

**DESIGN PROPOSAL FOR PACKAGING FACTORY, LAGOS  
WITH EMPHASIS ON HUMAN TRAFFIC AND  
CIRCULATION**

By

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## DECLARATION

**I, JEJELOYE TEMITOPE O.** of the Department of Architecture, School of Environmental Technology, Federal University of Technology, Minna hereby declare that this thesis work has been a personal academic undertaking executed under the supervision of my supervisor. All information utilized and their sources have been duly acknowledged.

A handwritten signature in black ink, appearing to read 'Jejeloye T. O.', written over a horizontal line.

**Jejeloye T. O.**

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## CERTIFICATION

This thesis titled PACKAGING FACTORY, LAGOS by JEJELOYE TEMITOPE.

O. meets the regulations following the award of degree of Masters of Technology in Architecture and is approved for its contribution to knowledge and literary presentation.

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Studies

## **DEDICATION**

This thesis is dedicated to the King of kings, Lord of lords whose mercy  
endureth forever. All glory be unto Him.

## ACKNOWLEDGEMENT

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## ABSTRACT

Packaging is responsible for a strong product identity and individuality.

Today's packaging has become highly sophisticated. A specialized service industry, which takes cognizance of all sector of production packaging design and specification

The skills, technology and techniques required within the packaging industry must change as well as to match them. People have been exposed to new methods and sophisticated equipments to keep abreast of production technology and techniques.

With the growth of the local manufacturing industries in the 60's and 70's in Nigeria the demand for multifarious packaging increases and up sprang a challenge to meet this demand locally because Government fiscal measures progressively made it difficult for packaged consumer durable to be imported.

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# CHAPTER ONE

## 1.0 INTRODUCTION

All over the world, effective packaging plays a significant role in the prevention, promotion and presentation of customer goods and durable. It helps in the storage, reduces damages and loss to goods-in-transit and minimizes pilferage and tampering. Package is also responsible for a strong product identity and individuality. Good and attractive packaging helps to sell the product in it.

Today's packaging has become highly sophisticated. A specialized service industry, which takes cognizance of all sector of production packaging design and specification. Since numerous products compete for attention in the market place, the more functional a pack is, the more chances it has for first selection.

Consumers taste changes with time. The skills, technology and techniques required within the packaging industry must change as well as to match

them. People have been exposed to new methods and sophisticated equipments to keep abreast of production technology and techniques.

New and more modern machines have to be installed to be able to produce to the taste of the customers.

With the growth of the local manufacturing industries in the 60's and 70's in Nigeria the demand for multifarious packaging increases and up sprang a challenge to meet this demand locally because Government fiscal measures progressively made it difficult for packaged consumer durable to be imported.

This factory will rise to the challenge and began equipping itself with various sophisticated machines and equipment. It will also engage in staff development and training up to the present challenges in his industrialized world.

## **1.1 AIMS AND OBJECTIVES**

### ***AIMS***

1. To set up a modern packaging factory that that will meet up the challenges in modern day manufacturing industry.
2. To develop and engage staff by training them to meet up to present challenges in the industrial world.
3. To discover and adapt to customers taste by providing attractive and appealing package.
4. To create a tamper proof package that will protect goods from damages and deter packaging pirates against copying.
5. To source and use indigenous raw materials to meet the needs of the factory for production.

### ***OBJECTIVES***

1. To compete for attention of selection by buyers.
2. To obtain and utilize the latest technological equipments and know how. Where machines are installed and production line is efficient.
3. To meet the demand of a multifarious local packaging industry.
4. To attract and win the local industries market.

5. To present and promote a strong identity for the packages.
6. To challenge for other packaging factories for upgrading of their products.

## **1.2 RESEARCH METHODOLOGY**

In order to carry out this study, various methods of obtaining research information or data would be employed. This is going to involve the followings: -

**Literature Review:** - Libraries are effectively utilized for the research work. It involve finding out information about this area of study in order to have a sound theoretical base.

**Case studies:** - This involves knowing the extent of work carried out in this area of study. Determining the architectural design problems encountered and correcting them in this study. Two levels of case studies are employed. The first is the local level where cases found within the country are selected and analyzed.



The second level is the international level, where cases outside the country are selected and analyzed.

**Interviews:** - This involves asking some questions from member of the staff of existing packaging factories who have knowledge of production and administrative procedures; possible problems being encountered in these areas.

**Personal Observation:** This is in the form of familiarization with the nature and general characteristics of study.

## **1.3 LIMITATIONS AND SCOPE OF WORK**

### **LIMITATIONS**

There are limited numbers of packaging factories in the country and this is one of the main limitations, then scarcity of materials for packaging, factory planning and design and access to the existing drawings of case studies taken is difficult.

## SCOPE OF WORK

This project work is divided into two basic parts, written part and the design aspect.

The former, basically documents the design process, problems, solutions, improvements and literature review of existing packaging factory, the later is the design of the wholesome "packaging factory", which lays elaborate emphasis on both Architectural and landscape design. In order to graphically express the conceptual factory conceived for this design couple with the most effective utilization of the gentle slope land form in question, the need to specify the types of landscape elements [trees, hedges, flowers, grasses], to hard landscape element such as walkways and soon becomes necessary task. The built structures are a singular unit.

The wholesome "packaging factory" include a variety of administrative, production and staff facilities unit mainly.

## PRODUCTION PROCEDURE

The production procedure of each of the sections differs as their end products differ. But a standard waste allowance of 5% will be allowed to all the production sections.

### CORRUGATED SECTION

Making of the corrugated board is the first step. This is done using the corrugated machine; this consist of the single-facer; mill roll stands; pre-conditional heater drums; conveyors; glue units; double-backer; triplex slitter-scorer and duplex cut-off machine. Flutes and Krafts are the raw materials used in production.

Images and letters are then printed on the produced corrugated-board via printing plates, which are fixed into the printing machines. The printing machines used are: S&S flexo [this prints, glue and folds the boards to cartons]; two printer slotter [this prints on and slottes the board]. The next step is the converting of printing boards into cartons; this includes folding, stitching or gluing. Strapping and packing. Machines uses includes Bah

Muller auto-stitcher [this folds and stitches the printed-slotted board]; Emba foler- gluer [this folds and glue the printed- slotted boards]; Lampomatic semi auto-stitcher [it stitches manually] and signode strapping machine [for strapping of printed cartons which are then packed in tens and hundreds, ready for dispatch.

### LITHOGRAPHIC SECTION

Plate making is the first step; the plates are made from films and artwork. The machines use are contact-cabinet-reviser, which reproduces films from negative to positive and vice-versa; step and repeat, which makes plates; Nullith plate processor; heating cabinet, for drying and baking [oven], for baking of plates to increases it durability. Printing then follows using two colours. Heidelberg offset machine; two colour Roland offset machine; 2 four colour Roland offset ultra machines and six colour Roland offset ultra machine. Proof before bulk run is very necessary.

Some of the board use are white line chipboard, wax laminated board and P.E laminated board converting and packing then follows; this process

starts with the making of the Die-cutting-lank-board, using sharp and punt metals which are fixed on a plank board in accordance to the specification of the job involve. Equipments used include Jigging machine and bending machines [manual and automatic operated]. The plank board is then fixed into the creasing and cutting machine and the printed-paper boards are die-cutted into its specified sizes. The slipper Olympia gluing machines folds and glues the printed Die-cutted boards. The factory operatives then do the packing into cartons ready for dispatch.

### GRAVURE SECTION

Its production procedure starts from the making ready section. This section will store the imported engraved-cylinder for each job in its make ready room where they are collected and fixed into the gravure printing machines. The engraved cylinder can be compared with the printing-plate in the other factories. Images and letters for each job are engraved on the cylinder. Printing follows and this is done using the rotor-gravure chambon machines, which print as many as six colours at once on the papers. There is always proof before the bulk run. The paper use are wet-strength; Cromocoat; Astral-lux; labels and self-adhesive to mention a few.

Converting and packing follows, this is done with the help of Chambon finishing machines [for labels]; Titan slitler rewinder [for wrappers] and punching machine [for trimming of label job, such as bottle-neck-labels]. The factory operatives then do the packing.

### FLEXIBLE SECTION

Lamination and, or coating is the first stage in its production procedure. The lamination/coating machine does this. The machine is capable of laminating tissue paper to Aluminum foil using wax, film to Aluminum-foil and film-to-film using adhesive. It also applies hot-melt coating of 18-20gsm and P.V.D.C. coating of 3-5gsm.

The laminated/coated substrates are then ready to be printed on. The next stages are the make ready stage; printing stage and the converting/packing stage. All these stages are the same as that of Gravure factory.

## **SOME OF THE MACHINES USE IN THE PACKAGING INDUSTRIES**

Machines use in the company is of various sizes, types and makers. Some of this electrical machines are: - Single-facer; Double-backer; Horizontal-baler; Triplex-slitter-scorer; Duplex cut-off; Rotor-breaker; Printer-slotter; S&S flexo-printer; Emba-foiler-gluer; Bah Muller auto-stitcher; Karma dye-cutter; Partition slotter-stacker; Slitter-scorer; signode-strapper; APR plate making machine; Two-colour Heidelberg off-set printer; Two colour Roland parva printer; Four colour Roland ultra printer; Two colour Roland ultra printer; six colour Roland off-set ultra printer; Slipper Olympia machine; Pivano cutting machine; Chamboon rotor-gravure printer; Jigging machine; Chambon finishing machines; Titan slitter-rewinder; New Chambon rotor gravure printers and the Laminating/coating machine.

While some of this machine uses A.C electric motors; others uses D.C shunt-electric motors for their operations. This direct current [D.C] is produce by using an A.C motor to drive the shaft of a D.C generator, which supplies direct current to the D.C motor, which in turn operates the machines. The electric motor used is operated on three phases and are

connected in star/delta or delta/star depending on the working principle of the machine involved. The motors are operated on 220-415 volts or 50Hz.



# CHAPTER TWO

## 1.0 LITREARTURE REVIEW

### 2.1 INTRODUCTION

Packaging in the strictest sense of the word is almost anything that protects, embellishes, or wraps a product. Packaging creates order out of chaos, allowing loose materials such as sugar, flour, or salt to be handle, shipped, and used conveniently and efficiently.

It can also be said to be an enclosure used to contain, protect, or transport product. These enclosures may be composed of paper, wood, glass, plastic, or a metal, depending upon the product. Packaging can also be used to make a product more attractive to the consumer.

From the beginning of commerce, packing has been indispensable in the movement of many kinds of products. Animal skin, baskets woven from reeds, and earthenware vessels may be considered the packages of

prehistoric man. The ancient world contributed glass bottles, clay amphorae, and leather bags. The cask was probably an invention of the middle ages. But it was not until the industrial revolution, which created a need for packaging great numbers of similar items for shipping, that the packaging industry became economically important.

Virtually all-modern manufactured and processed goods require packaging at some stage in their production and distribution. Fresh foods need the protection and convenience that packaging gives. Specialized knowledge and skills as well as specific machinery and facilities, are required to produce packages that meet one or more of five basic demands: protection from the environment; containment as a handle able unit; machine performance in the packaging process [such as on filling machines]; communication to identify contents and to aid in marketing; and convenience to everyone concerned with the making, distribution, and use of the product; in addition, disposal of the package must be easy.

These basic requirements must be provided at a cost related to the selling price of the goods. Apart from certain luxury items such as cosmetics and perfumes, packaging is not an essential part of what is to be sold but only

means of conveying it. Consequently, packaging costs must be kept to the minimum necessary to do the job required. Table 1 lists approximate packaging costs in relation to typical product costs. The labour content and the machinery required are not included. For some products, e.g., sugar, the packaging is at a minimum; for others [e.g. butter] there is great variability according to the job the package has to do.

**Table 1:** cost of packages in relation to product cost

Product	percentage of packages on the market costing		
	Less than 3 percent of product cost	3-10 percent of product cost	More than 10 percent of product cost
Sugar	100	-	-
Margarine	-	100	-
Butter	38	25	37
Flour	-	50	50
Tea	33	17	50
Cocoa	-	50	50
Biscuits	-	50	50

Chocolate	33	-	67
Toilet soap	18	41	41
Detergents	4	65	31
Tobacco	17	50	33
Cement	6	79	15
Electric light bulbs	23	40	37

## 2.2 HISTORY

Some common forms of packaging are thousands of years old. Large plant leaves were used to preserve food and are still in use in certain cultures. Animal skins were utilized as packaging materials in prehistoric times. Ceramics containers for the storage of olive oil dating from the 1<sup>st</sup> century- were excavated in Pompeii. Barrels for wine and other liquids were commonly used in classical Greece. The invention of weaving permitted the introduction of new materials such as linen or burlap to wrap objects of various kinds.

Several centuries ago the most common package was the glass container. Paper was too expensive to be used in wrapping and metal was used only sparingly as a container. Generally, consumer products were bought in the market place unwrapped. When necessary to transport goods, wooden crates were often employed, but packing crates were expensive to build and were used many times before being burned as kindling or used about the home.

The ancients developed glass bottles and phials to store perfumes and ointments. Baskets of wicker and reed were also used to package goods. Liquids were sold from open casks or bottles and the purchaser was expected to supply his own container.

In 1809 the first major development in the packaging industry occurred when Napoleon, distressed that his troops were suffering from malnutrition and food poisoning from badly preserved meats and vegetables, offered a prize to the first man who could solve the problem. Nicolas Appert, a French confectioner, claimed the award with his method of preserving foods by canning. The following year Peter Durand, an Englishman, received the first patent for developing a method of using metal containers

for preserving food – the tin can.

By 1850's the price of paper had dropped sufficiently to allow it to be used as a packaging material. Its first application was a container for tacks. In 1852 Francis Wolle received a U.S. patent for a bag- making machine. Thirty years later Albert j. Jones invented a machine that would corrugate, crimp, and boss paperboards. This development of the corrugated box allowed manufacturers to crate their goods in paper and ship them without fear of damage.

As additional improvements were made in packaging machines, new packaging materials also were developed. Today paper, wood, glass, and metals are still basic packaging materials, but with the development of plastics and the advance of our technology the packager has a wider selection of packaging materials than ever before.

