MULTI PURPOSE SHOPPING CENTRE, MINNA, NIGER STATE

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REGISTRATION NO. 89 - 1206

A THESIS BEING SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE, SCHOOL OF ENVIRONMENTAL TECHNOLOGY, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF TECHNOLOGY DEGREE M. TECH. (ARCHITECTURE).

MARCH, 2000

DECLARATION

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CERTIFICATION

This thesis titled MULTI PURPOSE SHOPPING CENTRE, MINNA, NIGER STATE, meet-up the regulations governing the award of the degree of Master of Technology in Architecture of the Federal University of Technology, Minna and is approved for its contributions to the Knowledge and literacy presentation.

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DEDICATION

In the name of Almighty Allah, the most Gracious, most merciful, I am dedicating this thesis to the entire WONUOLA FAMILY and my beloved BUKOLA OMOTOLA YUSUF. In return for their wonderful love and care for me.

SIGNATURE .....
WONUOLA, M.I.

ACKNOWLEDGEMENT

I acknowledge, with great sense of appreciation, the kindness and assistance, in one way or the other and advice provided, towards writting this thesis. They include Arc. Paul Haruna my able supervisor, Arc. Prof. S.O. Solanke, Arc. Dr. (Mrs) Stella N. Zubairu, Mr. & Mrs. Dauda Avasha of PTF headquarter Abuja, Mr.Wonuola A.A. of first bank of Nig. plc. market branch Jos and all members of 600 level in Architecture, Federal University of Technology, Minna whose efforts I commend. I would like to place on record, with delight, the advice provided by Engineer Abdulfatai Wonuola, Abdulrafiu Wonuola ARc. Yusuf,O.V. Engr. Damola M.O., Uncle I.G. Ayewoh, Engineer Ayo Bello of Eleganza Lagos, Alhafa Rafatu Balogun, Abdulazeez Olayiwola of Kawara Poly Ilorin and Arc. mall Abdulrasheed Dere of PCD associate Abuja.

I must, of course, thank my parents and benefactors, Mr. Mrs. Oloyede A. Kehinde Wonuola for their advice, support and care, my regards also go to the rest of my family members for their understanding and co-operation. Finally, my love goes to my sweet mother, Hajiya SIFAWU,A. WONUOLA and my beloved BUKOLA M. YUSUF for their contribution towards my up-bringing.

ABSTRACT

A multi disciplinary approach to the study of human problems, consequently the design bring about solutions to these problems has in the recent years, for instance, the world health organization programme which is expected to solve the problems of health in totality by the year 2000 A.D. The academic programme that rigidly separates the profession could be wasteful of both human and the set up material resources, but not, however, appreciate the multidisciplinary nature of human and the set up material resources.

The academic programmes, which is developed by the above philosophy aimed at the following points:-

Raising the creative abilities and capabilities of the students populace as well as the staff so that they could be able to effectively transform the available resources in their immediate environments into use. The creative abilities could also guide them to efficently and effectively perform the purpose in which they are applied. In this , however, the running of the affairs of the multi purpose shopping centre, Minna, Is oriented towards the realisation of the already set-up goals and objectives that produce technology which implies programatic knowledge as well as raising the level of organisation production, exchange,distribution and consumption. But development improves means of production very often, a product complex processes of scientific, socio-cultural and socio-economic interaction, it is therefore appropriate to appreciate the dynamics of the existing models of location of production.

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CHAPTER ONE

INTRODUCTION

It is essential, however, to know what multi purpose shopping centre is all about. This is because the centre is expected to have peculiar activities that is expected to take place at the centre. Multi purpose shopping centre could be defined as a combind forms, having many units or sections to make a whole of course multi purpose shopping centre as the name implies could further be defined as a place often a very large building which could be vertically or horizontally, spread; is where there is a large or medium numbers of different shops that are used for different forms of transactions which could, however, be charged with the responsibility to provide shelter as well as to hamonise the affected people within the contex. Perhaps, the centre for instance is expected to provide or generate revenue to the principal initiator. This text, however,deal with the desire to produce an abstract functional spacious design proposal for the users as this will bring about hamonisation among the people and people could transact in a conductive and descent atmosphere. Since by defination the term multi purpose centre means a place meanly for transacting. it is therefore, necessary to investigate the nature of it for clarity and better under standing. Although much of the detail is or could be handled by the guiding philosophy which is that of the professionals. The centre which is originally concerned with efficiently and effectiveness implementation of transacting in different forms will volunters to pay some sellected staff members who are expected to take charge of proper maintainance of the centre.

The centre in effect is going to be sited at Minna the state capital is administer to take care of all forms of transaction facilities and also to educate the general pupulace of the new invention of technology as different methods of construction and materials technology is going to be adopted.

Generally, the centre is charged with the responsibility to protect the shoppers againt danger and infury which is mostly caused by rain and excessive wind. In this respect, however, there are some forms of protection that the centre needed over the shoppers. They are as listed below:- health, offices, shops for adequate transaction, social interaction and all other forms of related matters.

Shopping, the world over means the same, a visit to a shop with intent to purchase goods or to search for a particular item. In Minna it is no different, planners made adequate provisions for neighbouhood giving resdents and all alvice well planned place to shop.

The centre is made up of 13 unit shops of various sizes of which each is meant to provide essential services to shoppers. However, this has not been the case for many of the shops around which in one way have been converted to uses other than was designed for example Nite clubs, Restaurants and Arcade and where they are for shops, the services are inadequate since they are not used for the purpose in which they are meant for. It is often very difficult, however, to complete shopping in them without criss crossing other neigbourhoods in search of certain commodities.

Alternaively, a place where one can do a day shoppin without leaving the premises and in effects where one can get most if not all the shopping requirement and essential needs under the same roof or premises. Though the federal housing authority is trying to solve the problems in our town and cities, introducing corner shops scheme. Corner shops were provided in various parts of our towns and cities to supplement the services of the people but this only in effect appear to stop short of solving the problem though more shops now offer a variety of services, yet people still shuttle about from place to place to shop often burnig fuel, energy and time.

Shopping has become part of our life inspite of the economic constrain people still do shop some for pleasure and others want it for needs, while

many others merely window shopping. An avenue should be created were people can satisfy their shopping desire conveniently with minimium fuss a place where shopping becomes a pleasure, a one stop place that will offer shopping needs and essencial services all in one building or premises thereby saving up in energy human and material. Hence the need for the multi purpose shopping centre Minna.

The centre is going to be located along Chiroro road, the centre is expected to create employment and job opportunities for the young school leavers and the like and smooth transcation for the people in contex. Locally manufactured materials will be encouraged as well as local construction technology will be applied in order to see how these traditional materials will be inco-operated and work in the modern situation, so that more durable will be achieved in our various shopping centres, the centre which is expected to serve as a practical example will also provide opportunities for experiment and for generating new ideas .

The centre would be in form of a complex that would be mere than just a shopping premise, but would incor-operate facilities like restaurant, Relaxation area, Bank, Health clinic among others. All these facilities are provided to give the customers satisfaction and fulfilment as to having truly done a day's shopping without the hazzles that has characterize todays shopping in our towns and cities.

1.1.0. DESIGN AIMS AND OBJECTIVES

1.2.0. AIMS

The design aims include the following:-

* Promotion of commerce and administration
* Proximity from other towns and cities
* It will serve as a source of revenue

* The provision of shopping centre where mutual interaction of both professionals and social interactions will be attanable.
* The provision of an architectural land work in Minna
* Provide a condusive atmosphere for shopping
* Provide a means of enriching the Communal Public of human interaction and participation.
* Provide an avenue where people can shop for most of their essential needs under one roof.
* Provide an architectural manument which apart from providing commercial services to the people, will by it nature a daily public gethering place will enhance and promote ideas in the mind of the people using it.

1.1.1. DESIGN OBJECTIVE

The proposed multi purpose shopping centre is to meet the set purpose for which the design borrow and the aspects of our indegenous architecture in use of court yards. The court yard approach is a means of encouraging communion among the different people within th building.

Apart from providing adequate ventication and lighting that enhance an effective and functional atmosphere for shopping it, will also create an atmosphere of communion among the different shop owners and an avenue for interaction between shoopers socially and commercially thereby achieving the objective of the project which is to provide a commercial and social point for the users.

It will also enhance the use of architectural mehs symbols and languages in creating a greater awareness within the users by providing an harmonous and functional design of a modern shopping centre with all necessary facilities adequately represented where essential needs are obtainable under one roof.

1.1.2. DESIGN GOAL

The proposed design will have the factor of functionality taking into consideration other factors like aesthetics and forms. The centre with particular refernce to welfare of the people, has a lot of emphasis placed on circulation within and around the area.

The provision of some elements of landscaping for example tree planting in surrounding area aimed at creating a natural environment. The walkways, corridors and waiting lobbies within the centre are adequately decorated with various indoors and out doors plants which would creat the impression of Architecture.

1.2.4. DESIGN PHILOSOPH

The philosopy of the design is to achieve circulation and functionality as well as to allow the design to have characteristics similar to the organisum and give the same impression of unity and harmonization. This philosophy is one that has to touch on the necessary parts of the centre in relation to the characteristics of its location and the peculiarities of its environment.

To provide

- Quietness, change of pace and oppotunities for transaction.
- A change in activity, provided by transacting
- Contacts with people outside the circle
- To emerge a dynamic and potential people through its activities.
- To create awareness between the people
- It will also create functinal interaction between the people.

All these factors helped to arrive at these major zoning reflected at the layout:

i. Shops of various sizes

ii. Supper market

iii. Electromart

iv. Bank

v. Business centre

vi. Health centre

vii. Library

viii. Restaurant

ix. Snack Bar

x. Security post

xi. Video mart and games arcade

xii. Information centre

xiii. Warehouses.

From the above arrangements, there is a separation of the unwanted niose zone and distraction which is mainly from cars, both coming to the centre and passers - by, the use of trees and fence were emphasized as wind breakers.

The Administrative/information zone caters for those that may not necessarily want to use the facility immediately.

1.5. RESEARCH METHODOLOGIES

The research methods adopted for this project include:-

- review of relevant literatures concerning the design and execution of similar projects.
- Consultation of maps, books and journals
- Direct enquiries to obtain necessary information relevant to the project.

- Consult relevant people and insitutions
- Visitation to existing shopping centres to borrow a few points from their organisation.

1.1.6. SCOPE OF STUDY

The proposed shopping centre will house the following facilities:-

1. Shops of various sizes
2. Supper market

Provision will be made for a single volume self service stores offering maximum convenience and durable merchandise.

The facilities to be provided include:-

a. shopping space
b. cashier point
c. stores for frozen goods, dry store, empties and perishable items.
d. display windows
e. staff offices and changing rooms.

3. ELECTROMART

Provision will be made for a shop that will sell strictly electronic and electrical appliances its component include:

a. A large volume display window
b. sales
c. store for electronic appliances and store accesories
d. testing room to accertain that the products being sold to costomers are in working order.

4. BANK

A bank will be provided within the centre to provide finacial

obligation to both shoppers and shop owners as well as other interested people that might not necessarily be within the complex.

The components will include:-

a. Banking hall

b. cashier counters,

c. manager office

d. accountant office

e. strong room

f. audit and credit office

g. sault and staff facilities.

5. BUSINESS CENTRE.

This will be provided to offer such services as telephone saloon typing and photocopy services.

6. HEALTH CENTRE.

A health centre will be provided to take, care of any health related problems that might occur within an outside the centre facilities. Facilities to be provided for include:-

a. Reception

b. Records room

c. Consultation room

d. Pharmacy

e. Observation

f. Store and lab

g. Laundary

h. staff room and changing room

7. LIBRARY

Provision will be made for library for people to primarily lending books to people and also offering reading spaces to people interested.

Its component include:-

a. checking counter

b. reading spaces

c. book store

d. general office

e. staff convenience

8. RESTAURANT

Provision will made for restaurant to offer any type of meal services. Its component include:-

a. eating area

b. clock room

c. kitchen

d. stores dry and cold

e. laundry

f. staff changing

g. customer toilet

9. SNACK BAR

This will be provided to offer lights meals and refreshment. It componet include:-

a. relaxation and eating area

b. bar

c. kitchen

d. kitchnetle

e. store (cold & dry)

f. costumers toilet.

10. SECURITY POST

This will be provided, for the purpose of providing security for the centre as well as maintaining law and order within and outside the centre.

11. VIDEO MART AND GAMES ARCADE

This shall be provided as an avenue for recreating, it shall include a video rental store and a games room which offer a variety of computer and video games.

Administrative Office

Provision will be made for office acommodation for management staff of the centre. Its component will include:-

a. reception

b. general office

c. managers office

d. store

e. staff convenience

12. INFORMATION CENTRE

This will be provided to cater for information needs of customers in the area of direction finding and related matters.

13. WAREHOUSES

Large warehouses will be provided for the purpose of providing long term storage facilities to shop owners.

CHAPTER TWO

LITERATURE REVIEW

2.0. HISTORICAL BACKGROUND OF BUSINES

Many businesses we know today were flourishing in the acient world before written records were kept. Agriculture was the first main source of livelihood, but trading centres sorn formed as early as 3000 B.C. commerce or business was a respected form of activity in middle east.

Early business was closely associated with religion in sumer and Babylon, ancient cultural centres of mesopotamia. All wealth belonged to the goods. Treasure was stored in the temples and business transaction were carried on by the priests of the gods in the temple country houses. Most domestic business at this time was on a barter basis with barely the usual medium of exchange. But for foriegn trade, uncoined gold and silver came into use in the form of "grains" "shelkels" representing specific amounts of metals. Gold at this time worth about eitht times the equvalent weight in silver. With the use of gold and silver came a counting or keeping track of money and property and banking.

Among our first readable example of writing are business records kept in Egypt and mesopotania about 3000 B.C. or earlier. Coins were another step forward when they appeared in Lydia about 700 B.C. By 500 B.C. cans were common in Greece and so were money changers. By the time of the Roman Empire, merchants and shippers ended by money and written records grouped themselves into societies, organizations resembling modern co-operations for greater protection and to simplify their dealing with the government. Romans with vast shipping and merchandising trade and sold shares of their businesses as well as land and goods.

2.1.0. KINDS OF ANCIENT BUSINESSES

Greek, mining, Egyptian and Roman construction work, and trading were the chief businesses of the ancient world. After the Roman Empire collapsed, business was almost wiped out in western and northern Europe. Byzartium, later constantionopole and now istan bul, continued to profit by trade with the orient. However, the mediteraniean was almost entirely closed to the commerce of the Christian world by the Moslem, who controllled it from 700 A.D. untill crusades which began in the 11th century.

2.2.0. EVOLUTION OF BUSINESS IN NIGERIA

In the late 19th century, Nigeria started to become business conscious, and she had trade contacts with her immediate Franco phone neighbours of Dahomey, Niger andCameroum on a very slight level. Whole similarities with mere distant Anglophone countries of Ghana and Sierraleone are much stronger. This situation is likely to change in the future when French becames as widely spoken as English.

The main business people found in the country then were farmers and increasing number of them earn their income from the sale of export crops of which the most important are groundnut, cocoa, plam produce coltton and rubber.

In those days, however, Lagos was the only principal seat of Government and commerce Lagos house the load offices of most, Government departmentsand leading business forms, foregn embassies and international organizations . But in Nigeria today other commercial cities and towns has spring up and more of them are still springing up day - in day out.

2.2.1. APPLICATION OF TECHNOLOGY IN MULTPURPOSE SHOPPING CENTRE

The applicability of technology is generally not universal. High rise office buildings are products of highly sphsticated modern modern industry that cannot be produced except by such an industry. Such buildings are not normally an urgent need for the poor. What the lest previlage need mostly is housing, good drinking water, motorable road, better sanitary conditions and a cheap and affordable eneergy supply as well as other necessary social aminities.

The idea of technology does not imply a going back in history to methods now out-dated, although a systematic studies of methods employed in the developed countries about hundred years ago could yiel highly suggestive results. It is often assumed that the achievement of western science, pure and applied lies mainly in the apparatus and machinery that have been developed from it, and that a refection of science. The real achievement lies in the accumulation of precise knowledge and their knowledge can be applied in a great varety of ways of which the current application in modern industry is just one. The development of muti purpose shopping centre technology will therefore means a genune forward movement into new territory, where the enormous cost and complication of production methods for the sake of labour saving and to be elimination is avoided and will be cheap and affordable by the generality of the societies.

The application of technology to multi purpose shopping centre is extremely wide and Universal, it will be obvious to anyone who takes the trouble to look the actual application taday. Examples of this could be found in every developed countries and indeed, in well advanced countries. It is simply that the brave as well as the able practi-tioners of the said technology do not know of any others to support

is thereby created. The available materials include the existing natural and imported factory materials.

Each of materials is made to associated, with its pecular category of technology. The choice of appropriate option of technology poses a challenge to individual countries. The choice often rest on the architects, the possible clients and what the architects intends to achieve. But most of the time the clients choice tends to prevails over those of the architects. Because to them it is easy for them to pre-judge the indigenous based materials and technology as inferior, they rather import the ones that are readily favoured. The consequence, however, is that the indigenous, natural materials and the corresponding appropriate available technology are neglected and therefore lose the opportunity of undergo the necessary processes of development and refinement.

In a way, so, long as the imported materials and the corresponding available technology neve afordable, there will be no problems. But the fact is that with the dwindling fortunes in the economies of most of these countries, and with the increase in scarcity of foreign countries, and with the increase in scarcity of foreign exchange, most of them can no longer sustain their high dependence on imported materials and technologies. Today, however, most of them are indilemma of how to realise their national development programmes. Under these circumstances, therefore, the chance of most middle and low income earners in a country like Nigeria for instance they cannot afford adequate construction materials for themselves because materials are becoming incressingly impossible and the Governments abandon this area of responsibility to eitheir individual citizens or corporate bodies. These circumstance call for a vethrick and in a way an in-depth study of the known

available construction materials and the existing technologies with a view to adopting and at the sametime improve upon the most collected ones that will help to ameliorate the problems of construction in the developing countries.

2.2.3 TECHNOLOGY, THE OPTIONS AVAILABE TO MULT PURPOSE SHOPPING CENTRE

Some of the availabe materils are the natural materials that are associated with traditional building systems. These include earth materials like mud and clay, thatch, grass other are vegetable materials, wood and raffia palm. In term of availability however, they are found in abundance within our immediate environment. In term of economic they are in-expensive to acquire. Also, they do not require skilled labour or high technical expertise and therefore they are affordable. Every one in the rural community is found to be a potential builder because of the traditional building system. Buildings produced through communal co-operative effort are good enough and satisfied all the housing needs of the rural dwellers. General speaking, however, traditonal system of buildings can be adapted as the climatic demand and the materials offers some, degree of aesthelic as well as structural properties. Often the sizes of the buildings are normally to human scale as they often harmonise with the natural environments.

With all the attributes the said tradional building materials are found to have a number of shortcomings. They are prone to five harzards and could easilly be attack by termites. Also they do not withstand the effects of weather. And very often, rainsforms cause a lot of damage to the mud walls and the thatch or grass roofs. They, therefore require seasonal repairs which, however, consume labour and time. The traditional building materials cannot therefore be guaranteed to successfully pass as the durability test can be used for construction of in both the rual area and cities, this is because some of the properties cannot satisfy the setup requirements for construction of building types in the cities. This is

because of the shortcoming and perhaps, with the increase in demand for shelter, most especially in the urban areas, the traditional building system has not satisfied the need for adequate building materials and construction technology for the developing countries, which impplies that there is need for an alternative to be found to replace the said traditional building materials and construction technology that could be applied in both rural and also meet up the cities requirements. Intermediate technology is a technology that employs the basic skills of any person which enable the person to produce needed goods or services that are suitable to both local conditions and for progress of the individual forms. In the aspects of engineering, it is something that is between the traditional and modern, for instance, a compressed moulding bricks machine. The reason why this tchnology is chosen is that any attempt to apply technological know-how in our complex society will necessitate people-centred. It is believed, however, that intermediate technology is people centred this is because it doesnt totally depart from indigenous technology and materials.

In a way the next option as been postulate as the extreme option as the best alternative, which is the use of the advance materials that are produced in the factories, also they, are found to meet up all the need requirements. The under lister, are some examples of the factories produced materials, laminated wood, iron steel, glass, other are factory made bricks and pre-cast concrete panels. All the groups of materials emplies the use of advanced technology that can be used to create modern architecture. The products of advance technology are found to be superior, this is because they, are made to through several stages of refrinement, experiments and above all developments which are standard and minimize wastage. Due to the mass production they appear to reduces their cost also makes them easily affordable all most every where. The advance building system are also made to produce very easthetically pleasing buildings and lend themselves to a very daring possibilities. All these

qualities find them makes them very much attractive and pleasing to most people as well as to architects in the developing countries, even though they do not have the culture to sustain their maintenance. Very often, however, in the attempt to create modern architecture, it is inevitable to embrace modern technology. But as far as most people in the developing countries concernd, modern architecture as well as advanced technology are seen as symbols of advancement. This, therefore puts the architects under pressure in making their choices of materials and construction, technology and also defers them thereby, from making the required input towards developing indigenous materials and construction technology.

