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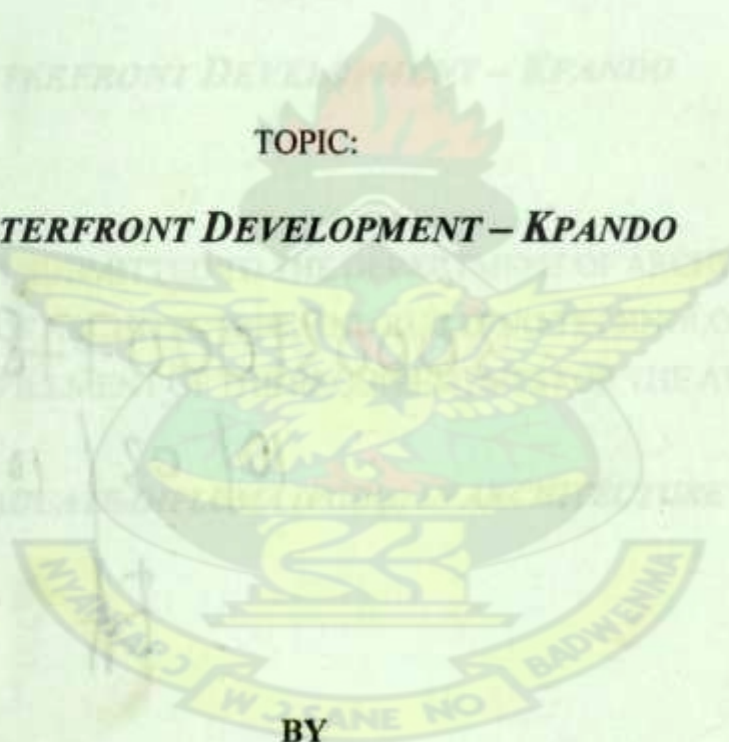
**COLLEGE OF ARCHITECTURE AND PLANNING**

**DEPARTMENT OF ARCHITECTURE**

**KNUST**

**TOPIC:**

***WATERFRONT DEVELOPMENT – KPANDO***



**BY**

***SENA YAO AMEDEWONU [BSc. ARCHITECTURE]***

**SEPTEMBER, 2009**

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**TOPIC:**

***WATERFRONT DEVELOPMENT – KPANDO***

**A THESIS REPORT SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE  
FACULTY OF ARCHITECTURE AND BUILDING TECHNOLOGY  
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF  
*POST GRADUATE DIPLOMA (PGDip) IN ARCHITECTURE DEGREE***



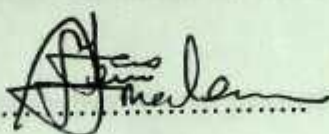
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***SEPTEMBER, 2009***

**DECLARATION**

I declare that I have personally, under supervision, undertaken the design thesis herein.

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Date..... 18-09-09.....

**Sena Yao Amedewonu**

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I declare that I have supervised the student undertaking the design thesis and confirm that the student has my permission to submit it.

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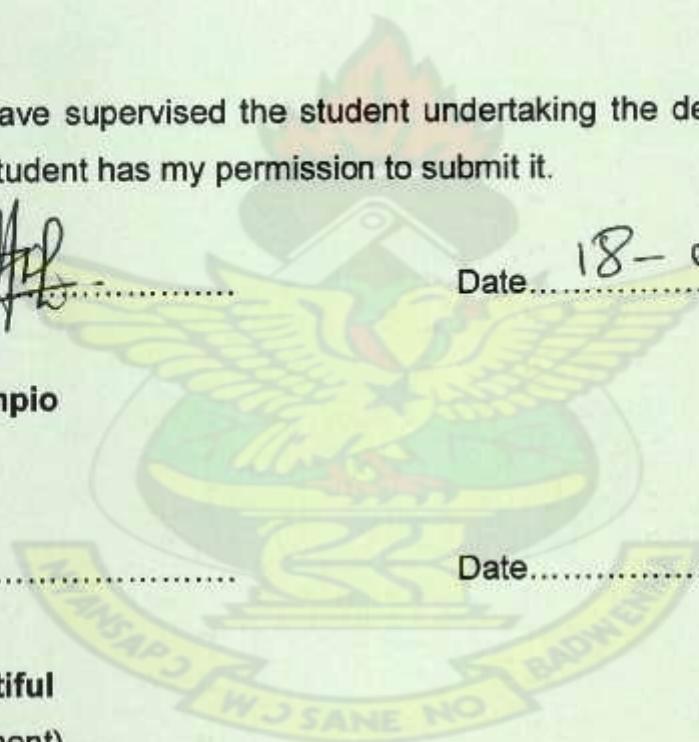
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(Head of Department)





## DEDICATION

*This thesis design is dedicated to the gracious God for his love, mercy and grace which has been sufficient for me through these past years.*

*It is also dedicated to my parents who have brought me this far with their love and support in every way.*

*It is also dedicated to all my lecturers who gave their all in giving me the best of education.*

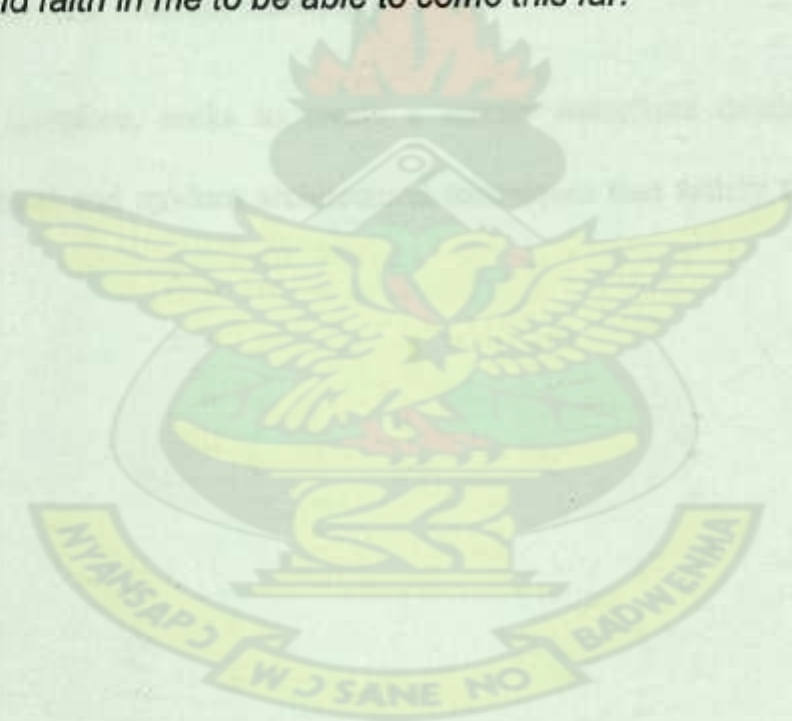


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*I am extending my sincere appreciation to my parents, for their love, prayers, financial support and faith in me to be able to come this far.*

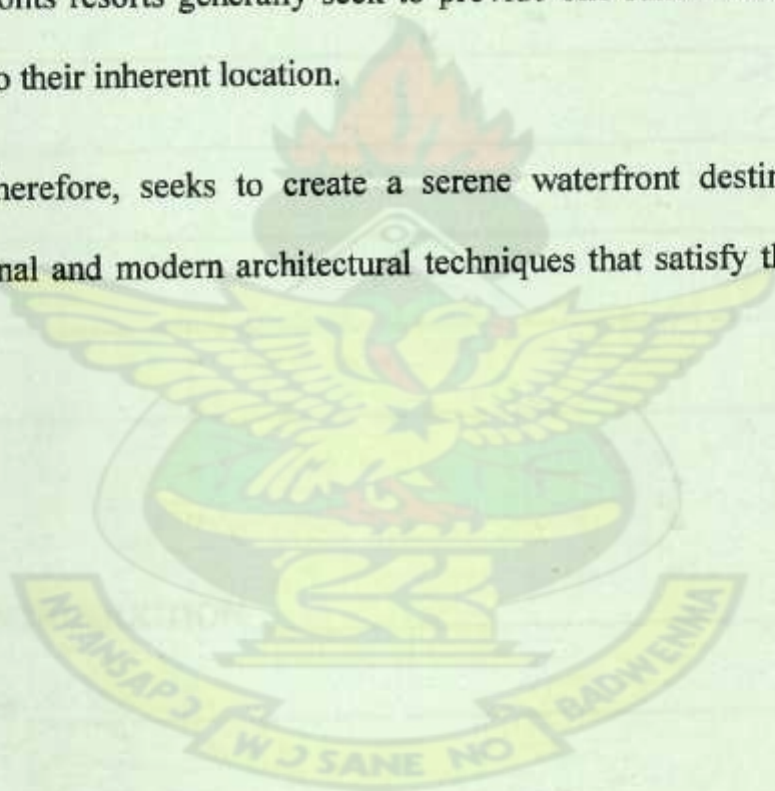


## ABSTRACT

The waterfronts of Ghana have generally been downplayed in terms of the built environment due to poor design and planning. There is a lot of potential in terms of tourism, both local and foreign.

The design of waterfronts resorts generally seek to provide one fundamental thing and that is relaxation due to their inherent location.

This thesis design, therefore, seeks to create a serene waterfront destination resort adopting both traditional and modern architectural techniques that satisfy the principles of waterfront design.





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# CHAPTER ONE

## INTRODUCTION

A new paradigm in international tourism has been established through the growing trend of holistic hotel and resort design, according to leading industry architects, interior designers, and sustainable tourism consultants. This view promotes a holistic development system integrating body, mind and spirit to create balanced, self-renewing and sustainable tourism developments.

International tourism can make significant positive changes to the world, particularly in the third world, where many countries are turning to tourism to build economic growth through increase in foreign exchange.

Ensuring the strategic long-term thinking and planning of tourism projects, so that they protect the environment as well as local cultures and communities.

Using the regenerative design system, that allows tourism projects to become part of their natural and cultural environments, by using local resources, and creating systems that continue to evolve and self-replicate. The relationship between man, building and the environment, combined with the natural cycles of the area, is the key, along with the historic and cultural preservation of the site. Water is recognized as the most precious resource, and ways are developed to ensure that it retains its purity and integrity over the long-term, thus giving the high value to waterfront hotels.

Interior designs reflect the natural beauty of the surroundings using exquisite natural materials, colour, texture and sensitive lighting. Holistic designers creatively blend colour, harmony, balance, proportion and style, resulting in a unique environment with a great sense of 'place'. Lighting is designed to reduce energy consumption, by maximizing natural light and using low-energy lamps.

The creation of magnificent spa sanctuaries, located in peaceful and restorative environments should be based on the principle of sacred healing of mind, body and spirit.



## 1.1 Problem Statement

Ghana is blessed with 539km of coastline, and almost all the waterfront resorts in Ghana are along the coast, just a few like Cisneros, at Sogakope, is inland on the Volta River. The Volta Lake offers 400km of navigable fresh water from Akosombo in the south, to Yapei in the north. The lake also has a number of beautiful islands.

With all this vast stretch of fresh water, the Volta Lakes shores are underutilized hence the need for some waterfront development. This will also go a long way to boost the tourism industry in the country.

One such place on the Volta Lake is the town called Kpando, in the Volta Region.

## 1.2 Site Location

The site is an island on the Volta Lake called Gabi Kpo (Gabi Island), located west of Tokor (a fishing suburb), in the Volta Region town of Kpando. It is a 20/mins boat ride from Tokor, using a boat powered by two out board motors.

## 1.3 Justification

- The boom in the tourism industry in Ghana annually hence the need for more hotel accommodation. From the data provided by the Ghana Tourist Board, tourist arrivals in the year 2007 were 586,612, which was an increase of 89,483 as compared to arrivals in 2006.
- The Ghana Tourist Board has a plan for developing the tourism industry in the country by 2010 and the provision of world class luxurious resorts and hotels is part of the plan.
- Kpando is centrally located within a very scenic mountainous and vegetative zone, from where one can access different ecological sites within 30/mins.

- Kpando itself has two religious sites. The Our Lady of Lourdes Grotto, in Agbenoxoe and the Blue Cross Grotto. There is a catholic retreat centre called Foyer De Charite at Alavanyo Abehivease, 19km from kpando.
- There are at least six waterfalls very close to Kpando, e.g:-
  - Tsatsadu Falls at Alavanyo Abehivease
  - Agumatsa Falls at Vli (this is the highest waterfall in West Africa)
  - Kalakpa, Tagbo and Aflakpui falls. These are on the Togoland ranges between Fodome and Liati.
- There is also the Tafi Monkey Sanctuary.
- Mount Afadjato near Amedzofe overlooks Kpando on the Togoland ranges.
- The lake offers limitless opportunities for various water sports and fishing as a hobby.

#### 1.4 Scope

The facility seeks to provide a therapeutic and very serene atmosphere using natural materials.

#### 1.5 Objectives

This is to serve/satisfy a range of people.

- The ordinary tourist visiting the Volta Region for its various tourist attractions such as the waterfalls, mountains, grottos.
- It should be able to accommodate the well to do Ghanaian who intends to go on a luxurious vacation.



- It should be of international standards to attract foreigners who are not necessarily tourists but holiday makers.

## LITERATURE REVIEW

### 1.6 Target Group

- Tourists
- Holiday makers
- Executive clients

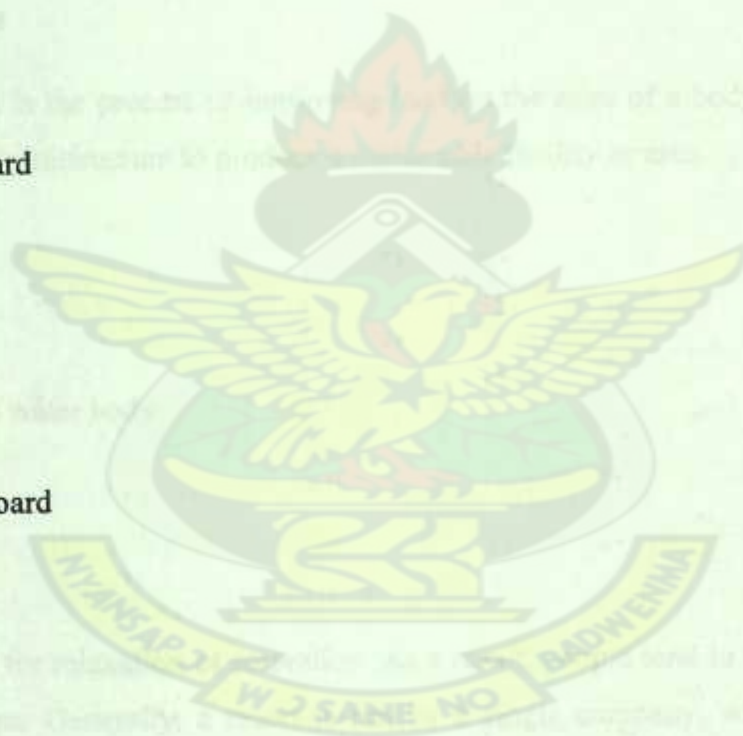
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### 1.7 Clients

- Ghana tourist board
- Kimportex Ltd.