## **2.3 FUNCTION OF PACKAGING**

Packing facilitates a more satisfactory for of handling many products. Lard, sugar, and almost all edible foods used to be sold in bulk, and the

commodity was subject to contamination on its way from the farmer to the consumer.

As marketing and distribution methods became more complex, and as the distance between producer and consumer became longer, protection and preserving goods became increasingly important. A variety of ways to ensure freshness and cleanness were devised. These ranged from evaporation to freezing and irradiation, and from using airtight tin cans to employing a variety of new forms of vacuum-packed or double and triple-wrapped merchandise. Beyond purely hygienic considerations packaging is necessary for shipping, transportation from the store to the home, and preservation in the home itself.

Consumers have learned to associate the design, the colour, and the quality of the package with the quality of the package with the quality of the brand. When containers seem cheaply designed, or when there is a defect—such as a difficulty in opening the package, consumers feel that the manufacturer has shown little interest in their needs. On the other hand, consumers want to be assured that the package is secure enough that it cannot be tampered with.

Designers of packaging are skilled in conveying the essence of a product in such a way that the consumer feels the appeal of a product without even seeing the contents. A good detergent package, with swirls and dynamic designs in bold colours suggests power. Perfume, for example, depends almost exclusively on the attractiveness of the bottle.

Packaging can help a consumer to notice and to identify a product. It is a signature, a guarantee, and a guide in choosing among many otherwise similar brands. People want their senses to be stimulated and appealed to, since their aesthetic sense has become sophisticated.

## **2.4 PACKAGING MATERIALS AND FORMS**

Nature has used packaging in many different ways and with various materials. Fur, nutshells, eggshells and the shell of a tortoise all are efficient materials fulfilling the main function of packaging: to protect and preserve as well as beautify. In commercial packaging, materials play a very important role. A package made of wood, metal, or jute makes a completely different impression from one made of silk or plastic.



Packaging materials have undergone fashion trends. Natural materials have been partly abandoned in favour of synthetic ones such as plastic, cellophane, or polyurethane. Many contemporary packaging materials provide better protection than the earlier natural materials. Food wrapped in saran wrap or a similar material last longer and is protected from air, bacteria, humidity, and other detrimental influences.

Packaging materials can enhance or detract from the apparent value of the object being wrapped. For example, Camembert cheese from a wooden box seems to taste better. Jewellery in a velvet setting appears to be more valuable. Wine in a tin can does not compare in appeal with wine in an elaborate glass bottle.

Whenever amorphous contents are wrapped, such as meat or bulk butter, a feeling of greater security is given to a product when it has regular shape. Manufacturers have experimented with unusual shapes to test consumer reactions. A Swedish packaging concern, for example, developed an irregular, triangular-shaped container for milk and soft drinks. The container was used even for wine and established a unique position for itself in the market.

## **2.4 MATERIALS AND THEIR CHARACTERISTIC AND MAJOR APPLICATION**

**PLASTICS:** - Plastics did not have a major effect on the packaging industry until after World War II. Today however, no packaging material is versatile. Plastics are available in the form of flexible films, rigid or semi rigid sheeting, extremely light cellular foams, and even as liquid coatings that add new protection and performance properties to older materials.

One of the largest packaging application is in combination with other materials, such as metals, glass, and paperboard, to build new containers that are utilitarian, more convenient, attractive, and economical. Examples are everywhere rustproof plastic bases for paper bodied cleanser cans, as coatings for boxes and cartons, as coatings for glass aerosol bottles, and as foam for interior cushioning pads for shipping containers that carry delicate instruments or fragile glassware.

**PAPER AND BOARD:** - paper- including wraps, bags, cartons, and corrugated containers- accounts for approximately half the money spent for

packaging materials. Recently, paper has gained new performance values from its combination with plastics. Also, new techniques, for which paper is an ideal medium, continue to bring new richness and beauty to paper, making it desirable for many packaging purposes. The basic advantage of paper and board include low cost, ease of fabrication in different sizes and shapes, durability for most packaging jobs, and the ability to be set up, filled, and sealed on high-speed equipment.

Paper in sheet and board form is widely used laminated with aluminium foil, creating a packaging material that combines brilliant luster with moisture protection. Paper complements foil in other ways. The rigid-foil frozen-food tray is often topped with a paperboard lid, both for reasons of economy and because paperboard is a superior medium on which to print the package sales message.

Corrugated board is a paper product, which is feeling the impact of new strategies of marketing and merchandising. In the past, the corrugated carton was regarded purely as a utilitarian carrier; this was reflected in its drab exterior. More recently, however, a distinct trend has developed towards a colourful surface decoration by using full colour printing on white

Kraft linerboard, the outer layer of material, which covers the corrugation.

**CANS:** - the term "tin can" is a misnomer. The package can is made of steel, with at a very thin coating of tin plate. Only 0.4% of a can's weight is tin, and it is now possible to produce cans with enamel linings that eliminate the need for costly tin.

A strong competitor of steel in the large container market is aluminium. Aluminium is lightweight, nonrustable, pleasing to the eye, and very easy to facilitate without side seams- and it is competitive in cost with steel. This competition has forced steel producers to develop new light weight grades of steel, some which are less than half the weight of metal considered acceptable for can manufacture in 1959.

Complicating the picture has been the introduction of composite aluminium foil and paperboard can, a strong challenger for markets formerly dominated by metal containers- particularly motor oil and frozen citrus concentrates. The foil-fiber can, as it is called, is low in cost, lightweight, and disposable.

One of the result of the vigorous competition among canning materials is the development of many easy-opening feature designed to eliminate can openers "Zip-open" and "lift-off" tops for hermetically sealed aluminium and steel cans are becoming a reality long awaited by packagers and consumers. Regardless of the composition, the hermetic can's place in packaging is secure. It is economical, it leads itself to high-speed machine filling, it is an efficient self-service merchandising medium, and it is convenient to use and discard. But above all, it is strong and exceptionally protective. Canned foods, which have been opened and found to be entirely palatable.

**GLASS:** - the glass cannot rust or corrode, is chemical inert, and is resistant to great temperature extremes. Also, from a design standpoint, it can be blown or moulded to an infinite variety of shapes. However, competition for metals and plastics has forced the glass industry to accelerate the pace of normal programs of product improvement. The result has been great strides in performance and in properties of glass containers.

Although it is not evident to the average consumer, today's glass bottle is

far lighter in weight than the was the standard bottle or jar at the end of world war II. Continual technological advances have been made in reducing the weight of glass bottles and jars at no sacrifice in strength. New surface coating minimize surface damage and enable glass containers to be handled on high-speed bottling line and distribution with less danger of breakage. A notable outgrowth of these developments has been the introduction and acceptance of the inexpensive disposable glass bottle used to an increasing degree by dairies and other bottlers.

**METAL AND PLASTIC TUBES:** - when astronaut John Glenn made America's historic first triple orbit of the earth on feb.20, 1962, the absence of gravity in his capsule made it impossible for him to take food in the normal way. Thus the major portion of his food consisted of a paste like mixture, package in a plastic tube which col. Glenn squeezed directly into his mouth. The plastic tube he used is a modern version of the collapsible metal toothpaste tube.

Metal tubes, however, still occupy a special place in packaging. They keep their content fresh and pure until consumed, and they permit dispensing of

the exact quantity desired. They are used for a broad range of foods and non-foods, ranging from toothpaste to heavy caulking grease.

Metal tubes are produced with or without protective internal linings, depending on the product. Most pharmaceuticals require a liner to prevent undesirable chemical reaction. Although aluminium is most commonly used in tube manufacture, lead and tin also are employed. Lead, however, is easy to rupture and tin is too expensive for most products, although it is used widely in the packaging of ointments, where strict demands of compatibility between package and product must be met.

A special feature of plastic-tubed products is that after they are dispensed by squeeze action, the tube retains its shape. The plastic most used in squeeze-tube production are polyethylene and vinyl, but a new plastic, polypropylene, is gaining acceptance for foods, chemicals, cosmetics, and pharmaceuticals. Polypropylene shares with other plastics the ease of printing and lightweight, but it possesses superior grease resistance and retention of fragrances.

## CHAPTER THREE

### 3.0 RESEARCH AREA

### 3.1 CIRCULATION

Horizontal circulation of people, whether customer or staff. We will be taken to account the position of the reception in relation to access and security, the possible aural and visual distraction of management is also considered.

This has been an unfortunate feature of the design of some modern packaging plant; workers must be protected from such distraction.

Other questions like; should access to certain areas be restricted to staff? If so, will lock and key be necessary? Will "staff only" doors be needed e.g. for use with material trolleys? Operation at peak times or at all times? Is provision to be made for power driven cart/trolley? Main entrance and exit doors deserve particularly carefully study. Will there be a lobby to prevent draughts affecting staff on duty, at a counter just inside the entrance? This is essential unless doors are revolving. A curtain may be expensive but perhaps it will be justified. If revolving doors are proposed, is there



that there is reduction in obstacles or impediment to people movement and at the same time is safe and convenience.

Most pedestrian's trips are relatively short only a few meters, probably walking from blocks to blocks, sections to sections. This is because pedestrian always seeks parking spaces within 600ft of their destinations.

There is the need to understand the pedestrian trips including the functions activities actions associated with the trips so that better pedestrian's facilities can be developed. Pedestrian trip purposes are closely related to the types of land use associated with the trip origin or destination. The number of trips attracted or generated by an activity depends on its size and type. For instance, production building, which is put to use, always will attract or generate more trips than any other section in the factory.

For the purpose of this study, three pedestrian trips can be distinguished within and around industry namely, terminal trips, functional trips and the last but not the least recreational trips.

### **TREMINAL TRIPS**

These are trips associated with the transportation made arrears. It includes the packing lot loading bay and offloading bay, service area.

### **FUNCTIONAL TRIPS**

This form of trip is the most common or prevalent. They are made to carry out a specific function such as business trips, which are either related to work or personal business trips.

### **RECREATIONAL TRIPS**

These types of trips are really prevalent in industrial sector that is business oriented. But it is very obvious that one cannot do without tem. Workers or the staffs obviously need to relax, eat, while away time to be able to work efficiently. So these trips for relaxation, changing rooms for resting as well as their activities in which walking is one of the primary purpose.

### 3.3 VEHICULAR CIRCULATION

Circulation can be design as a pleasant experience especially when walking or riding special effects either they are in order at the beginning or at the end of the journey. Convenience suggests speed when desired.

Although this type of environment [industrial setting], the questions of speed are totally out of it. This owing to short distances around. Also there is the need for a reasonable protection from acoustical and visual nuisances vehicle can produce. The glare effect arising from the source of light, sun must be adequately taken care of to reduce accident. Special trees will have to be planted along the driveways. Safety is another vital issue one cannot forget. This is because it is a commitment to friction-free traffic flows. These includes adequate road capacity, discourage proper acceleration drive-ways, make sure that the corner and bends conform to standard turning radii, accident proof, lighting and signalization, a logical sequence in lighting all traffic channels are very vital and important.

Aesthetic is also necessary in circulation, it implies a couple of functional requirement with designed opportunities. A well-planned and designed circulation creates a beautiful environment, which gives a very good and boost the image of the industry.

These three factors can be interlinked because of the diverse ways in which they cut across themselves.

### **3.4.1 HUMAN FACTORS**

This factor is very vital when planning circulation, because they are going to be the user. So therefore care must be taken when considering human factors. However the study of anthropometrics is necessary to be able to determine the various dimension of human being in different posture for instance, space requirement for human being when climbing stairs is quite different to when walking on a flat ground. Also the issue of space utilization, access for utilizing a particular operation is all vital things associated to human factors. Aside this volume of human being needed in a particular point should be noted. To exemplified this, administration blocks especially reception where the number of human figure is expected to be higher than the other place must be provided with enough space to be able accommodate the large number of people and avoid collision. Further more the activities determine which, how and where spaces are probably required.

### **3.4.2 PLANTS/MACHINES FACTORS**

These machines always perform the production activity of any industry. So therefore care must be taken to adhere strictly to the manufacturer's instructions. It is not a mere saying in Nigeria today that most people preferred to set aside this manuals from the manufacturers of these machines. This may be due to the shortage of space, thinking of the designer who sees these manuals as too extravagant when it comes to use of space. Take for instance, some of this small printers around, the basic thing is just to get a shop, mount your machine without given due concern to space. Access to the machine becomes very difficult.

Positioning of machines, wiring of machines, space requirement for machine, space required to utilize it are all vital things to the designer should concentrate on if he/she wish to maintain cleanness as well as reduction in accidents.

### **3.4.3 EXPECTED TRAFFIC [VEHICLE]**

These cover the various types of vehicles that will be needed in this factory. Trucks, delivery van, cars both for customers and workers, ambulance for the clinic and all these vehicles will be put to use should be documented so that adequate road capacity shall be provided. The dimension of the likely used vehicle should be noted so those standard turning radii are given. Also as part of circulation that shall be needed to consider whether to segregate small vehicle from big vehicle, main access from services entrance.

### **3.4.4 BUILDING POSITION**

Also one other factor that should equally receive attention is the building positioning in respect to driveways, park or garage. Orientation of building should be done in such a way to permit easy accessibility. Store; warehouse should be very close to truck park, offloading bay should be far away from work clinic. Access for servicing should be very close to maintenance and other sections is paramount such as waste disposal.

### **3.5 IMPORTANCE OF CIRCULATION**

Circulation is very important in any environment be it industrial zone, residential zone, institutional or any other environment you can think of the result of effective circulation can be under emphasized, as some of its important shall be analyzed here after.

#### **SAFETY**

A well-planned and effective circulation ensures safety. It reduces accident since adequate provision is provided for space. It reduces collision in that control of movement is ensured. Among other things worthy of note is the reduction in over-crowding and ensures strict orderliness.

#### **HEALTH**

Good circulation brings about reduction in health rise hazard. This with strict adherence to machine manual ensures that adequate spaces are provided taking into consideration the servicing and human working relationship. With the number of working personnel noted and this

throughout the building. This is not easy because of the different type of machinery, which will be combined together and is expected to work in harmony for effective productivity and efficiency. At least two scientists with real justifications should be called upon to undertake the task of installation of this machinery.



# CHAPTER FOUR

## 4.0 GENERAL INFORMATION ON CASE STUDIES

This is vital data collection means, the essence is to acquaint the researcher with the existing real situation of a particular project focus, and to ascertain problems and limitations, which would serve as corrective measures for proposed design and would enhanced improvement upon what existed.