As the modern construction technology may by symbol of progress, the marriage with it has created a lot of serious problems for most developing countries. It is, however, dependent on imported materials that requires a lot of highly skilled due to the manufacturing proccesses as well as specia-sed labour, which is often in short supply. Also they are capital intensive and takes away a lot of scarce foreign exchange from these countries. It is difficult, therefore, to maintain because the level of maintenance culture in some of the developing countries is often below the demands of high technology. This very lack of maintenance culture leads therefore to constant break-down of machineries put in place and their under use.

All building produced through the advance technology are most of the times monumental and out of tune with the very natural landscape which also disrupt the spatial organisation that ensures cohesion as well as natural functioning of the communities. Macgrejor (1987) had noted that the scale and the size of these building in the cities of most developing countries have created new problems for planners in terms of permissible space between building. But according to him, the great deficiency in most of the cities has been the failure to adequately solve these problems. In addition, however, most cities in the developing countries do not have

adequate five - fighting services to be used in case of five emergency in high-rise building. It means that all these problems point to the fact that high technology has posed more problems and it also not satisfied the need for adequate construction technology for the countries, rather it has created some big gaps. "The gap created between the two technologies is so enormous that a transition from one to the other is simply impossible.

There is need therefore, to stop-the gap, which is intermmediate technology as this empowers the service of local craftsmen, and utilises the available natural materials. These materials include stone, wood and clay products also these materials undergo unsophisticated factory processing, they are also dependable and are not quite expensive to acquire or come by. They can be applied by architects in the developing countries to create human buildings that are quite to human scale. Frank Lioyd Wright during his daily years of his career utilised a lot of natural materials in creating his organic architecture, and the building, produced with all these material blend with the natural environment.

The benefits of these natural materials as well as the said intermediate technology makes them appear as the most suitable option to serve the needs of the developing countries Schumacher (1975) in prescribing a panaces for the economic problems of the developing countries has advocated the adoption of intermediate technology. In all, the reason the advanced technology fits more smoothly in relatively unsophistioted high capital intensive modern technology. It impplies, however, that the equipment for the level of technology would be fairly simple and therefore understandable, suitable for maintenance and repair on the spot. He also, profered that with intermediate technology, people are easily trained, and that supervision, control and organisation are simpler. Intermediate technology

is much more adeptable to market fluctuations than highly sphisticated equipment and is less vulnerable to unfore seen difficulties. More importantly it is labour intensive and will lend itself to use in small scale establishments. All these reasons mentioned above will also apply to the technological needs in the building industry.

Listed below are possible way in which intermediate technology can be applied to achieve a sustainable and affordable construction materials in a developing societies.

2.2.4. WALLING MATERIALS

Extensive study has been carryied out and good success has been recorded in the use of mud, particularly laterite as walling material. The exidence of the success could be found overywhere both in the developed and developing, countries. Other areas where success have been recorded as weilling materials includes:

* burnt brick/block
*rammed earth
* production of particle board, ceiling board and non-load bearing walls from coconut.
* building bricks from rice husk using sand as filler
* compressed stabilised bricks
* using bamboo as a reinforcement and walling material

From research and analysis it was found that all the above lister natural materials are economical and durable and the technology is simple to go by.

2.2.5. ROOFING MATERIALS

This part of the building structure is the most vuluerable part because it protects both the occupant as well as the building (walls, floor and fundation) from rain, sun and wind. In this while careful consideration must be taking in selecting the kind and style of roof to be used in buildings. There are various types of roofing systems depending, however, on the type of building and its span. It ranges from sophisticated type lideable roof, cable net roof shell roof, space, frame and pneumatic structure while the less sophisticated like pitch roof uses corrugated sheet, concrete deck and thatch. The modern technology has left its with so many choice, but the question is how many people can afford it? But using intermediate technology. The following roofing materials could be obtained. All the materals have been tested kind found durable and even have some special qualities that products high, technology do not poccessed.

Listed below are some of the roofing materials:

* Thatch
* Fibre concrete roofing tiller
* slates
* Micro concrete roofing tiller
* Ferro cement roof.

2.2.6. BINDERS

There is no doubt that the best binding agent still remains cement wich is a product of modern technology which is very capital intensive. However, researches have been carried out on how to find a cheaper solution or alternative to cement, and so fare positive result has been achieved. In cuba lime pozzolana cement is now in mass production using rice husk ashes and bagasse ash. Furthermore, it

has been tested that lime itself can be used as a possible option for cement where it is readily available.

Also, clay bitumen can be used as a stabiliser for laterite, and sometimes, it may be used with cement. This will reduce the quantity of cement to be used and it will give us the same quality, and the same reducing cost.

CHAPTER THREE

3.0. INTRODUCTION

Due to the non-availability of dependable data, it is not possible, however, to estimate the actual loss by fire annually in this country. It is not always appreciated that all loss by fire is loss to the Nation. When an individual loser is indemnified loser is indemnified by insurance, the effect is merely to spread the loss over a number of persons, the labour expended in replacing the property is a national loss, as it could otherwise have been employed in adding to the national wealth instead of merely replacing fire wastage. The minimization of loss by fire can, therefore be regarded as a national duty, and it is surprising that until recently so little effort has been made to reduce this waste.

The problems of avoiding the outbreak of fives and preventing their spread is know as "Fire prevention or fire protection" The two designations are easily reconciled, for without anaccurate and comprehensive knowledge of the hazards involved, it is not possible to prevent fires, on the other hand a full knowledge of them usually suggested the remedy.

Incidences of five outbreak in buildings have receieved much publicity in the past couple of years within the country. This is mainly due to the fact that fire incidents in recent times has devastated several public buildings of great magnitude and socio-economic value. Some of which include the republic Building (1981), NECON House 1983, cocoa house 1985, NAPA Building (1990) Defence Building (1993) and investment Building (1993),.

The issue of fire in building in Nigeria and else where is not a new phenomenon, as fire outbreaks have been recorded both in the home and industry every now and then serious concern with fire in buildings can be traced back to some fire tragedies which destroyed cities and Towns in recent past,. The burning of Rome in AD 64, the Great fire of London in 1666. The fire of Hambugin 1891 and the destruction of Bultimore in 1904 are only a few exampes. In each case, however, there was a follow up particularly with the objective of improving constructional standards for buildings, their separation from each other and fire fighting facilities.

The architects role in the prevention, detection and combat of fire through appropirate designs, specification and choice of materials, amongist others should be strictly adhered with but they have been greatly under estimated in Nigeria. Fire requirements are therefore, regarded as a necessary evil to be satisfied with minimum requirements or even circumvented. Indeed very few make conscientious effort to creatively integrate fire requirements into their designs. With the increase in the frequency and magnitude of building fire incidences and the associated losses, it seems obvious that fire in buildings is a great social and economic problem which deserves the concerted effort of all concerned, especially the architect.

Fire has been described as the basis of chemical science and an enabling factor in the spread of men, after the old stone age to the colder regious of the earth. For fire to be initiated, three essential requirements must be brought together in correct proportion: These are;-

* adequate supply of oxygen above 14%
* a supply of fuel (combustible materials)
* an appropriate level of heat.

The ignition temperature is dictated by the properties of the fuel which may be in a solid, liquid or gaseous state. Combusion may be evidenced as smouldering, smoke, incandescence or flaming.

Many of the fire incidences in buildings are due to human neglect and carelessness. Fire arising from faulty design, gas explosion, electrical, mechanical fittings, cigars, candle and matches all come under this category. There have been speculations about sabotage and arsons especially in public buildings. Unfortunately results of panels usually set up to investigate such fire outbreaks have not made much significant impact in educatin the public on the causes of such fires and possible solutions. Public Another cause of fire, which man has no control over "is" "act of God" it includes fire due to earth quaker, volcanic eruptions. But these rarely occur especially in this part of the world.

3.1.0. PHASES OF FIRE

The development of fire in a single space exhibits three recognizable phases as illustrated in the figure below.

3.1.1. PHASE I

This covers the time of fignition and initial development of the fire. Depending, however, on conditions within the building it may last between a few minutes, and several hours. As the fire develops smoke and hot gases are release towards the ceiling. The hot gases will warm all contact surfaces in readiness for flash over conditions. Flashover in a room lined with fire retardant materials will be delayed, for a few minutes, this phase of fire development is very critical to the safety, escape/evacuation of people in a building.

Some of the combustion by - products like carbon monoxide can be very lethal. Some containing noxious fumes can kill with dreaduf speed even at temperature as low as 80°c. In adition, smoke and fumes produce in this phase will hamper escape and rescue operations. It is the responsibility of the circlutect to ensure that safe means of escape are provided for building occupants before the next stage of ire commences.

3.1.2 PHASE II

When all the surface of th combustible materials in a room are burning, the fire is regarded as being "fully developed". It is at this phase that both the building structures and adjacent properties are at the highest risk. The fire endurance of those elements enclosing the fire source must be long enough to enable the fire to be fought without spreading to other spaces.

3,1,2, PHASE III

This is often reffered to as the period of decay. It is the last stage in any fire when either the fire has been put out or burnt itself out. What remains of the building and its occupants after this stage could

be a yardstick for measuring the thoughfulness are care demostrated by the architect and property manager in the discharge of their duties. It shouls also provide lessons which will become relevant to future projects.

3.1.3. PRODUCTS AND EFFECTS OF FIRE

Most of the people killed by fire in buildings have died as a result of difficulties in locating exists due to smoke, poison by gases like carbon monoxide and suffocation due to lack of oxygen. Over 80% of casualties in non-domestic premises are caused by the effects of heat and smoke. The combustion proces brings about a thermal decomposition of the fuel material. This is accompanied by a rise in temperature and the release of smoke and other gases like carbon monoxide ammonia, sulphur dioxide carbon dioxide, and hydrogen cyanide. The composition of gases emitted depends on the composition of the fuel material while toxic potency is enhanced by rise in temperature. Irritantgses like ammouia affect the tear ducts and respiratory tract causing blurred vision, coughing, choking thereby increasing an escapees vulnerability to panic and irrational behaviour. Depletion of oxygen level as a result of increase in other gases leads to collapse and may be eventual dealth of persons present in a burning building.

Although smoke is not a direct cause of death, but during fire out-breaks, it contributes to fatality by reducting visibility causing loss of valuable escape time, trigering off panic, creating difficulty in location of exits and hampering rescue operations.

Ashes of some materials when mixed with water become acidic and corrosive and thus pose some danger to escapees and the building structure. Gases, smoke and heat are obviously the most dangerous products of combustion. Early detection of these product will ensure the safe evacuation of people and possiblly properties to safe zones and most probaly, the early and successful containment of the fire. The architect no doubt has a major role to play in this regard most especially in the careful detailing of buildings and proper intergration of appropriate free detection and alarm systems.

3.1.4. SPREAD OF FIRE

During fire, smoke heat and flames are transmitled by the processes of conduction, convection and radiation via three media, namely

* building contents - furniture, fittings and fabrics;
* building fabric - finishes, substrate and structure;
* building spaces - concealed spaces and circulation spaces.

The duration and severity of a fire is determined by the amount of air supplied to it and the quantity of combustible material available. The longer the fire stays the greater the possibility of its being transmitted not only to other parts of the same building, but also to adjacent buildings. The rate of fire spread depends on:

* The properties of the fuel including type, quantity, arrangement and surface area.
* Degree and effectiveness of compartmentalization within a building.

* Fire load in each compartment, area of window or other openings in the external walls of each compartment.
* Wind conditions at the time of fire
* Source of fire, and
* Any installed fire fighting equipment.

The fire hazard presented by a building or compartment within a building depends on both its size and use to which it is put. Design features like open planning, atrium and mezzanine floors are gaining wider acceptance especially for banks and office building designs. These features have been found to encourage spread of smoke and flames to adjoining compartments thus inhibiting the safe escape of building occupants. Escape routes should therefore be located away from them.

With small openings, rate of burning is conctrolled by the amount of air flowing through the openings irrespective of the quantity of fuel. With big openings, however, rate of burning is not proportional to the amount of air supplied, but to type of fuel and arrangement of combustible materials in the space. Experiments have, therefore, shown that rate of burning may be increased and in some cases the fire may be hotter in compartment, with a single opening, than in a compartment with no opening.

Callapsing barriers like walls, roofs and floors, open doors, windows, ducts, cracks and other uprotected openings in a compartment permit the transfer of hot gases, flames and smoke od areas not otherwise affected by fire.

These destructive fire elemets travel very fast and must be constantly borne in mind by th architect, so that effective fire detection alarm and control techniques are employed for successful containment of fire in buildings.

Prtevailing wind will deflect flames which project beyond the outside wall of the burning compartment thereby increasing the risk of fire spreading to adjacent compartments and properties. Wind indues pressure difference within a compartment which could assist the passage of smoke and gases through opening in the building. Wind between adjacent buildings create complex flow patterns which could carry smoke and burning fire brands to adjacent buildings. Shattered window glasses, cans, knots and bolts could all turn out as dangerous fire brands. The closer the buildings are the greater the risk to adjoining buildings. Also other weather conditions like sunshine and rainfall have been found to have a relationship with the spread of fire and its severity.

Buildings for obvious reasons must be placed at reasonable distances from one another. Fire dampers like trees around buildings will definitely be an advantage. External walls of adjacent buildings should be constructed of materials with high ignition temperature and possibly high thermal capacity so that incident heat is not transmitted directly to the interior.

It has also be found that some causes of fire are more efficient than others in achieving spread from one compartment to the other. An aronist for instance will not leave anything to chance. He will most probably be someone who knows the buildings and it contents well. Fire originating from intertional ignition and burning rubish have about three times as great a chance to spread as those starting from other causes.

Once fire has been detected and located, an inbuilt (inhouse fire installation system should cone into furce before external help arrives, This system should be capable of coming into quick operation, reducing the intensity of fire, suppresing fire at all levels and having a cooling effect.

3.1.5. DESIGNING AGAINST FIRE

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

For the occupants the design should therefore be concerned with safe means of escape and safety of people in the event of fire. For the content, however, the design should consider the rate and extent of damages to property for the structure itself, design should limit the ravage of fire on its, intergrity, structural and otherwise, for the environment, design should curtail the spread of fire from one

building to another, environmental pollution and degradation.

The objective of fire safety is summarized as follows:

i. Life safety, occupants and visitors

ii. Property protection

iii. Prevention of conflagrations.

The scope of fire protection in building is very wide, this is therefore illustrated in the fig below. This investigation will therefore focus on protection and prevention. Precautionary measures are in built characteristics of a building which are inbevently safe and are effective by their presence. They differ from active measures which only come into use in the event of fire outbreak.

3.1.5. SITE LAYOUT

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

i. Storage, manufacture or processing of highly combustible or explosive products or materials which are likely to burn with extereme rapidity, or which may produce poisonous fumes or explosions.

ii. Storage or manufacturing which involve highly corrosive toxic or noxious alkalines, acids, or other liquids, chemicals producting flame, fume, poisonous irritant or corrosive gases.

iii. Storage or processing of any materials producing explosive mixtures of dust or which result in the division of matter into fine particles subject to spontaneous ignition.

These include ammunition, explosives and fire works manufacture, cotton dress making, tar, pitch or resing processing, distilleries feather renovating, paint and vanish manufacture.

Within buildings which may not be classified as high hazard, some parts thereof may indeed pose high hazard, kitchens and garages for instance. They should be identified and treated accordingly.

Adequate air spaces should also be provided not only between adjoining properties, but also between seperate buildings within single ownership.

In many of the urban centres in the country land has been very high value and this is in part has encouraged over - crowding, closely built structures and little air spaces. Apart from aiding the quick spread of fire, such situation inhibit the activities fire fighters who will not have enough room to man-euver their equipments. Even where spaces may have been provided, they may have been converted to other uses like parking, storage etc. thus delaying or preventing rescue and fire fighting operation. The biger the building the greater the need to access it through more

sides than one. The need for unprotected fire path to and around the building cannot be over emphasized. Any gradients to such access must be limited. Architects should take issues of plot coverage, air spaces and setbacks very carfully. Routine checks will ensure that tenants/occupants abide by the rules binding their usage of premises.

3.1.7. INTERNATIONAL PLANNING

Buildings must be designed and supervised through construction to ensure that in the event of fire, they will resist collapse for a sufficient period of time to allow escape and evacuation of occupants and also minimize spread of fire. Design precautions should be considered creatively as a matter of design and in conjunction with other design criteria right from the inception of the project. This aspect of design should not longer be left to other or treated like an after thought as so often seems to be the case.

Architectural designs should be as detailed as can be. Right at the begining, brief for all installations and fittings for different purpose in the building should be anaysed and intergrated into the design. In essence, every equipments in the building, should be designed for. These includes equipments which indicate voltage leakage and cut off devices. Equipments like condensers and transformers which generate heat should be located in well ventilated area The usual practice of providing big ducts running through and round a building will thus be eliminated in many cases like the cocoa house, these ducts have aided the quick spread of smoke, heat and gases during fire outbreaks. Ducts and other cables holes should be fire stopped. Intumescent strips can be found useful for such purposes.

While designing the internal spaces, however, the architects should endeavour to ensure cross ventilation. Areas of high fire risk should also be isolated. Design should ensure that fire in one room or compartment does not obstruct escape of the occupants from other parts of the building. All doors except bathroom and WC door should be self-closing, fire resistant and swing out-wards in the direction of flight.

Floors must beable to prevent penetration of heat, flame,smoke and gases. Columns should be at least as fire-resisting as the beam/floors the support.

Dead ends, winders and differnce in floor levels should be avoided, as much practicable, narrow spaces, openings prevent fire penetration. Where necessary, however, roofs vents, extractor fans and facilities for fire fighting and rescue operations should be provided. These include landing pads ladders etc. In additon, honest and qualified contractor should be sellected to build. Supervision should be strict. Poor quality materials should be shunned.

3.1.8. COMPARTMENTALISATIONS

The small the area in which a fire is confined, the less the difficulty in containing it and the chance of its develping into a big fire. Consequintly, the less the risks and damage to life and property. A whole building depending on its size could be a compartment or be subdivided horizontally and or vertically into compartments. Compartment wall and floor are those which subdivide a building for the purposes of separating occupances within a building or subdivide the building for the purpose of restricting fire. Compartmentalization ensure reasonable fire safety for building occupants (especially

those who need to be evacuated) by restricting fire spread for a reasonable length of time compartmentalization is achieved by using fire resistant walls and floors to prevent vertical and horisontal fire spread. Success depend on segregation of high risk areas from other areas and isolation from one another e.g. kitchen and garage, adequate insulation and appropirate size of compartments. It has been suggested that with a functional sprinkler system, a compartment may be of unlimited area, except for multi store buildings.

Unfortunately, in many cases, that is usually regarded as adequate fire sep by compartmentalizations is a wall that has little ability to resist fire or contain its owning it owing to faculty detailing, inappropriate chice and use of materials or faulty construction. The weekend the fire resistance of a compartment wall, any may even lead to collasps of some elements.

Compartmented spaces may be linked or be perforated, usually by communicating doors and windows must have fire resistance of the compartment wall and or floor concerned. Where it is necessary for services to perforate the membranes, these must be carried in non-combustible materials. Ducts and other openings must be sealed by fire retardant materials like dampers and intumescent strips and paints.

3.1.9. FIRE - RESISTING CONSTRUCTION

It is generally acknowledge that it is impossible to construct an absolutely fire-proof building, as all materials are detrimentally affected in some way or other if they are subjected to as sufficiently high temperature, when, however, only materials having a high degree of fire resistance are appropriately used in the construction of a building, the term "fire resisting" may properly be employed statutory regulation control the planning of buildings and demand certain physical qualities having regard to the stress to which the buildings will be

subjected. But untill comparatively recently there was no requirement that a certain standard of fire resistance should be attained.

3.2.0. IMPORTANCE OF BUILDING CODES

Building codes play an important part in the overall protection of the community from a fire safety standpoint. Code coverage includes basic structural requirements, structural intergity, fire protection are related to structural elements, means of egress, interior finish, vertical and horizontal openings that are directly related to fire protection. The building official must of necessity, be closely concerned with all fire prevention regulations with respect to original construction.

3.2.1. SAFETY OF OCCUPANTS

An occupier has a moral responsibility to ensure thesafety of

i. Occupants

ii. The building

iii. Surrounding property.

Conditions that could jeopardize safety in an emergency include the existence of real or supposed danger. An individual in a possible panic situation is usually taken by surprise by the condition with which he is faced and may make a hasty evaluation of the possible dangers.

However, his reaction to the danger may make the difference between life and death. For example, a fire might be burning in a building with combustible ceiling tile. If the ocupants are able to evacuate the building in an orderly manner without delay, they can well escape the dangers of the burning tile. On the other hand, hasty and uncoodinated movement toward the exit could bring about death if this

panic conditions were to cause an individual to fall down. These pesons on the floor or in process of getting up could well prelude the possibility of other occupants safety leaving the structure.

3.2.2. MEANS OF ESCAPE

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

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

Provision of means of escape requires protected escape routes, smoke control facilities fire resisting doors and the maintenance compartmentalizations.

The under listed below are the three main escape routes:

i. horizontal parth from location to a protected stair case/ lobby, place of refuge or open air (in case of bungalows)

ii. vertical path (staircses, lifts, escalators).

iii. horizontal path from escape staircase, lift etc. to final exist or place of refuge or open air.