### 1.8 Funding

- Ghana Tourist Board





## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Definitions

According to the Oxford Advanced Learner's Dictionary a **waterfront** is a land on the edge of a body of water. **Development** is the act or process of developing; growth; progress.

##### *Waterfront development*

Waterfront development is the process of improving land on the edge of a body of water using technology, culture and infrastructure to produce a sustainable facility or area.

##### *Waterfront resort*

A resort situated along a water body.

#### 2.2 Resorts

A resort is a place used for relaxation or recreation. As a result, people tend to seek out a resort for holidays or vacations. Generally, a resort is run by a single company, which attempts to provide for all or most of a vacationer's wants while staying there, such as food, drink, lodging, sports, entertainment, and shopping.

Towns that contain resorts—or where tourism or vacationing is a major part of the local activity—are often called resort towns. The term resort is sometimes misused to identify a hotel that does not provide the other amenities required of a resort. However, a hotel is frequently a central feature of a resort.



**Fig 2.1** Resorts combine a hotel and a variety of recreations, such as swimming pools

The Walt Disney World Resort is perhaps the most famous example of a resort in the world; however, resorts exist throughout the world. Resorts are especially prevalent in Central America and the Caribbean.

### 2.2.1 Types of resorts

#### ❖ Destination resort

A destination resort is a place of lodging whose inherent location and amenities attract visitors regardless of the route needed to arrive or the area wide features of interest. The destination hotel concept has existed at least since the 19th century and occupies a significant market share of all lodging in the world as of 2006. From the late 1980s to the present the extent of amenities and conference facilities has greatly expanded for many destination hotels. Destination hotels are also called destination lodgings and destination hotel. Considerable academic and business analysis has been conducted in the field of destination hotels. In the *Arnold Encyclopaedia of Real Estate* a destination hotel is characterized as a place of lodging not chosen for convenience and not chosen for people in transit to other areas.





**Fig 2.2** Historic Kviknes destination hotel in Norway

The typical characteristics of a destination resort are:

- Amenities which are quite complete and self-contained
- Upscale nature of the lodging operation
- Distinctive characteristics of the building, gardens or adjacent natural feature
- Activity set which makes leaving the property unnecessary

#### ❖ All-inclusive resort

An all-inclusive resort is a resort that, besides providing all of the common amenities of a resort, charges a fixed price that includes most or all items. At a minimum, most inclusive resorts include lodging, unlimited food, drink, sports activities, and entertainment for the fixed price.

#### ❖ Beach Resorts

Beach resorts are resorts that are located on or within a short distance from a major beach. Many beach resorts have activities that include snorkelling, kayaking, scuba diving, parasailing, and boating. Some even have their own on-site beach, especially for guests.



### ❖ Golf Resorts

Golf resorts include resorts that either have an on-site golf course or are located within a reasonable distance from one or more golf courses. Some accommodations at these resorts will come with golf passes to allow guests to play the course free of charge.

### ❖ Luxury Resorts

A luxury resort is a very expensive vacation facility which is fully staffed and often boasts many visitor activities and attractions such as golf, water sports, spa and beauty facilities, skiing, natural ecology and tranquillity. A luxury resort is an elite luxury property which exhibits an exceptionally high degree of customer service and hospitality. A flawless execution of guest services will be the resort staff's and managements main concern. A luxury resort will commonly also feature a superb architectural interior and exterior design as well as an interesting physical location.

### ❖ Mountain Resorts

Mountain resorts are resorts located on or at the base of a mountain. Activities include down-hill skiing, cross-country skiing, snowmobiling, sightseeing and more.

### ❖ Ski Resorts

Ski resorts are located within or close to a ski area or ski village. Many ski resorts have other activities to engage in besides skiing and snowboarding, such as snowmobiling, sledding, horse-drawn sleds, dog-sledding, ice-skating indoor swimming, hot-tubbing, game rooms, and local forms of entertainment.

### ❖ Spa Resorts

Spa resorts are resorts that have a health or day spa located on-site. Spa resorts are a great way to get away from the stresses of work and career.

### ❖ Theme Park Resorts

Book lodging at numerous timeshare resorts near major theme parks world-wide. Maps show distance from resort to major theme parks.

### ❖ Tropical Resorts

Tropical resorts are located within tropical climates. A guest staying at a tropical resort will include year round warm and sunny weather

#### 2.2.2 Features in hotels

Features in resort will vary depending on the type of resort, location of resort and its target group.

Features may include:-

- Gardens



Fig 2.3 A garden



- Swimming pools



**Fig 2.4** A swimming pool area

- Gym



**Fig 2.5** A gym

- Conference rooms



**Fig 2.6** A conference room

- Tennis court



**Fig 2.7 A tennis court**

- Restaurants



**Fig 2.8 A restaurant**

- A bar



**Fig 2.9 A bar**



- A lounge
- Shops
- Laundry
- Forex bureau
- Massage parlour



**Fig 2.10** Massage parlour

- Sauna



**Fig 2.11** The interior of a sauna

- Golf course
- Water sports ( when along a water body )
- Helipad
- Casinos

## **2.3 Relaxation Therapy**

The purpose of relaxation is to do away with certain activities that place undue stress upon the body. Most of the techniques of relaxation therapy involve retraining the muscles of the body to get rid of hidden underlying tension. Relaxation therapy also teaches individuals to recognize slight tension in their everyday life and enables them to deal with this. When an individual is stressed, then the so-called “fight or flight response” is activated, with the person experiencing increased heart rate, blood pressure, and respiratory rate.

One of the major tools employed by relaxation therapists is deep breathing, as tension per se causes breathing changes. People under stress tend to breathe with relatively short, shallow breaths. Yoga is a form of relaxation that employs breathing and positioning of the body to improve agility, both mental and physical, and reduces tension by allowing the body to relax. Yoga promotes happiness in a state of inner tranquillity and balance, with inner peace and harmony at the root of the therapy.

### **2.3.1 Meditation**

Meditation seeks to achieve self-awareness and awareness of one's relationship with the environment. During meditation thinking is separated from perceiving, so that the individual can stand apart from the emotional self. According to proponents, meditation renders participants more conscious of God and more amenable to the godly qualities of life. It has been practised for centuries and is a vital part of many Oriental, Asian, and Indian religions; Buddhists use meditation to purify the mind and gain insight. Having the advantage that it can be practised at



any time in any place; it is best practised in a comfortable position with eyes closed, with complete relaxation of all muscle groups. Most meditation programmes involve increased awareness by focusing on the internal environment—some aspect of feeling; a thought; a physical process; or a sound. In addition, external focusing can also be achieved, such as on an object or a physical activity.

### **2.3.2 Aromatherapy**

Aromatherapy dates from the ancient Egyptians, who used scents of aromatic oils such as eucalyptus, lavender, and clove to treat skin disorders. It was not until 1930 that the French chemist René Maurice Gattefosse discovered that essential oils used for cosmetic purposes also had medicinal applications. Practitioners administer the oil in a variety of ways, usually by rubbing it into the skin. The oils are readily absorbed into the body and circulated through it. The fragrance of the oil also appears to be important in the therapy. Advocates of this type of complementary medicine claim that conditions as diverse as inflammation, oily skin, dry skin, influenza, and decreased physical immunity can be successfully treated with aromatherapy. Emotional disorders are also treated with aromatic oils: rose oil being thought good for jealousy, camomile for anger, and hyssop for grief.

### **2.3.3 Visualization**

Visualization is the use of the imagination to create pictures of desired situations or conditions. With any visualization technique, the more powerful and complete the picture, the greater the response. Consciously using visualizations allows participants to use the imagination in a structured way, providing clear links with dreams and desires and thus allowing relaxation and the control of the physical symptoms of disease. Put simply, by thinking about feeling good, the patient will feel good. In addition, participants try to visualize how the body appears internally in an attempt to overcome some common physical illnesses such as hypertension (high blood pressure). Some people also believe that effective visualization focused on improving the efficacy of the immune system can slow down the rate of progression of cancer and AIDS,



although this remains a topic of considerable debate. Visualizations allow exponents to reinforce feelings and thus combat stress and some of the physical manifestations of disease.

#### 2.3.4 Massage/Somatotherapy

This is one of the oldest forms of therapy known. Its origins are in the Orient, but it is now widely practised in the West and may be included in a course of physiotherapy. Oriental massage is designed to give relief from fatigue, sluggishness, stiff shoulders, headaches, and so on. Western massage concerns itself with nerves, joints, muscles, and the endocrine system, and with treating disorders such as strokes, poliomyelitis, numbness and joint pains, chronic abdominal pain, and chronic constipation.

The underlying principle of massage is that all information received by the individual must firstly be received by the body, and the way that the body receives it will ultimately affect the way the brain receives it. Therefore, the body affects the mind and conversely the mind affects the body. Massage attempts to unify, coordinate, and integrate body and mind by stimulating nerves and muscles, based on the theory that every part of the body is controlled by a spinal nerve. Gentle pressure from the fingertips is used to suppress nerve function and heavier pressure to stimulate.



**Fig 2.12** A massage parlour in a hotel



## 2.4 Therapeutic nature of landscaping

### 2.4.1 Colour healing in the garden

Colour therapy is an age-old pursuit, and was originally used in ancient Greece and in the healing temples of light and colour at Heliopolis in Egypt. The therapy was also held in high esteem by the ancient Chinese and Indians for several thousand years.<sup>8</sup> (David Squire, 2002)

#### ❖ Pure and innocent

In the West, white is the colour of purity, and is frequently worn by brides, while in the east it is the colour of mourning. In ancient Egypt it was the colour of joy. In gardens it has the aura of coolness and authority. White robes are particularly popular among men in Arabic countries as, unlike black, white does not absorb light and therefore helps to keep the wearer cool and fresh.

#### ❖ Calm and serene

One of the qualities associated with blue is calmness; therefore, a garden that needs to promote a sense of tranquillity should be predominantly blue. Indeed, blue is said to reduce blood pressure and to slow down breathing and pulse rate.

Buddhists believe deep blue is the colour of infinity, and it is often thought to be the ideal colour for contemplation. In surveys for favourite colours, blue is usually the most popular, preferred by more than one-third of all people. Western religion also use blue: Virgin Mary is invariably depicted wearing a cloak or dress of what has come to be known as Madonna Blue.

Traditionally, hospital wards were painted white or light cream, but light blue was increasingly found favour as colour to aid recovery.

### ❖ Emotion and sexuality

Red is an emotive colour, and exposure to vermilion, in complete contrast to blue, raises blood pressure and increases the rate of respiration. It is also the colour for sexual invitation, and this, perhaps. Partly accounts for the increase on pulse rate.

In India, red symbolizes great female power, sexuality and all the energy of passion and positive emotion. In China it is a lucky colour, and is worn by brides.

### ❖ Cheerful and optimistic

Yellow is the colour of brightness and cheerfulness, and is claimed to be the primary colour of the intellect, hope and productivity. People who like yellow are said to be individual and original in their thinking and attitude, and always willing to absorb new ideas. Strong dislike of yellow is said to indicate a rejection of retrospect, a fear of innovation and, taken to its extreme, hopelessness. Incidentally, yellow is often the favourite colour of children.



**Fig 2.13** A blend of yellow and other bright colours



❖ **Cool and soothing**

Green produces a cool and soothing ambience, and signifies growth, fertility and freshness. Outdoors, shades of green vary, depending on the time of the day and year and the nature of the leaf surface.



**Fig 2.14** A hotel room with direct contact with nature

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Methods used in research**

##### **❖ Case studies**

- The first study done was on the Saint John waterfront, Canada. The reason for this study was to understand the general principles of designing a waterfront.
- The second study was on Labadi Beach Hotel, Accra. The reason for this study was to study what goes into designing a five star hotel on a waterfront, in terms of facilities to provide, materials used and services to provide.

##### **❖ Precedence study**

- This study was done on thatch roofing. It generally delves into the types of thatching materials, life expectancies and the construction of thatch roof.

##### **❖ Interviews with hotel staff**

- The reason for this was to find out how the hotel facility is managed and the general problems faced due to the design.

##### **❖ Personal observations**

- I personally visited a number of hotels such as La-Palm, White Sands and Golden Tulip. The purpose of these visits was to use their various facilities such as their pool, restaurant and rooms to analyse special arrangements and design. Other areas considered were the car park, landscaping and public areas.



## CHAPTER FOUR

### FINDINGS AND DISCUSSIONS

#### 4.1 Literature review findings

- ❖ The most suitable resort type for such a facility will be a destination resort due to its inherent location, target group and amenities going to be provided.
- ❖ All the general features for hotels such as swimming pools, gardens, gym, conference rooms, restaurants, tennis courts, etc. would also be appropriate for such a facility.
- ❖ In order to satisfy the relaxation aspects, the adoption of the various therapeutic techniques, such as aromatherapy, visualisation and massage/somatotherapy, would improve the quality of the facility.
- ❖ The therapeutic nature of landscape would also enhance the facility. The use of white, blue, red, yellow and green plants and flowers would give a cool, soothing, calm, serene, pure and emotional atmosphere.

#### 4.2 CASE STUDY 1 (Saint John Waterfront)

##### 4.2.1 Reason for study

This is to understand the general principles for designing the waterfront

##### 4.2.2 Overview

Saint John Waterfront is in New Brunswick Canada. It is a large-scale oceanfront planning in progress featuring all amenities from linear parks to lawns. The set of images illustrate the design and open space potential offered by waterfront park projects.