### OBJECTIVE

1. To evaluate the structural and functional performance of facilities.
2. To evaluate the rate of patronage of the customers.
3. To evaluate the degree of response of customers to existing provided facilities.
4. To evaluate the staff's requirements of facilities provided, the existing spaces and the relationship between them, as well as in relation to required standards.

## **4.1 CASE STUDY ONE: BORDPAK PREMIER PACKING**

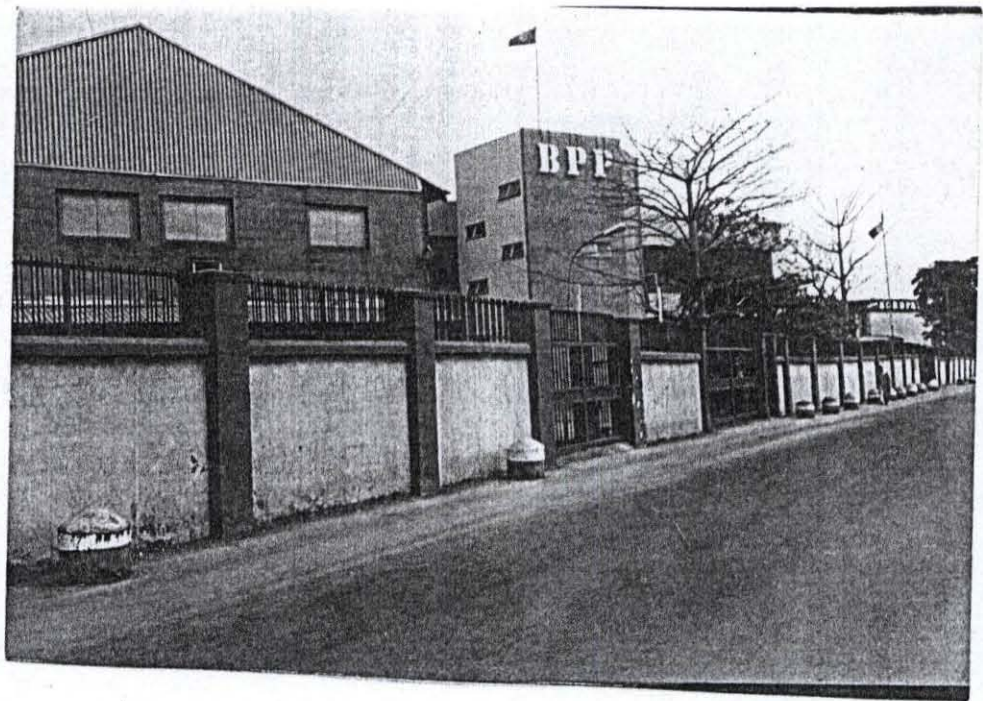
### **ADAPA LAGOS**

In circulation as regard to industry, attention should be given to services and emergency access is a major functional consideration. Services vehicle including trucks for deliveries, forklift for loading and off-loading, refuse removal and emergency vehicles such as ambulances, fire service vehicles. In order that or to a very good and easy circulation. The designer should aim at reducing any unnecessary curve or corner bend, so that the big trucks will be able to maneuver well without any difficulties. Also there is the need to separate or segregate the main access from the services access. The aim of this is to forestall delay or accident. Servicing access is always constructed in such a way to enable long trucks to ply easily.

### **3.4 FACTORS TO BE CONSIDERED WHEN PLANNING CIRCULATION**

There are varieties of factors to be considered when planning circulation. Although they can be grouped to under these three heading namely

- a) Human factors



have been provided since all this years, and the management. For a job well done in terms of maintenance of the machines staffs and buildings. However, inadequate car park and the landscaping with soft landscape is still needed to be introduced to make the premises more comfortable.

## **4.2 CASE STUDY TWO: VEERLEER WORLDWIDE PACKAGING, APAPA, LAGOS**

Veer leer worldwide packaging Apapa, Lagos, is a privately owned packaging factory owned by some group of lebaneses, located at ½ Dockyard road Apapa, Lagos founded in 1981, the factory is into manufacturing of metal packages.

### FACILITIES AVAILABLE

1. Administrative block
2. Production halls
3. Training halls
4. Clinic
5. Security post
6. Car parks

## 7. Power house

### ADVANTAGES

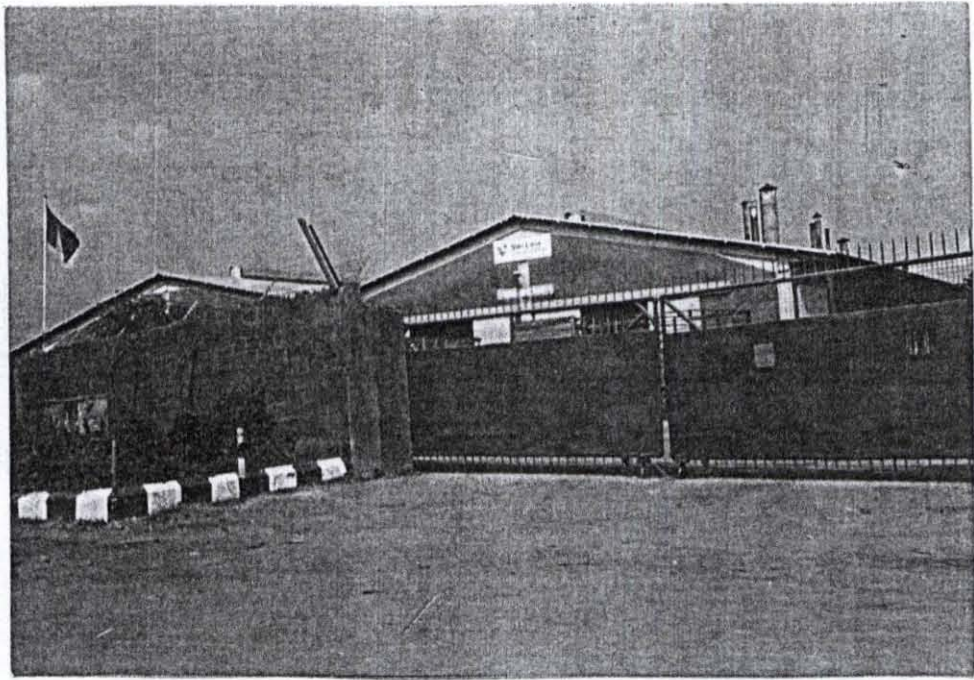
- i. Easy to access
- ii. Building are well spaced
- iii. Good landscape

### DISADVANTAGES

- i. No privacy
- ii. Inadequate car park
- iii. Poor security network
- iv. No room for expansion

### APPRAISAL

Been that the factory is owned by foreigners its planning is different in way most especially the landscape aspect of planning. The premises is well landscape but in the other side the arrangement of the facilities within the premises is not fine because it does not give room for privacy because at the main entrance you first meet the production halls which suppose to be



at the private zone of the site, the administrative offices at the inner most part of the site which suppose to be at the public zone of the site.

So before you get to the administrative offices you must have seen all the secret of the production halls. This is recognized and corrected in my design.

### **4.3 CASE STUDY THREE: DOYIN INDUSTRY, COKER VILLAGE, LAGOS**

This industry is a private owned by an indigenous individual [Prince Samuel Adedoyin]. It is situated in Coker village district, off Orele/Mile 2 expressway Lagos.

It consists broadly of 3 major units via:

1. Administration
2. Factory
3. Maintenance

The administration serves as the controlling centre while the factory, which handles production, is broken down into four sections: - lithographic, gravure, flexible and corrugation.

### ADVANTAGES

- i. It is well equipped
- ii. Good layout for factory
- iii. Factory sections well related
- iv. Adequate facilities provided for staffs

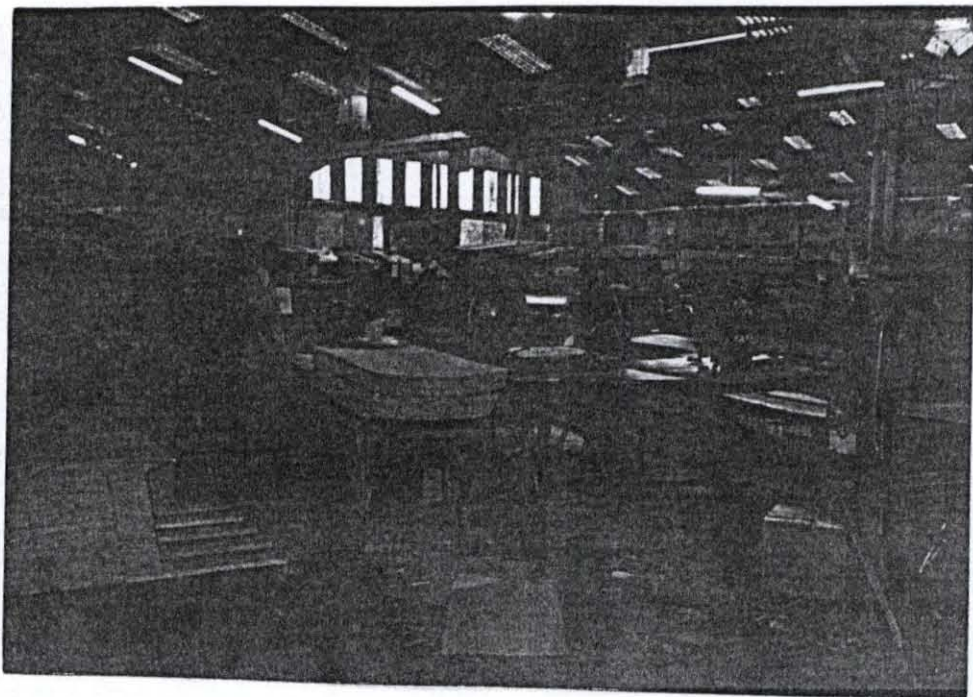
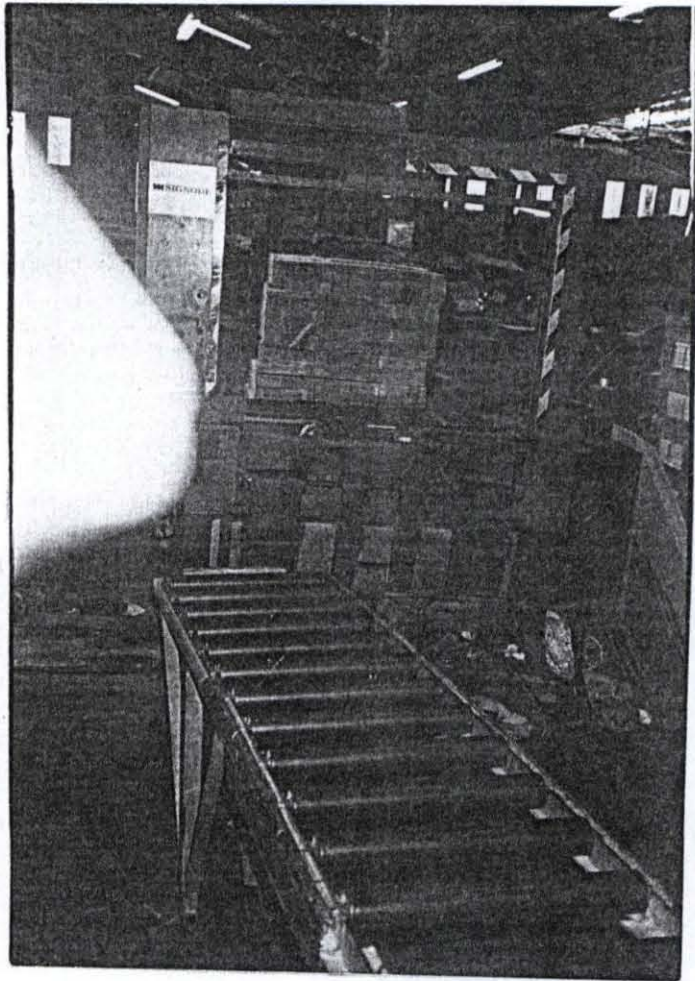
### DISADVANTAGES

- i. Access road to factory is bad
- ii. Inadequate parking space
- iii. Delivery bay too small

### APPRAISAL

This industry's layout enhances ease of production process, thereby helping its ability to meet the demands of the client. The distance between the administrative block and the factory is a little too close for comfort.





# CHAPTER FIVE

## 5.0 CLIMATE DATA

Since, the site for the proposed paper package factory is situated within badagary, the climatic features of the site can be regarded as being the same with that for Lagos state.

### 5.0.1 WIND

There are two major prevalent in Lagos State. These are:

- i. The **Tropical Maritime Wind**: This is the more predominant wind and is wet and warm. It blows from the southwest to the northeast and accounts for cloudy weather as well as the tropical rains and thunder storms characteristics of Lagos State and even more pronounced in Victoria Island due to its proximity to the Atlantic Ocean and the accompanying seas breeze.

ii. The **Dry Tropical Continental Air Mass**: This wind blows from the Sahara to the Southwest usually called the Northeast. It pushed the tropical maritime air mass to the south ensuring the onset of the dry season.

The percentage wind speed frequencies for Lagos State are shown in attached fig. While percentage monthly and mean annual wind frequency for all directions are shown in the attached table.

[See table on next page]

**% WIND FREQUENCY FOR LAGOS BASED ON 3 HOURLY WIND  
RECORDS FOR 1951 —60 (LATITUDE 600° 35'; LONGITUDE 030° 21'  
ATITUDE 40M)**

Speed Range in Knots	Total All Directio ns											
		J	F	M	A	M	J	J	A	S	O	N
CALM	26.3	21. 8	24. 1	27. 3	26. 9	25. 3	20. 7	20. 8	25. 6	32. 5	31. 2	29.0
1 – 10	73.2	76. 7	72. 2	69. 8	71. 3	73. 8	76. 7	76. 4	72. 8	66. 2	28. 1	70.8
11 – 12	0.5	1.4	3.1	2.7	1.7	0.8	2.6	2.7	1.6	1.1	0.7	0.1
21 – 23		TR	0.1	0.1	0.1						0.1	TR
34 OR MORE				TR							0.1	

**REMARK: 2 OR 3 COUNTED AS 0.1**

**(Source: FED. MET. SERVICE OSHODI LAGOS)**

## 5.0.2 RAINFALL

Rainfall in Lagos State is generally heavy as a result of its locations close to the Atlantic ocean and its elevation of about 6m the sea level. The rain falls all year around and is heaviest between April and July. These very rains are usually followed by a short dry season in August and thereafter, another very rainy season between September and October. Generally, Lagos State falls into the equatorial zone with annual rainfall measuring up to 1857mm. See attached figure below 62% of the annual rainfall occurs between may and July while 20% occurs during the second rainy season between September and October.