Means of escape to be effective must therefore satisfy the following conditions:

* people should be able to escape safely, unaided.
* must be suitable to occupants e.g. young, old handicaped,
* must be familiar to building usess,
* must be wide enough to evacuat every one within short period;
* must be able to shield people from smoke, heat and gases.

3.2.3. EXIT

The number of exits required depends largely on function of the building, degree of risk availability of functional fire fighting equipments and number and characteristics of occupants. Exits should be located such that it will be unlikely for fire to block them all at the same time. Travel distance for any occupant should not exceed 45m. This is based on the premises that a mobile adult can travel at the rate of 15m/min in a smoke filled space where there is some degree of visibility and presence of oxygen, if only at a level informed persons will travel 6m/min under similar conditions. To determine exit widths, the number of people who could be be involved in escape is translated into exit widths wich can accommodate them safely.

Escape must be achieved within 2.5 minutes. For some buildings, this works out a discharge rate of 40 persons/min/530mm of width of exit. The rate of discharge of people through escapes routes

can be calculated using the following guides

Corridors 1.5 people/m with/sec.up-going stair 1.1 people/m width/sec. down-going stairs 1.15 people/m width/sec. These should be no reduction in clear way travel path, corridors, or staircases along an escape route. Where two or more streams of people converge, the width of an escape should be arranged along the corridors so that maximum unbroken length of corridors does not exceed 61m. Dead ends along escape routes should be avaoided as they lead to confusion an panic.

3.2.4. SIGNAGE

Occupancy signs.

A useful measure that can be in the interest of safety is posting the structure for maximum occupancy. Posting should be based on measurable standares to make sure that the number of persons inside the structure at no time exceeds the exit capacities and does not exceed predetermined limitations based on a sqaire - footage formula as well.

A posted capacity sign, if properly enforced, should result in a felling of security by individuals who happen to see the sign while on the premises. Such a sign gives an indication that consideration is being given to avoid overcrowding and that steps have been or will be taken to reduce the possibility of people coming into the structure.

The overcrowded condition is a very difficult one of control, especially where people are moving in and out without a peak fixed performance time. This movement makes it extremely difficult to properly record the number of people who happen to be in the place at a given movement. Of course, panic possibilities are not limited to places that are enclosed or under cover, panic may occure in an outside location, and every consideration must be given to the

provision of adequate means of egress, and prevention of over crowding at such a location.

3.2.5. EMERGENCY LIGHTING

Emergency lighting has also been found to be most helpful, most occupancies install battery-operated emergency lighting units designed to give at least a minimum amount of lighting during power failure. Exit lights are also important for the enhancement of safety. Practically all building and fire codes should proscribe exit lighting throughout be use of a lighting system designed specifically for marking of exits. Under electrical code procedures, this light should be wired in such a manner as to assure continued operation except in the event of a major power failure.

3.2.6. EXIST SIGNS

Much discussion has been given to proper working and colours for exit signs. Some premises use green while others use red.

The matter of prevention of panic, however, has a supposedly been a factor in these discussions and in the subs equent development of requirements. Some people feel that red indicate fire, which in the opinions bring forth the concept of red as being a colour for exit lights. The other school of thought is that green indicates safety and an individual seeing green will cutomatically go toward that door in an effort to reach a place of safefty.

There are dudoubtedly valid arguments on both sides and for that reason the life safety code of the national fire protection. Association (NFPA 101) recognizes both colours.

But in recent years, a combination exit light and emergency has come on the market. This device provides direct lighting under, the fixture for exit visibility and, in addition, provides lighting of

the exit sign to give persons a proper direction to exits.

3.2.7 PUBLIC ADDRESS SYSTEM

The means of obtaining immediate response on the part of the occupants to any emergency condition that might arise, cannot be over emphasized. The use of a public address system has been found to be extremely desirable. In some cases, a public adress system operated by automatic control has been used to replace the more normal fire bell or fire horn system. By a recording mechanism, the public address system has been used to alert occupants to the existence of an emergency condition to all occupants. Bell, are used to indicate telephone, messages, changes of shifts as well as other conditions of a non-emergency nature. Public assembly occupancies may be equiped with both fire alarm and public address systems. This is of course a most desirable situation.

3.2.8 SEGREGATION

Segregation is an application of the principle of not putting all the eggs in one basket. Processes which are known to be liable to give rise to outbreaks of the fire should be carried on either in separate building or in a portion of the premises bricked off from the remainder, any openings being fitled with
fire resisting doors, thus tending to confine any outbreak to the department in which it orginated. Similar arrangements should be made for the storage of hazardous goods, only sufficient for one days use being brought into the factory at a time. Even where no hazardous goods or processes are present, use can be made of fire doors in substantial

partition walls, extending from floor to roof, to divide a premises into more or less self contained portions. Parts used for manufacturing purposes, where fires are likely to spread and the loss to be heavy. To be effective, fire doors must be well constructed, fitled and maintained, and capable of being closed quickly when required; these necessities are often overlooled.

3.2.9. EMERGENCY EVACUATION DRILLS

A good example of fire reaction training should be the periodic simulation of fire drills. Most large premises have interior fire alarm systems as well as fire extinguishers mounted at various locations in the structure. But there are very few occupancies private, commercial, or corporate in which drills are carried out or in whuch fire extinguisher training is given.

It is possible that if a fire drill were staged on a periodic basis within the building, he might be led to believe that the drills were being held because the building was unsafe from a fire protection standpoint. It is advised that Residential occupancies should likewise be inclined to hold fire drills on a periodic basis. This is an accepted procedure and again is one that has probably resulted in the saving of lives on a number of occasions.

3.3.0 GENERAL FIRE DEFENCE

Since a most important principle of successful fire extinction is to attach an outbreak immediately, it follows that any device which can detect a fire automatically and the control or extinquish it with the minimum loss, must be of great value, certain facilities

can be incorporated into buildings/structures to automatically provide this service.

These are listed below:

3.3.1. SPRINKLERS

Automatic sprinkler systems using water as the extinguishing medium have been universally adopted as one means of achieving this purpose.

Basically, automatic sprinkler installation comprises of a system of pipes erected at or near, the ceiling on each floor of a building and connected, through controlling values, to one or more water supplies. At intervals on the pipework are sealed outlets called sprinklers heads. These incorporate a device where by a rise in temperature to a predetermined limit causes the sprinkler to open and water to be discharged in the form of a spray over an area of the floor below. The sprinkler are so spaced that the spray from any two sprinklers overlap leaving no part of the floor unprotected.

3.3.2. DRY CHEMICAL SYSTEMS

Dry chemical extinquishing agents are known as regular or ordinary dry chemicals and multi-purpose dry chemicals. The former are used to combat fires involving flamable liquids. Typical dry chemical agent use potassium bicambonate, sodium bicarbonate, monoammonium phosphate, potassium chloride or urea - potasaium biocarbonate as base material.

Dry chemical should bnot be used where delicate electrical contacts, switches and relays are present, as the insulting properties of the chemical may render the equipment inoperative. Some dry chemicals are corrosive and for theit reason, should be removed from undamaged surfaces soon after extinquishment.

3.3.3. CARBON DIOXIDE SYSTEMS

Carbon dioxide has a number of properties that makes it a desirable fire extinguishing agent, especially in situations where water is not the answer. It is non-combustible, it does not react with most substances and it provide its own discharge pressure. As a gas, carbon dioxide can penetrate the ire area, and it leaves no residue, thus facilitating cleanup.

3.3.4. DRY RISERS

A dry is simply a vertical pipe which is normally kept empty of water, fitled with outlets at various floor levels is charged when required by means of fire service pumps. In effect, it is substitute for a line of hose, over which it has many advantages. It enables an upper floor level fire to be attacked by the fire brigade with a line of standard nose without the loss of time entailed in having to lay hose up through the building from the street.

A dry riser is charged through inlets at ground level, which are usually housed in external glass-fronded boxes. Each box is normally identified by the words "DRY RISER" painted in red on the glass. Inlets may occasionally be found below pavement level in a box with a cover similar to that used for a hydrant.

3.3.5. DRENCHERS

While a sprinkle system protects a building from internal fire, drenchers are placed on roofs and over windows and external openings to protect the building from damage by exposure to a fire in a adjacent premises.

A drencher system is comprised of water-heads some what similar to those of sprinklers, these may be sealed or unsealed (open drenchers), but in the later case the water is turned on manually. In a few instances, drenchers may controlled by quick-opening values operated by loss of air pressure in a detector line system in a similar manner to high velocity water spray systems.

The underlisted are the types of drenchers available in use:

* Roof drenchers
* Wall or curtain drenchers
* Window drenchers

3.3.6. HOSE REELS

Increasing use is being made pf hydraulic his reels as the first line of attack in building today. The comparative lightness and lack of jet reaction from the nozzles makes the hose rels a suitable item of equipment. Since only the amount of tubing required needs to be pulled off the reel before the water is turned on (in some cases the water can be turned on before any tubing is run out) only one person is needed to operate it. So many different types of hose reels are in use that it is impracticable to describle every variation. In principle, however, the equipment is very similar to the standard hose reel fitted to fire appliances.

3.3.7. FIRE ALARM SYSTEM

A general alarm of fire in a building can be raised either by a person acting a manual alarm or automatically, by a detection system. Even when a building is occupied, an automatic detection system offers advantages over a manual system in those areas which are remote, secured, seldom visited etc, and where fires can start, take hold and cause damage before they are discovered. At the times when buildings are not occupied, the advantages of early detection are obvious.

3.3.8. PRINCIPLES OF AUTOMATIC FIRE DETECTION

The function of fire dectectors is to detect one or more changes in the protected environment indicating the development of a fire condition. They may operate:

* when the invisible products of combustion are being released.
* when smoke is being produced
* when the temperature in the vicinity of the fire rises rapidly or reaches a predetermined figure.

3.3.9. HOUSE KEEPING PRACTICE

Good house keeping is plain common sense, one dose not need intensive training to recognize, almost untlitively at the first glance, wheter or not the house keeping on a premises is satisfactory. Cleanliness and orderliness are basic to good firesafety.

Good housekeeping practices - both indoors and outdoors are good method of controlling the presence of unwanted fuels, obstructions and sources of ignition. Certain aspects of house keeping are a common denominator to most properties occupancy. It is neither

practical nor posaible to describe every features of house keeping for all occupancies. Management will visualize hazardous house keeping situations peculiar to the occupancy and eliminate them.

Below are the principles of good house keeping the basic requirement of good house keeping fall into three categories:

i. proper layout and equipment

ii. correct materials handling and storage

iii. cleanlines and orderliness.

When proper attention is given to establishing the routines for these three factors, good house keeping is almost a certainty.

3.4.0 PORTABLE FIRE EXTINGUISHERS

Fire in their early stages can easily extinquished with the application of the proper type and amount of extinquishing agent. Portable fire extinquishers are designed for this purpose, but their successful use depends upon several conditions.

* The firm must be discovered while it is still small enough to be extinquished by a portable unit.
* The extinquisher location must be obivious and accessible.
* The extinquisher must be of the proper type and capacity for the fire in progress, and it must be operating condition.
* The person discovering the fire is trained and proficient in the use of the equipment.

3.4.1. FIRE ESCAPE STAIRS

To be effective, these should be built within enclosed shafts should open into shafts at all floors, except final exit level. Doors should be located such that swing do not obstruct flow of people already in the staircase. Design of staircase should be subjected to detailed soruting as regards width, rise and run of steps, size and placement of landings, head rooms, a hand rails, materials, smoke control techniques and ventilation. In addition, stair case should not continue unbtructed into basement, as this will confuse people hurrying to escape. It may be pointed out here that means of vertical transport like escalatory, elevators/lifts are not considered reliable means of fire escape. They are usually sensitive to smoke and high temperature and are subjected to stall in case of power faliure.

3.4.2 PLACES OF REFUGE

In large and complex buildings immediate total evacution of occupants may not be possible during fire. The need, therefore arises for places of temporary refuge. They are usually seperated from other parts of the building by means of construction elements with high fire rating. They are thus, some, heat and gas free and provide a safe heven for people who are waiting to be recued. If the building has a high fire risk, it is advisable to provide for filtered air supply and lighting to these special compartments.

3.4.3. SIGN AND NOTICES

A major casuse of panic is the mability of the occupants of buring building to see escape routes as a result of heavy smoke and darkness.

In some cases, however, people especially visitors trapped in a burning building may not even the know the escape routes. It is adviseable therefore to have escape route signs in the buildings. These will provide architects another opportunity to exhibit their creativity

Exit signs should be bold and placed a 2.5.m intervals. They should be illuminated at all times. If need be, their power supply must have a higher reliability rating than normal lighting. A study showed that the frequency of "lost" people on a complex but often used route was reduced from 40% to 17% by the improvement of one sign along the route.

3.4.4. FIRE EQUIPMENT

Inspite of all precautionary measures taken at the design and construction stages, the risk of fire is not totally eliminated. There is need, therefore, to have inbuilt fire equipments like fire alarms, detectors and fighting equipments which become handy in the event of fire.

The detectors will indicate that fire has been noticed wihin or around a building but will not do anything to control it unless some other system is also activated as a consequence. By noticing a fire at an early stage, more time is avialable for occupants to escape and early action to combat the fire can be taken. A dectection system need to be coupled with an alarm system which could also trigger on pre-recorded instruction on evacuation. Fire detection signals can be used to function other systems such as closing doors, shutters, escalatory, operating smoke extracts and pressuring systems. Active control of fire requires the provision of extinction systems. Automatic sprinkler installations are the most common when properly incorperated into the design and installed, they have been found effective in suppressing fires and thereby curtailing the extent of damage. On the

average automatic detectors can result in a 50% reduction in fire damage, while atomatic sprinklers can reduce the change of a large industrial fire by a factor of 6 and a large shop fire by a factor 2.

Given below is a checklist for the desgn of escape routes These includes:-

i. Sufficient number of exits of adequate capacity properly located with convenient access.

ii. Protection of exits against fire and smoke during the duration they will be in use. Exit routes could be slightly pressurised to control smoke and gases.

iii. Alternatives exits in case one is blocked by fire.

iv. Places of refuge to cater for those who are unable to escape, pending when they be rescued.

v. Protection of equipments bad areas of unusual hazards which may otherwise endanger people using escape routes.

vi. Control of psychological factors conducive to panic

vii. Careful selection of interior finish and contents of escape routes to prevent fast fire spread.

viii. Well ventilates and property lit escape routes.

ix. Escape routes which are easily identifiable, accessible and not obstructed. Distinct marking of escape routes, with non-escape routes marked "no TNOROUG+1 fare"

x. Escape routes leading directly to the open at ground floor level.

xi. Door on escape routes constructed to be self-closing and opening outwards in the direction of escape,.

3.4.5. MAINTENANCE OF EXIT FACILITIES

Another important factor is the maintenance of exits. No exit can be considered usable if it is necessary to obtain a key or otherwise go to a considerable amount of trouble in order to open the door. Likewise, the blocakage of exits is a major detriment to effective use of exits, especially under panic conditions. It must be recognised that individuals will react differently under the stress of even a small amount of smoke or heat. It may seem to be a minor problem to have to remove a chair that is blocking an exit. However, in time of stress from such materials when used in isolation. The architect must know how to relate such behaviour to required fire performance. A structure should be able to resit fire long enough for the occupants to be evacuated and operations of fire men. No construction material is fire proof. Fire rating of 45mins - 4 hours may be required for differnt building elements.

Fire resistance of construction materials can be assessed by their:

a) stability - measured as the time taken in minutes for collapse or excessive deflection to occur in a material or structural element under a fire load.

b) integrity - relates to the time take in minutes for the development of cracks and other openings through which flames, smoke and hot gases can pass during fire occurrence.

c) insulation - time take in minutes for the attainment of stated maximum and average temperature rises on unexpected faces.

While specifying materials against fire in buildings, the architect will be wise to consider the following properties of different materials, surface spread of flame, heat contribution,

toxicity of combustion products, physiological effects of combustion products, corrosive effects of combustion products, and density of smoke emission. Material withh high surface spread of flame can be improved by coating them with flame retardant paint. Care must, however, be taken to ensure that the paint and nature susbstrate are compatble. Planing materials emit heat which is received by air and other surfaces in the vicinity of fire, preheating them in readiness for a flashover condition. The total heat contributed by a material is a function of its calorific value and total weight.

Before the discovery of fire it is possible that some gases which are infurious to human life have been generated. Facilities should be provided for the extraction or dilution of such gases. The greatest quantities of carbon monoxide are produced in poorly ventilated rooms whose contents are cellulosic and represent a high fire load. Hot air and smoke produced during combustion can cause severe body burns affect respiratory track and may result in panic, shock and even death. Although the amount of heat that can be tolerated by human beings is influenced by many factors, the upper limit range is put at 50° - 66°c. The acceptable level of smoke production by a given building material will depend on its position in the building in relation to the probable swquence of fire development within a building. Many domestic fires originated in soft furnishings where low heat and oxygen produce a condition where only slow decomposition of the combustible material is evident, generating large time avialable for occupants. No doubt, measures of height, ventilations, smoke, extractors. Vents, pressurisation etc, will clearly modify acceptance levels for smoke production.

The table below shows the estimated survival time days after burns

The table below shows the time of evacuation by one stair.

in a panic situation, this may be a task that cannot be handled. The presence of a chair or other obstruction may bring about a number of deaths because of pile-ups of persons failling at the location of the chair. People can not be expected act rationally under such conditions. Every effort must be made to reduce the possibility of panic by proper maintenance of all means of egress.

Exits must be cosidered in the original construction of building. Often occupancy changes bring about a change in requirments from an exit stand point. Through close periodical inspections these changes can be noted, and proper remedial steps can be taken.

Proper maintenance of exit facilities means assurance that all exits are properly marked and usable at all times. The exit lights must be on the exit doors readily operable, and all exits must be readily accessible without blockage of any kind.

There is a tendency, for example, to place ticket boots tables, soft-drink dispensing machines an other objects in exit passage - ways without consideration of safety.

3.4.6. MATERIALS

Building fires affects the way structures behave. Sometimes, they excessively alter the physical and mechanical properties of construction materials. On hesting, most building materials undergo physicochemical changes accompanied by transformations in their micro structure and at the same time changes in their properties.

To be ale to specify appropriately, an architect must have a good working knowledge of the behaviour of different building materials especially with refrence to fire. Materials used in conjunction to form elements of buildings may behave quite differently.

CHAPTER FOUR

CASE STUDIES

Architectual contribution towards the areas of construction and boosting of the nations economy cannot be overlooked because it is not only do they offer theoretical solutions but feasible design works well planned and schemed with all necessary requirements are also fulfilled proposed. Similar architectural works preceeding this research include Wuse Shopping Centre Kaduna.

Geographically, all these business centres are situated in this country (Nigeria), thus they share so many factors that affects commercial goods and service production.

Wuse shopping plaza, Abuja shopping mall and Hadidi Shopping Centre Kaduna have been chosen as case studies. These business centres are located in the belt of Nigeria were the vegetation varies and where unifying characteristic in the occurrence of grass takes place,

Generally, commercial centres in Nigeria is public owned, especially those in the southern part of the country. Therefore, special considerations in mode of its design is yet to be implemented and the same applies to the mode of operation. Most importantly with partcular business centres found in mushroom sheds in the country.

As an architect, the planning and design are essential facilities in a standard commercial centre of such safety measures applied to relationship between the various units which of course makes up the commercial unit and the general functionality of the commercial centre (the multipurpose shoppung centre) would be considered. In

the multipurpose shopping centre, these responsibilities could effectively be met after a thorough understanding of the following.-

CLIENTS/SPONSORS/USERS/

The client of this facility is the sole owner of the centre. The regular customers are the workers and civil servants suroounding the centre

The choosen site fulfill the following merits:- They include

- the site is beautifully landscaped for attractive visual appearance specially due to its bayside location,.
- the parking facilities are provided at strategic points.
- the design of the pivilions allow for natural ventilation and energy efficiency.

4.1.1. EVALUATION ARCHITECTURALLY

Architecturally the centre reflects beauty in simplicity from my observation. Emphasy was more on functionality and easy flow of trafic, linear form dominates the structure interwoven with glass glazed panels.

4.1.2. SITE VIABILITY FACTOR(S)

The site is not quite large considering the range of activities required within and around the proposed shopping centre. In order to accommodate all the desired activities, interraction within the complex will be achieved both horizontally and vertically. Consequently, the centre will be a story structure and spread out functions.

The choosen site possesses certain characteristics that makes it viable for the proposed shopping centre. Among these unique features are:-

1. The site falls within the central business district of Minna. Therefore, it will allow for a continuous trend in commercial activities (especially the business activities).

2. Humans are always having a legendary affliliation with activities evolving around them. The choosen site was one used as a temporary market place. It is still being used illegally for various types of petty commercial activities. The location of the business centre on this site will alow for a continuous tread of commercial activities.

3. The site is of fairly regular shape with flat terrain. These allows of advantageous planning. It will also allow for reasonable economic construction.