4.2.3 Design

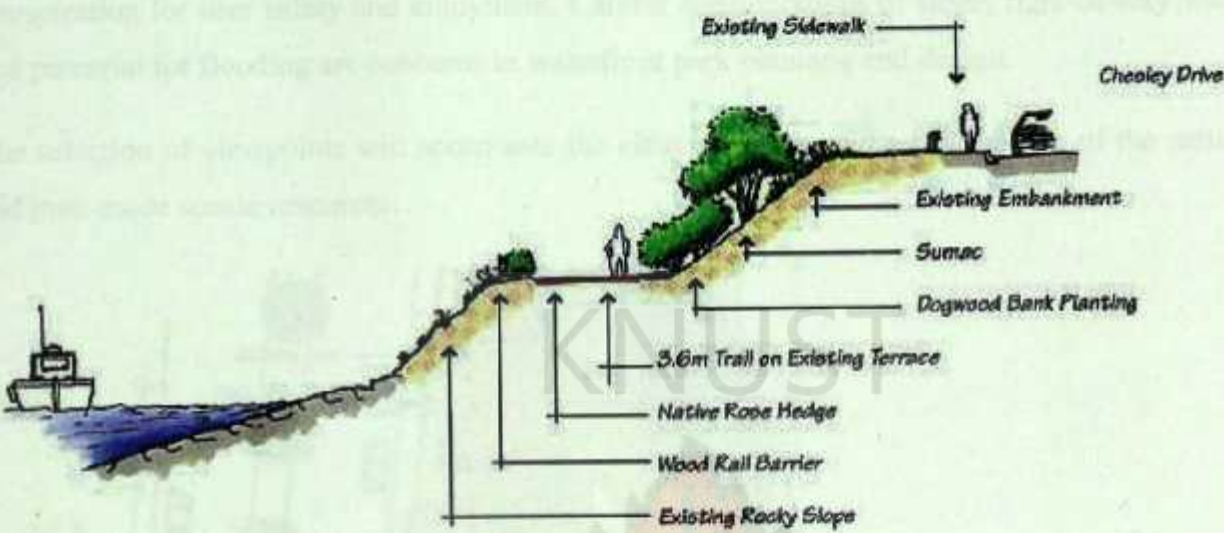
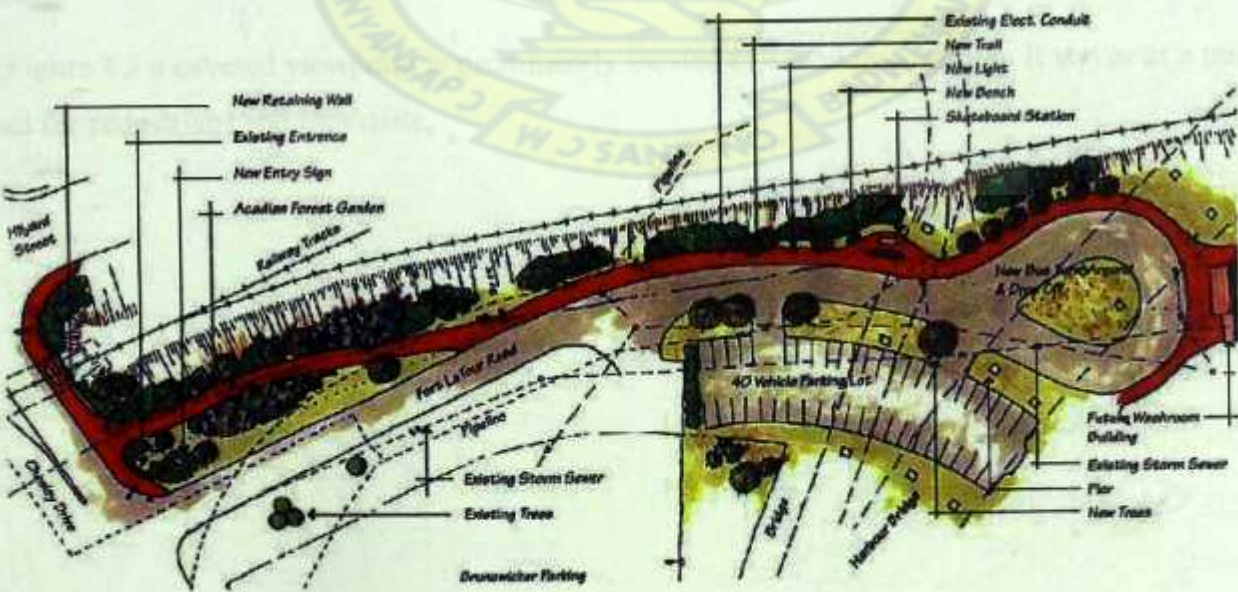


Fig 3.1 Routing of a pedestrian and bike path

The image in Figure 3.1 shows the routing of a pedestrian and bike path. The parking lot as a symbol of everyday pressure, anxiety and rigidity is separated from the pathway, promoting feelings of relaxation and freedom.

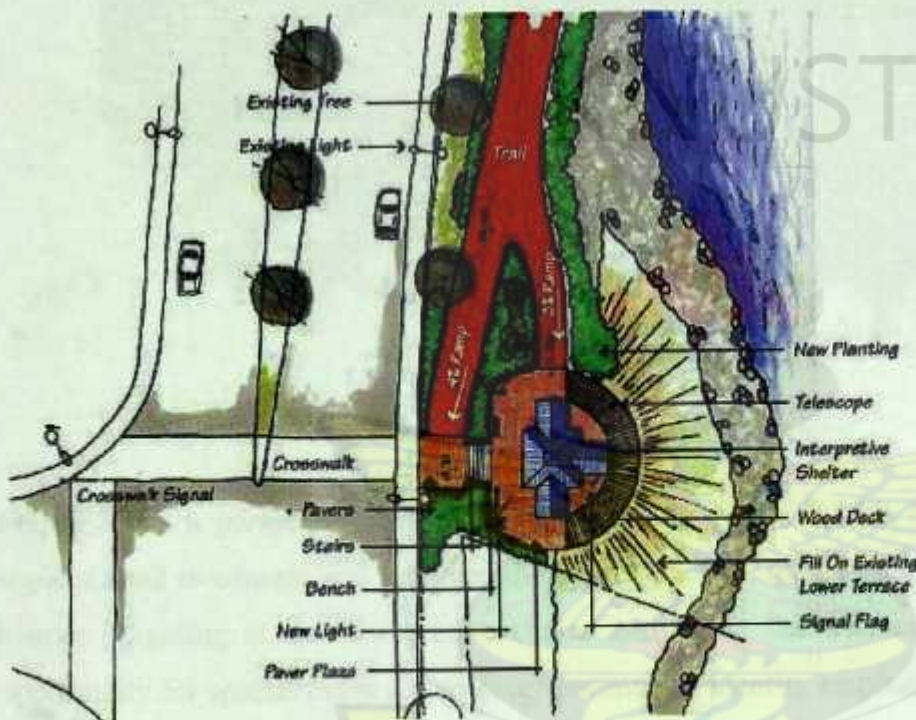




**Fig 3.2 Trail**

Figures 3.2 is a cross section illustrating the importance of separating various modes of transpiration for user safety and enjoyment. Careful considerations of slope, right-of-way width and potential for flooding are concerns in waterfront park planning and design.

The selection of viewpoints will accentuate the citizen's and tourist's appreciation of the natural and man-made scenic resources.



**Fig 3.3 Plan of viewpoint**

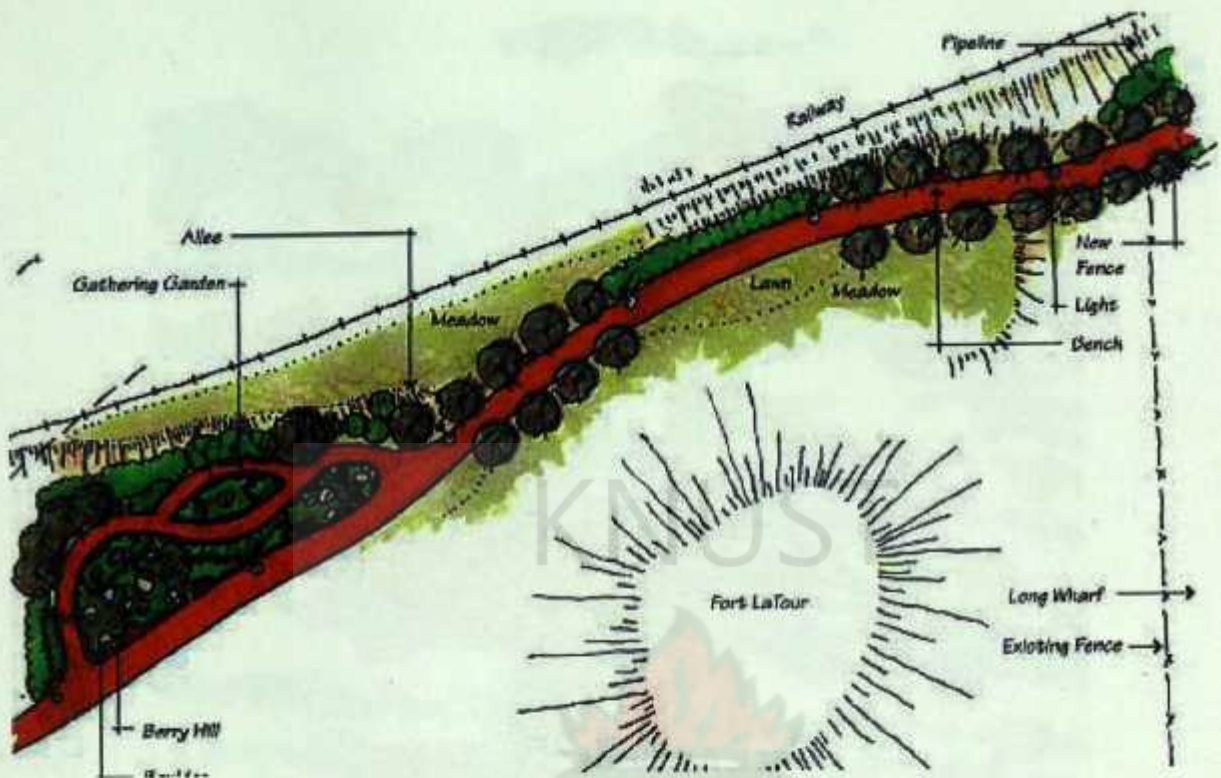
In Figure 3.3 a covered viewpoint is prominently located at a road intersection. It serves as a trail head for pedestrians and bicyclists.



**Fig 3.4** Perspective of viewpoint

Figure 3.4 is a perspective image of the same viewpoint. Notice the presence of interpretive signage used to educate and heighten the appreciation of the landscape, wildlife and community history. Lighting at the interpretive centre and along the trail are a safety feature and an opportunity for special event advertising, community identity emphasis and added interest.





**Fig 3.5 Path Features**

Figure 3.5 is an example of a linear trail with a side room featuring a skate board area. From an ecological perspective, the linear trail is allow-impact land use on a very sensitive area (waterfront/wetlands). Native plants can help ease runoff and erosion while maintaining the site's natural character. Side rooms reduce damage to other areas of the site caused by undirected activity. From a psychological perspective, detours fill our innate human need for exploration and relief from everyday monotony, providing true re-creation.

The proposed shade and interpretive structure shown in Figure 3.6 offers use and educational opportunities along the waterfront path.



Fig 3.6 Perspective of another viewpoint



### 4.3 CASE STUDY 2 (LABADI BEACH HOTEL)

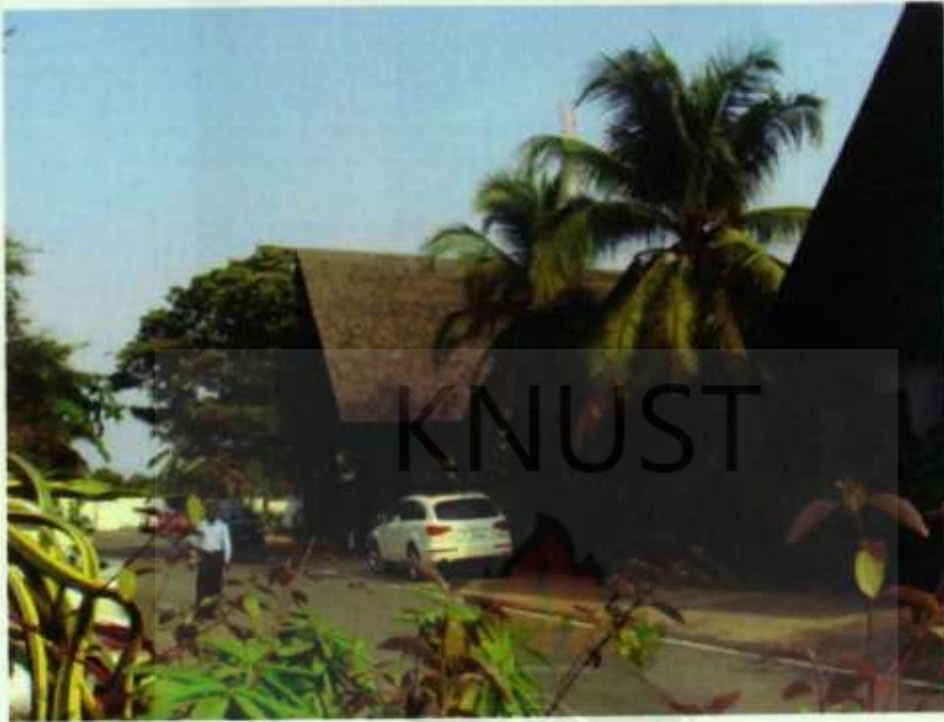


Fig 3.7 Labadi beach hotel

#### 4.3.1 Overview

Set amidst tropical landscape gardens, adjacent to one of Ghana's most popular beaches in the country's administrative, communications and economic centre. The Labadi Beach Hotel caters for the business and leisure traveller with an occupancy rate of 95% all year round.

#### 4.3.2 Facilities

- 102 rooms and suites
- 2 paraplegic rooms

rooms are self contained and either have one or two beds ,a television, a desk, a safe, a closet and beautiful views outdoors.



**Fig 3.8** Corridor leading to rooms



**Fig 3.9** Double room





**Fig 3.10** View from double room

- ❖ Curio and gift shop
- ❖ Conferences and banqueting for up to 250 delegates
- ❖ 2 flood lit tennis courts
- ❖ Volleyball court
- ❖ Swimming pool with adjacent children's' pool



**Fig 3.11** Swimming pool



**Fig 3.12** Children's pool

- ❖ wireless internet connectivity in lounge, terrace and conference areas
- ❖ 2 bars and restaurants



**Fig 3.13** Lounge bar



- Beach frontage



**Fig 3.14** Coconut grove overlooking the beach

- ❖ Health club offering a fully equipped gymnasium, sauna and massage facilities



**Fig 3.15** Fitness gym



**Fig 3.16**Massage parlour



**Fig 3.17** Sauna



**Fig 3.18** Changing area



**Fig 3.19** Shower



### 4.3.3 Materials

Natural materials such as stone and wood are used throughout the facility due to the nearness to the sea.



**Fig 3.20** Main lobby



**Fig 3.21** Concrete walls clad with stone



~ Fig 3.22 The various blocks of the hotel are linked together using covered walkways



Fig 3.23 Wooden column detail



Little metal coated with paint is used as the joinery between the concrete portions and the wood, as used between the wooden columns of the covered walkway and the terrazzo flooring.