(Source: Adopted from Lagos Metropolitan master plan project, unit, 1979, page 1 - 7. Nigeria in maps. Nigeria publisher services limited Ibadan Barbour, OGUNTOTINBO and NWAFOR 1982).

Percentage Wind Speed Frequency for A Lagos Station

<Insert diagram>

### **5.0.3 TEMPERATURE**

The maximum mean monthly temperature fluctuates around 30°C while the minimum mean monthly temperature is around 23°C. Differences in mean monthly average temperature in the various months are relatively longer in the dry month and smaller in the rainy months. See attached figure the coolest period is in the middle to the rainy, season while highest temperatures occur in November to December and in February to March.

### **5.0.4 HUMIDITY**

The relative humidity measured at a Lagos station showed that humidity is generally high between 60% and 90%, for the high mean. Monthly average. However, the relative humidity is higher in the early hours of the Morning (7-10am.) and lower in the afternoon hours (1-4pm.). See attached figure. This is characteristics all year round because although August is a rather dry month, it is nevertheless, characterized by a relatively high humidity. This is particularly true in the coastal area of the country.

(Source: Federal Metrological Services Oshodi, Temperature and Humidities, 1956 —75).

### **5.0.5 ISOLATION AND RADIATION**

Seasonal variations in the length of day in Nigeria is not great. Maximum possible hours of sunshine vary between 12 hours 25 minutes and 13 hours 1 minute in June in the south of Nigeria. In January these values range from 11 hours 15 minutes in the North and 11 hours 35 minutes in the South. The actual total of isolation received at the earthy surface is substantially reduced mainly by cloudiness whose effect is marked in the south due to the proximity of the Atlantic ocean and the persistent influence of humid south west winds. Thus in coastal area such as Lagos, the early sunshine values lie between 45% and 55% of the maximum.

<Insert Diagram>

## 5.0.6 Bio Climatic Chart

For human physical comfort the chart recommends

- a) Temperature range of 20°C to 30°C
- b) Radiation level lower than 100W/M<sup>2</sup>C
- c) Wind speed (or air movement) less than 0.1 m/s
- d) Relative humidity of between 30% and 65% (source) Nigeria in maps. Nigeria publisher service limited by Barbour Oguntoyinbo, Onyemelukwe and Nwafor, 1982).

For inferences drawn from various data collected, optimisation of these data's will in no small way assist in the thorough formulation a comprehensive design proposal.



## **5.1. GEOLOGY**

Sedimentary rocks of the lower cretaceous period occur widely in Lagos State. Also, tertiary beds from the coastal plain sands stretching from Calabar in the Far East through Lagos State to the borders of Benin Republic in the West.

### **5.1.1 TOPOGRAPHY**

Lagos State lies entirely within the coastal plain, which is characterized by sand banks, lagoons and creeks. The land does not rise 650 meters above sea level anywhere in the state. Rather most areas lie below 320 metres above sea level. In addition, steady coastal retreat is occurring in some areas as a result of grand scale beach erosion.

The rivers, creeks and lagoons in the state fashion. From the west Badagary creek enters from the Republic of Ben in and it is joined in the north, about 24km. From the Nigeria Benin border, by the Yewa River. Then comes Ologe lagoon looking almost like the Caspian Sea in shape. The rest of the state is dominated by the Lagos lagoon. Drawing into the

lagoon are numerous stream and rivers flowing in from the north important ones being the Owo, Ogun, Solode-Barre, Owa and Osun rivers. The interconnecting pattern of these water bodies creates a large number of islands with varying sizes.

One consequence of the foregoing is the existence, over most of the state, swamplands of low to very low agricultural productivity. Only very thin land on the northern fringe of the state has soils of good potential for agriculture.

## **5.2. SOCIO CULTURAL LIFE**

The indigenous peoples of Lagos State are the Yoruba subgroups of the Aworis in Ikeja, the Egus in Badagry area, the Ijebus in Ikorodu and Epe, while Lagos Island consists of an administer of Benin and Eko Aworis as well as repatriated Yorubas and other immigrants. However, the state in its modern form is a soda-cultural meeting point, which has attracted a cross-section of Nigerians from other all over the federation as well as non-Nigerians from other African countries and the result of the world.

Nevertheless, Lagos State has its own distinctive cultural characteristics,

which have been nurtured all along by its indigenous people. The arts and craft of the state include pottery, sculpture, mat weaving, basket weaving, hair plaiting, and raffia works. The

Cultures of the peoples are also reflected in certain types of masquerades which have particular times of the year for their festivals and some of which originate from ancient religious practices. The major festivals include those of the "Adamu Onisha (Eyo Masquerades) of Lagos Island/Equunegun, Koni and Osun Iya-Alaro festivals of Ikeja, Eluku festival at Ikorodu, Ebi festival and okoso festival (Boat Regatta) of Epe, the Sangeto masquerades of Badagry and a host of others.

The Lagos State council for Arts and Culture was established in 1973 for the promotion of the state's cultural heritage.

### **5.3. ECONOMY**

The economy of Lagos State, especially metropolitan Lagos, forms the hub of Nigerian's national economy. This is not surprising in view of the state's traditional role as the Federal Capital of the country until some years ago. Currently, metropolitan Lagos continues to provide, serve as, or support the

following.

- a) The most elaborate port facilities in the country;
- b) The older and busier of the two railway termini on the country's Atlantic Coast;
- c) The country's busiest international and domestic airports;
- d) The range of buildings and allied infrastructure which the federal administration and its parastatals have used hitherto (and most of which they still use);
- e) The headquarters of most merchant, commercial and development banks as well as insurance and re-insurance companies.
- f) The Nigeria stock exchange and allied institutions;
- g) The largest concentration of industrial and commercial establishments in the country together with the diversified activities allied to them;
- h) The whole paraphernalia of the Lagos State administration itself and those of its dominantly urban-based local government units;
- i) A wide range of educational institutions including polytechnics,

college of education, universities and research institutions~

- j) The seat of diplomatic missions to Nigeria;
- k) The location of various intentional organizations;
- l) A wide range of hotels and recreational facilities
- m) The terminus of road transportation to various parts of the country and the rest of West Africa;
- n) The largest receptacle of migrants, both rural urban and internationals;
- o) A large and growing population of skilled and semi-skilled persons that provide bases and market for a wide range of higher order goods and services.

These and other functions make Lagos “tick” and provide the state with a bright and magnetic economic climate. Regardless of the change of its status as national capital, and given the inertia and circular and cumulative causation processes that characterise economic development, the hegemony and growth of the Lagos area appear assured well into the future. What policy makers may worry about is how to manage, sustain and future the processes.

#### **5.4. DEMOGRAPHIC DATA OF LAGOS STATE**

At the time of the 1963 national census the population of Lagos was put at 1,443,568. By the end of 1985, 7.3 million inhabitants were estimated using an annual growth rate of 8% in the urban populated areas, and 2.5% per annum in the rural areas with spare population, Lagos State in particular is a constant victim of the effects of rural, urban migration in the country and is said to receive 300,000 people per annum or 25,000 people per month. It is estimated that at this rate, the population of Lagos State alone may exceed 12 million by the year 2000. A reasonable explanation per this rapid growth in population is directly linked to the industrial potential of the state and the numerous investments being marched both as a source of revenue and per the provision of employment opportunities for the ever increasing population. In conclusion, the rate of population growth in Lagos State is 10% per annum.

urban mass transit programme and by the end of 1992; the current administration in the state had provided 60 out of a planned 1000 buses under its jubilee line programme.

A major problem of LSTC is the need to acquire enough spare parts to salvage the over 500 broken buses in its various depots.

### **5.5.2 WATERWAYS**

The waterways and lagoons, which abound in the state, are being increasingly used. For the riverine areas, water transport by canoes and motorised boats have been natural options for a long time, Ferry service between Apapa and Lagos was pioneered by the Federal Inland Waterways and in 1983, the state government established its own ferry services.

These services use jetties at Apapa, Federal Secretariat, Mainland Hotel, Marina, Maroko Queen's Drive, and Tarkwa Bay. With increasing state attention in recent times and the negotiated involvement of the Nigeria

Posts Plc., the numbers of vessels and jetties used for passenger and cargo transport in the state have increased remarkably.

### **5.5.3 RAILWAY**

The Nigerian Railway Corporation runs its normal Cargo and passenger services from the Iddo Terminus to the northern parts of the country. It also traditionally provided skeletal intra-state commuter services between Iddo and Agege in the metropolitan area. Pending the resuscitation of the metro line project, the state government in conjunction with the Nigeria Railway Corporation launched the jubilee Rail service in November 1992 to expand the rail commuter service in the state. This has further boosted the tripartite multi-modal transport system (formally initiated in May 1989), involving better integration of the road, water and railway transport facilities in the state. The jubilee rail service has two trains of 10 coaches, each with a capacity of 1500 passengers operating between Iju/Agbado and Ijora/Apapa.



#### **5.5.4 AIR TRANSPORT**

The biggest and most modern airport in Nigeria is the Murtala Mohammed International Airport, which accounts for over 50 percent of total air — passenger traffic in Nigeria (averaging 6,220,336 people annually in the 1981 — 87 period). The airport complex at Ikeja has three wings respectively for international, domestic and private airlines. Practically all the major airlines of the world operate air services to Lagos. There are provisions in the state regional plan to construct another airport at Lekki Peninsula for domestic travellers in order to relieve pressure on the Ikeja airport facilities.

#### **5.5.5 TRAFFIC FLOW**

Traffic congestion has almost always been a serious problem in Lagos State, due to no doubt the industrial activities so prevalent in the area. There have been several proposals to the solution of traffic congestion, varying from the establishment of new routes to the car tailing of car movement from day to night.

## 5.5.6 TRAFFIC DATA

Table 5.1 Composition of traffic on board street from Tafawa Balewa Square.

<b>TYPES OF VEHICLE</b>	<b>COMPOSITION AS A % TOTAL ON BROAD STREET</b>
Private Cars	59.74%
Taxis	25.74%
Minibus	15%
Trucks, Tankers	1.05%
Motorcycles	3.93%
Bicycles	1.74%

Peak hours are between 700am and 8.00am, 11.00am and 12.00 noon and between 400pm - 6.00pm. (Source: OKAFOR, 1998)

The earliest methods used to ease traffic congestion in Lagos State was the installation and rehabilitation of traffic light by the Federal Government

and the 'odd and even number scheme also establishment by the government of which both scheme s did not help much. The most recent attempt at easing traffic congestion in the state has been the recent construction of axial road, bridges and expressways (which are usually still congested, especially at break periods) e.g. the third axial roads. Third Mainland and Oworonshoki road, which form outer ring road and actually facilitate traffic flow in and out, of Lagos Island. The Opebi link road which was completed years ago linking Ikeja with Oregun has greatly eased traffic congestion in Ikeja, which is a very densely populated and high industrialized area of Lagos State.

### **5.6.0 EXISTING LAND USE AND FUTURE TRENDS**

Lagos State as a whole, occupies just 0.4% of the Federation but accommodates 5% + 0.8% of the nations population. The state is presently occupying 358,861 hectares of land, or which 75,555 hectares consist of lagoons and waterways. The Lagos State land department is responsible for the use of land, both present and future use, land allocation, policies as well as insurance and revocation of right of occupancy. The Land use in Lagos State is basically divided into areas for residential development,

agriculture and industry that is the good blighted area which lack basic infrastructural facilities like drains, roads, water and electricity 42 of such blighted areas have been identified and improved e.g. Ipori, Badiya, Orile-Iganmu, Ileje, Bariga.

A major land use policy in Lagos state is controlled land intensification use, to ensure allocation of space for essential services such as community services, transportation, recreation and commercial facilities etc.

The available land area that now accommodates the present population will be substantially the same to accommodate the projected 14million people by the year 2000. the state therefore, could not afford to waste any piece of land, to see to this problems land department is now in control of land investigation and allocation in Lagos state.

The department, which came into existence in January 1984, is an amalgamation of the former ministry of land matters, the former ministry of economic and physical planning and the housing and development matters department of the former governor's office.

In the assignment of ministerial responsibilities, the department is

responsible for the following:

1. Land use and allocation committee
2. Land policy
3. Acquisition of land for state purpose
4. Insurance and revocation of right of occupancy
5. Implementation of development scheme
6. Special technical committee on developments
7. New towns development authority
8. Provision of infrastructures in the government estate
9. Statutory and regional planning
10. Approval of layout and building plans
11. Development control
12. Preparation, monitoring and revision of development schemes
13. Control of the extraction of laterite
14. Housing
15. Rent control
16. Property development
17. Urban renewal schemes

# CHAPTER SIX

## THE SITE

### 6.0 SITE ANALYSIS

Site analysis, the process of understanding existing site qualities considers factors that determine a site character, the purposes each factor serves, the location of each of each factor, the category into which each factor will fit in the design process.

Factors, which determine a site's character, include water, physiography, orientation, vegetation, view climate that are classified under natural factors. Others are manmade factors, location, cultural attraction, utilities, services, building and roads.

*The factors serve two purposes:*

- i. Functional Requirements of Man: moving, living, shopping, working, learning, maintaining.

- ii. Pleasurable Requirements: Recreation, amenity, regeneration, beauty, rest, quiet, nature, nature process requirements of the physical and biological environment; the interaction of land, plants and animals in self-supporting process (Salam July, 1991).

### **Site Selection Criteria**

The site along lagos-badagry road was chosen as the site for locating the proposed paper package factory in that the site is under the Ojo local government area urban development council and it was being proposed for industrial development by the Lagos State Government. For many years, the site selected was an ordinary water log land but in the early nineties during the military regime, the Federal Government took over the lands within these areas from the State Government. Major part of this lands were allocated for residential purposes. Now that democracy is back, the State Government has reclaimed the Osborne project.

