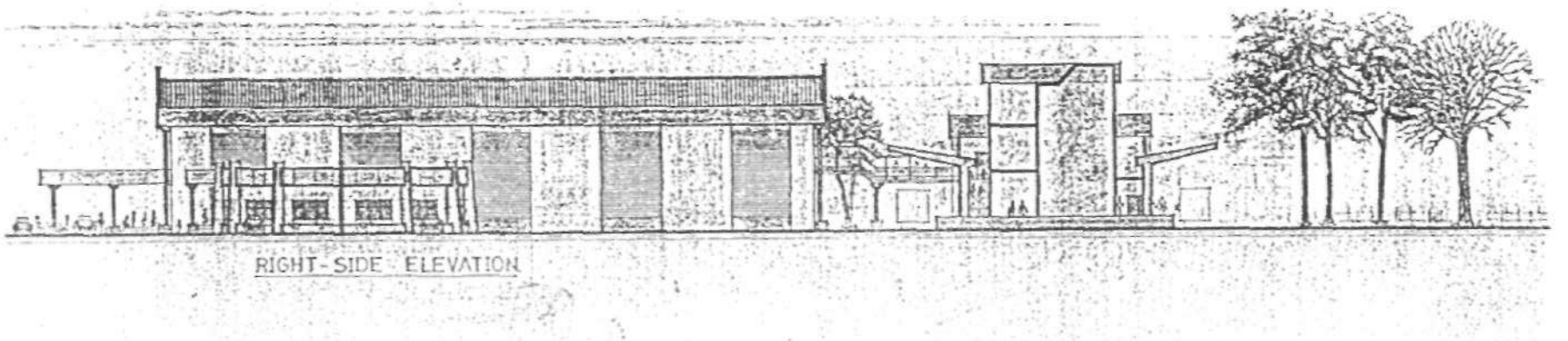

A B C D E F G H I J K L M N O P
GROUND FLOOR PLAN 1:200




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SECOND FLOOR PLAN 1:200



APPROACH ELEVATION



RIGHT-SIDE ELEVATION