4.3.4 Services

*Electricity*

- ❖ main supply ECG
- ❖ 1000KVA plant additional power

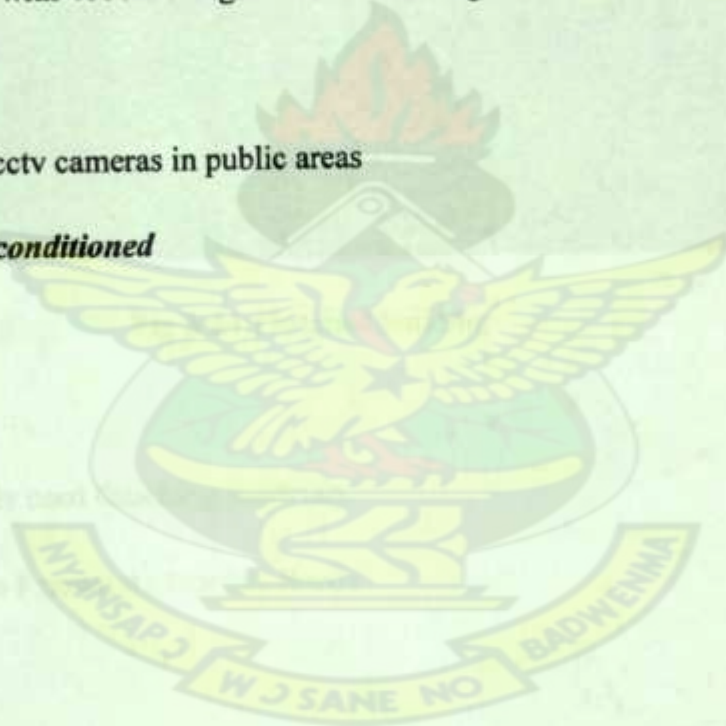
*Water*

- ❖ main supply GWC with 4000-6000 gallons water storage tanks with treatment plants

*Security*

- ❖ 24hr security plus cctv cameras in public areas

*The hotel is centrally air-conditioned*



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#### 4.4 PRECEDENCE STUDY (Thatch Roofing)



Fig 3.24 Thatched building

##### 4.4.1 Types of Thatch

There are three commonly used thatching materials:

- ❖ Water Reed (Also Known As Norfolk Reed)
- ❖ Long Straw
- ❖ Combed Wheat Reed (Also Known As Devon Reed)
- ❖ Others Include Flax, Heather, Broom, Sods, Marram Grass etc - for further information please contact T.A.S.

*Water Reed* (*Phragmites Australis*) is the most durable thatching material.

*Long Straw* is a winter wheat straw which has not been combed with its name referring to the style of thatching rather than the material, achieved by any singular process although generally



for the last 90 years, long straw thatching has used the processed straw from the threshing drum. It has the shortest life expectancy of the three commonly used materials.

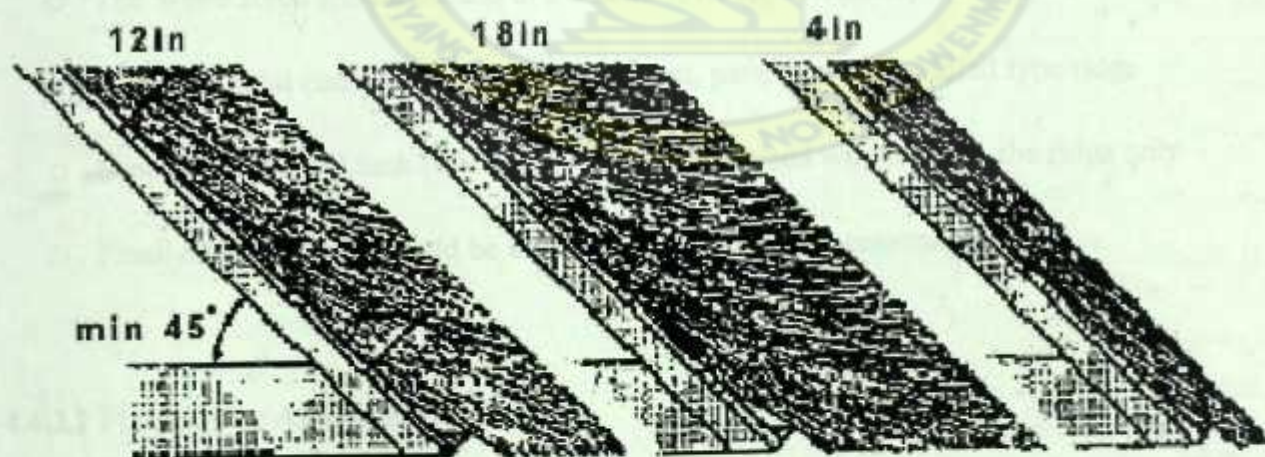
**Combed Wheat Reed** is winter wheat straw which has had the leaf removed and is laid in a similar way to water reed. With modern farming methods tall strong straw has become less readily available.

#### 4.4.2 Life Expectancies

- Water reed, which is the most durable thatch, can last up to 50 years. Maintenance will include re-ridging every 10 to 15 years.
- Combed wheat reed can have a life expectancy of 25 to 35 years.
- Long straw will last from 15 to 25 years.

As with water reed, both these materials will require re-ridging at 10 to 15 year intervals.

These life expectancy figures can drop noticeably the further west the thatched property is situated. This appears to be due to climatic conditions. The warm, high humidity, clean air conditions experienced in the West Country are ideal for the microbes that begin the decomposition process



**Diagram1:** Roof pitches



The pitch of the roof will relate directly to the pitch of the thatch and equally the thickness of the thatch will influence the pitch of the thatch. Thus, an 18in coat of thatch will lie at a much slacker pitch than a 12in coat and therefore a thicker coat will wear more quickly. The thinner the thatch, the steeper the pitch, however there must be adequate thickness of thatch over the fixings, thus a 4in coat of thatch is steeper than a 12in coat, but because the exposed stem length is longer (and therefore wears more quickly) and because there will be very little thatch over the fixings the thatch will not last as long as a 12in coat. An optimum thickness for maximum longevity would be between 9 and 15in for water reed and 9-12in for combed wheat reed and long straw. Therefore, there are an almost infinite number of specifications depending on pitch of roof and length of the thatching material.

#### **4.4.3 General Information**

##### **4.4.3.1 Water Reed Specification for New Build Thatch**

Thatching is generally recognised as a craft and as such it is almost impossible to give a single specification for a re-thatch. However in the field of new build thatching the majority of work is undertaken using water reed and therefore a specification is possible.

Other specifications are:

- The Water Reed should be laid to a thickness of approximately 12" (300mm)
- The ridge most commonly used is a block cut, patterned and saddled type ridge
- Supply and fix, 3/4 inch (19mm), 22 gauge galvanised wire mesh to the ridge only
- Finally the Thatcher should be expected to leave the site reasonably tidy

##### **4.4.3.2 Fixings (For All Types of Roof)**

Hazel or steel runners can be applied and secured by steel thatching nails, fixing wires, twine or spars. The method will depend on the roof in question and the material used, however water reed



on a new roof is usually fixed with thatching nails or stainless steel wires attached to rust proved screws.

#### 4.4.3.3 Roof Pitch

It is advisable to set the pitch at about 50 degrees. This is not due to the weight of the material which is in fact not over heavy, but rather to facilitate efficient drainage. Dormer roofs and eaves window-roofs should be at least at a 45 degree pitch, if possible.

#### 4.4.3.4 Insulation of a Thatched Roof

Thatch is inherently a good thermal insulator with 'r' values of 11.1 and 14.3 mK/W for reed and straw respectively. It is worth noting that generally thatch is considered a 'warm roof construction' and consequently does not require the ventilation of a tiled roof.

#### 4.4.3.5 U Values

The U value of a roof refers to its thermal conductivity, that is, how quickly heat is lost from it, and is measured in watts per metre squared per Kelvin. The U value of 12 inches of Water Reed on a pitch of 45 degrees is 0.35 W/sq m K. An R value is the inverse of U. The current building regulations state that the U value required from a new roof should be 0.25 W/sq m K. Therefore there has to be some sort of insulation even under a thatched roof.

The calculations for U value are relatively complicated and therefore should be left to the architects. However it is definitely worth telling any interested parties that Thatchbatts and Barrier Foil underneath the thatch give a U value of 0.16.

#### 4.4.3.6 Weight of Thatch

When calculating for a roof construction a weight of 7 lbs/ft<sup>2</sup> (34 kg/m<sup>2</sup>) should be assumed.

#### 4.4.4 Roof Construction

##### 4.4.4.1 Smaller Span Roofs

For a 16'6" (5.03m) span roof with a clear span a simple form of truss is required as indicated in diagram 3. The trusses should be set at between six to eight feet apart. Rafters, ties, collars and diagonals should be 4" x 2" (100 x 50mm). The diagonal members should be notched so that the purlins will be held at right angles to the rafters.

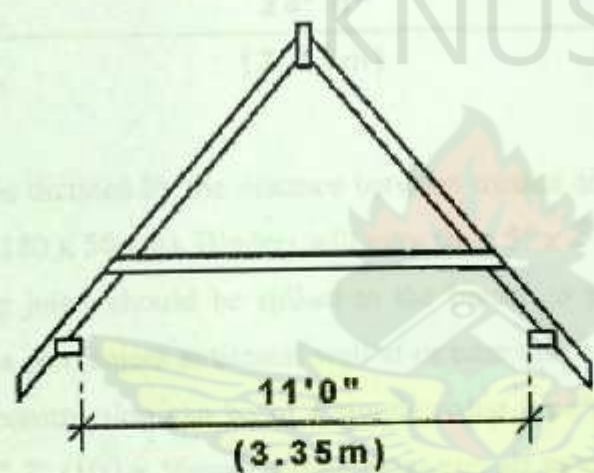


Diagram 2

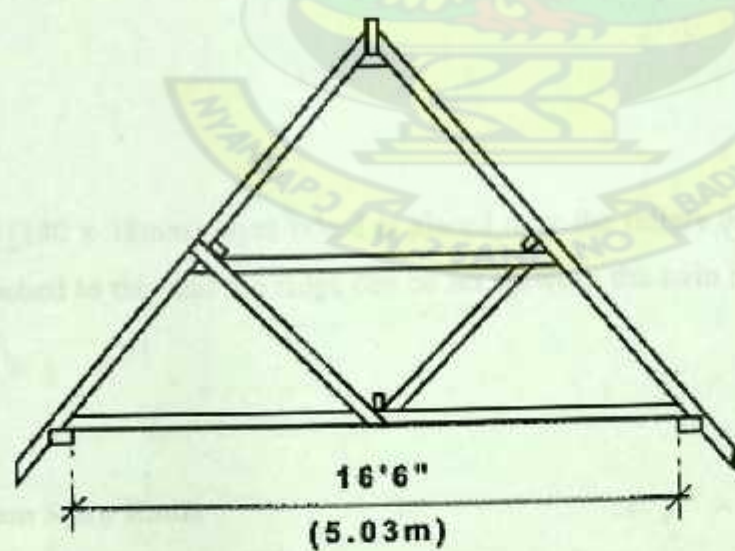
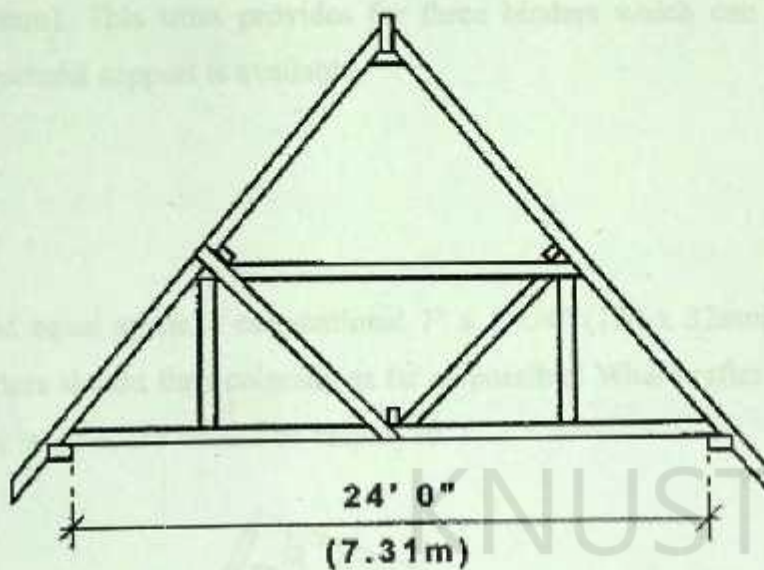


Diagram 3





**Diagram 3**

The size of purlin is dictated by the distance between trusses and will vary from 5" x 2" (130 x 50mm) to 7" x 2" (180 x 50mm). Binders will vary from 5" x 2" (130 x 50mm) to 6" x 2" (150 x 50mm). All ceiling joists should be spiked to the binder to prevent sagging. Binders can be omitted if there is a convenient structural wall at or near the centre of the span. Up to an 11'0" (3.35m) span the construction can be of a simple collar type with the collar set in the bottom third of the roof. 4" x 2" (100 x 50mm) ceiling joists can act as collars if conveniently positioned. All rafters must be bird-mouthed over the wall plates.

#### **4.4.4.2 Valley**

A 7" x 1 1/2" (180 x 38mm) layer board is placed over the rafters of the main roof. The jack - rafters are attached to this and the ridge can be set between the twin rafter members of the truss. See diagram 5.

#### **4.4.4.3 Medium Span Roofs**

The truss illustrated in diagram 4 is suitable for a 24' (7.3m) span. Ridge collars and diagonals and bottom ties should be 4" x 2" (100 x 50mm), hangers are 3" x 1" (76 x 25mm). With a span of this size the ceiling joists require support in three positions if the joists are to be kept at 4" x



2" (100 x 50mm). This truss provides for three binders which can be omitted whenever a convenient structural support is available.

#### 4.4.4.4 Valley

With large and equal spans, a conventional 7" x 1 1/4" (180 x 32mm) valley rafter should be used. Jack-rafters should then coincide as far as possible. Where rafter spacing of the two roofs are different, a layer board should be employed.