Selecting the site and proposing the Recreational Centre is very ideal due to the fact that the land was prepared to serve that purpose.

## **Site Location**

The project is located opposite federal government school, Ijaniki along the Lagos-Badagry express road which has a side road named Coker street that leads to a residential district about 2km from the proposed site.

## **6.1 SITE PHYSICAL FEATURES.**

The site been located presently has no structure on it. On the whole of the site is just dense vegetation of high-level grass and some well-spaced trees. Right behind the site is a 6.5kv stepped down transformer, which serves the surrounding area and may also serve the factory.

### **SIZE AND SHAPE**

The site is about 380m x 200m that is about 7.5 hectares of land. The site, which is almost rectangular in shape, has gentle slopes toward the main road.

### **SOIL CONDITION**

On the survey maps for Lagos State, it can be seen that soil is comprised of hydromorphic and alluvial soils. The soil has a load bearing capacity of



0.15 tones per square feet. The soil consists of loose grading to dense sand with a thickness of approximate 15m. Under lying this unit is a strata of predominantly stiff clay, containing them stiff layers of peat. The clay unit sands within an approximate distance of 3m and continues to a total depth of 30m (1 bile property corporation, Adeolu Odeku Street Development, Lagos. European group report 1 vol. II December 1977, page 9). The ground water table is quite high. This implies that the construction of a basement will have to be avoided; pile foundations will be used for heavy structure on the site. Due to the corrosive native of the soil, steel cannot be used in the piling and so reinforced concrete piles will be used in design.

## **LAND COST**

The site is situated along lagos-badagry express road, which is a newly developed project, a highbrow area where land cost is high. And due to the area been a major industrial district that house most the biggest new generation industries in the country, development has been rapid thereby making of land very high. A plot of land within this area can go for as much as ₦2.5 million

# CHAPTER SEVEN

## 7.0 DESIGN CONCEPTS AND CONSTRUCTION

### 7.1 DESIGN CONCEPT

The design concept adopted here is primarily based on synthesis elements are put together and a new architectural statement is created.

Design concept: Analysis- collection and classification of data.

Synthesis- setting up possible solution or hypothesis.

Integrates elements into whole      Evaluation- choice of solution

This is based on systematic methods by the use of integrated charts and random connections of diagram to evolved an architectural form.

The system provides the designer with authority for decisions about the

shape and size of the building by the use of proportional system or grids

The form of the building will be of no significance if the system fails to satisfy users needs in terms of planning, space standards, environmental control etc.

The concept is based on canonic approach to design where the shape of the building is not determined before hand.

## **7.2 DESIGN APPROACH**

The architectural form evolved by weaving together the concept [a response to the site ]: an analysis of physical and environmental functions of the sites, and the desire to create a relationship between the space people occupy and the landscape they view from these spaces.

a) The site concept [a response to site]: -

All offices have an outlook over landscape. Buildings are designed against external influence of site, the site is an agricultural land; and the design maintains the feel of a rural environment.

The production hall, powerhouse, maintenance workshop all located farthest on site; these shelters the administrative offices from noise and vibration from it.

Building oriented away from traffic noise, building has a single focal entrance, car park located at a convenient places to give natural progression to entrance.

The main entrance hall is the control point for administrative staff, and visitors. Production staff entrance is separated from main entrance to the building movement of the production staffs limited to one approach to production hall.

b) An analysis of physical and environmental functions on site: -

Building oriented to avoid morning and later afternoon sun penetration. View of landscape from offices not blocked by shading devices. Internal circulation connects support facilities and office area. Production area requires enclosures and privacy and no outlook.

c) A relationship to landscape: -

The building and the landscape are designed to be single architectural development of the site.

- Elements of the landscape are conceived as architecture and elements of architecture as landscape.
- Avenue of trees creates formal route to main entrance.
- Courtyards created to extend landscape into the interior and ease human traffic and circulation within the building.
- Internal spaces glazed to provide visual links with the outside.
- Building screened by tree belt: reduced heat gain and cuts off direct sunlight from working stations.

### **7.3 SITE CONCEPT/PLANNING [ANALYSIS]**

The site concept is based on the noise level at various locations on site.

The noise level decreases as one progresses away from the main road.

This has influenced the locations of facilities on site. The production hall, maintenance workshop and powerhouse are located farthest, since quiet

and vibration free environment is desired in the front office.

## **7.4 SITE ZONING**

The site is zoned based on its functional requirements. The concept is therefore termed suitable for a packaging factory, as it strives to providing an arrangement that is adequate for traffic flow, building orientation, location of services and parking lots.

## **7.5 DESIGN PROVISION**

The design provisions have been arrived at after due consideration of the requirements for a packaging factory of this nature and an analysis of similar works.

## **7.6 MATERIALS AND CONSTRUCTION**

### **7.6.1 MATERIAL SELECTION**

The use of local architecture and components in construction works shall be encouraged not only to depict the aesthetic nature of the environment but also to give costs.

The following considered in choosing materials to use for the factory construction:

- i. Cost: The final cost of material should not surpass the initial cost
- ii. Safety: Material chosen should not be dangerous
- iii. Comforts: Comfort of both users and staff should be considered in choice of materials
- iv. Durability: All materials chosen should be able to stand the test of time without fading or been damage by strains.
- v. Maintenance: Materials chosen should be easy to maintain; in cleaning with less cost.
- vi. Appearance: Materials must be appealing to the eye should be chosen.

## **WALLS**

Clay bricks shall be used along side concrete blocks, commonly known as cement blocks. The two shall be integrated to achieve desired aesthetic

and safety of structure. The clay bricks usually come in the 4½ inches (100mm) while the cement block usually come in the dimension of 9 inches, 6 inches, 4½ inches (225mm, 150mm, 100mm respectively) when adequate sand-cement mix is attained. They could be used in bungalow as vertical load bearing walls without the use of columns.

### **WOOD PANELS**

These are acoustic properties. They too share similar attributes for their inherent absorbing characteristics. They shall thus be used in enclosures where noise reverberation are likely to be of undesired effect e.g. theatre, indoor squash hall, basketball etc.

They shall also be used in the reception and conference hall where they are anchored to the walls for the installation of light fittings and other electric devices.

### **GLAZING AND GLASS PANELS**

Glazing of two-way visibility, which would permit dual view shall be particularly be used in the restaurant, the indoor games and museum. This



glazing shall be used on the interior and exterior wall of the building, so as to facilitate a scenic look for the inside.

Glass panels of sliding and swinging nature anchored the aluminium metal frame are to be used indoors and windows of administrative block and other necessary places.

### **CONCRETE**

Concrete columns and beams shall also be major structural elements in construction. Accordingly, all internal columns beams, ducts, roof gutters, roof slabs, and floor slabs shall be of reinforced concrete, thickness as individually outlined by the structural engineer. All slanting walls, interior or exterior shall be of concrete nature; serving as butter walls.

### **ROOFING SHEETS**

Long span aluminium roofing sheets shall be used for most structures on the site, with exception of place like the gazebos in which thatch roof shall be super imposed on corrugated aluminium roofing sheets so as to show

the architectural character or style of roofing to blend the tropical environment.

## **7.6.2 CONSTRUCTION**

Before construction, it is important to carry out site investigation on the site to determine its suitability for building and nature and extent of the preliminary that will be needed, particularly the nature of the soil. The position and size of the main service should be determined. The nature and condition of site boundaries should be noted together with the extent of the site clearance work such as buildings to be demolished and trees and shrubs to be removed.

Water content of the soil need to be drained to prevent the passage of ground moisture into the buildings.

## **FOUNDATION**

The type of foundation used depends on the condition of the site. Foundation like pad (continuous) and pile can be used due to moisture of the soil (waterlog), which will require some

ground modelling. Consultation will still however be made to the foundation engineer to evaluate and determine the most economic type.

## **SUPER STRUCTURES**

This should be achieved by frame construction techniques using reinforced pre-cast modular element. The retaining wall of the floor slabs should be reinforced concrete.

## **FINISHES**

In selecting wall and ceiling finishes probably the two most important consideration are appearance and maintenance costs. Also important are resistance to consideration, acoustic properties and provision of a smooth even surface.

All surfaces in this design shall be of 20mm masonry cement plaster rendering.

External walls shall be painted matt finishes. This is because matt finishes avoid reflections of light sources and minimize surface irregularities. While all internal walls shall be painted texture paints. They have weather shield and fire retardant properties.

## **LANDSCAPES AND EXTERNAL WORKS**

Grasses areas and roadside verges possess great amenity value and also perform useful functions such as absorption of sound and reflection of glare.

The finishes surface should project 20mm above adjoining surface, such as gravel or ballast treated with weed killer between grassed areas can be constructed with various materials and the choice will be determined largely by such factors as initial cost, maintenance cost, appearance wearing quality and non-skid properties. Pre-cast concrete paving slabs or flag shall be used for walkways. It will be used alongside rubble stone paths.

## **7.7 SPACE REQUIREMENT**

These will be considered under the various departments that make-up a packaging factory.

The factory is designed to accommodate 64 permanent employees and various casual workers as the case may be.

The following space standards have been used in computing the activity area.

### 1. Administration

Accommodation	Dimension [mm]	Area [m <sup>2</sup> ]	Units	TotalArea[m <sup>2</sup> ]
General Manager	4500x5500	24.75	1	24.75
Gen. Manager Sec	4000x4500	18.00	1	18.00
Factory Secretary	4000x5500	22.00	1	22.00
Personnel Officer	3500x4000	14.00	1	14.00
Account	2700x5000	13.50	1	13.50
Account Clerk	4000x5000	20.00	1	20.00
Conference hall	6000x10000	60.00	1	60.00
General office	3500x5200	18.20	1	18.20
Exhibition hall	6300x10000	63.00	1	63.00
Reception	5500x8000	44.00	1	44.00
Production Director	3600x3600	12.96	1	12.96
Total				310.21

## 2. Commercial

Accommodation	Dimension [mm]	Area [m <sup>2</sup> ]	Units	Total Area [m <sup>2</sup> ]
P.R.O.	4000X5000	20.00	1	20.00
Marketing Dept	3700x4700	17.39	1	17.39
Purchasing Office	4000x6500	26.00	1	26.00
Sales Director	3600x3700	13.32	1	13.32
Total				76.71

## 4. Production

Accommodation	Dimension [mm]	Area [m <sup>2</sup> ]	Units	Total Area [m <sup>2</sup> ]
Planning	4000x4500	18.00	1	18.00
Production Manager	3700x4000	14.80	1	14.80
Production hall	16000x25000	408.00	2	816.00

Raw material ware house	17500x32000	56.00	1	56.00
Finished product ware house	17500x32000	56.00	1	56.00
Computer unit	4000x6000	24.00	1	24.00
Quality control	4000x5300	21.20	1	21.20
Supervisors	3600x4000	14.40	1	14.40
Sampling	3600x4000	14.40	1	14.40
Total				2042.00

#### 4. Maintenance

Accommodation	Dimension	Area	Units	Total Area
Chief engineer	3000x4600	13.80	1	13.80
Assist chief engineer	2800x4600	12.88	1	12.88
Workshop	6700x10000	67.00	1	67.00
Total				93.68

## 5. Staff Facilities

Accommodation	Dimension	Area	Units	Total Area
Canteen	10000x1900	90.00	1	90.00
Changing room	4300x4700	20.21	2	40.40
Kitchen	2800x4300	12.04	1	12.04
First Aid	3800x4300	16.34	1	16.34
Clock in/security	3000x4300	12.09	1	12.09
Toilets	1200x2000	2.40	8	19.20
Bathroom	1200x2000	2.40	6	14.40
Training hall	8000x9000	72.00	1	72.00
Total				277.30



## 6. Environmental site

Accommodation	Dimension	Area	Units	Total Area
General house	3000x3000	9.00	1	9.00
Visitor car park	3000x1200	48.00	1	48.00
Workers [staff] car park	3000x1800	45.00	1	54.00
Service vehicle park	6500x7500	48.75	1	48.75
Gate house	2000x2000	4.00	1	8.00
Water tank	3000x3000	9.00	1	9.00

# CHAPTER 8

## 8.0 DESIGN SERVICES

### INTRODUCTION

Services are system of arrangement that supplies public needs. It could be described as expert advice giving by agent after the installation of an appliance.

This chapter will detail the type of services provided for in the design and how these services have been used to achieve a conducive environment for the factory, especially in the production area. These services includes

- a. Electrical, mechanical (heating, cooling and ventilation)
- b. Plumbing (water supply)
- c. Drainage and sewage disposal
- d. Acoustic
- e. Fire safety
- f. Telecommunication
- g. Security

h. Maintenance

i. Refuse disposal

## **8.1 ELECTRICITY AND LIGHTING**

The supply of power is the only dominical feature upon which satisfaction of a recreation centre is based. The power supply company would be notified of the estimated total electric need to confirm service availability and coordinate the location of service connections. A transformer will be required to switch from the supply voltage to the service voltage.

The centre shall be hook up to the national grid through the 1.4kV power line passing through the site by means of the centre's own step down transformer. In addition to this an automatic generator will be installed to check the inadequacy of power supply on the part of NEPA.

### **8.1 LIGHTING**

This perform two major functions in a building

a. To illuminate the interior and its content

b. To aid visibility in order to perform some tasks

Lighting of an interior however depends on the task to which the interior space shall be use for. Indirect cornices will provide high degree of uniformity of lighting. This is to display some interesting architectural works in places like multipurpose building e.g. museum.

High voltage lamps will be used to light up the production halls and the lobby.

## **8.2 HEATING, COOLING AND VENTILATION**

In achieving thermal comfort in the factory, factors to consider during the design and planning are building location and orientation, choice of building materials and construction. The importance of ventilation and need for thermal comfort cannot be over emphasized, considering the nature of the activity carried out and the climatic condition of environment.

Central cooling system shall be installed in the administrative office. The system shall be centrally controlled but individually monitored to create ease and comfort for the end users.

### **8.3 WATER SUPPLY**

This deals with the supply of water. It also relates to the treatment and discharge of soil and wastewater from the building. Water will be supplied from the water board and the supply should be in the right quantity and at the proper flow rate, pressure and temperature. The service pressure must be high enough to absorb pressure losses due to vertical travel and friction as the water flows through pipes and fitting and still satisfy the pressure requirement of each building fixture. As an alternative to this overhead tanks shall be provided alongside bore holes in which water sourced from the bore holes will be pumped mechanically to the overhead tank effort, shall also be made to provide the site with a treatment plant for portable water supply.