4. The surrounding road pattern and accessibility as will be discussed later, allows for adequate and full utilization.

5. The site will allow for viability of the structure from the major thorough - fare, the paiko road.

6. The site does not have any commercial activity in its immediate environ. This will allow for full patronage.

4.1.3. VIEWS

SITE SENSORY FACTORS

The shopping centre being a public square requires easy identification.

This is achieved by means of the following design strategies

- Orienting it to directly face the main access road.
- Giving it an imposing nature that will allow for easy identification.
-- Providing a well define entrance porch that is:

1. Demand and attitude of customers/people there
2. The commercial set up in the particular town where it is to be sited.
3. Basic knowledge involved in the commercialisation.
4. Historical and cultural background of the people.

4.2.0 CASE STUDY I

4.2.1. WUSE SHOPPING PLAZA ABUJA

Site location: Wuse shopping plaza Abuja is located at Wuse. The plaza is very popular and easily accessesible because of it location. It is located along a bushy road.

4.2.2. HISTORY

The building, shopping plaza is popular shopping plaza. The building is mainly designed to serve the purpose of a shopping centre.

The cient of this commercial centre is private. It is used by financial, private firms and shopping units are found in the complex.

4.2.3. MERITS

- The site is on the road easily accessible
- There is banking facilities
- Circulation is perfect.

- The site has a good location
- The plaza is located in a very business conscions area with a fair landscape.
- It is well accessible through public and private transportation.
- It has a modern organisation and set up
- There is space for future expansion

4.2.4. SPECIAL PROBLEMS

Wuse shopping plaza has some demerits which are listed as follow:-

- No fire fighting facilities
- No Restaurant
- There is no recreational facilities on site
- Natural lighting is highly minimised in the building
- There is no adequate parking facility
- There are few landscape.

4.2.5. FACILITIES

The shopping plaza is basically made up of shops offering different services such as boutiques, video rental gift shops, shoes and photographic materials to mention but few. Some of the shops ar, however, being used for office space, low firms and travelling agences.

4.2.6. FUNTIONALITY

The vertical development nature of the site contributes greatly to the functionality of the shopping plaza. Also its strategic location add to its success in this direction. The

scattered nature of the shops allows for movement of shoppers in and around the complex hence the far of shoppers concentrating on one place is removed. Equal attention is given to each store in terms of customer traffic.

4.2.7. EVALUATION ARCHITECTURALLY

Functionality and organisims are the main architestural characteristics that is used as the aims achieved by the plaza.

The plaza can, therefore, be regarded as being functional, but needs an improvement in it planning and organisational techniques.

CONCLUSION

The shopping plaza provides type of form of shop units that the proposed multi purpose shopping centre will take. However, improvement shall be made in the area of lighting and ventilation. Also functional follow within and around the complex will be ensured as well as the provision of display units will form further improvement in the Multi purpose shopping centre design.

4.3.0. CASE STUDY 2

4.3.1. SHOPPING MALL ZONE 4 ABUJA

4.3.2. SITE LOCATION

Shopping mall is located Wuse at zone 4 Abuja the Federal capital.

4.3.3. HISTORY

The building, shopping mall is popular shopping centre. The building is mainly designed to serve the purpose of a shopping centre.

The client of this commercial centre is private. It is used by finacial, private firms and shopping units are found in the complex.

4.3.4. MERITS

- Site is easly accessible
- Circulation within the site is perfect
- Parking space is well defined
- Density of shoppers is effectively dispersed by the scattered location of rows of shops which in effect limit fire in case of five out break.

4.3.5. SPECIAL PROBLEMS: SHOPPING MALL LOCATED AT WUSE ZONE

Shopping mall located at Wuse zone 4 Abuja has some demerits which are listed as follows:

- No space for future expansion
- Landscape is not properly done

- No fire fighting facilities
- No banking facilities
- No health facilities

4.3.6. FACILITIES

The shopping mall is basically made up of shops offering different services such as Business centre, gift shops, super market, Video rental, while some are being used for office space, low firms and travelling agences to mention but a few.

4.3.7. FUNCTIONALITY

The vertical development nature of the site however, contribute greatly to the functionality of shopping mall. Its strategic location adds to its success. The form of arrangement within the site, hence the fear of shoppers concentrating on one place is adequately taken care off.

4.3.8 ARCHITECTURAL EVALUATION

Functionality and organisums are the main architectural characteristics that is used as the aims achieved by the shopping mall.

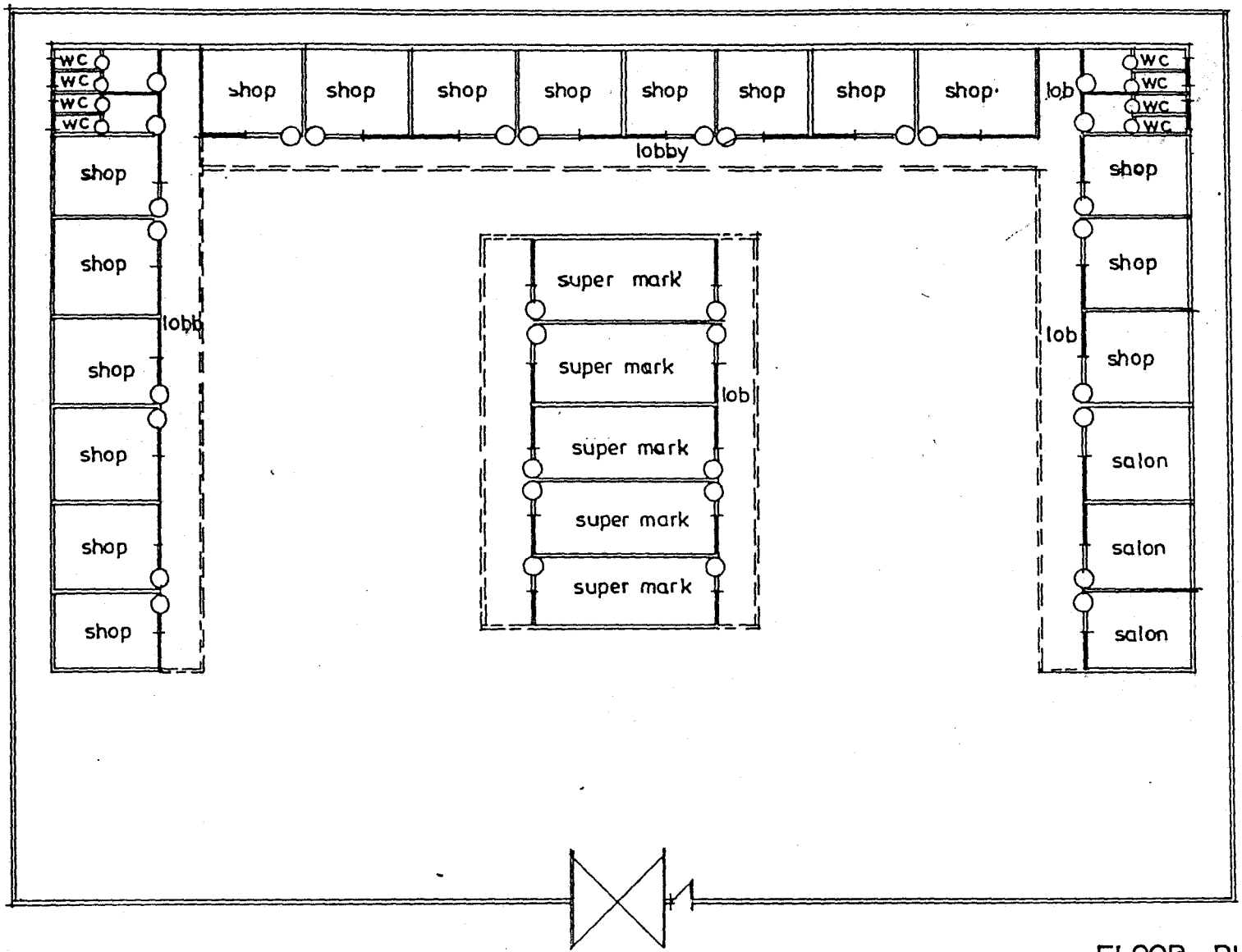
The shopping mall can, therefore be regarded as being functional, but needs an improvement in it planning and organisational techniques.

SITE ORGANISATION

The shopping mall Abuja is made up of units in a stony format. It has layout with shops effectively linked up with corridor which allows for easy access into the shops.

CONCLUSION

The shopping mall provides the type of form of shop units that the proposed multi purpose shopping centre will take. But improvement shall be made in the area of lighting and ventilation and functional follow within the complex will be ensured for adequate shopping and provision of display units will form further improvements in the multi purpose shopping centre design.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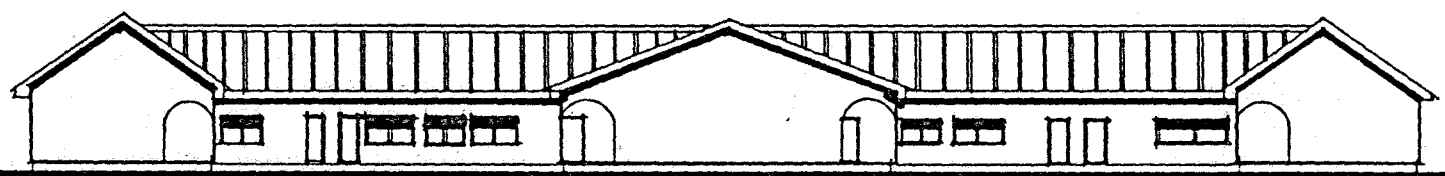
FLOOR PLAN



FRONT ELEVATION

CASE STUDY 3

HADIDI SHOPPING CENTRE

4.5.1. SITE LOCATION

Hadidi shopping centre is located along Isa Kaita road Kaduna opposite capital school.

4.5.2. HISTORY

Hadidi shopping centre is popular shopping centre. The centre is mainly designed to serve the purpose of a shopping centre.

The client of this commerical centre is private. It is used by private firms and shopping units are found in the complex which some people use some of the shops as office spaces.

4.5.3. MERITS

- The site has a good location
- It is well accessible
- It has a modern organisation and set up
- Circulation is perfect
- It has a well defined parking space.

4.5.4. DEMERITS:

- There is no space for expansion of site
- No fire fighting facilities
- No restautrant
- Banking facility
- There is no recreational facilities on site

4.5.5. FACILITIES

Hadidi shopping matt is basically made up of shops offering different services, such as business centre, super market, boutiques, video rental, while some of the shop spaces are being used as office space low firms and travelling agences to mention but a few.

4.5.6. FUNCTIONALITY

The scattered and bungalow of the site contributes greatly to the functionlity of the Hadidi shopping centre. Also its stragetic location add to its success and the scattered nature allows for movement of shoppers in all direction hence the fear of shoppers concentrating on one place is remove. The bungalow approach gives equal attention to each store in terms of customer traffic unlike in the case of story building where some shoppers find it diffecult to move up.

4.5.7. SITE ORGANISATION

The Hadidi shopping centre is made of units in a bungalow format. It has a scattered layout with shops effectively corridor which allows for easy acess into the shops.

The centre have a exit/entrance route also allows for easy movement in and out of the centre.

4.5.8. ARCHITECTURAL EVALUATION

The bungalow nature of the centre makes it distinct yet simple. The buildings, however, are higher than most bungalows because of an additional floor which ofcouse allows for shops to gain space.

The centre as observed was designed more for functionality and convenience as against casthetic like most building of this nature.

Apart from the bold new sign board at the entrance one could pass out without know of the existance of the shopping centre.

CHAPTER FIVE

DATA COLLECTION

5.0. PHYSICAL AND SOCIO - CULTUAL BACKGROUND

5.1.0. PHYSICAL AND GEOGRAPHICAL SETTING

Maxlock group Nigeria limited in its Minna master plan report, Narrate the historical background of the town. Niger state was created in April, 1976 from the former North western state which Minna is the capital. Being a newly creted state carved out, it had its shares of the national cake which is a spring board for development. It also had an additional incentive being natural endowment from mother - nature.

Niger state, with the capital in Minna is situated in the middle belt region of Nigeria. With location between latitudes 3.20 and 7.40 east, and 8.00 and 11.30 north. It has a total and area of 74.344 km which approximately 8% of the land area of the country (Nigeria).

Niger state has boundaries of cardinally, with Kwara, Kebbi, Kaduna and Zanfara states at the North, kogi at the south. River Niger separating tem, Abuja the (Federal capital city) at the south west.

5.2. CLIMATIC CONDITION

Niger state with Minna as the capital is located in the middle belt of Nigeria, has tropical climate which is marked by distinct dry and wet seasons.

5.2.2. RAIN FALL

Minna, the raining season beings from April and increases progressively in duration and intensify from North to south. It reaches its peak between July and August and subsides towards October and November. Data collected from the meteorogical centre in Minna shows that the mean annual rainfal varies from 1100mm in the North to over 1400mm in the south. This inveriably implies however, the duration of the wet season varies from 150 to 200 day of a year.

The implication of such intensity and duration of rainfall on the building and site is quite enormous and as such, good drainage network would be provided on site and of strip and raft foundations would be applied. In a sandy land form, the drainage network is given special considerations, as this would allow water drain towards the natural shape of the site, away from the building structure.

- specification for appropriate use of building materials of techniques of construction would be employed.
- the defects of surface and underground water scaping through the building would be tackled by adequate drainage.
- Load bearing capacity of the soil would be tackled by adequate compaction.

5.2.3. WIND

The North - East trade winds from the Sahara brings the harsh and dry wind makes the site uncomfortable (thick vegetation cover is a remedy) whole, the south-west monoon winds brings rainfall and cooling to the site due to effect of the Atlantic ocean.

The sun rises from the East side of the site and gives brightness, life and day lighting and set at the west side to give evening light and a beautiful horizon effect.

The whole characteristic of the site, though with some modifications, makes it conductive for the set fast of a beautiful landscape and architectural display.

5.2.4. VEGETATION

Existing on the proposed site is blend of sparces and thick vegetation which is characteristic of Sudan/Guinea Savannah with green bush grass spread over site, scattered and trees which include shear butter, etc.

In order to effectively take care of the micro climatic factor of solar radiation, for instance, wind, humidity, air temperature and other, the meticulous selection and planting of a artificial vegetation is and must be paramount and adequately provided for waterin i.e. maintenance would be put in place.

It is also important to also note that, in the context of the scope of this project, the task of a well planned and workable landscape is focussed as a result of this, however, attention would be adequately be given to specify types of flowers, shrubbs and trees to suit the purpose for which they prescribed.

5.2.5. TEMPERATURE

During the period from January until the onset of the rains both deaily maxima and minima are rising to their annual peak just before the rainy season. During the rainy period daily maxima drop to a low level in Augus, while the reduction in

minima is less pronounced and the minimum temperatures remain faily steady. After the rains the maxima begin, an increase which is fairly sustant until the raise after January, while minima drops steadily, also until the cycle repeats.

5.2.6 HUMIDITY

Evaporation from open water and soil, and transpiration from soil, micro-flora, natual vegetation and crops, are together termed evapo transpiration. The transfer of water to the atmosphere by evapo transpiration can account for up to 885%5of rainfall annually.

Potential evapotranspiration (PET) is the amount of moisture which would be lost from a soil/vegetation surface if water is not a limitation. In other words, and transpiration (PET) can be estimated by a variety of measurement and empirical or empirical/ theoretical famular.

Like other synoptic metrological station in Niger state, Minna's mean annual (PET) exceeds mean annual rainfall. Actual evapotranspiration over a year therefore is always less than potentials value.

5.2.7. ECONOMY AND COMMERCE

The economy of the state (is still at the intitial stages of development. Very little is realised by way of internal revenue but provision has been made and is being made) to change the present situation, since internal revenue is most reliable source of funds to sustain any economy. Having on to the lowest population densities, the land present the amin asset of the state.

All produce are small scale, most of the existing industries, are small-scale enterprises consisting mainly of traditional craft work, food processing plants and repair and service workshops. Most of the people in the state depend on agriculture for their livelihood but the farms are small and productivity is low. There has been concentrated effort by the government to assist the local farmers by providing farm inputs at standardized rates and loan with low interestrates. However, it is expected that the productivity on the far will improve substantially within the next few years.

There are only a few known deposits of minerals in commercial quantity. It is hoped, however, that the clays around Abuja and Bida, the sand and silica around Bida, and the marble in Kwakuti will lend themselves to future exploitation and provide the base for the development of ceramic glass and terazzo tile industries.

COMMERCE

The expanding market around Minna might soon attract some of th established commercial institutions like leventis, chellaram and Kingsway to move into Minna. For now the available commercial centres are the Minna main market, and Gwari Market.

There are quite a number of supermarkets available with departmental goods such as Donleos, Thy will, Jonapal, Systems, Onignide, Niger supermarket and Bosso shopping centre.

The government is improving on the condition of the various rest houses (Niger house motel, motel annex) and the only three star hotl, shiroro hotel. There are other private hotels such as Jafaru guest inn and Masfala but they are not sufficient for this fact grown town.

Though Minna is still developing, its economy is low compared with some other states. As such one will expect that the architectural implication would be moderate. But Minna is a place that takes on challenges and brighter futures start some where. This has already been observed in the ultra modern cutural centre (U.K. Bello Arts Theatre) and the central Mosque. Therefore, it is seen as a challenge to the future rather than a misfit.

5.2.8. TRANSPORTATION AND TRAFFIC FLOW

The town of Minna is physically divided into two halves by the railway lines that run east to west. It separates the Tudun Wada Housing area and the present former secretariat to the south from the core area GRA and Bosso in the North.

These, therefore, implies a great traffic conflict between the train and motor vehicles by the creation of level crossings. There are two level crossings in the town (one at the centre and one on the Kuta road before Gbadaya) before the decision on construct fly overs, although there is an unofficial on at the western part of the town near the ministry of works yard, used mainly by construction traffic.

Generally the roads in Minna have suffered a relatively slow pace of development in the past years. This may be due to the lack of high demand for the use of roads in the town. But the change in the status from a divisional headquarters to a static capital in 1976, more people are being attracted to the town and the demand for road usage is steadily increasing and thus a massive township road renewal programme, has been embarked upon partly for prestige reasons but also to provide a sound base for the traffic organisation within the town.

Presently, the town is not facing a very serious problem in terms of congestion. But a great percentate of the traffic flow is along the Bosso (dual carriage way spine) A level of car ownership and the fact that only few visitors come to the town daily.

The location of my multi purpose shopping centre creates a food link between the active area of the town (commercial area) and the neighbouring towns and villages. This make the centre easily accessible.

5.2.9. EXISTING LAND USE AND FUTURE TRENDS

A major land use policy in Minna, Niger state is controlled by land intensification use, to ensure allocation of space for essential services such as community services transportation, recreation, commercial and institution facilities. To help achieve the essence of this important policy adequate surface drainage especially during the rainy season must be caried out. The land

is therefore, used for farming. there is fairly thick vegetation cover which is similar to the type found along the river valley.

As development into nature and most of the natural setting are being erased, this proposal helps to preserve nature within a built setting.

CHAPTER SIX

6.0. SITE ANALYSIS

An indepth study of the site was carried out by geographical maps to acquaint one with the relief/topography of the site and natural features present at the site. A visit was also paid to the site to confirm the map work and to take stock of the existing natural and artificial features of the site.

From the above, however, the following facts were established as site characteristics:-

The site slope are gentle, but accentuating a good directional natural water drinage, while with respect to contour intervals, the site is relatively flat, check the fig below.

AREA OF SITE

The site covers a total of square metre on a hectares of land

6.1.1. SITE VIABILITY FACTOR(S)

The site is quite large considering the range of activities required within and around the proposed multi-purpose shopping centre. The desire is to accommodate all desired activities. Interraction within the complex will be achieved both horizontally and vertically. Consequently, the centre wil be structure and a total spread out of all functions on ground.

The chosen site possesses certain charracteristics that makes it viable for the proposed centre, among these unique features include:-

1. The site falls within the central business district to Minna Therefore, it will allow for a continuous trend in commercial activities (especially the business activities).
2. The site does not have any commercial activity in its immediate environ. This will allow for full patronage
3. The surrounding road pattern and accessibility as will be discused allows for adequate and full utilization.
4. The site will allow for visibility of the structure from the major thorough - fare, the paiko road.
5. The site is of fairly regular shape with flat tewain, this allow for advantageous planning. It will also allow for reasonable construction.

6.1.2. ACCESSIBILITY

The site lies along the paiko Suleja dual carriage road. This constitutes, however, its main access. To the far right of the road is a developed road that branches from the main road. The road which serve as the main vehicular access to the barracks. The pedestrian access will be via paiko road. They will be linked directly to the centre by well defined pedenstrian walk ways that will set out directly from the bus stop. The traffic within the complex will be one way traffic and the car park will be well defined. This arrangement is to avoid conflicting vehicular access with pedenstrian access and to create and maintain free flow of traffic along the major paiko road.

6.1.3. VIEWS

Site Sensory Factors

The multi purpose shopping centre being a public square requires easy identification. This is achieved by means of the following design strategies:-

- Orienting it to directly face the main access road (Paiko road)
- Giving it an imposing nature that will allow for easy identification.
- Providing a well defined entrance porch that is celebrated with a totally glazed units at the top of it. This is to catch the eye and direct one into the centre.