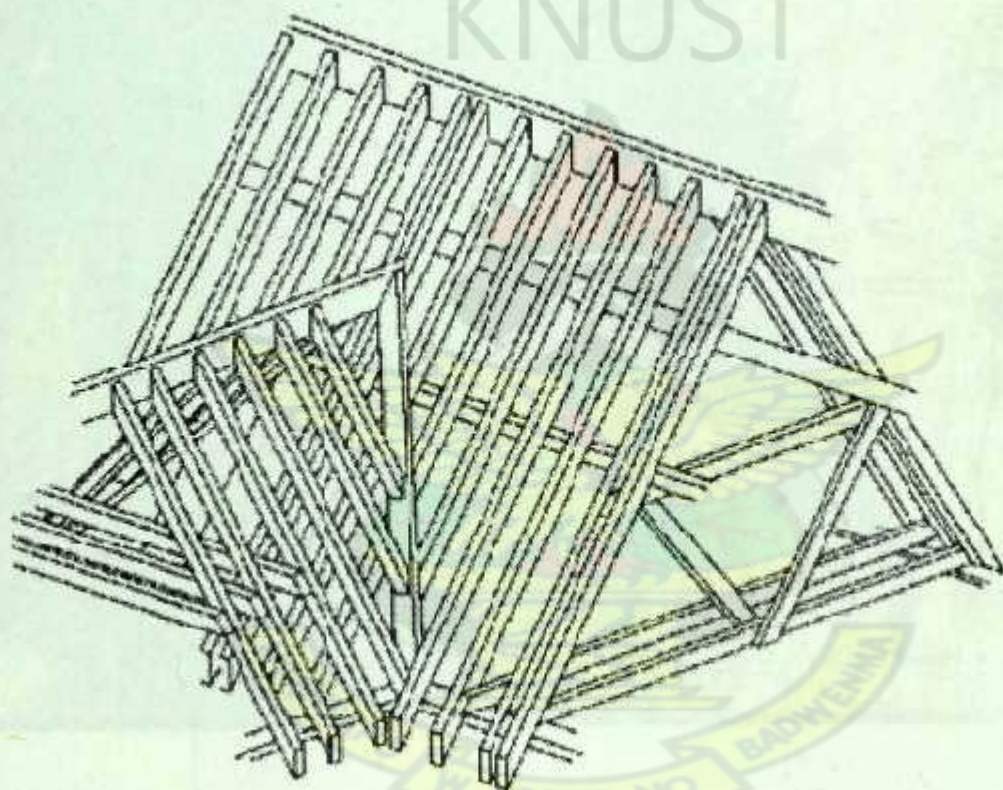


Diagram 5

#### 4.4.4.5 Ridge

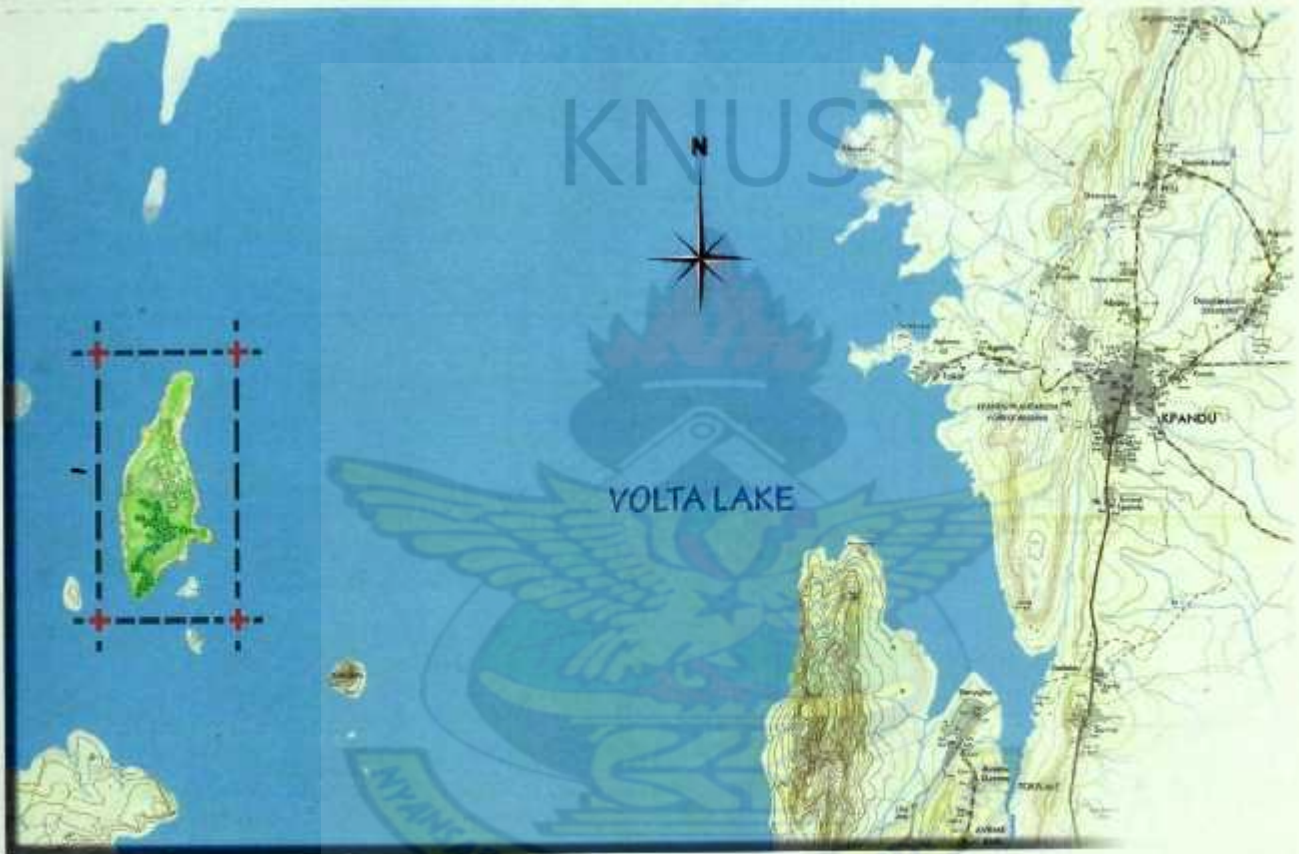
Presuming 4" x 2" (100 x 50mm) rafters and a 500 pitch, the ridge plate should be 9" x 1 1/4" (229 x 32mm) and the up-stand of the ridge should be 2" (50mm) from the ridge. Thereafter battens should be spaced at 9" (228mm) centres.



## 4.5 Site

### 4.5.1 Site Location

The site is an island on the Volta Lake called Gabi Kpo (Gabi Island), located west of Tokor (a fishing suburb), in the Volta Region town of Kpando. It is a 20mins boat ride from Tokor, using a boat powered by two out board motors.





Gabi Kpo (Gabi Island)



#### 4.5.2 Orientation

The longest sides face the east and west

#### 4.5.3 Site Conditions

The island currently has scattered settlements on it. The tribes here are the Ewes, Fantes and Adangbes. The main economic activity is fishing.



A fisherman mending his net

#### 4.5.4 Access

The island is accessed by boat from mainland Kpando but it can be accessed from anywhere on the Volta Lake.

#### 4.5.5 Soil Typology and Vegetation

The island is a pebble beach island and has fertile soil. It is covered with grass, shrubs and trees.

*Implications* - site would be able to support good landscaping with grass, shrubs and deciduous trees.



Pebble beach

#### 4.5.6 Infrastructure and Services

- Buildings on the island are built with mud stabilized with pebbles and straw and roofed with thatch



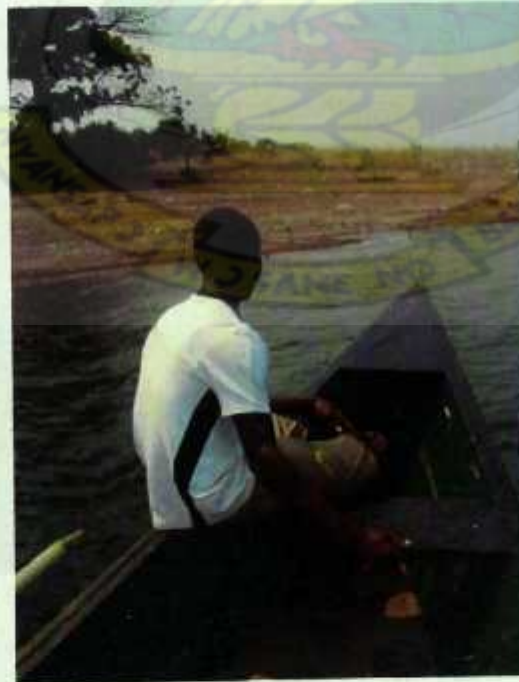
A view of a settlement





A close-up view of wall construction

- No electricity on the island. Closest transformer in Tokor
- No pipe borne water
- Means of transportation is by canoe or boat



- Refuse is gathered and incinerated

- The pit latrine is the only sanitary facility on the island hence no sewage lines

*Implication* - construction technology can be adopted and the organic waste can be recycled to generate gas and electricity.

#### 4.5.7 Merits

- Soil typology supports good landscaping
- The island is huge enough to accommodate a biogas plant to generate energy and gas for the facility
- The island offers a very scenic atmosphere
- Residents on the island can provide labour for the facility
- The Volta Lake has the potential of providing a platform for a variety of water sporting activities
- The highlands on the other sides of the lake provide wonderful views





#### 4.5.8 Demerits

- The lake being navigable by anyone can pose a security threat
- Not easily accessible

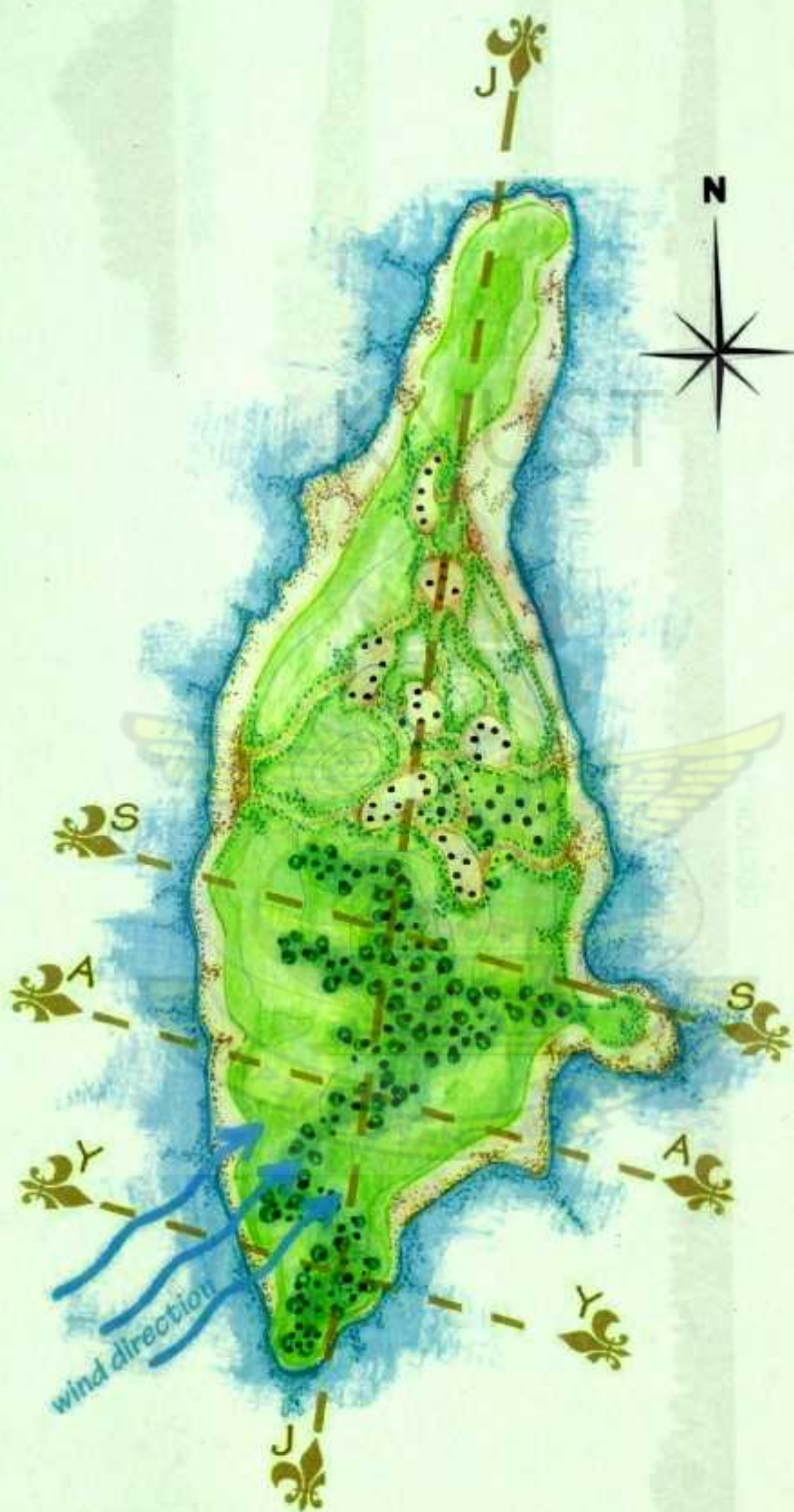
#### 4.5.9 Site Analysis

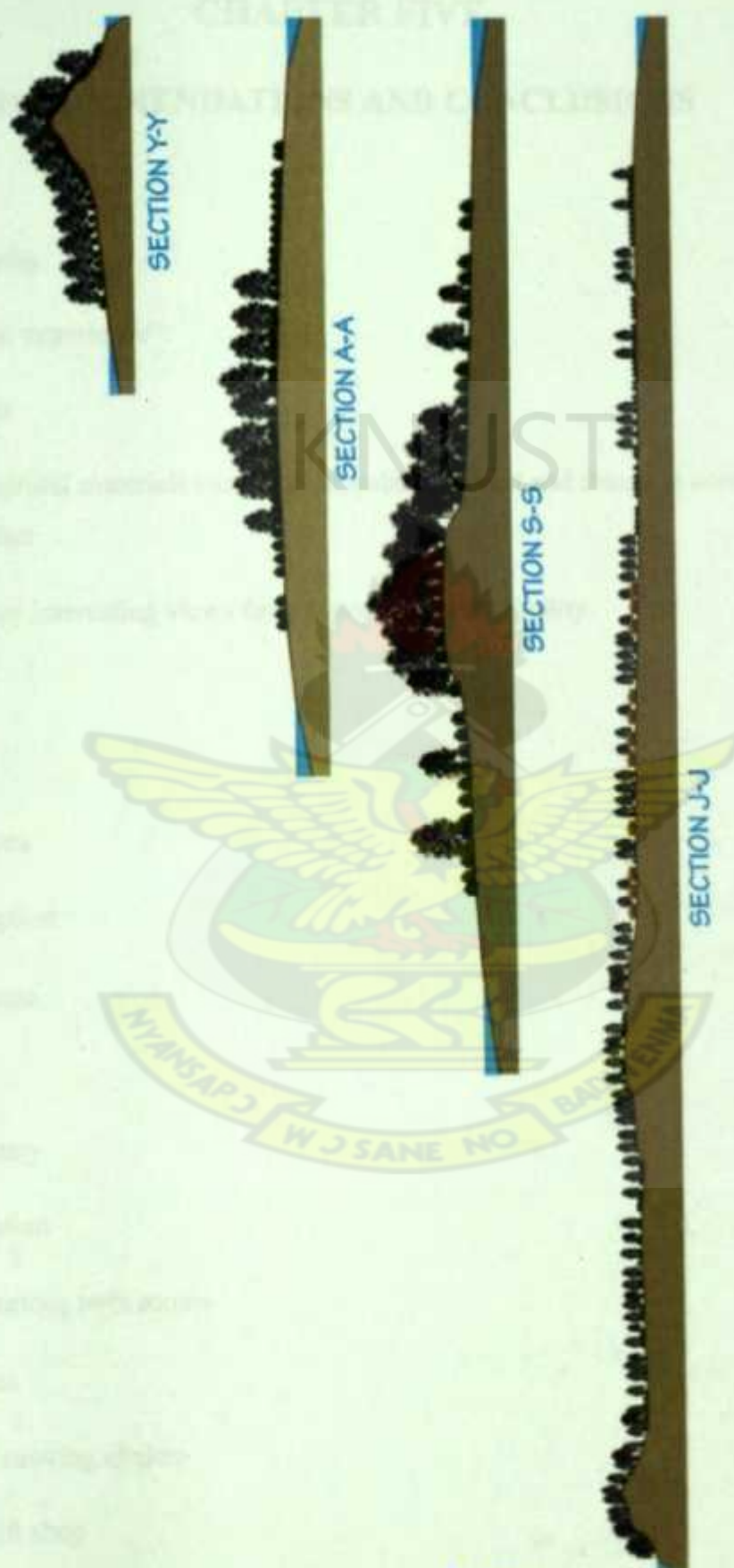




Water levels during high and low tides









## CHAPTER FIVE

### RECOMMENDATIONS AND CONCLUSIONS

#### 5.1 Design philosophy

“Eclectic therapeutic experience”

#### 5.2 Design concepts

- The use of natural materials such as mud, pebbles, wood and thatch in construction, for a soothing effect
- Ensuring very interesting views from every part of the facility.