## **8.4 DRAINAGE AND SEWAGE DISPOSAL**

Sanitary drainage system depends on gravity flow and will require large pipes and proper installation. Drainage system must be designed to provide an efficient and economical method of carrying away water born waste. In such a way as to avoid the risk of pipe blockage and the escape of effluent into the ground. They are drained into septic tank and finally into the soak away pit. This would be designed and positioned by the service engineer.

## **8.4 REFUSE DISPOSAL**

Wastebaskets and bins shall be located strategically for collection of waste in small bits. All the waste will be collected on the site by refuse disposal trucks, which in turn dumps them into the incinerator where the refuse is finally burnt.

## 8.5 ACOUSTIC

This is defined as the science of sound including the production transmission and control of its effects. The acoustic design of a place involves the reinforcement of desirable noise. Sound that could be generated as a result of different human activities in buildings such as the production halls [machines], generator house and others alike have been sufficiently handled by the under listed ways:

- a. Independent slab shall be provided bordered in all size by anti-vibration pad (AVP)
- b. 24 hours noise pattern for the area shall be put into consideration
- c. High headroom in large enclosure such as the production hall and the administrative block, provision of large windows would also guard and regulate echo effect and reverberation.
- d. Use of panel absorbers of fixed frequencies in the production hall
- e. Provision of carpet floors in interiors of low noise desirability
- f. Reverberation time for building shall be adequately calculated and used for acoustic purpose.

## **8.6 FIRE SAFETY**

For effective control for fire that may occur in the centre, both manually and automatic fire control devices shall be installed in form of smoke detectors, water sprinklers, fire alarms, sirens, fire high rite and fire extinguishers at strategic places. Also the use of fire retardant finishes and fire escape route.

## **8.7 SECURITY**

Security shall be achieved by fencing the site boundary with high-level walls of wire fence with security devices such as camera and movement sensors to detect any break in.

Security post shall be provided at strategic places to control and monitor activities in the centre.



## **8.8 TELECOMMUNICATION**

This is the exchange of information at a distance, provision of phone communication facilities at strategic points of where major activities take place e.g. restaurant, reception, and offices.

The offices and reception shall be provided with intercoms and shall be linked through the phone company externally.

## **8.9 MAINTENANCE**

This is work undertaken in order to keep restore or improve every facility i.e. every part of a building. Its services and surrounds to a correctly acceptable standard and to sustain the utility and value of the facility.

The maintenance of this factory shall be the responsibility of the management, who shall employ adequate maintenance staffs, and provide a certain percentage from the revenue generated from maintenance.

The type of maintenance that will be employed will be planned maintenance, which consist mainly of preventive maintenance and

corrective maintenance, this includes routine checks and servicing or cleansing restoration facilities and replacement.

Factory facilities are to be carried out by the sub-contractors who installed them initially.

## CHAPTER NINE

### 9.0 ASTHETIC AND GENERAL APPRAISAL OF THE PROJECT

#### i)AESTHETICS

"Aesthetic deals with ideas and concept that are fundamental in the creation of a work. It also deals with descriptive attempts to solve visual, mental and sensual issues concerned in a work" [Anthony.C. Antoniade. 1981].

Aesthetics inquiring helps us to understand what kind of feelings are created by our design. The aesthetics of this work is to looked at from the following: -

- The general site layout arrangement
- The plan arrangement
- The elevation

The site is weared together by a belt of matured trees to give it a natural setting. An avenue of trees created to give a formal route to the main entrance and give a natural progression to the entrance.

The building and landscape are designed to be single architectural development of the site. Here elements of the landscape are conceived as architecture and element of architecture as landscape.

Courtyards are created to have environmental condition problems solved and the courtyard beautify the factory complex.

The offices are arranged to have an outlook over the landscape from the offices are not blocked by the shading devices.

The movement of the production staffs within the factory is limited to one approach to the production halls.

## **GENERAL APPRAISAL**

In designing this packaging factory, an attempt was made to create an environment that is not confusing; the whereabouts of any user of this complex is directed by the flow of functions. The environment can be said to be accessible as it is easy to find your way in and out of the complex.

The introduction of the space for large exhibition hall for finished product within the complex create an identity for the packaging factory.

## **5.5. TRANSPORTATION AND TRAFFIC FLOW**

### **5.5.1 ROAD TRANSPORTATION**

A city like Lagos with its rapid development leading to increase in population will require a very effective transportation system.

The government's policy concerning the transportation sector is the establishment of a mass transit programme, involving the integration of all modes of public transportation. It also involves private sector participation

## **CONCLUSION**

The architecture that came up here is a work of synthesis in which possible solutions were put together in a way that constitutes a new statement.

This effort is believed to bring quality package to the industries in Nigeria and neighbouring countries, quality in terms of materials and printing.

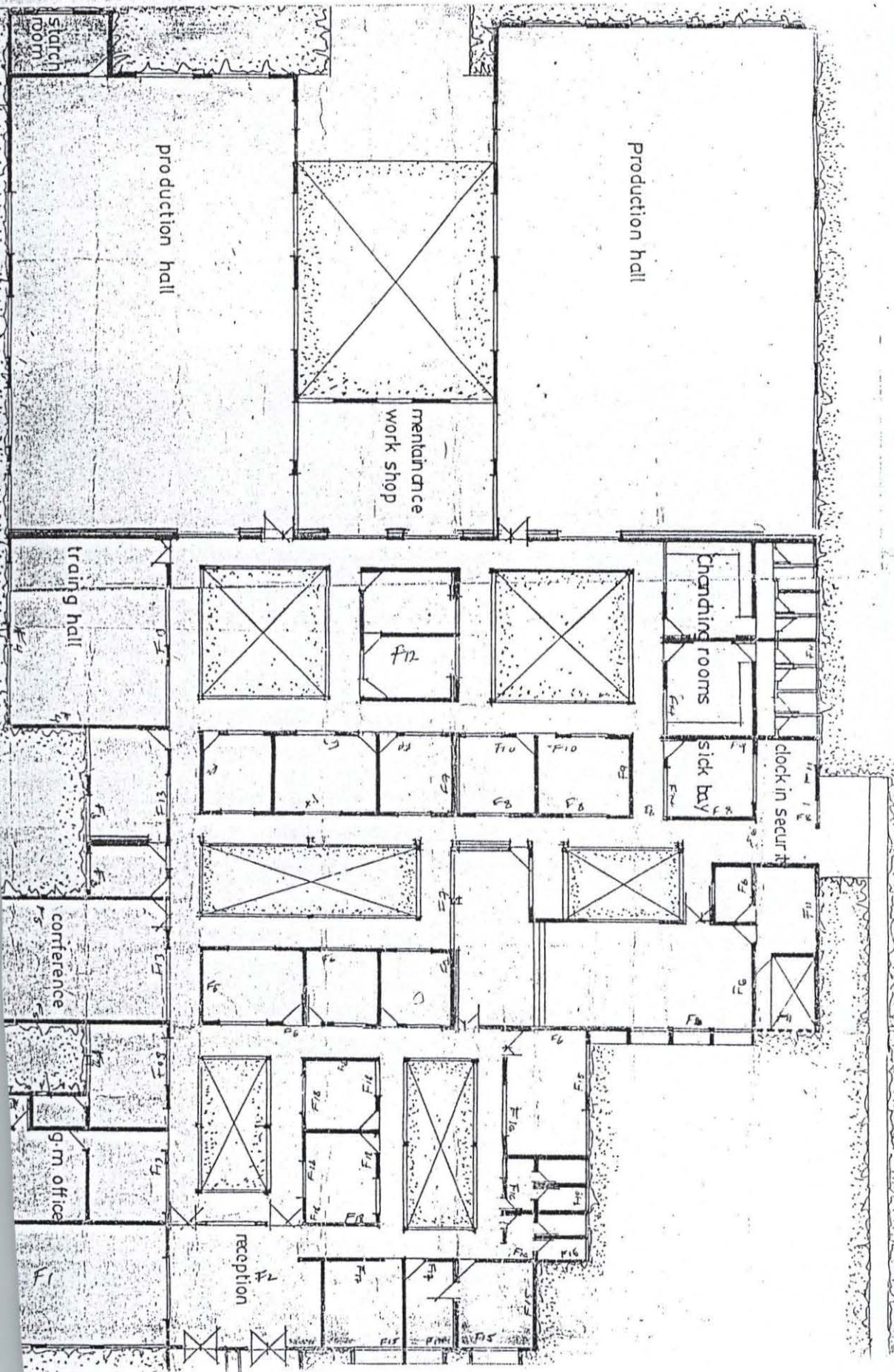
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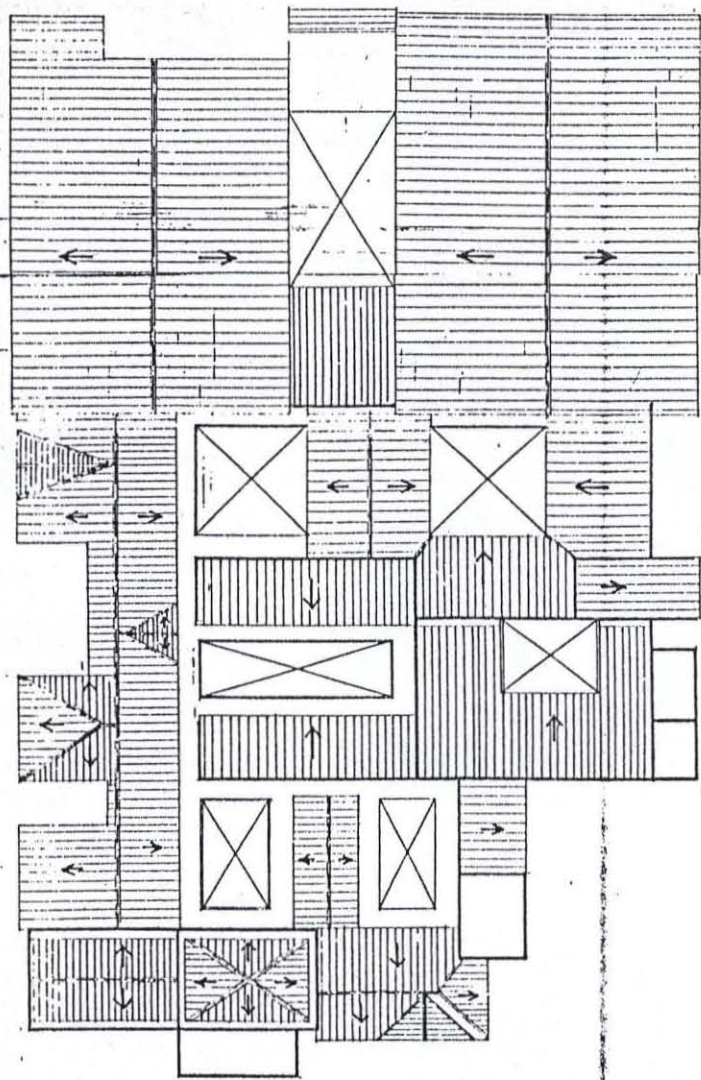
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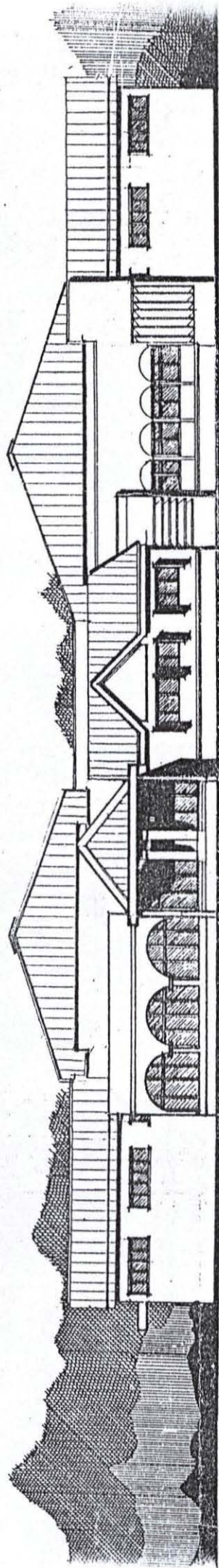
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New Age Encyclopedia vol 13