The bank as well as the clinic zone or unity is well land scaped to provide adequate conductive environment for the people, while the commercial zone provide the necesary services to the entire populace, the comfrence hall could be used for meetings and it could also be hired by the outsider for occasions. In all, it could function as a point where social activities could be held.

6.1.4. PLANNING CONSIDERATION

In the development of the site, the principle of functional planning are consered. This principle involves the identification of the needed awareness within people in an identified geographical boundary.

The overall planning and form of area is determined by the inter-related constraint of programme, zoning, beauty inter-functional arrangement, accessibility, adaptability, use of natural beauty and econmy.

6.1.5. ENVIRONMENTAL CONSIDERATION

There are two major problems that are associated with the issue of the environment

i the thermal comfort, and

ii. wind control

Thermal Comfort

This constitutes a problem whenever there is high temperature in the enclosure, and it could be as a result of chosen poor materials as well as method of construction. But this could be rectified by ensuring necessary careful design of the walls, roofs and all shunt of openings are carefully chosen and designed to achieve the said thermal comfort for both days and nights.

6.1.6. Wind Control

In this case however, it is generally take care of by adequate landscaping and the use of external barriers as this would improves comfort conditions in the buildings. The location of windows also serves a form of wind control device.

6.1.7. FUNCTIONAL ANALYSIS

The functional analysis of the design was systematically carried out by outlining all the needed or esential facilities for the centre as seen below and is followed by these stages:-

Individual triangle of function were designed for each unit of design to asertain the kind of relationship that exist between them, whether hot, warm or cold relationship, then individual

functional flow - diagrams were protected based on the kind of relationships each facility has with the other to form an effective and convenient flow of function and finally, an intergrated flow diagrams were drawn based on the individual triangle and functional flos. To give influence to the overall site layout. This method of analysis helps to combat the issue of functionlism, bearing in mind that a structure is useless if it is not functional, stable and beautiful.

6.1.8 SITE PLANNING

The site was planned based on the analysis explained above and considering that each locality to be developed as a centre present unique features as the people, Minna does and also have limitations which require original solutions, imaginative and a flair for treinsaction. As a basis for planning, however, the following principles were applied which eventually reflect the main aims and objective of developing 70% ferrugmous tropical soil, most frequently ferrofinous tropical soil with abundant lithosols. Generally, the grey humus/clay soil are asoociated with Minna, it is an area with high CBR and medium CBR california bearing ratio/value, best suitable for different infrastructures.

6.1.9. SOUND

The site proposed for the centre is directly on Minna Paiko road. Consequently it will be prone to noise from vehicles along the road. The demerit is, however, taken care of by locating

the centre 45m set back in the front, while the sides and rear air space have a minimum of 6 metres. This is also designed with reference to (Town and country planning Edict 1986) Building plan regulation 1966.

Enough trees will also be planted strategically to help reduce air borne noise. For the same reason, the generator house was located far away from the plaza.

6.2.0 ORIENTATION OF THE MULTI PURPOSE SHOPPING CENTRE

The cerientation of any building is the relationship of the building to its immediate surrounding. With the analysis of the geographical, climatic and geological factors of the site, the site is suitably oriented with the site relative to the sun and prevailing winds.

It is well positioned to take advantage of good features of its immediate surrounding environment, namely, access roads, good views, trees, grass, lawns and flowers.

The building location, orientation is aimed at taking advantage, of the suns termal, hygenic and psychological benefits. It also take advantage of good views.

6.2.1. THE SITE LAYOUT CONCEPT

Since the proposed Minna multi purpose shopping centre is required to fulfil the stated aims and objective, the functionlity of the centre becomes a prime factor in the design. Consequently, the site layout is based on its functional requirement and it has the perfect situation in terms of traffic flow and parking lots. This can be termed as a functional concept.

6.2.2. LOCATION

Minna lies at latitude 9° 37' North and longtude 6°33" East on a geological base of undifferentated basement complex of mainly gneiss and magmatite.

The site for the centre is located along chanchanga road near Minna trade fair complex. It is to share a common boundary with the trade fair complex.

The site falls within latitude 9°35' and 9°36' North and longitude 6°34' and longitude 6°35'55" East.

6.2.3. SUNSHINE AND CLOUD COVER

During the dry month (November- April) the annual monthly variation of sunshine follows a general trend which is over 214 hours on the state. The approach of rainy season increases the trend in cloudness. The sunshine hours experience a major decline as the rainy season reaches its lowest value in the month of August.

CHAPTER SEVEN

THE DESIGN CONCEPT

The design concept for the multi purpose shopping centre Minna was gotten from the design. In achieving this concept, however, the facilities to be provided for in the shopping centre were first listed with the various componets of these facilities. The functional relationship of these various componets in each facility was established using the triangle of function which indicated the relationship each componet has with the other by the use of coloured dots with each colour representing the level of the relationship, yellow dots for warm relationship while blue dot was used for a cold relationship.

After the establishment of the componets, relationship with each other, a functional flow diagram was constructed from the triangle of functions, this procedure is carried out for all the facilities that were provided in the proposed centre.

DESIGN CONSIDERATION

The special consideration explained above are of paramount importance in the design of the mult purpose shopping centre environment this is necessary for the proper functioning of the centre, acconstic standard, adequate lighting, ventilation, fire protection, security and safety.

MATERIALS SELECTION

In selecting materials for building construction like mult purpose shopping centre, it entails a lot of parameters. These parameter may be broadly classified into economic criteria

mechanical properties and aesthetic qualities. Economic considerations in the use of materials are done on the basis of cost of maintenance, fire resistivity replaceability and durability. Usually, the mechanical properties of behavious of a material are the basis for the economic rational and aesthetic qualities, therefore becomes the main factor in this project in the site, planning the lobbies, the courtyards, aesthetics and functionality becomes the sole determinant.

Furthermore, durability is never forgotten, structural properties of shear, tensile, compression, creep, plasticity, hardness, resistance to erosion, elasticity, softness and electrical, core all of paramount importance in mechanical consideration in this project. The material composition, especially in places like roof, walls, floors and finishes are to be carefully chosen in relation to their properties as well as to minimize the cost of maintencance to the minimum cost.

7.2.2. MATERIALS

The materials used for the construction of the centre are quite numerous, these include: the building materials and adequate landscape materials to make the environment pleasing and habitable at all time.

Special atention was given to the choice of materials considering the weather and climatic facors affecting the site analysed, chapter six (site analysis) bearing in mind that there are indoor facilities.

For the landscape materials, they are in two categories, the soft landscape include trees, flowers, hedges, grasses and water, while hard landscape consititute the following: concrete seats for relaxation, ascads and all built structures, stones and so on.

Cave was, however, taken in the section of plants that do well in the Savannah zone in which the project is to be sited, they include:-

- Umbrella trees for shades
- Mango guava and orange trees (fruits)
- Royal palm at the recreation (area)
- hedges, grasses along the walk ways

Matuials for landscape include the underlisted:

- the use of rubble stone on certain land scaped area to make use of ntural resources to bring about natural aesthetic in the recreation area.
- flardwood seats and tables were used where canopies or shades are introduced
- concrete were used under direct weather condition example under trees).
- Brick walkways and terraces to create friction and reduce slippery effects.
- concrete kerbs were also used to prevent the lateral spread of the road, it is also used to control surface water drinage from tired road, as well as to discourage the encroachment of vehicles onto footpaths and gress verges.

BUILDING MATERIALS USED INCLUDE

- Terrazo (multicolour) granite for public areas for example reception, lobbies and shops
- The use of sand crete hollow blocks for building walls
- Ceramic floor finishes for internal private spaces, rooms and offices
- Long span aluminium roofing sheet (green colour) to blend with the vegetation and due to non corrosive nature of durability and aesthetics.
- Bricks for the construction of snacks shops
- The use of brick-facials as well as finishes for blend (uniformity)
- Built-in furnitures in the courtyard for relaxation and recreation area.
- Metal railing on the clinic and shopping areas and also to achieve both aesthetic and for security purpose.
- Glass door and windows, to bring landscape into interiors.

The materials used for the entire site were to achieve aesthetis, durability, functionality and above all, to blend with the encironment.

7.2.3. CONSTRUCTION

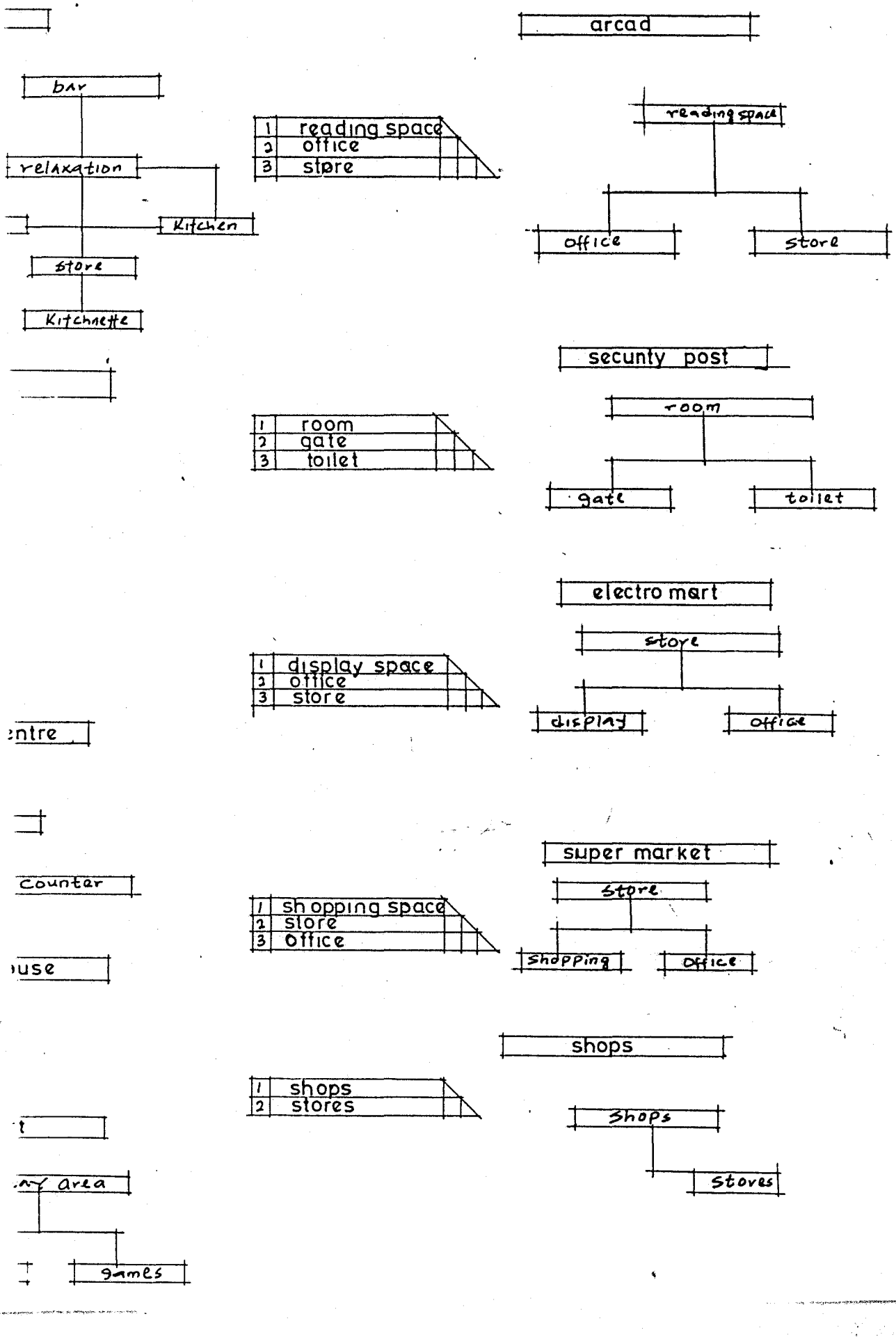
Construction usually being with external work which include clearing of th site, the removal and replacement of the top soil, the removal of trees from their roofs to prevent settlements of any kind. Also its involves removing all elements of obstruction to the works on site. Manual as well as machines are employed, where necessary, depending on the area involved and what the site is consituted of.

Construction goes ahead by providing the access roads, parking lots, site offices, fencing, stores for the materials expected to be used at the site, necessary installations of heavy plants in order to prevent obstruction/movement of other activities, necessary sign post, landscaping and installations of basic utilities before the actual construction work on the project starts, as these will bring about smooth running of the set up programmes of works. For a viable project of this nature, however, technology of construction as wel as quality of work are very important to bring about realisation of the desired goals.

The foundation is determined mainly by the soil type which is mainly sandy in nature with a well compacted hardcore, raft foundation spread all over the entire area of the building,.

STRUCTURAL CO-ORDINATION

Such as columns and beams are introduced, where necessary, on the plans. Columns beams, roof gutters are reinforced. Walls are mainly of hollow-sanderete block of 450mm x 225mm for the external walls and 150mm x 450 are used.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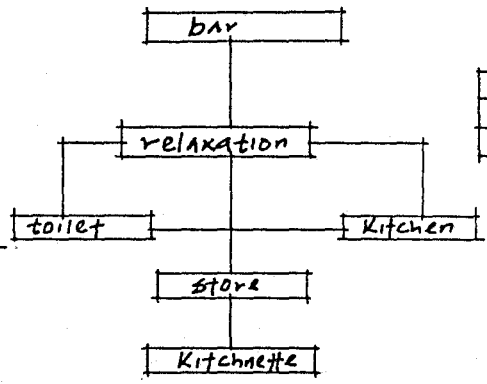
5	store
6	toilet



1	reading space
2	office
3	store

restaurant

1	room
2	gate
3	toilet

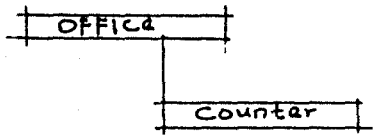
1	eating area
2	kitchen
3	store
4	changing rm
5	toilet

act

1	display space
2	office
3	store

information centre

1	office
2	counter



1	shopping space
2	store
3	office

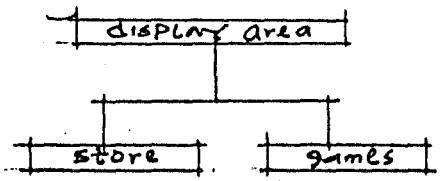
ware house

1	ware house

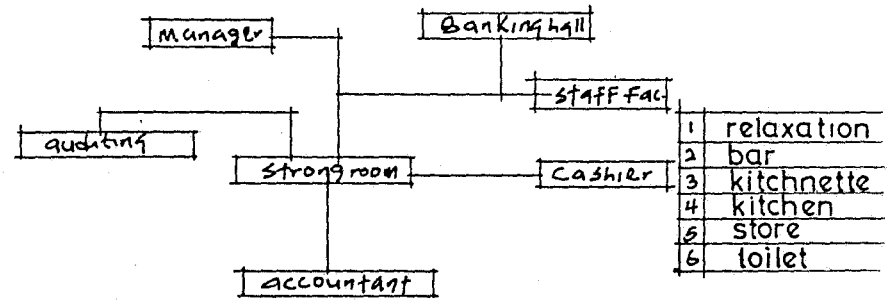
1	shops
2	stores

video mart

1	display area
2	store
3	games



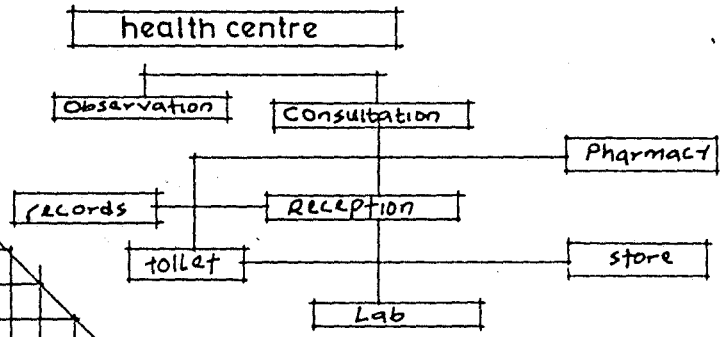
bank



1	bank hall
2	cashier
3	manager
4	accountant
5	strongroom
6	counting
7	staff fac.