#### 5.3 Design brief

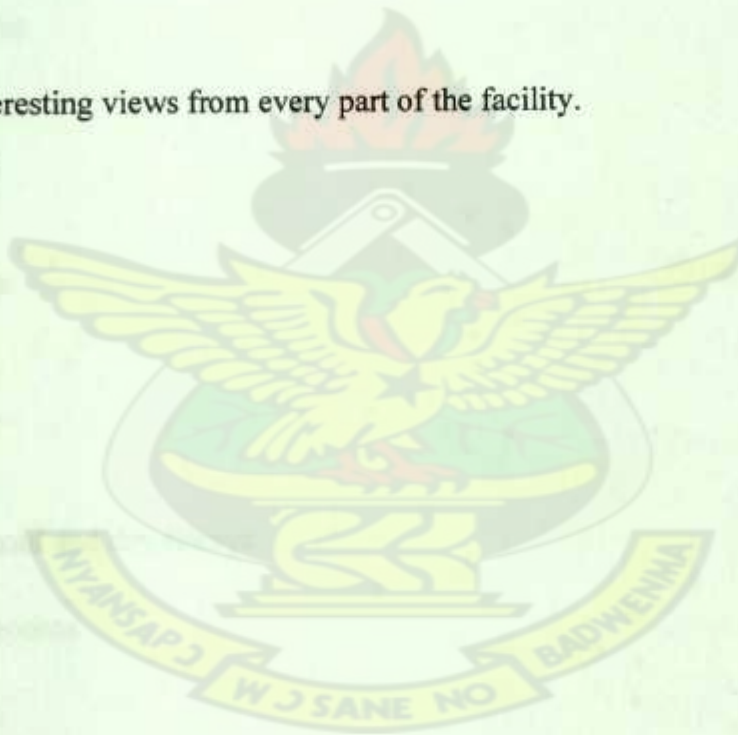
##### ❖ main lobby

- offices
- reception
- lounge
- bar
- sanitary

##### ❖ accommodation

- luxurious twin rooms
- suites
- self catering chalets

##### ❖ curio and gift shop



❖ Business centre

- forex bureaux
- internet cafe

❖ tennis / volleyball court

❖ golf course

❖ bars

- sitting area
- dancing area
- sanitary

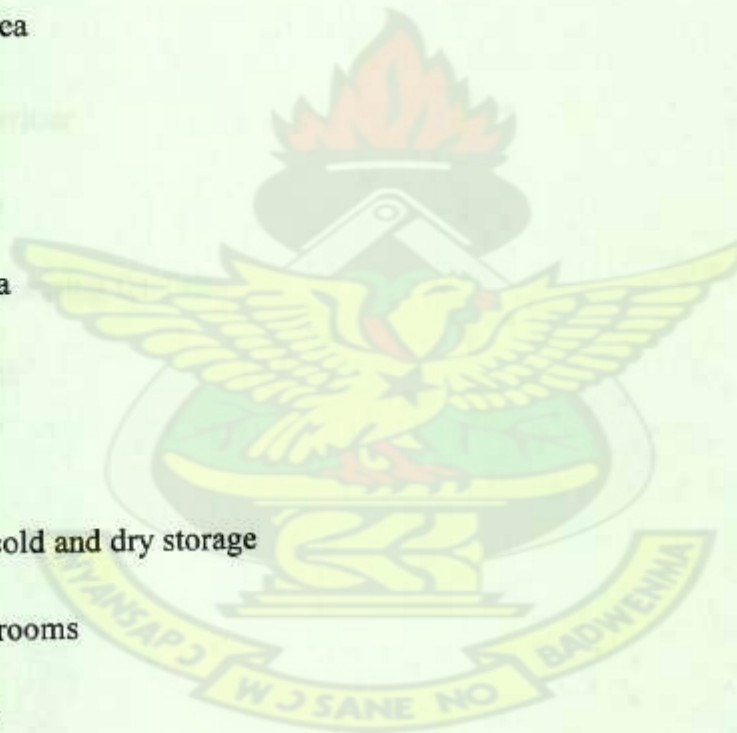
❖ restaurant

- dining area
- kitchen
- severy
- storage - cold and dry storage
- changing rooms
- restrooms
- sanitary
- waste disposal unit

❖ swimming pool

- changing rooms
- sanitary

KNUST



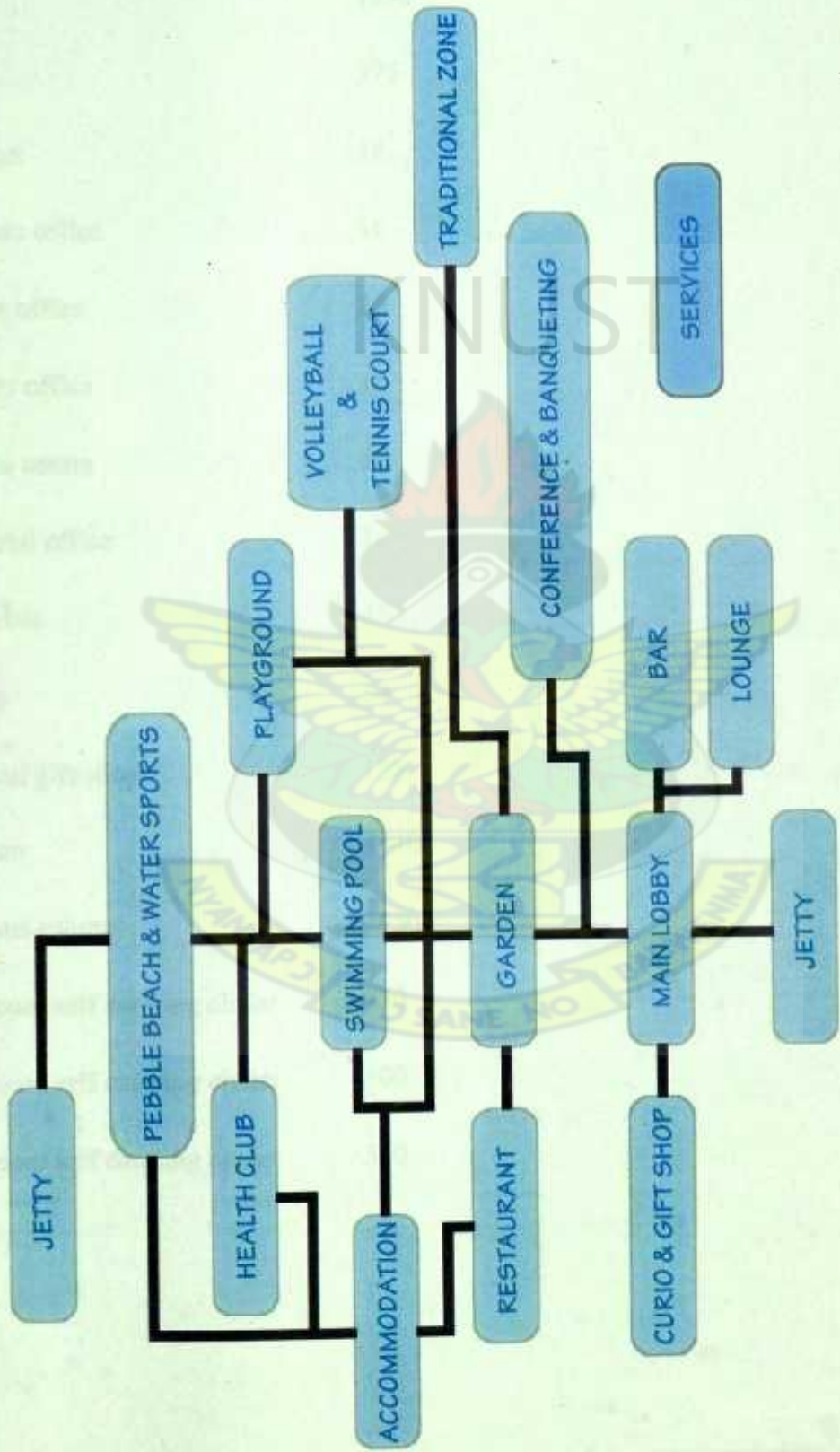


# KNUST

- pump room
- ❖ conference and banqueting facilities
  - main hall
  - sanitary
  - storage
- ❖ health club
  - gymnasium
  - Sauna
  - massage parlour
  - hot springs
- ❖ fishing and water sporting facilities
- ❖ therapeutic gardens
- ❖ playgrounds
- ❖ traditional zone
- ❖ laundry
- ❖ biogas plant
- ❖ power plant
- ❖ water storage and treatment facility
- ❖ heliport
- ❖ first aid post / medical unit



5.4 Functional diagram





## 5.5 Accommodation schedule

SPACES	AREA (sq.m)
Main Lobby	1838
<ul style="list-style-type: none"><li>• hall</li></ul>	375
<ul style="list-style-type: none"><li>• reception</li></ul>	18
<ul style="list-style-type: none"><li>• managers office</li></ul>	16
<ul style="list-style-type: none"><li>• cashiers office</li></ul>	16
<ul style="list-style-type: none"><li>• accounts office</li></ul>	16
<ul style="list-style-type: none"><li>• business centre</li></ul>	66
<ul style="list-style-type: none"><li>• secretarial office</li></ul>	16
<ul style="list-style-type: none"><li>• Lounge/bar</li></ul>	450
<ul style="list-style-type: none"><li>• sanitary</li></ul>	64
<ul style="list-style-type: none"><li>• curio and gift shop</li></ul>	138
Accommodation	4440
<ul style="list-style-type: none"><li>• luxurious rooms</li></ul>	2950
<ul style="list-style-type: none"><li>• 1 bedroom self catering chalet</li></ul>	430
<ul style="list-style-type: none"><li>• 2 bedroom self catering chalet</li></ul>	500
<ul style="list-style-type: none"><li>• 3 bedroom self catering chalet</li></ul>	560

SPACES	AREA (sq.m)
--------	-------------

Curio and Gift Shop	138
---------------------	-----

- |  |    |
|--|----|
| <ul style="list-style-type: none"> <li>Storage</li> </ul>    | 36 |
| <ul style="list-style-type: none"> <li>main floor</li> </ul> | 86 |
| <ul style="list-style-type: none"> <li>office</li> </ul>     | 16 |

Business Centre	66
-----------------	----

- |   |    |
|---|----|
| <ul style="list-style-type: none"> <li>forex bureaux</li> </ul> | 30 |
| <ul style="list-style-type: none"> <li>internet cafe</li> </ul> | 30 |
| <ul style="list-style-type: none"> <li>server room</li> </ul>   | 6  |

Tennis / Volleyball Court	3200
---------------------------	------

Bars (Cocktail)	209
-----------------	-----

- |  |     |
|--|-----|
| <ul style="list-style-type: none"> <li>sitting area</li> </ul> | 100 |
| <ul style="list-style-type: none"> <li>dancing area</li> </ul> | 48  |
| <ul style="list-style-type: none"> <li>sanitary</li> </ul>     | 36  |
| <ul style="list-style-type: none"> <li>storage</li> </ul>      | 25  |

Bars (Traditional)	130
--------------------	-----

- |  |     |
|--|-----|
| <ul style="list-style-type: none"> <li>sitting area</li> </ul> | 100 |
| <ul style="list-style-type: none"> <li>shed</li> </ul>         | 18  |
| <ul style="list-style-type: none"> <li>storage</li> </ul>      | 12  |



SPACES

AREA (sq.m)

Restaurant

1470

- dining area630
- kitchen776
- sanitary64

Swimming Pool

3600

- leisure pool2100
- adventure pool1375
- changing rooms64
- bar25
- storage25
- pump room25

Playgrounds

50

Therapeutic Gardens

X

Conference and Banqueting Facilities

370

- main hall250
- sanitary64
- storage50

SPACES

AREA (sq.m)

Health Club	880
<ul style="list-style-type: none"> <li>Gymnasium</li> </ul>	400
<ul style="list-style-type: none"> <li>Sauna</li> </ul>	40
<ul style="list-style-type: none"> <li>massage parlour</li> </ul>	50
<ul style="list-style-type: none"> <li>hot springs</li> </ul>	300

Fishing and Water Sporting Facilities

X

Club House

450

Laundry

100

Biogas / Power Plant

X

Water Storage and Treatment Facility

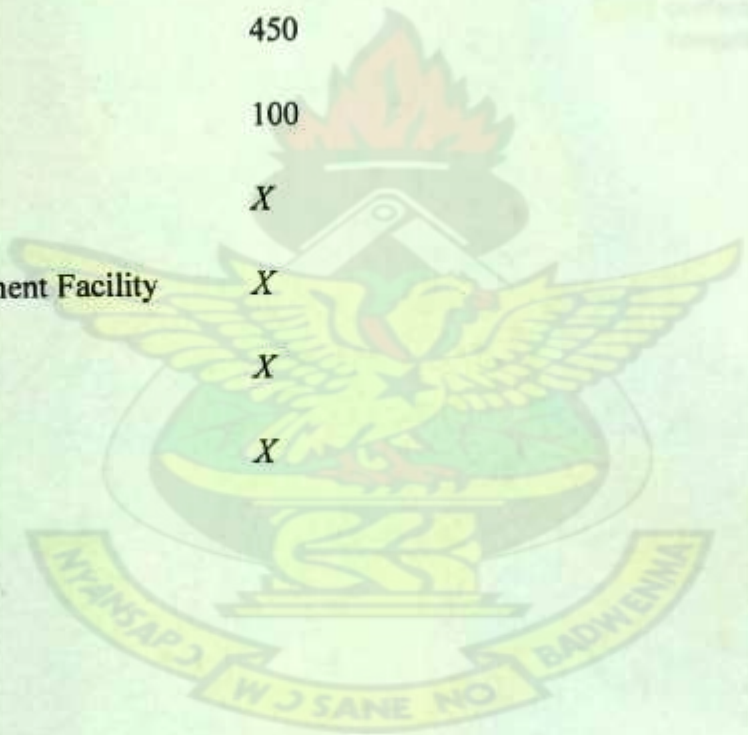
X

Heliport

X

Golf Course

X



LEGEND

	existing buildings
	new buildings
	new roads and footpaths
	existing roads and footpaths
	existing drainage
	new drainage
	new water supply
	new sewerage
	new electricity
	new telephone
	new telegraph