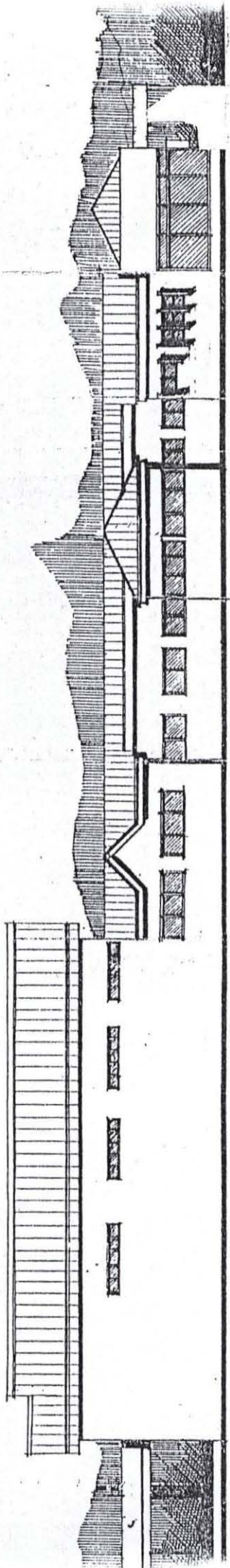




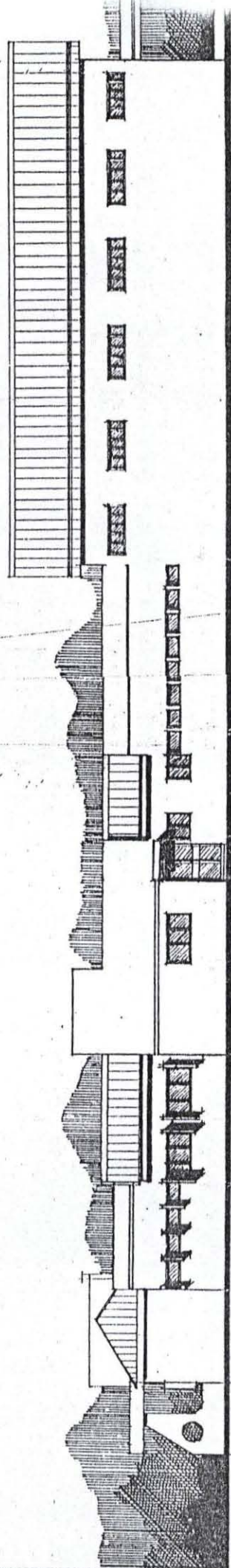




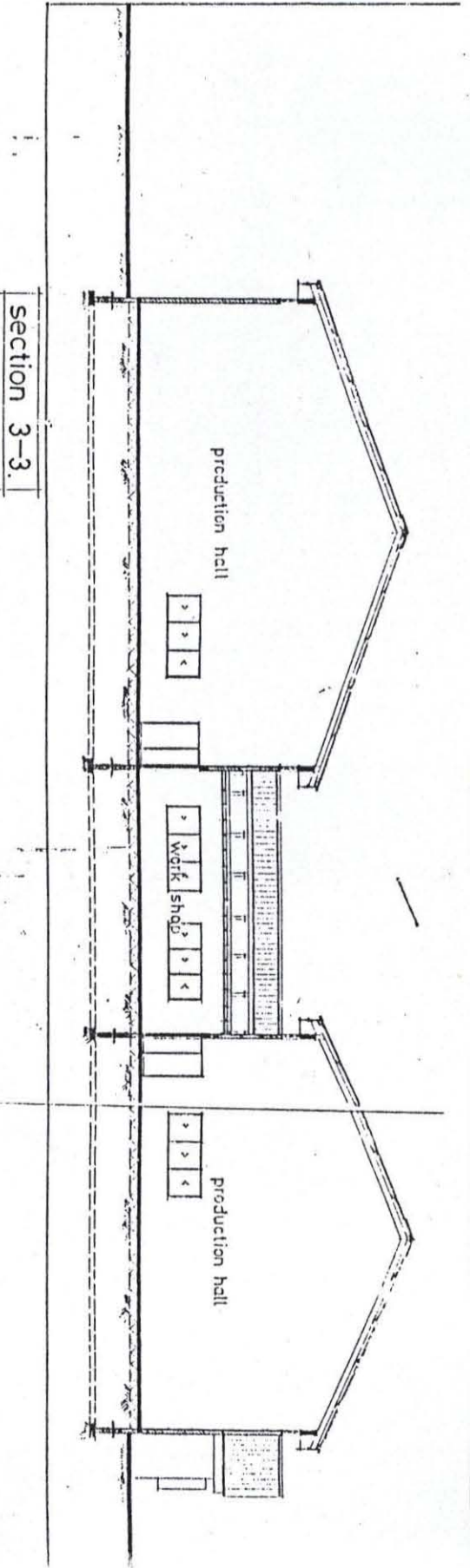
front elevation.



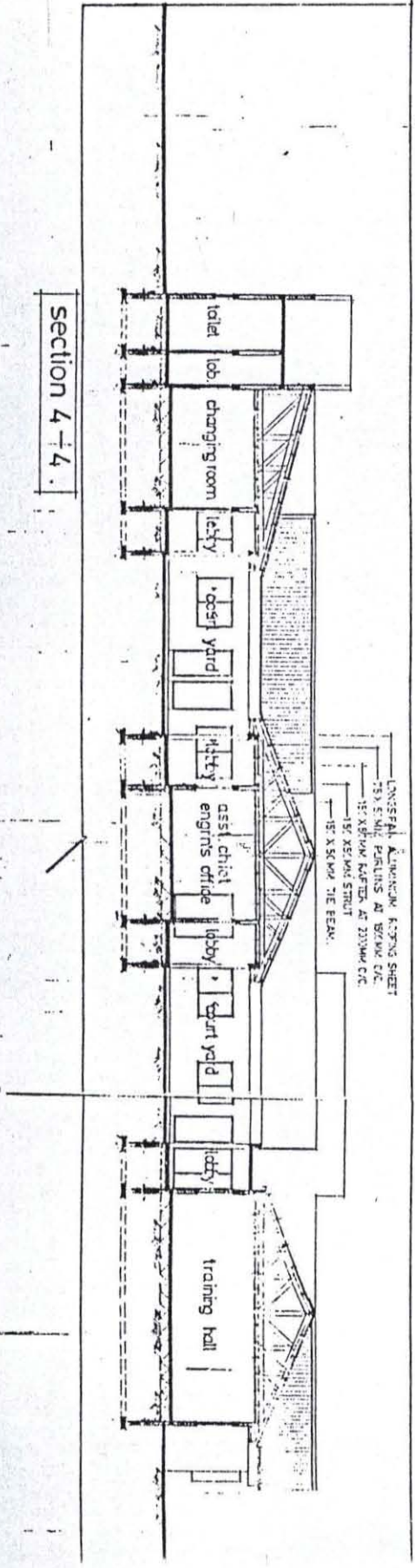
FROM POSITION



right side elevation.

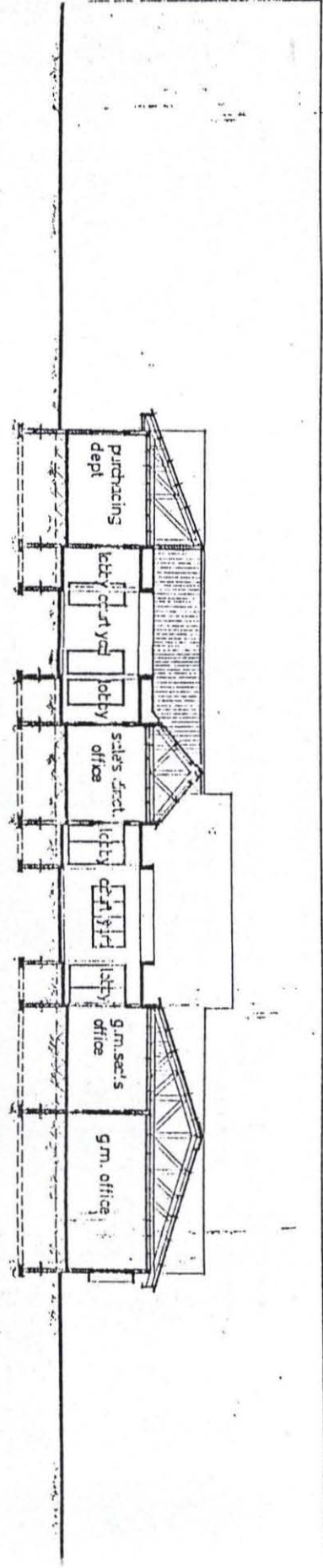
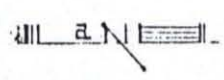


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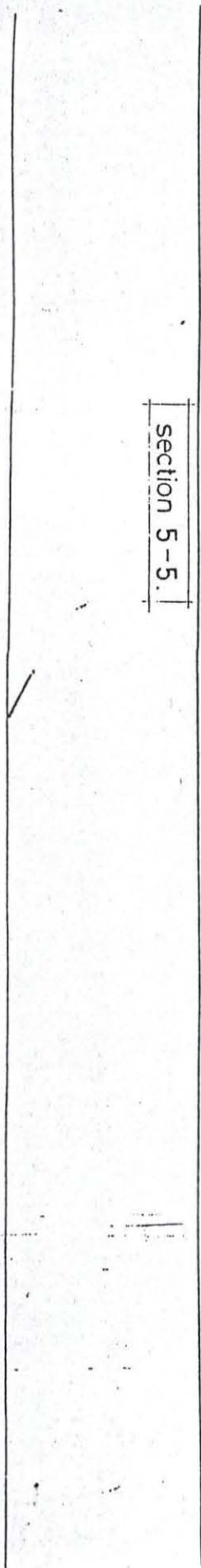


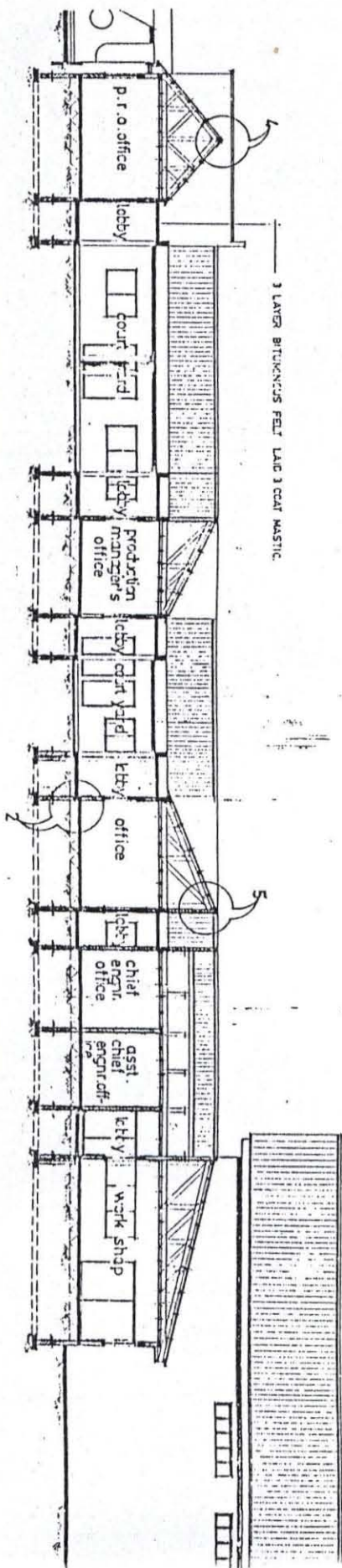
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SECTION 4-4



SECTION 5-5

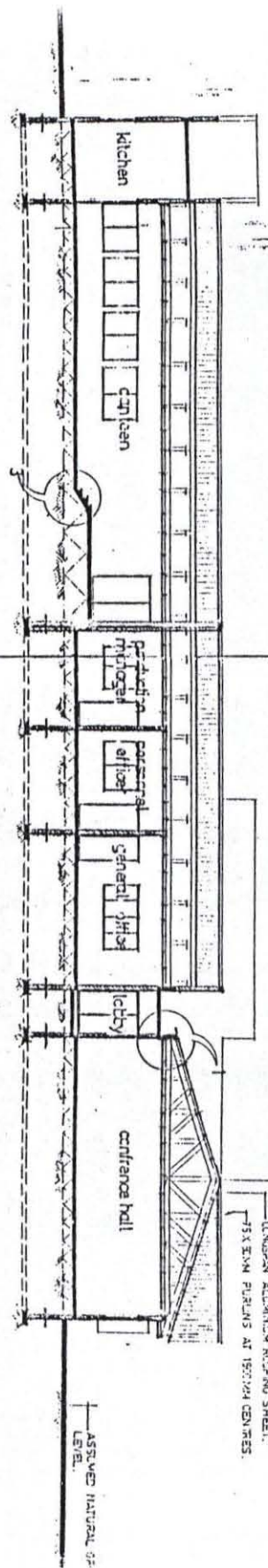




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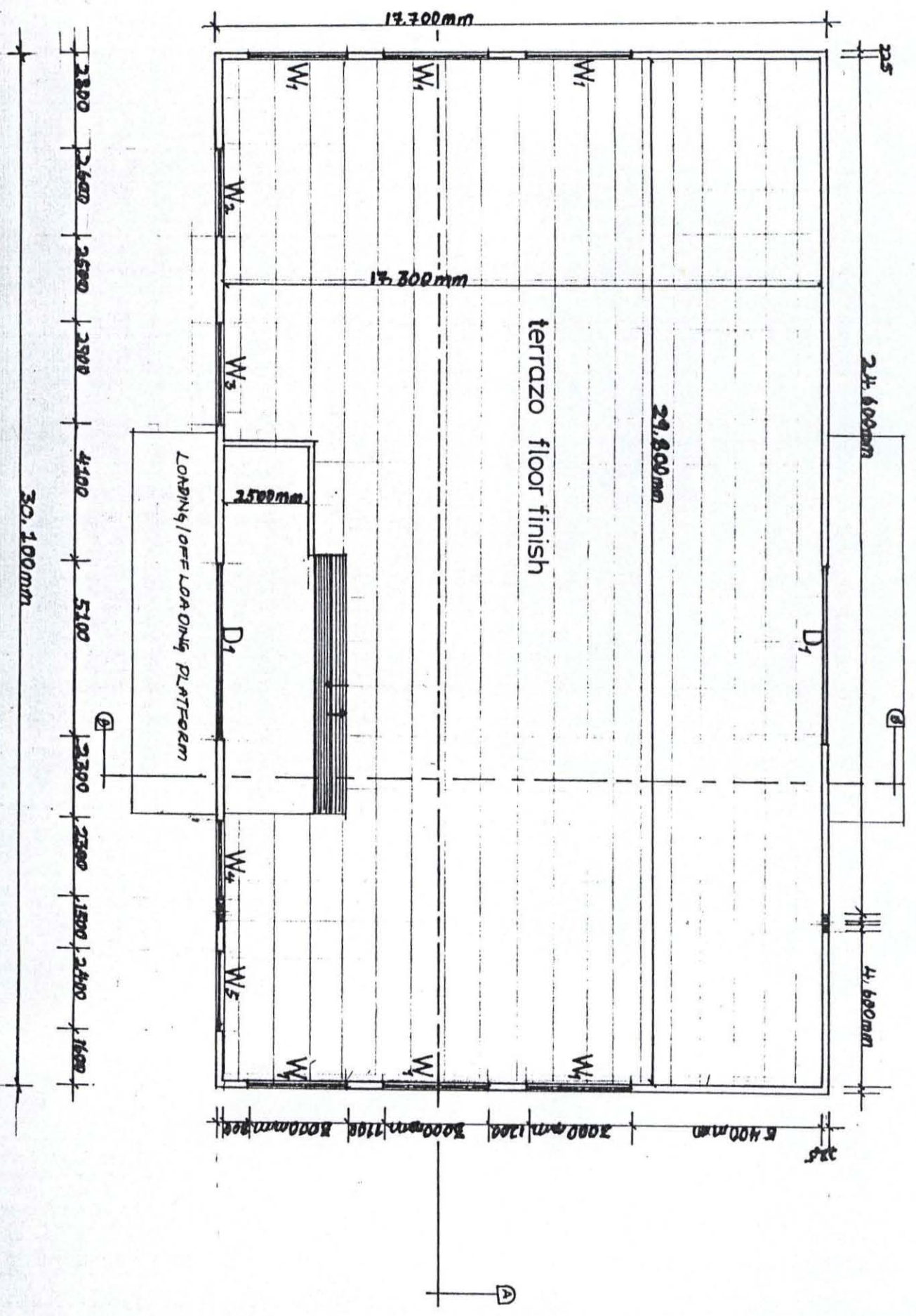