1	relaxation
2	bar
3	kitchnette
4	kitchen
5	store
6	toilet

health centre

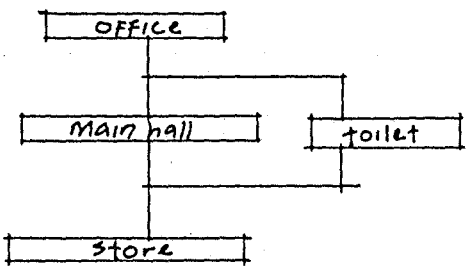


1	reception
2	records
3	consultatn
4	pharmacy
5	observatn
6	store
7	lab
8	toilet

1	eating area
2	kitchen
3	store
4	changing r
5	toilet

1	office
2	counter

business centre

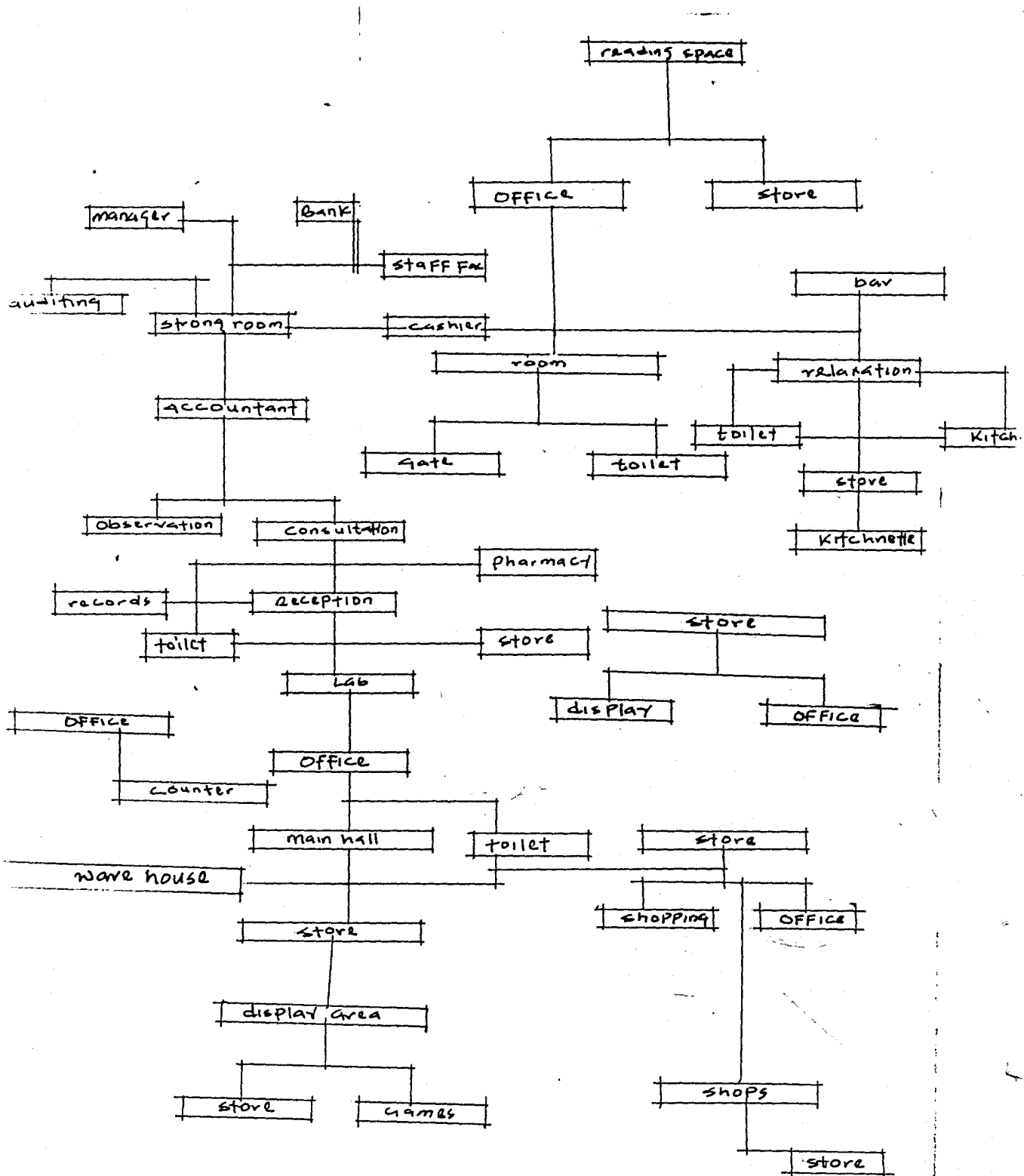


1	main hall
2	office
3	store
4	toilet

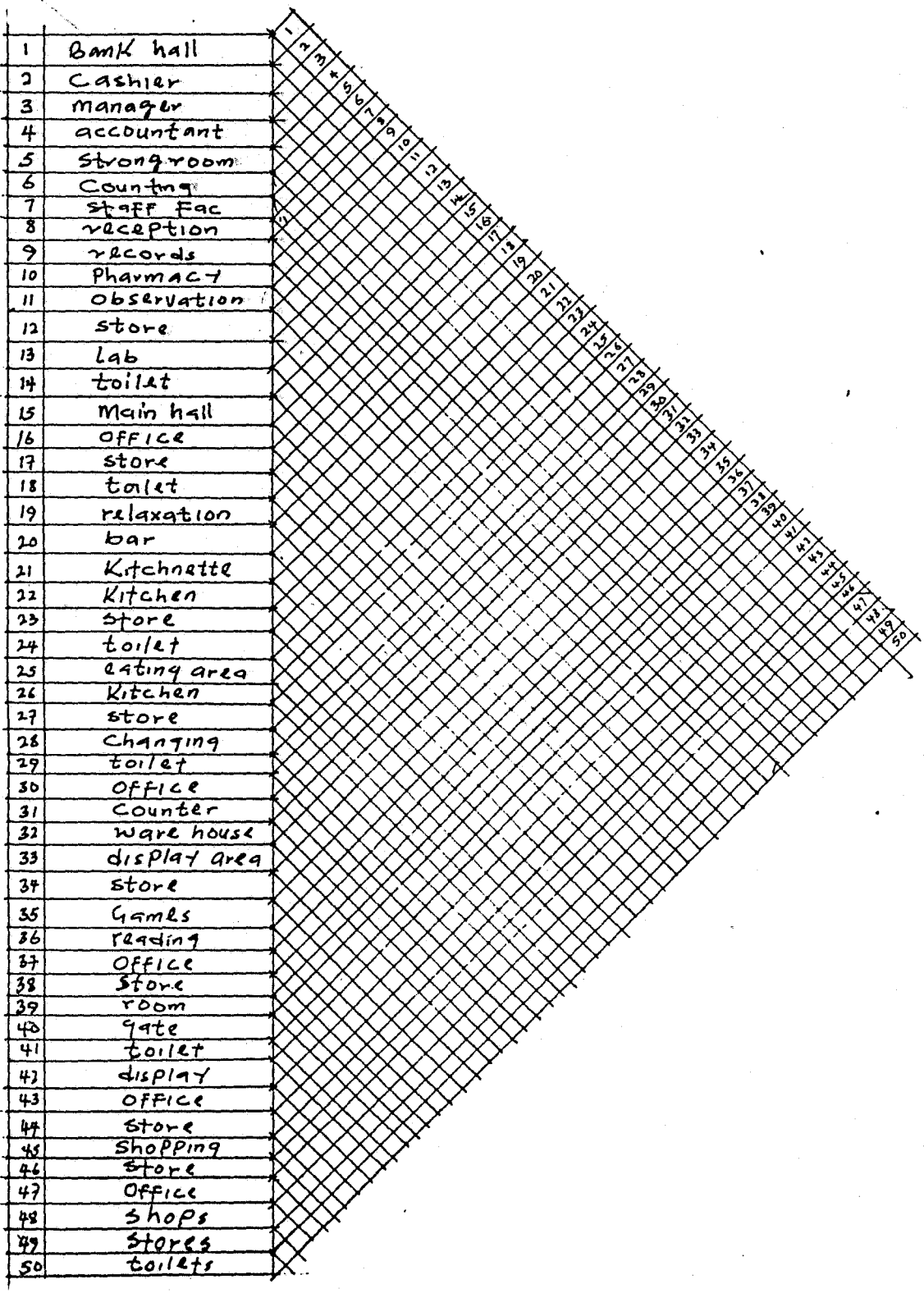
1	ware house

1	display area
2	store
3	games

INTEGERATED BOXING TO SCALE



INTEGRATED TRIANGLE OF FUNCT.



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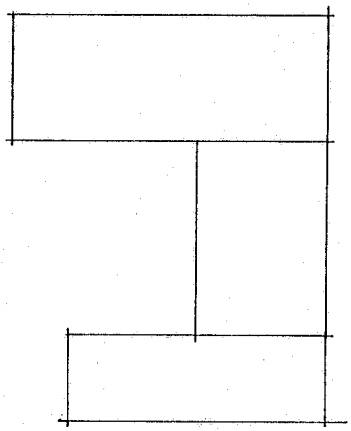

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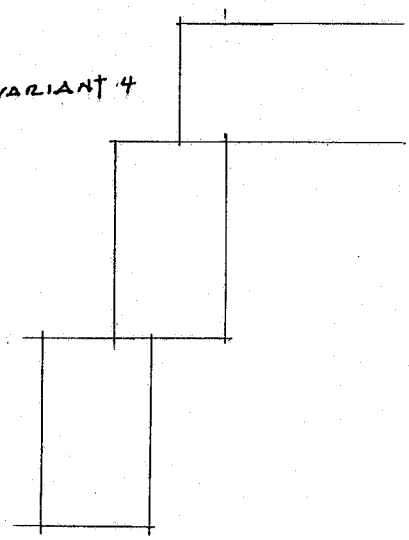

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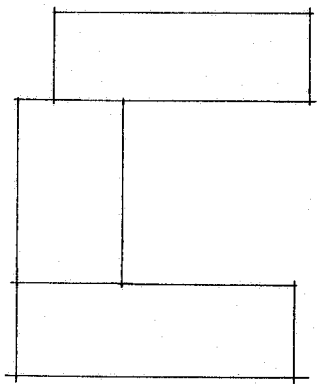

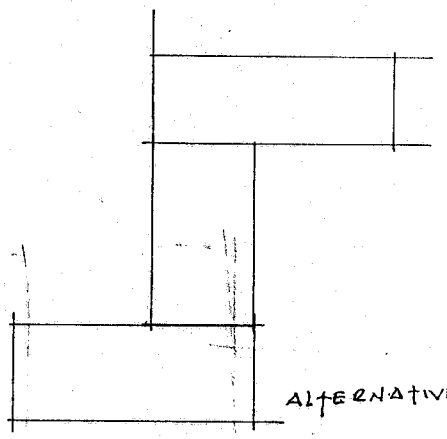

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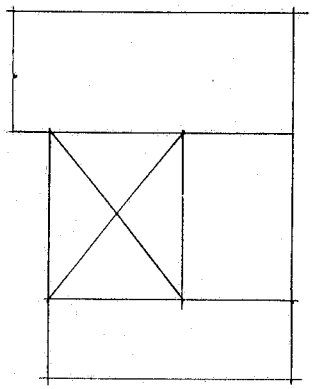

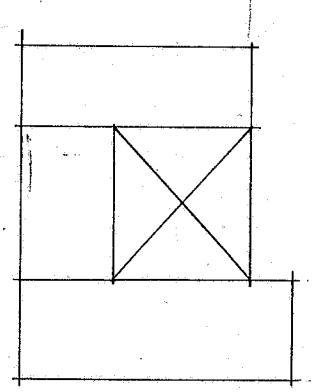

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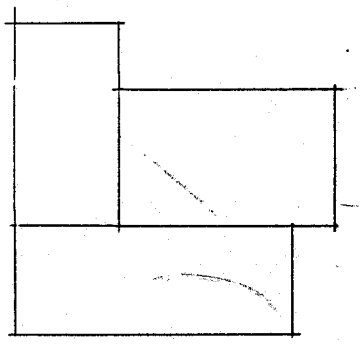

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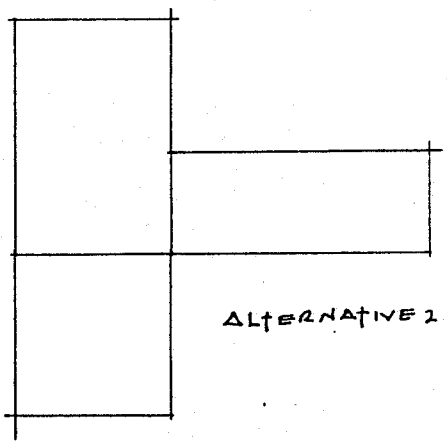

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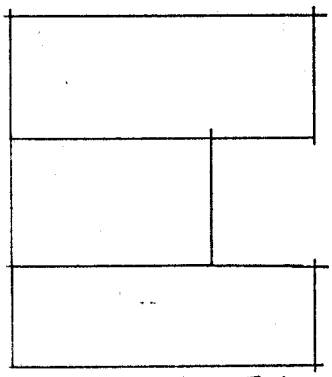

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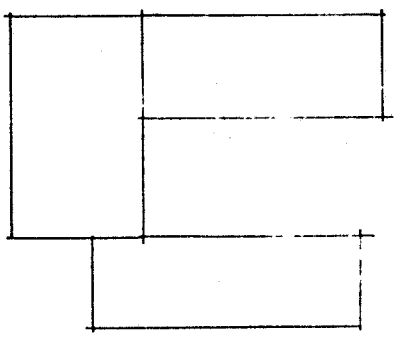

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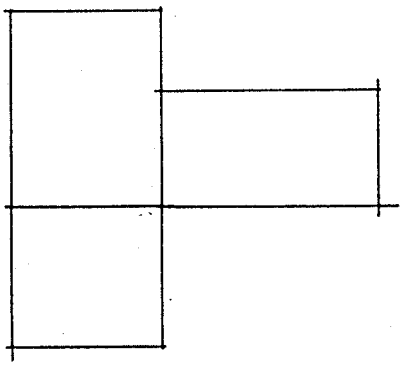

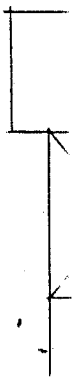

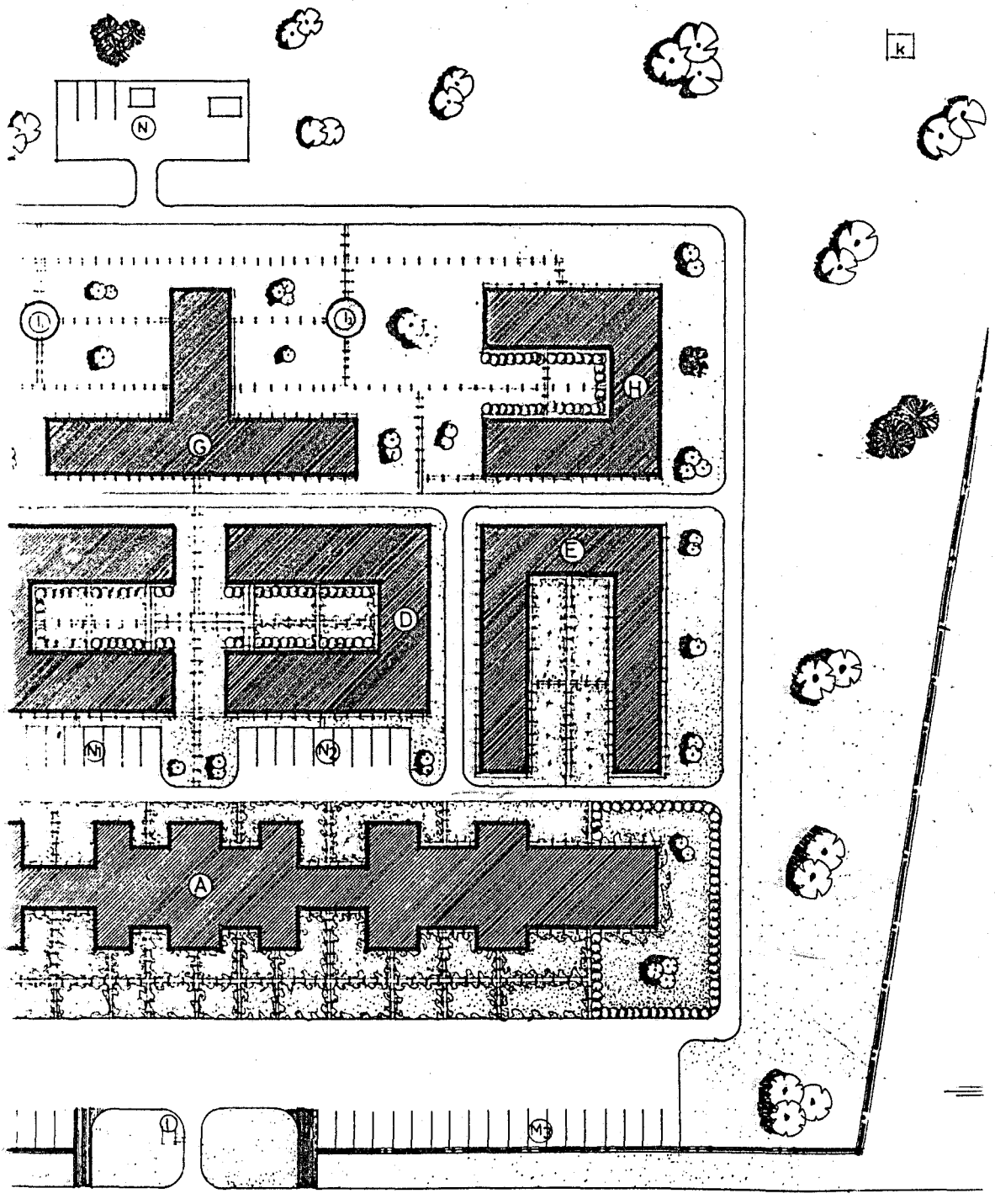
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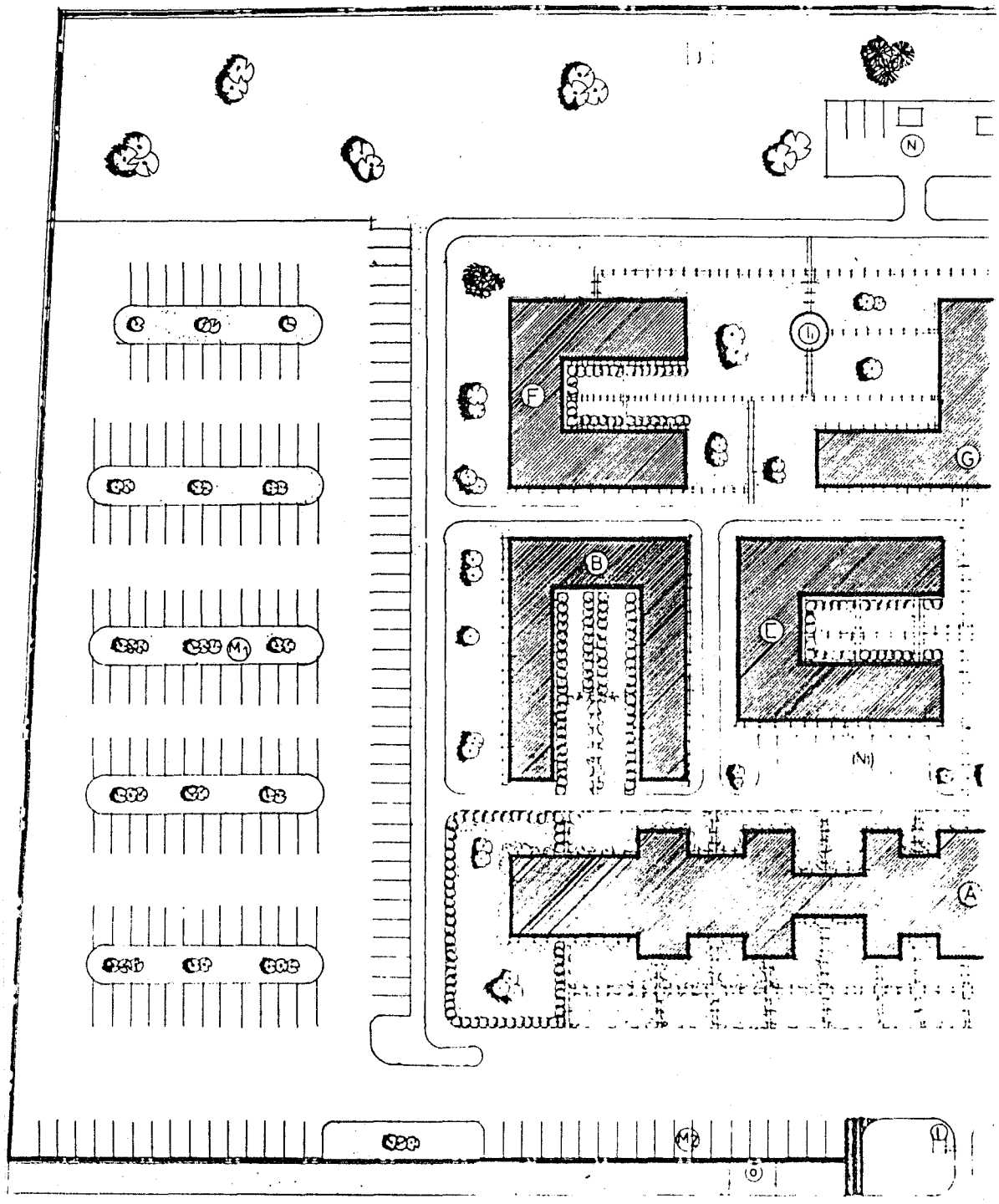

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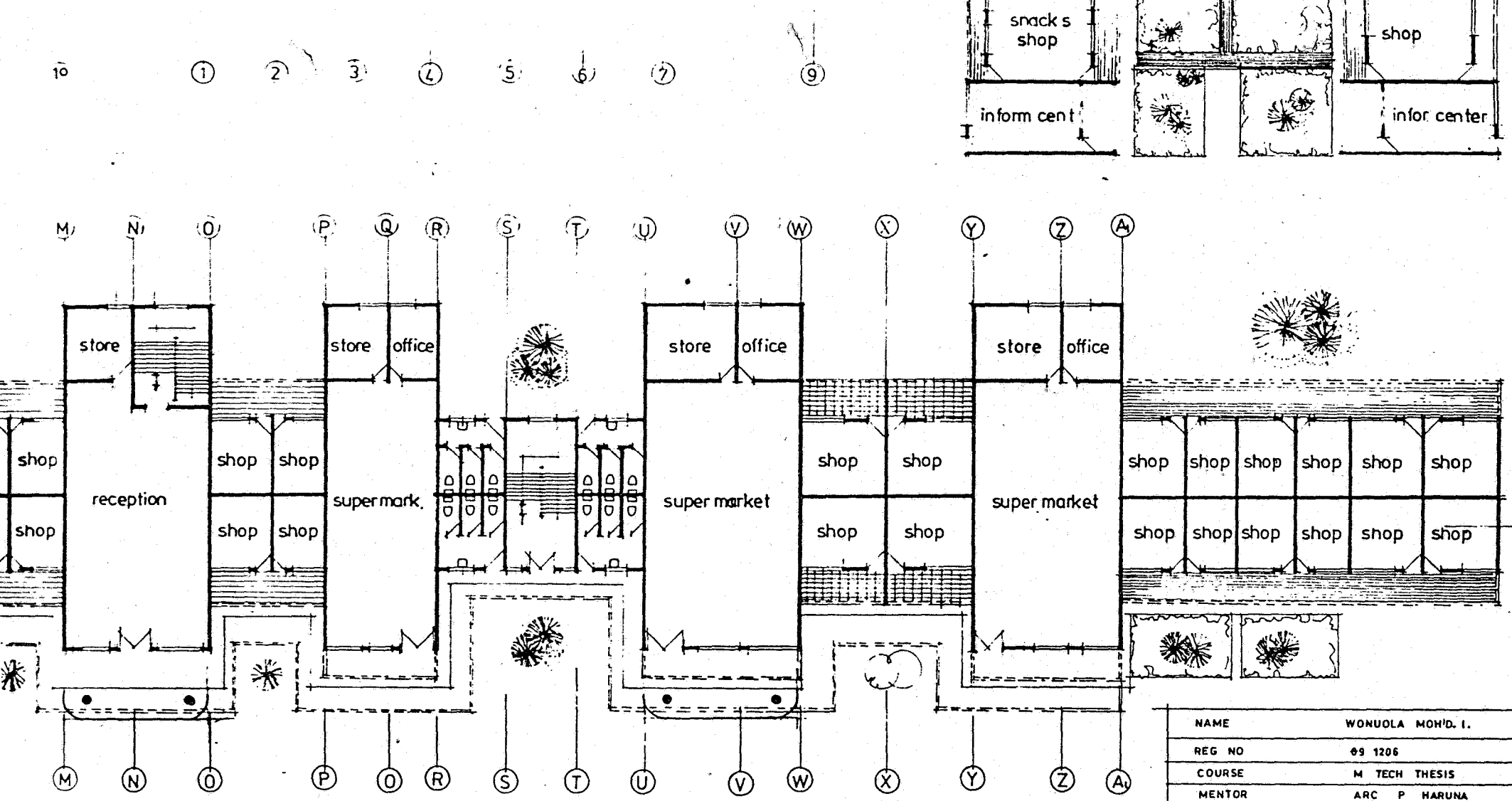