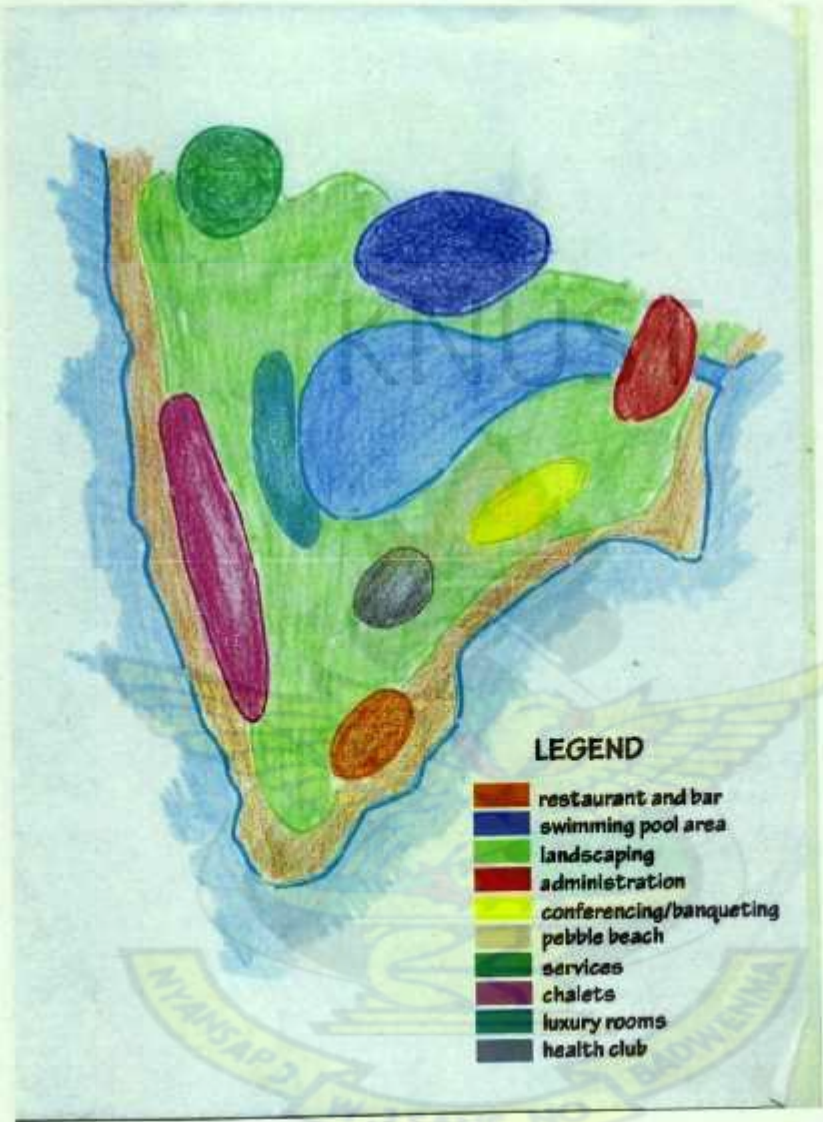
5.6 Conceptual site planning

5.6.1 Option 1



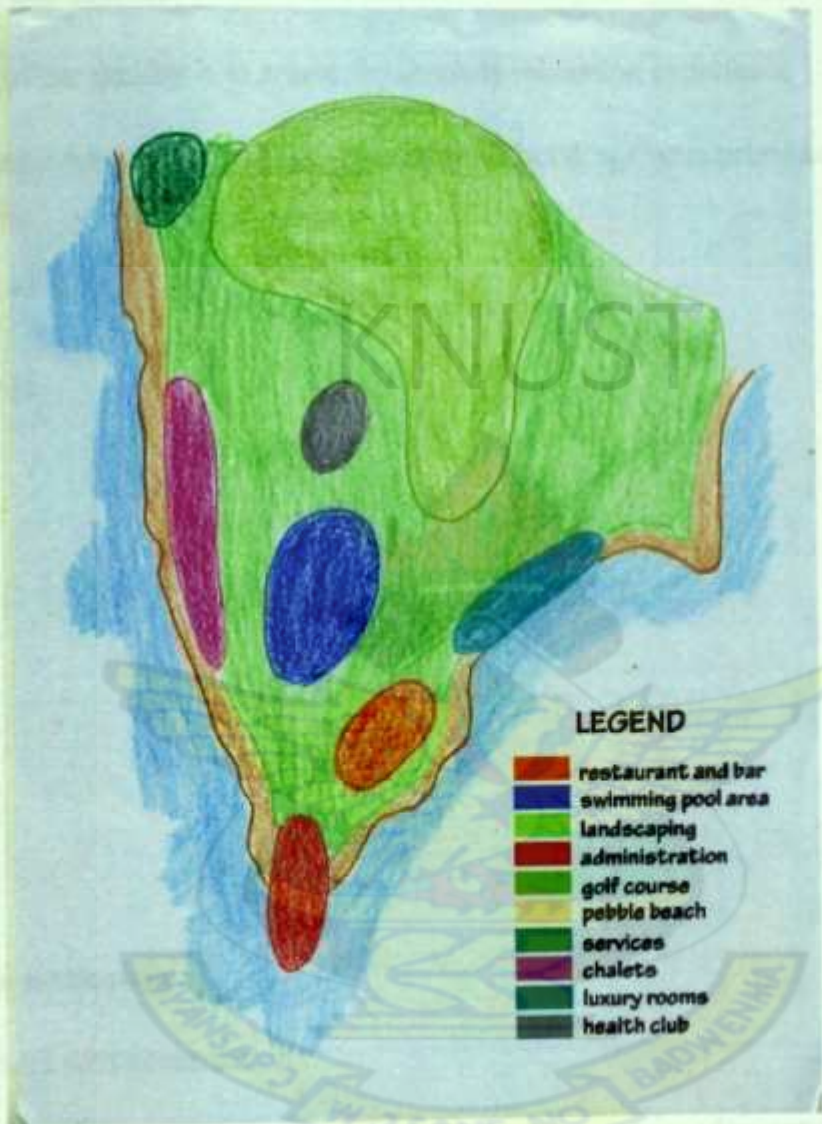
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5.6.2 Option 2





5.6.3 Option 3



Although the final design is somewhat different from all options above, they all had a bearing on the final product.

### 5.7 Design

Set amidst tropical landscape gardens and bounded by Ghana's famous man-made lake, Lake Volta. The hotel facility provides a serene and luxurious atmosphere for its discerning visitors.

The main objective of the facility is to assure the absolute relaxation experience

The choice of materials, choice, texture and orientation of buildings were prime considerations in designing this facility.

#### 5.7.1 Materials used

- ❖ Mud
- ❖ Bamboo
- ❖ Wood
- ❖ Rock
- ❖ Thatch

#### 5.7.2 Construction technology

- ❖ Stabilised mud wall construction
- ❖ Wooden stud frame construction, clad with bamboo and wooden panels
- ❖ Rock wall construction
- ❖ Thatch roof construction



## REFERENCES

### 5.7.3 Services

#### ❖ Electricity

- Biogas plant
- 1500KVA plant additional power
- Solar power

#### ❖ Biogas plant will supply gas for the kitchen

#### ❖ Water supply

- 6000-8000 gallons water storage tanks with treatment plants

#### ❖ Security

- 24hr security plus cctv cameras in public areas

#### ❖ Sewage and drainage

- All sewage and waste would be recycled to produce energy and other by-products for the facility

#### ❖ Ventilation

- Natural ventilation as the primary method of ventilation
- Tower HVAC systems as the secondary method of ventilation

### 5.8 Conclusion

This waterfront destination resort is therefore designed to meet the needs of all users of the facility in a tranquil serene atmosphere through the creation of a therapeutic environment.



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7. [http://en.wikipedia.org/wiki/Category:Hotel\\_types](http://en.wikipedia.org/wiki/Category:Hotel_types)
8. <http://www.thatchingadvisoryservices.co.uk/>