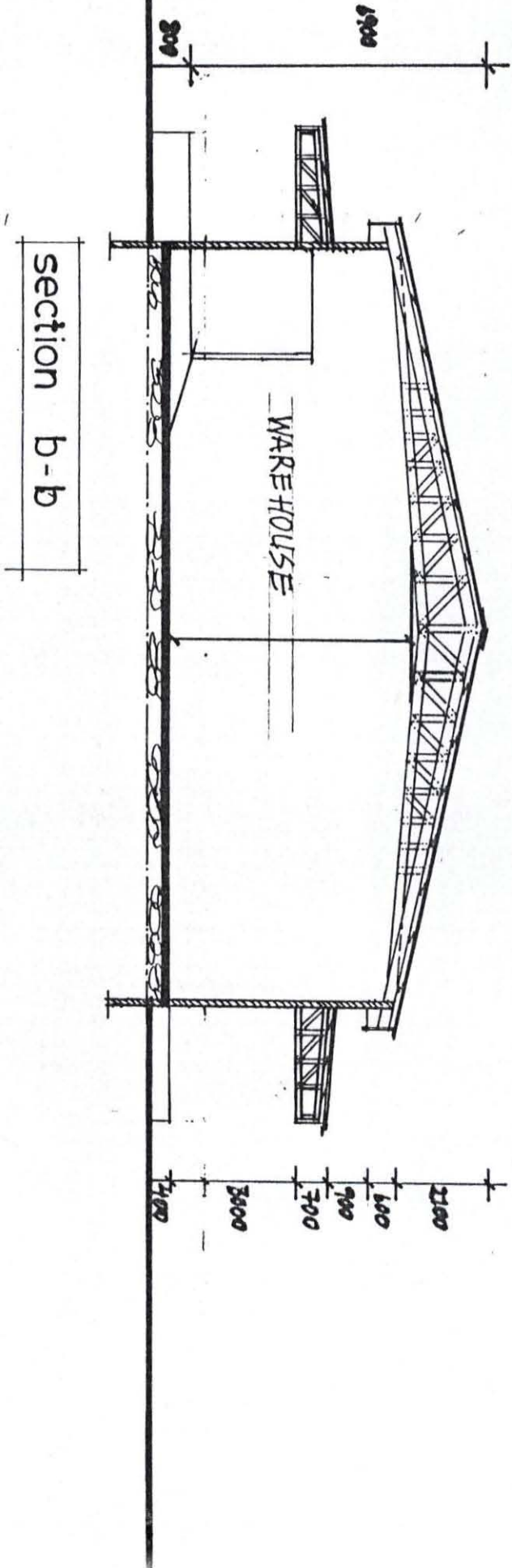
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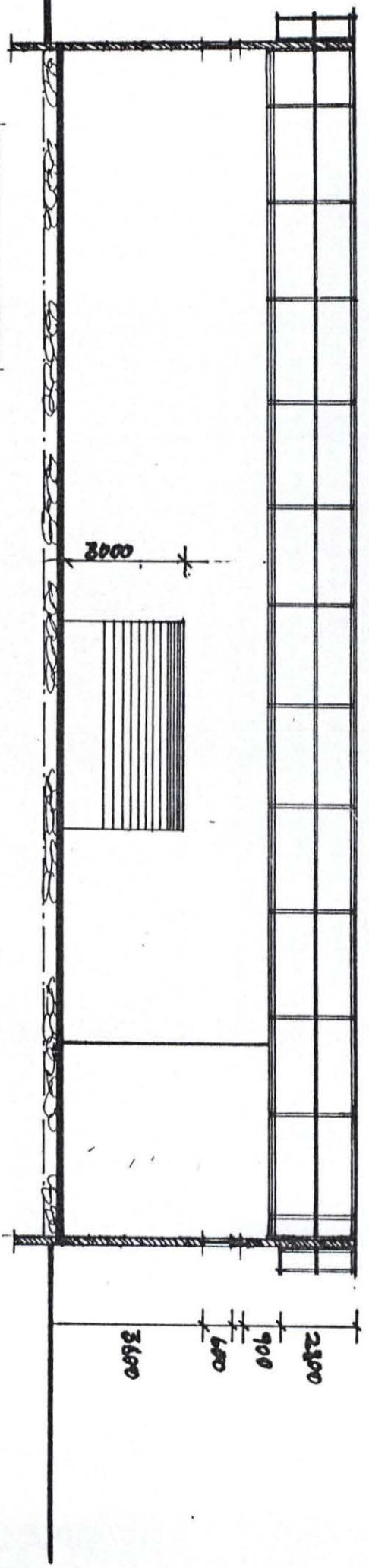
RICE CAP  
LONGSPAN ALUMINUM ROOFING SHEET  
1 1/2 X 3 IN. PURLINS AT 150 IN. CENTERS

ASSUMED NATURAL GP  
LEVEL





Section a-a

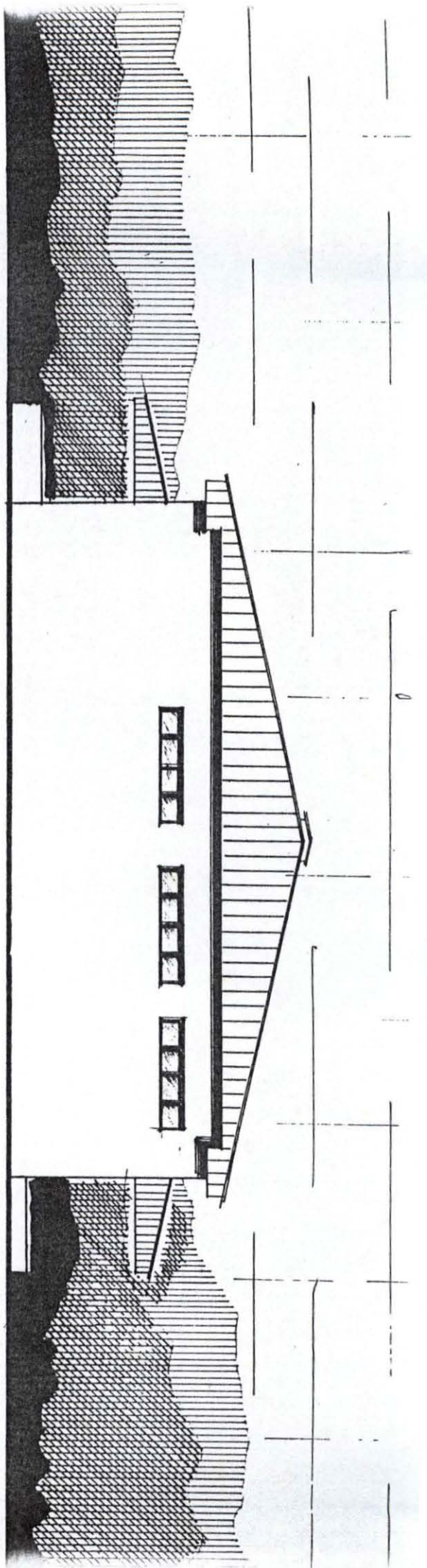


DESIGN PROPOSAL FOR

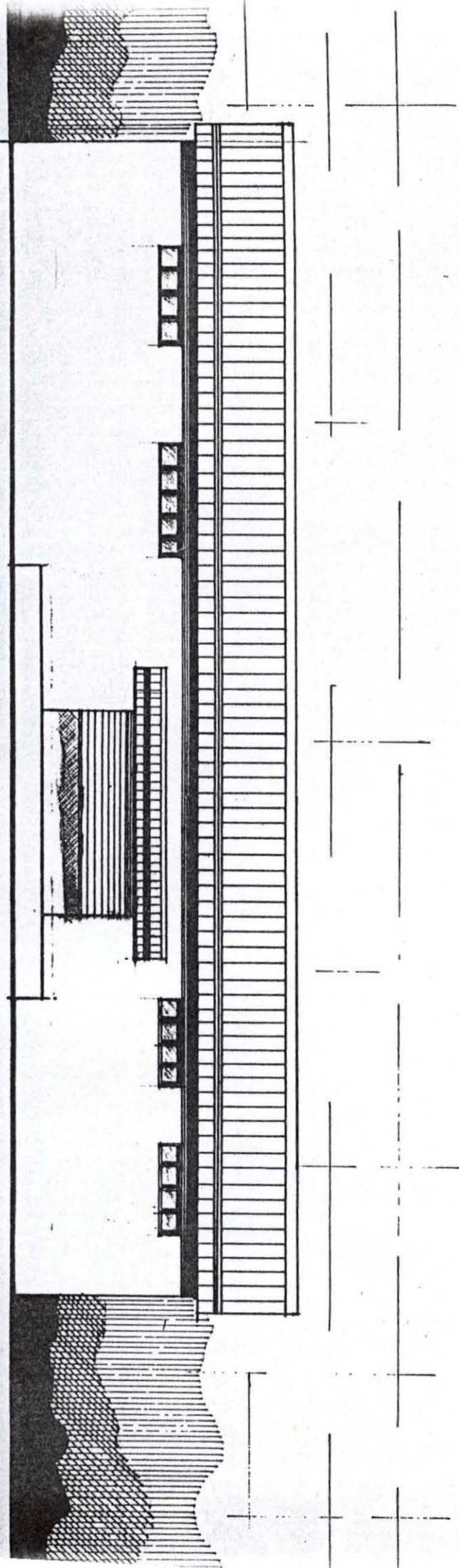
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With Swinburne

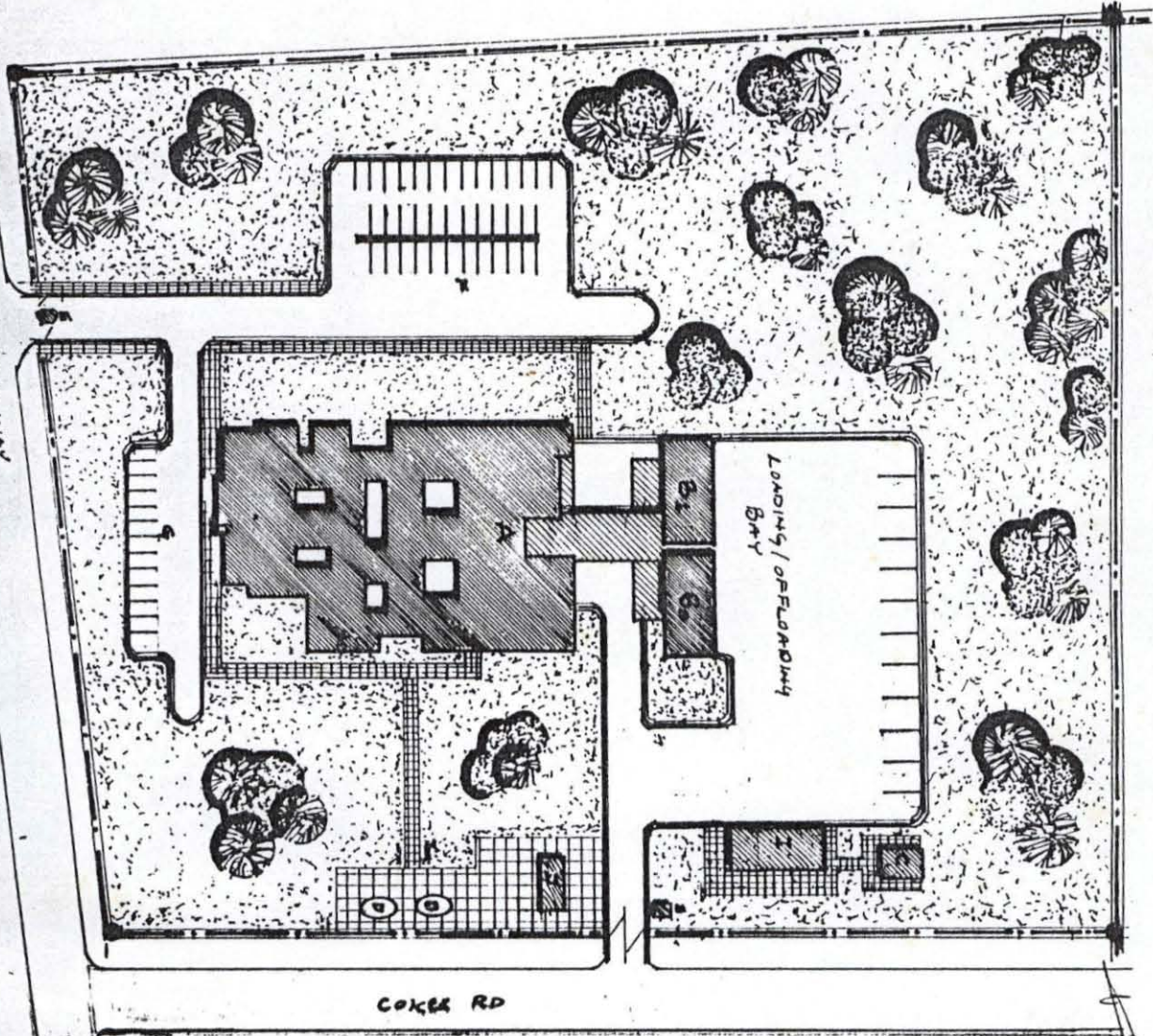
side elevation.



front elevation



LA 905 - BAD 4427 EXPRESS WAY



COXER RD



LEG	DESCRIPTION
A	ADMIN / PR
B1	WAREHOUSE
B2	WAREHOUSE
C	GENERATOR
D	WATER TANK
E	GATE HOUSE
F	VISITORS/CL
G	STAFF'S PA
H	SERVICE P
I	MAINTENAN
J	PRESAURE