GROUND FLOOR PLAN

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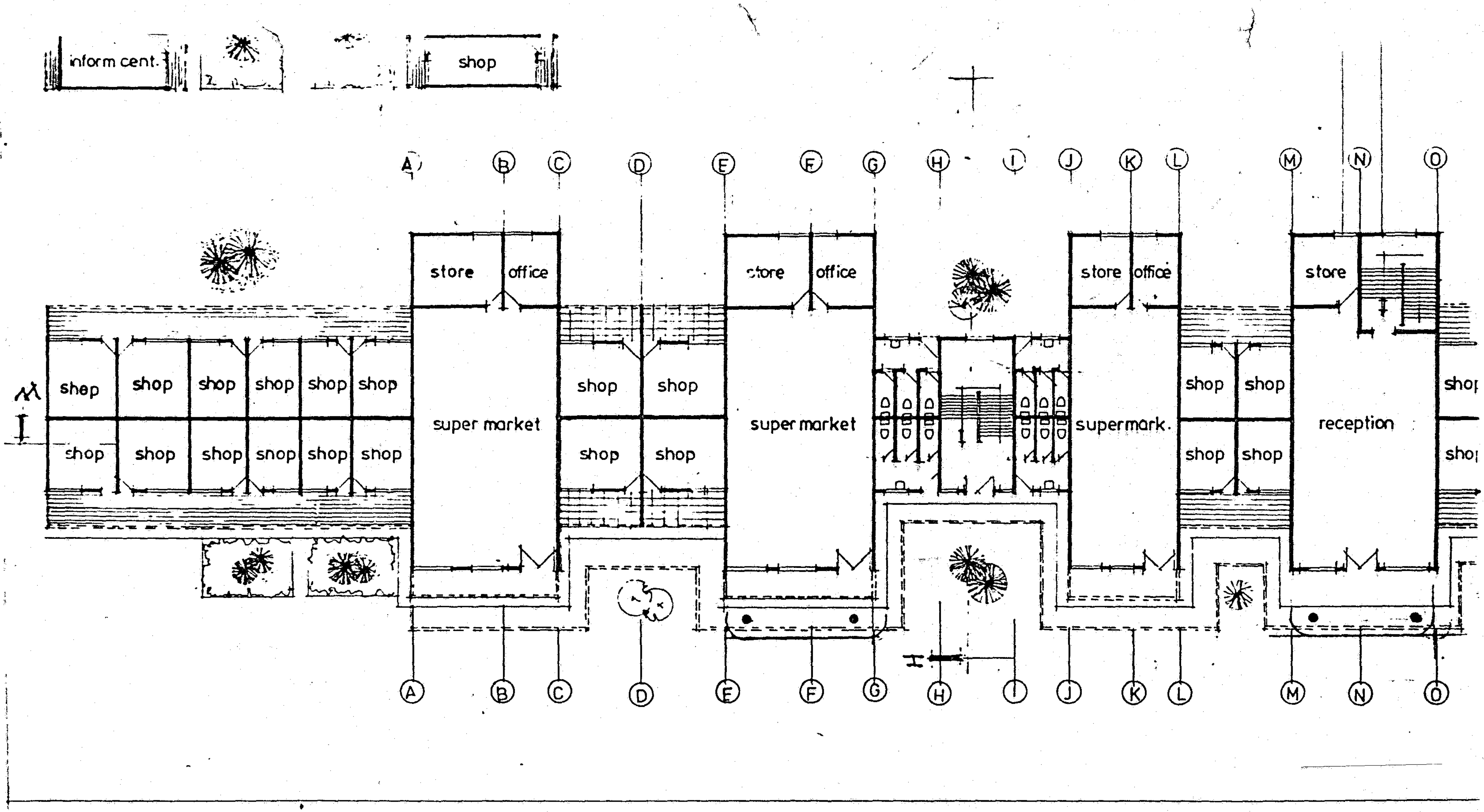
REG NO	99 1206
COURSE	M TECH THESIS
MENTOR	ARC P HARUNA
DWG TITLE	FLOOR PLAN
SCALE	1 200
DATE	MARCH 2000



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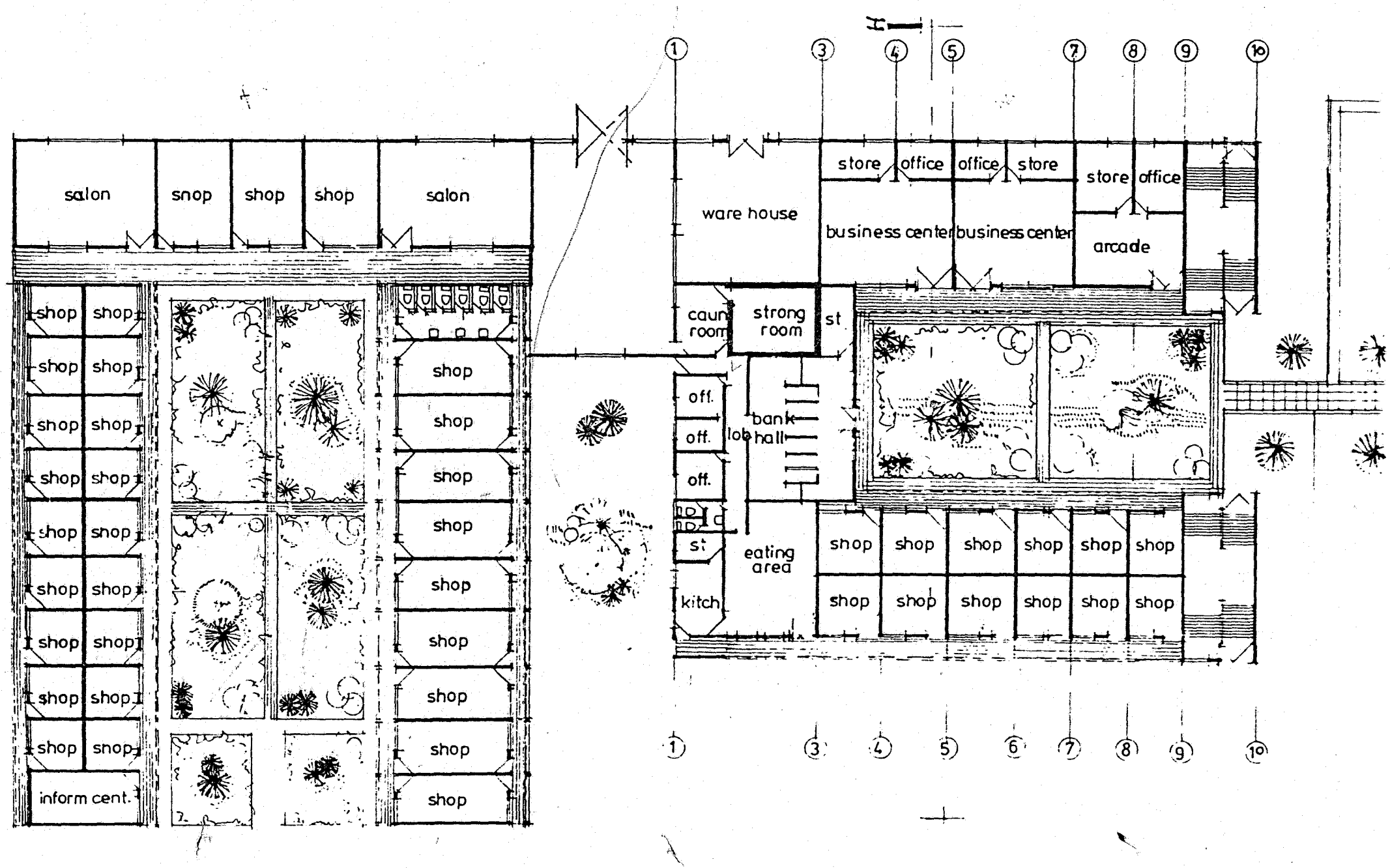
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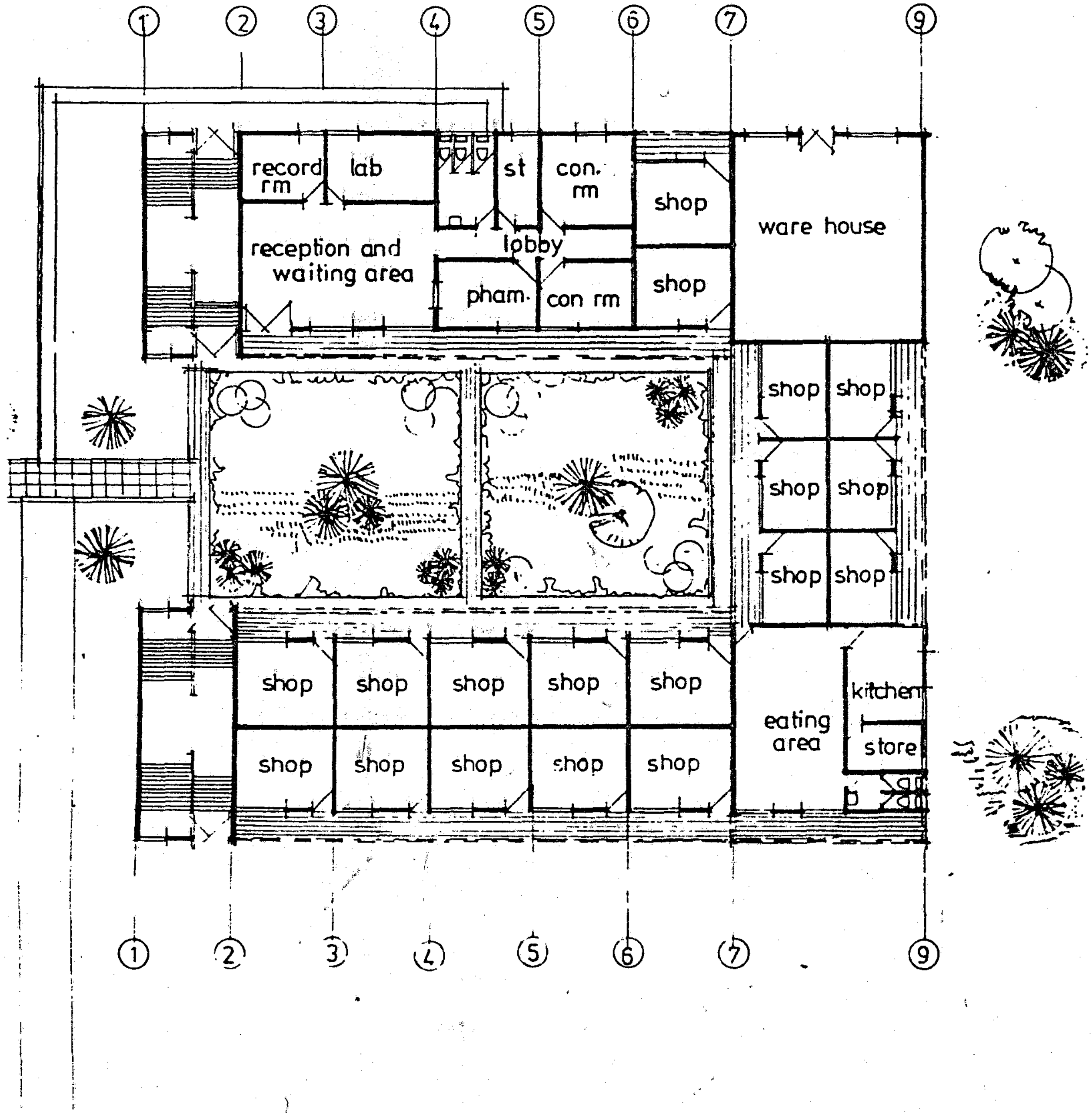

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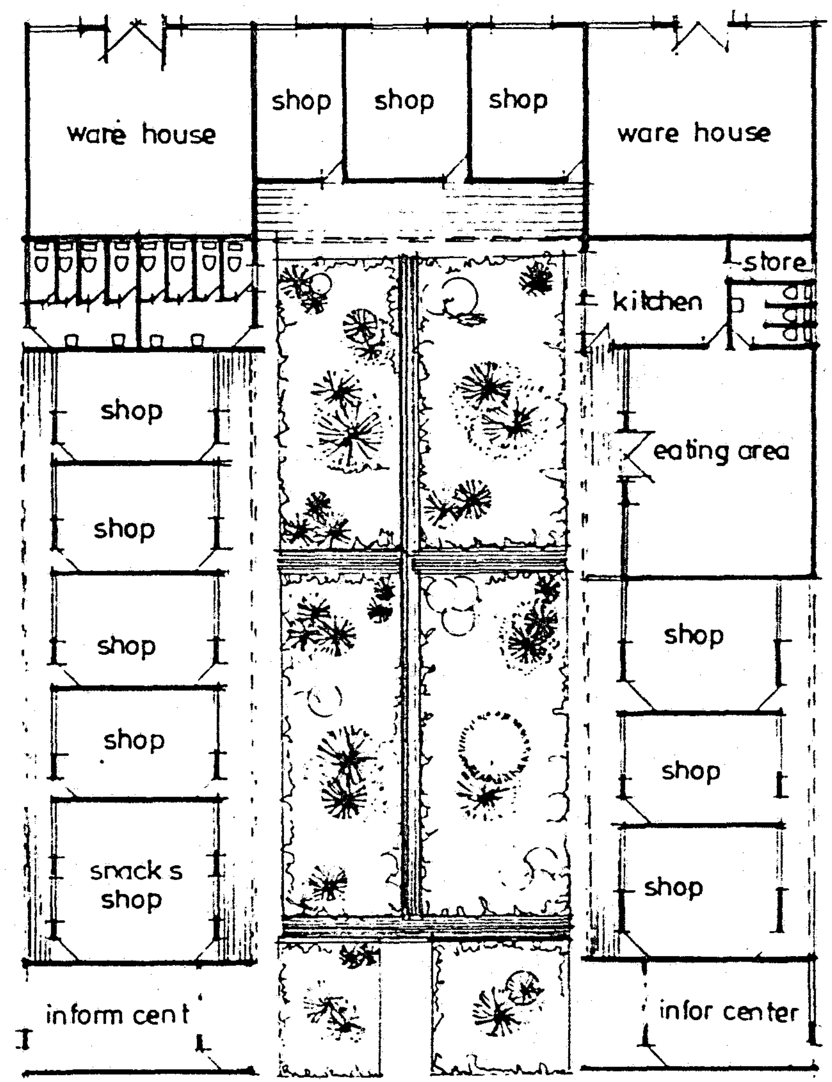

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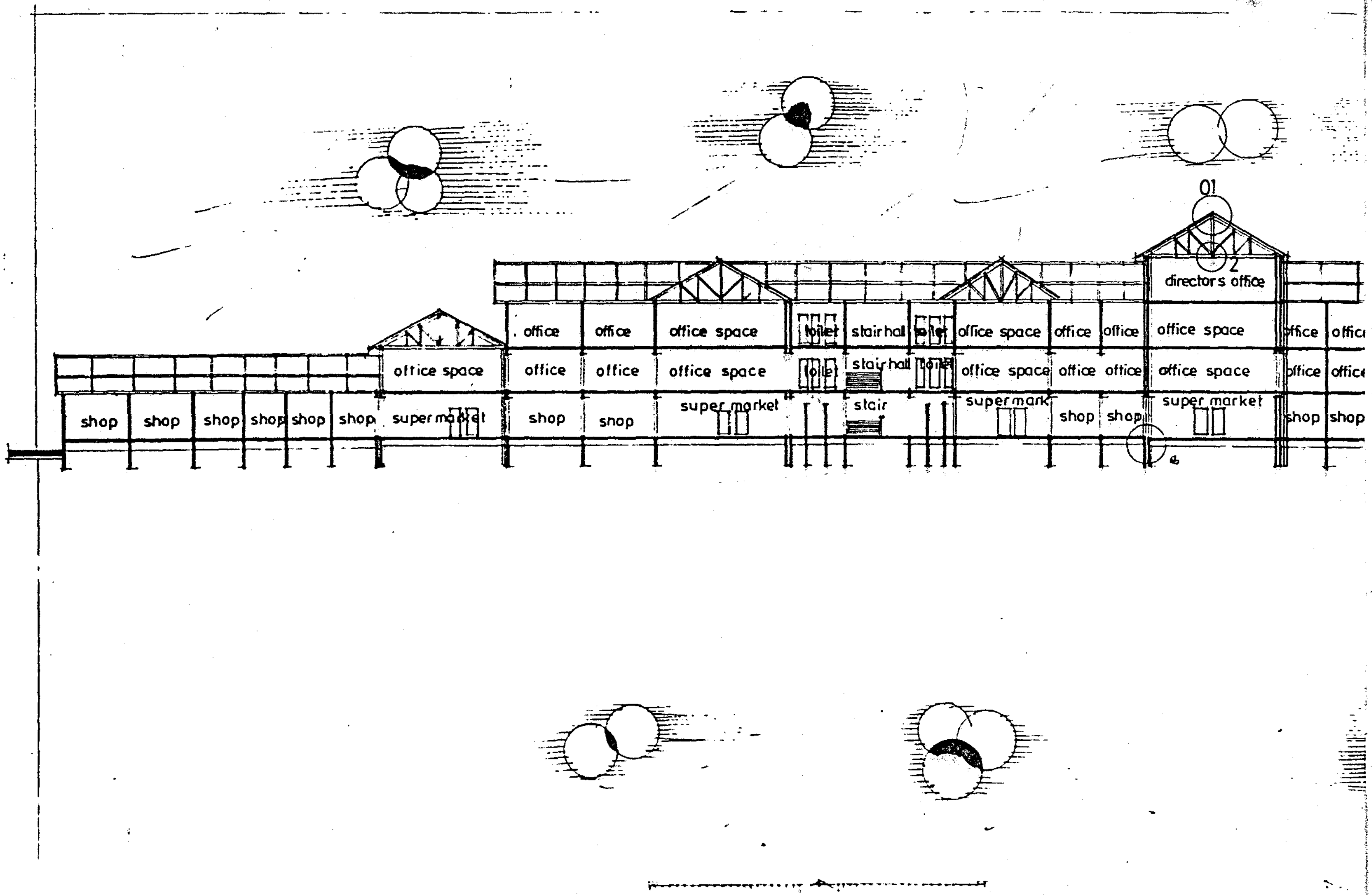
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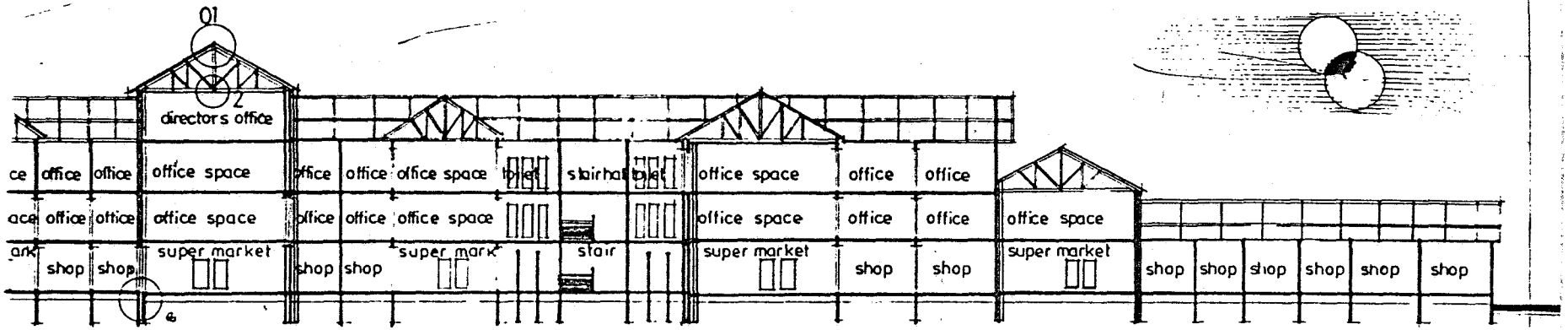
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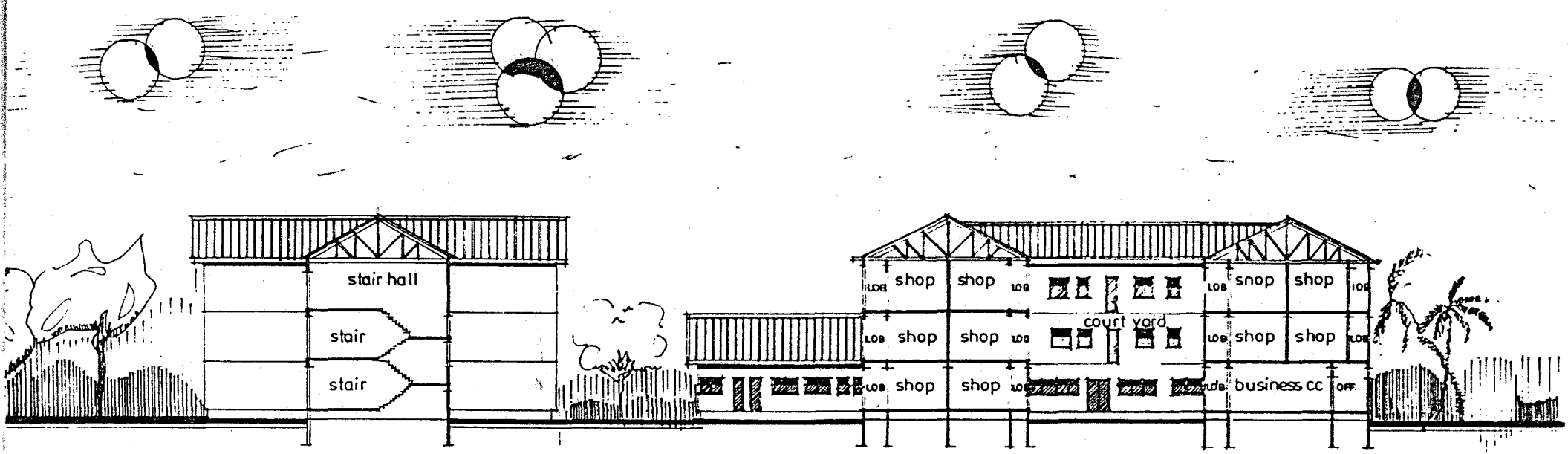

SECTION H H

ULTI PURPOSE SHOPPING

THE MINNA

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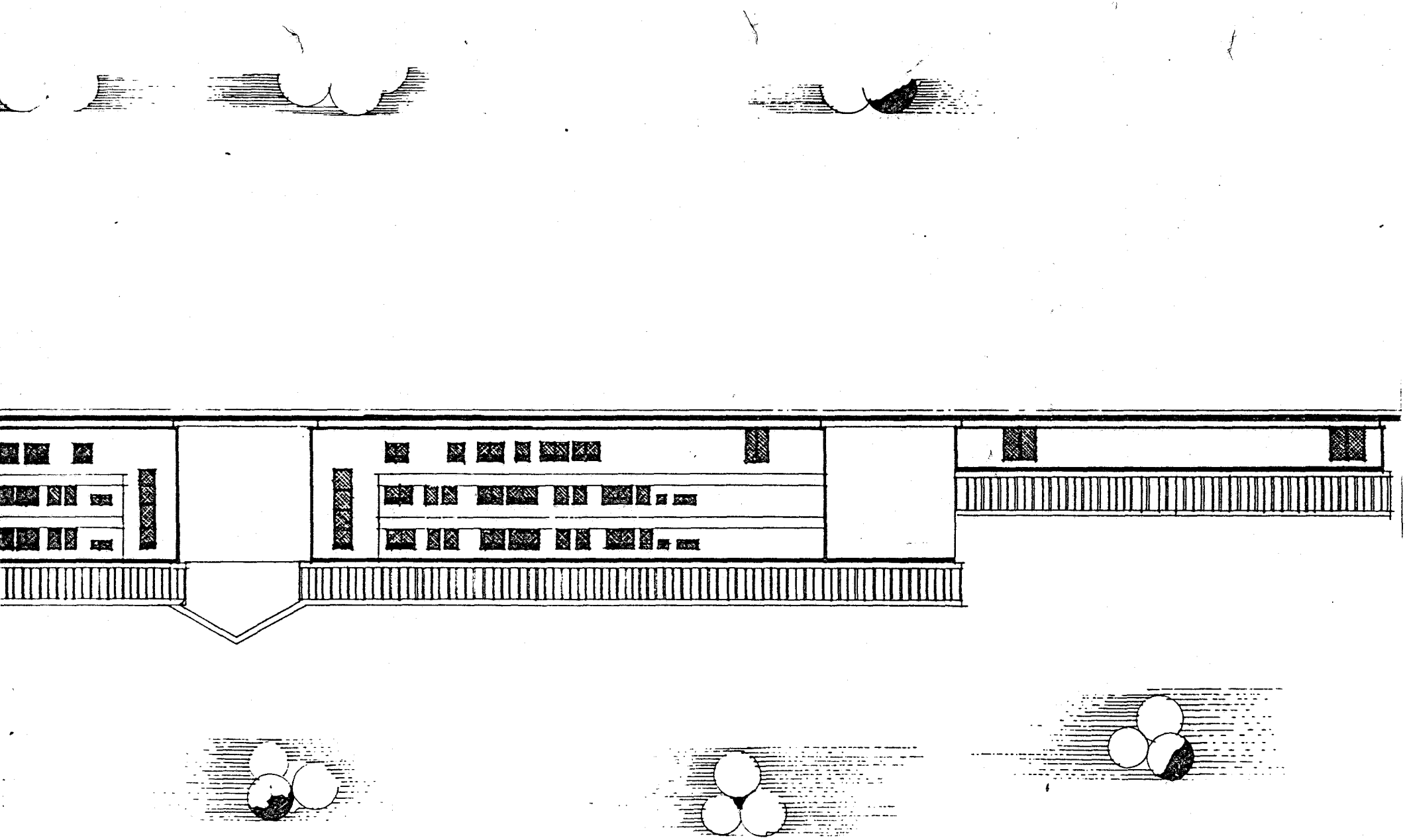
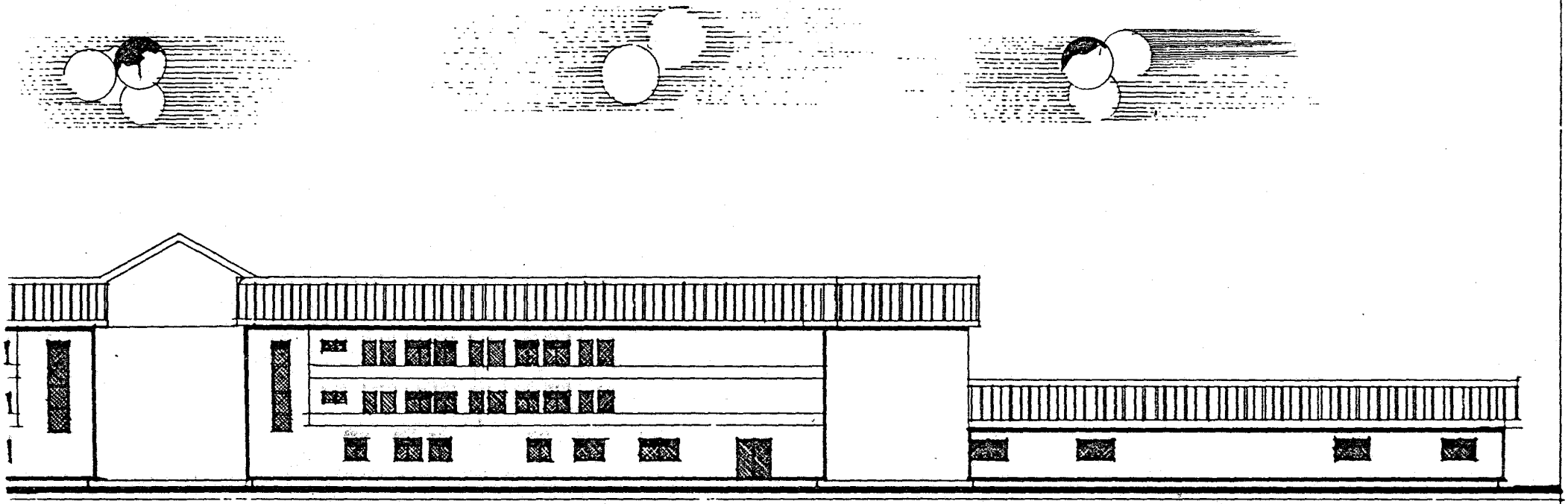
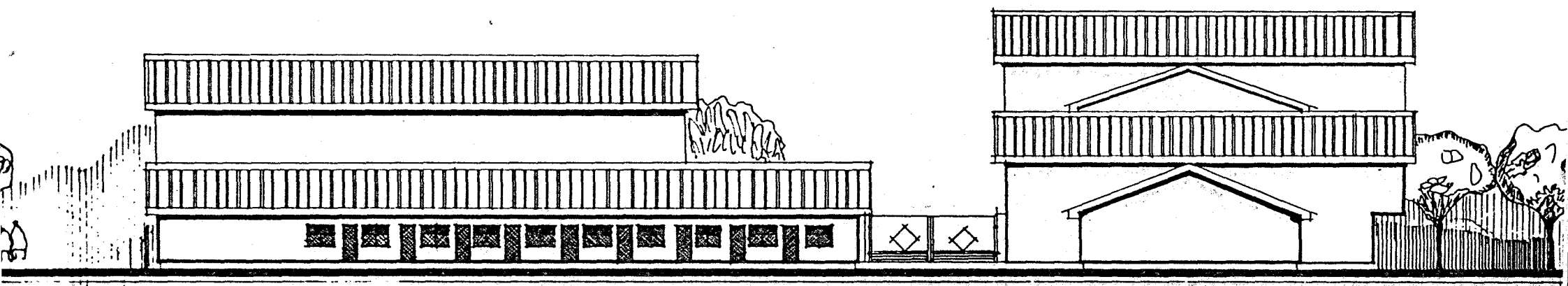
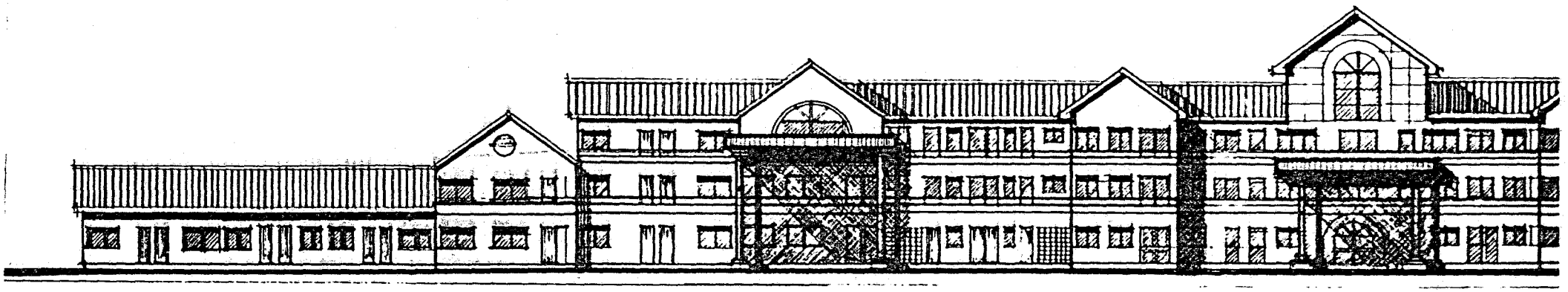


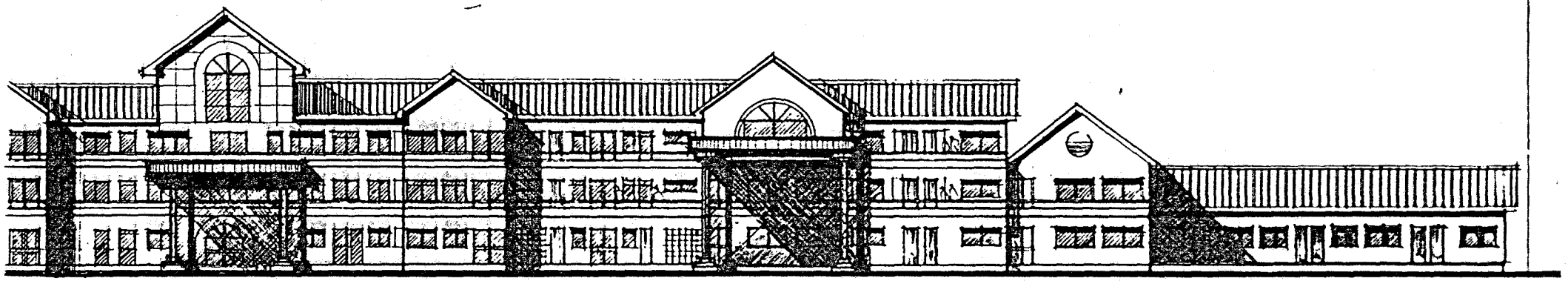


BACK ELEVATION

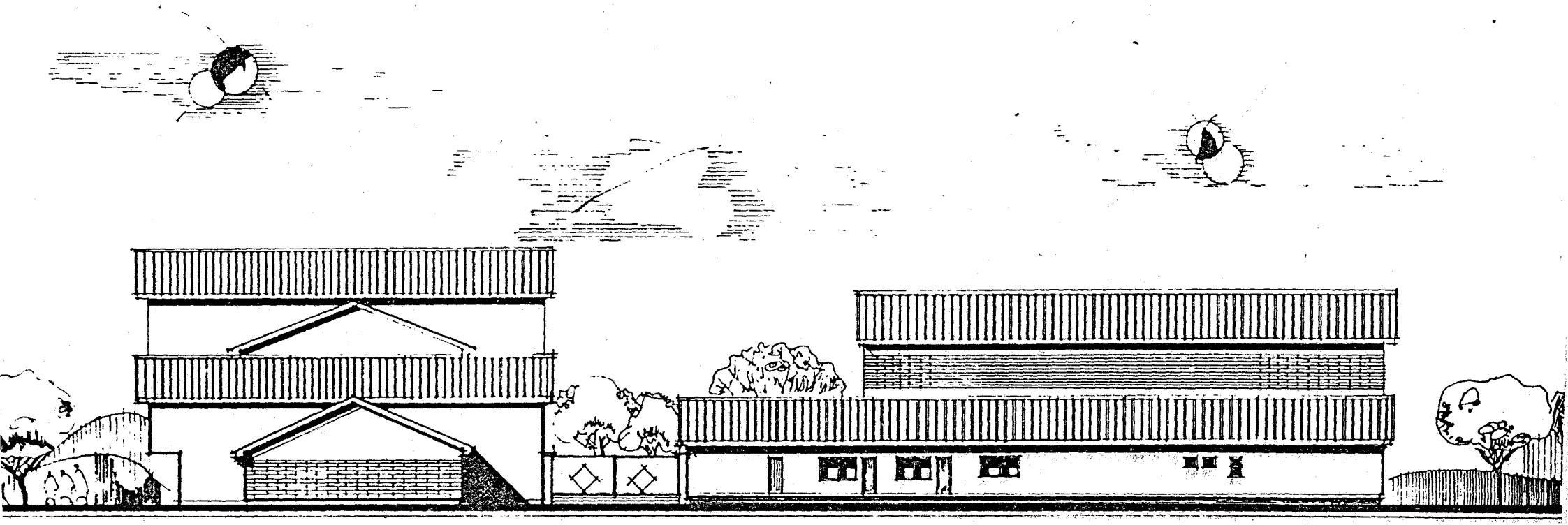


LTI PURPOSE SHOPPING
AE MINNA





FRONT ELEVATION



RIGHT HAND SIDE

MULTI PURPOSE SHOPPING
DE MINNA

CHAPTER EIGHT

8.0 DESIGN SERVICES

Services in its content enhance efficient and smooth functioning of the facilities put in place and those provided on the site. They are basically engineering in nature.

8.1.0. ELECTRICITY AND LIGHTING

The national electric power authority (NEPA) is expected to supply power, but in case of failure, for activities to continue a stand by generator of equivalent capacity shall be provided as a supplementary

- street lighting, along major walkways
- external security lighting around the building
- earthing system (precautionary)
- fire alarm detectors, at the restaurant, kitchen area shops, administration and perhaps the entire complex will adequately taken care of.
- telephone system at the reception, and telephone service unit.
- circuit wiring system for the building
- the electronic and computer games for indoor games.

8.1.1. Mechanical services - A 500,000 gallon specifically built for this project to serve the entire complex. The storage shall be connected to a recycling (puming) device and water treatment gadgets.

Plumbing Services - Domestic metal pipes are connected to individual building and areas requiring water supply from the major water source, which is the 50000 gallon capacity tank overhead. Plastic pipes are used for connecting water closets, sinks, baths, to the soak away. Roof qutter, is drained to the ground gutter through PVC pipe

8.1.2. Fire and security services - fire extinguishers are placed strategic points to all buildings.

8.1.3. FIRE PROTECTION

The centre comprises of several units as such adequate care must be taken to prevent fire incident, if not completely but must be minimized considerably, in this design. Care was also taken in the selection of non - combustible materials. Most of the elements, components applied cannot cause fire themselves except ignited by another sources as such, the underlisted are suggestions for necessary precaution which should be strictly followed.

- Waste paper should be discarded appropriately
- Combustible materials should be treated with fibre retardants.
- The entrance into the centre should be solidly constructed fire door.
- Minimum of two $1\frac{1}{2}$ hours resistance for all structural elements
- Flammable material or volation chemicals should not be stored in the centre.

- Water sprinklers should be avoided.
- Anti smoke detectors and fire warning alarm should be located at strategic points
- Fire fighting equipment such as carbon-dioxid or coventional fire extinguisher should be used in the centre.
- Circuit breakers, should be located at strategic locations as specified.
- Combustible materials for example paper should not be stored within the enclosure.

The materials used in the construction and finishing must have a fire rating of within two (2) or 1½ hours in order to prevent the guide spread of fire in case of occurence.

8.1.4 SECURITY

This is perhaps another vital area where due considiration should be given in the design stage considering the fact that, the centre comprises of several units, as the commercial unit may consist of materials or chemicals that are highly flammable also, other area that must be given adequate attention is the information desk, where possibly infomation may be kept within the administration unit for proper documentation.

In addition to structural and environmental requirements, security systems are to be employed in the centre to ensure safety of life and properties as well as to prevent theft and arson of valuables

The number of entrance doors are limited as this is expected to control too many movement to and from the centre. All the

windows and doors will be provided with burglary proof. Enquiry/check point is located at the entrance toyer with the main security/control room.

8.1.5. DRAINAGE

The drainage pattern both underground and on surface are dependent on artificialy created channels designed to slope away from the building. It is lined up with the public drainage channels that run along the Paiko road.

This design strategy is aimed at avoiding:-

- The deterioration of the soils load bearing capacity
- The harmful effect of moisture on the building finishing material especially the floor finishes
- Consequently, the centre is elevated above the ground level by 450mm.

8.1.6. WASTE DISPOSAL

Waste disposal from th site shall comform with the Minna township waste disposal policy. Metal containers shall be provided at specific locations within the multi purpose shopping centre.

8.1.7. WATER SUPPLY

The supply of water is sourced from water board, but in case of failure adquate privision is made to resque th situation when there is stopage from main supply. Provision is also made for both overhead and under ground tanks to provide storage for enough water. Also bore hole is dug at an appropriate location with pumpin machine to effectively pump water to the tanks to provide for constant supply.

8.1.8 MAINTENANCE

Quite a number of people will be employed and paid monthly by the management to adequately maintain and clean the centre on daily basis. These people are also charged with the responsibility of ensuring proper usage of both the facilities within the complex and the entire buildings.

8.1.9 SOLAR CONTROL

This is adquately taken of care off in the orientation. Also enough trees are planted in stragetic locations and the opens are properly located to prevent direct penetration. But in areas where all the above arrangement could, not meet up, then curtain are used to reduce direct penetration.

CHAPTE NINE

AESTHETICS

The first and major consideration in shop provision is simplicity. The architecture, the planning, the construction and the management must be devoid of all unnecessary encoumbrances. The basis must properly fit in with the socio-cultural patterns and perhaps the climate of the environment, but apart from that, shops should be simple. Finishings decorations and other embellishments should be kept to a minimum.

Traditionally, in most parts of Nigeria, the house is really never finished as the process of extension and modification continues. For this reason, however, the proposed design was made with possibility of future expansion without tampering with the aesthetics of the building.

The essential functions of shops include durability stability relatively fair insulation from noise, weather exclusive, excessive heat and prologed resistance to fire to enable tenants to escape the building in case of fire outbreak, and affordability. There are, of course, other consideration which were earlier mentioned like socio-cultural and even geo-political nature. These natually vary from locality, to locality, nevertheless, they are important and was given due consideration im my proposed design.

In all a proposed design should or must be made to satify basic requirements, and also be made affordable and aesthetically pleasing, which is the focus of this design thesis project from inception of this project and it is fully achieved.

The multi purpose shopping centre, when viewed from the above landscape features, the design and beauty would then become very apparent from the point.

The combine use of semi-circular and other regular forms of squares and rectangles is to portray a mixture of African traditional architecture and the contemporary world, the elevational forms were given close links with plans to achieve the same effects. The use of beautiful flowers to give a natural fragrance and pleasant looking to the whole setting.

GENERAL APPRAISAL

The design of multi purpose shopping centre, Minna is basically to achieve the set task (aims and objectives). Generally, the multi purpose shopping centre is charged with the responsibility to protect the shoppers against danger and injury which is mostly caused by rain and excessive wind. In this respects however, there are some forms of protection that the centre needed over the shopper. These include:- the under listed below:- health, offices, shops for adequate transaction, social interaction and all other forms of related matters,.

Shopping the world over means the same a visit to shop with intent to purchase goods or to search for a particular item, or a place where one can do a day shopping without leaving the premises and in effects where one can get most if not all the shopping requirement and essential needs under the same roof or premises. All these including other services could be done in the multi purpose shopping centre saving up in energy, human and material. Hence the shopper shop in desired convenience. With all the facilities put in place, if the multi purpose shopping centre, it enable the users to make the best use of their shopping time. To the Architectural world, it shall stand as a reference point of study and admiration. The project shall be financed by the interested private enterprenuer, to achieve maximum efficiency. The private enterprenuer shall supply all the official backing required locally and otherwise while the running and management shall also by the same body.

CONCLUSION

The benefit of the discovery technology for the multi purpose shopping centre seems to favour both the construction materials as well as the technological needs for the country Nigeria.

The architecture evolved in the design of the multi purpose shopping centre can be described as functional from the design procedure which incorporates the canonic approach to design as described in the concept evolusium.

The effective execution of the multi purpose shopping centre is not only to provide another commercial centre but will go a long way in solving the related problems.

Finally, the form produced by the design approch was given a baknced facade rich in aesthetics and character.

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