## APPENDIX

Architectural Drawings

# KNUST



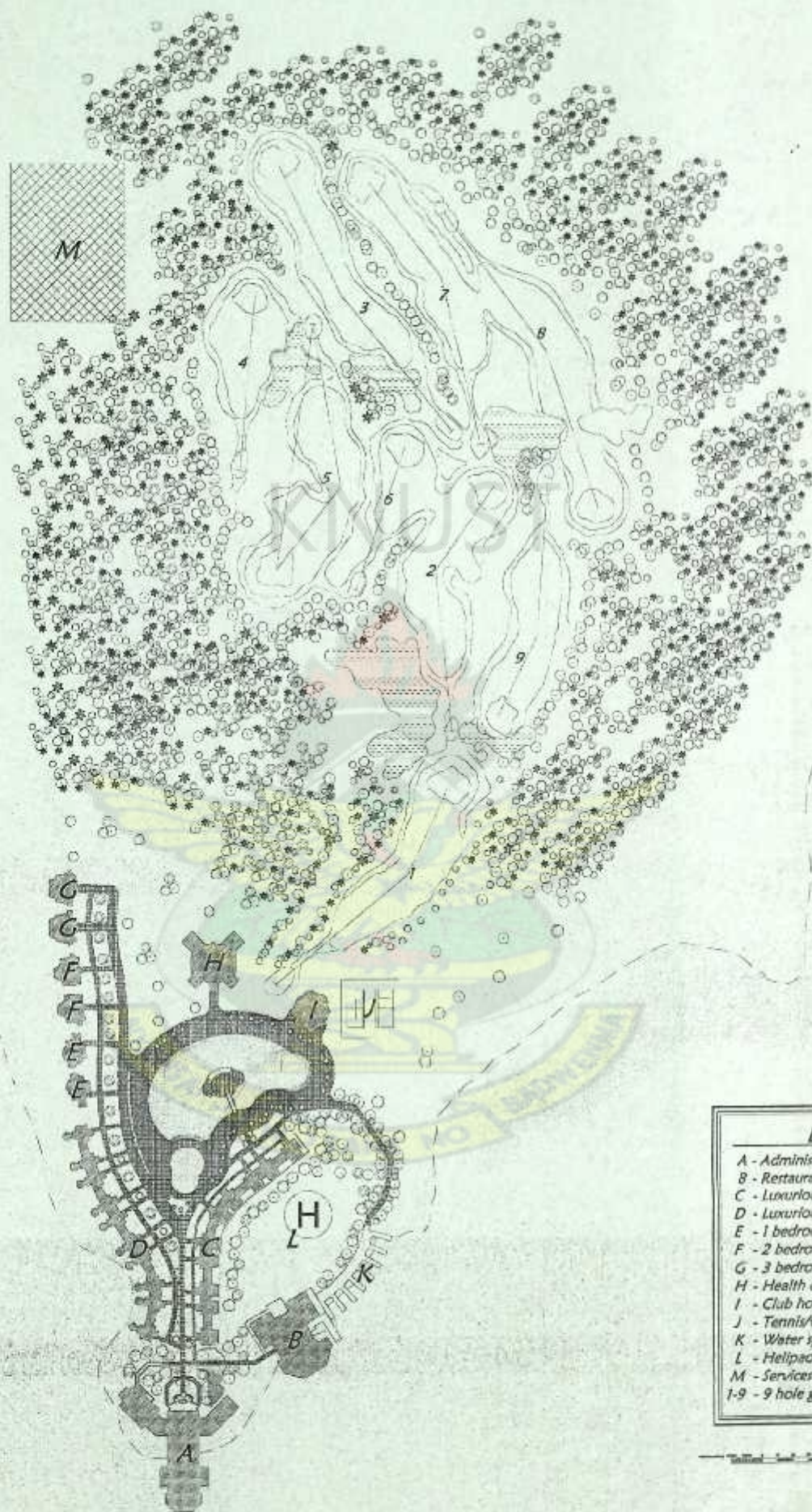




# ATANKA KUMASI

AN ANNUAL REPORT  
OF THE UNIVERSITY



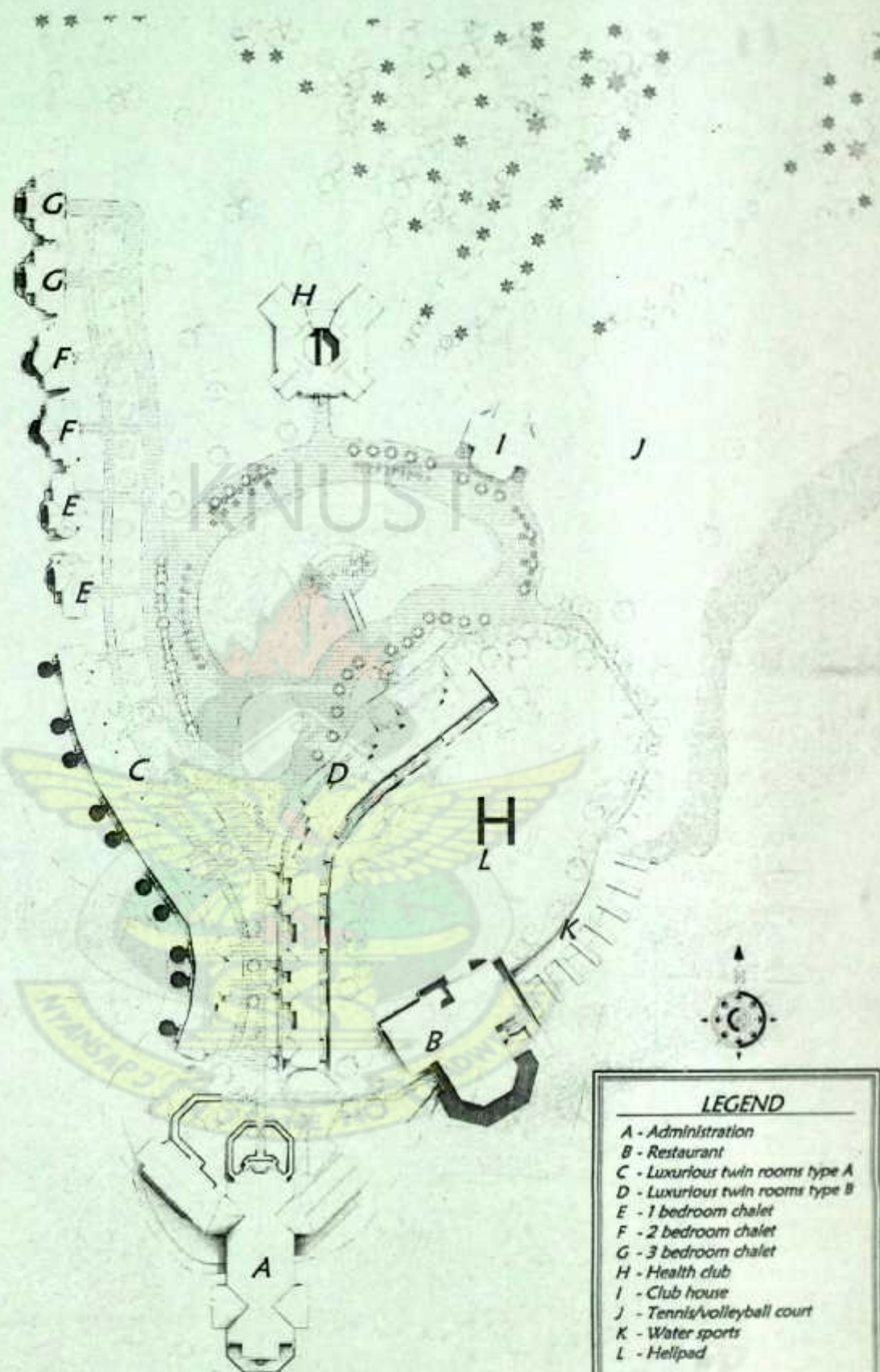


LEGEND	
A -	Administration
B -	Restaurant
C -	Luxurious twin rooms type 1
D -	Luxurious twin rooms type 2
E -	1 bedroom chalet
F -	2 bedroom chalet
G -	3 bedroom chalet
H -	Health club
I -	Club house
J -	Tennis/volleyball court
K -	Water sports
L -	Helipad
M -	Services
1-9 -	9 hole golf course





# BLOCK PLAN



## LEGEND

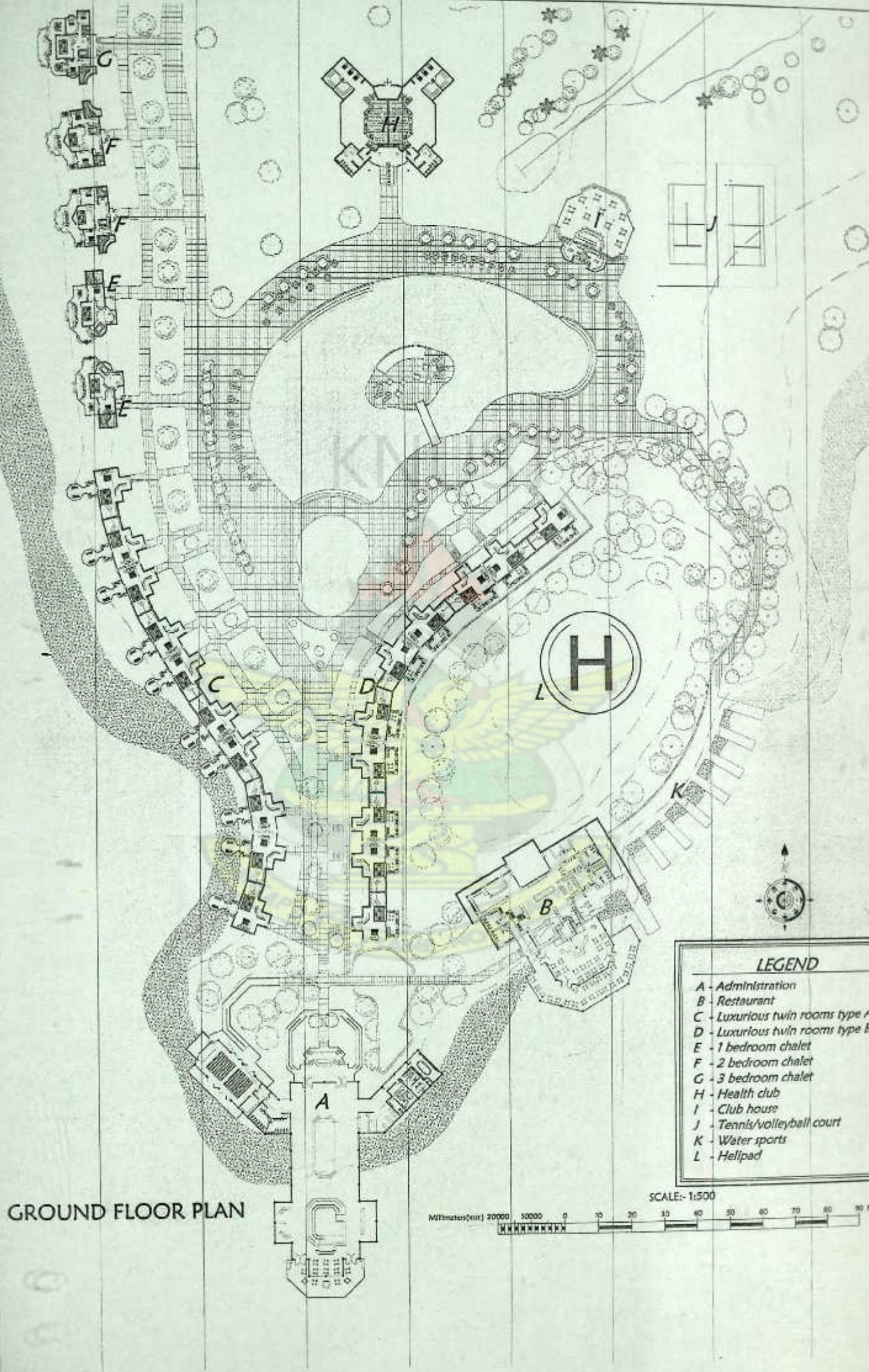
- A - Administration
- B - Restaurant
- C - Luxurious twin rooms type A
- D - Luxurious twin rooms type B
- E - 1 bedroom chalet
- F - 2 bedroom chalet
- G - 3 bedroom chalet
- H - Health club
- I - Club house
- J - Tennis/volleyball court
- K - Water sports
- L - Helipad

SCALE: 1:750





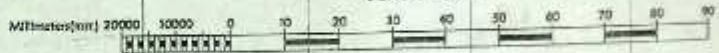
# GROUND FLOOR PLAN



## LEGEND

- A - Administration
- B - Restaurant
- C - Luxurious twin rooms type A
- D - Luxurious twin rooms type B
- E - 1 bedroom chalet
- F - 2 bedroom chalet
- G - 3 bedroom chalet
- H - Health club
- I - Club house
- J - Tennis/volleyball court
- K - Water sports
- L - Helipad

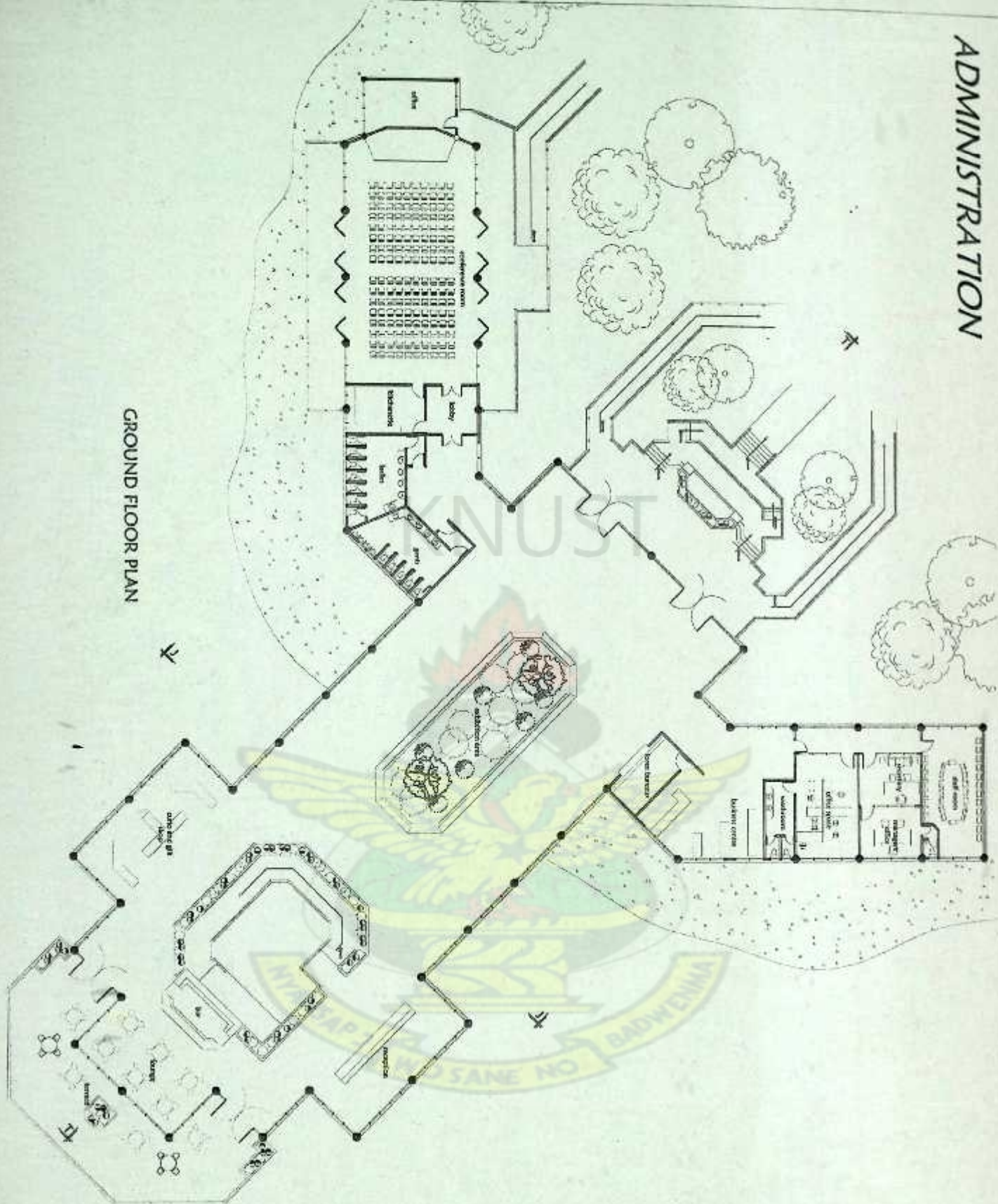
SCALE:- 1:500





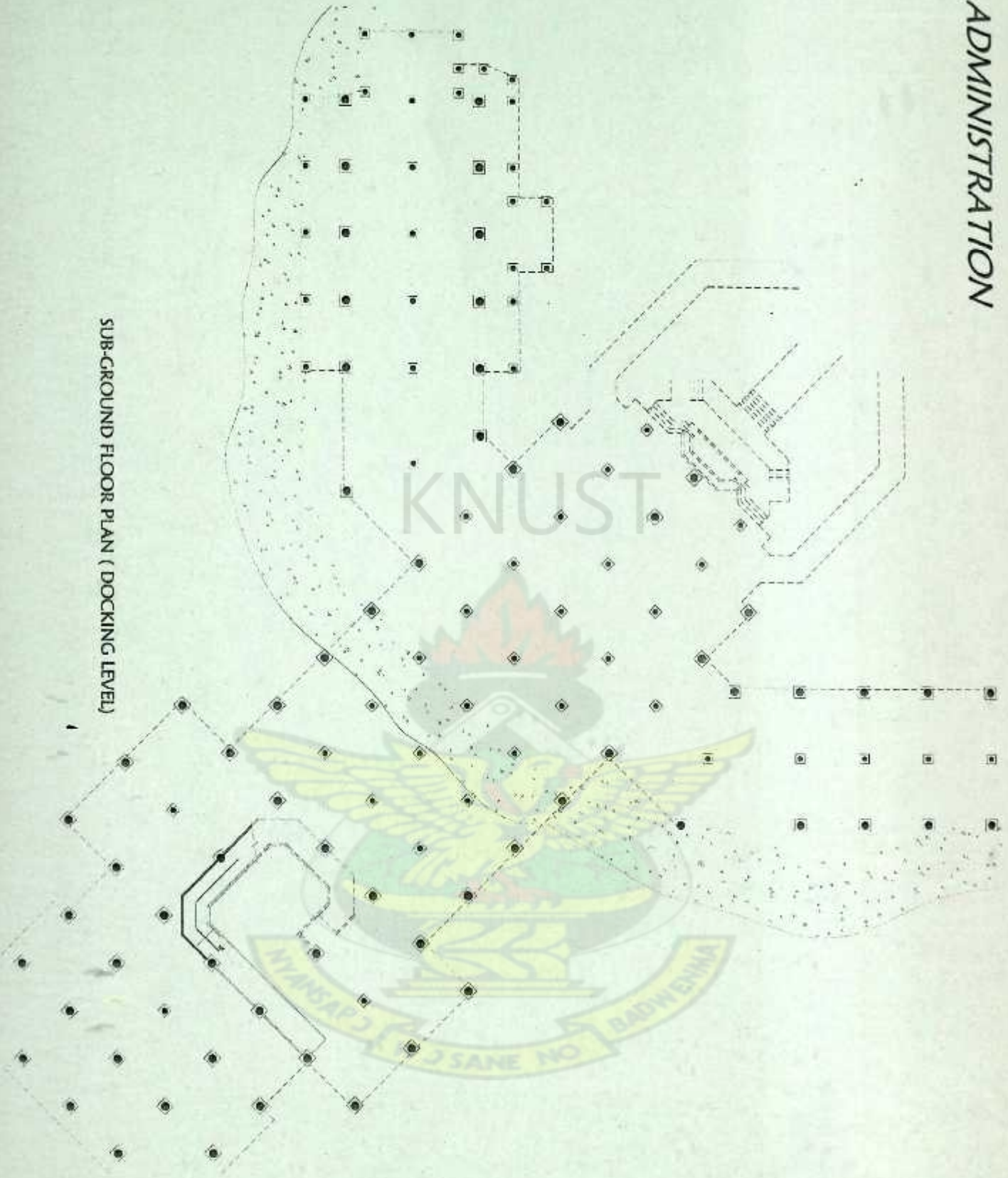
# ADMINISTRATION

GROUND FLOOR PLAN

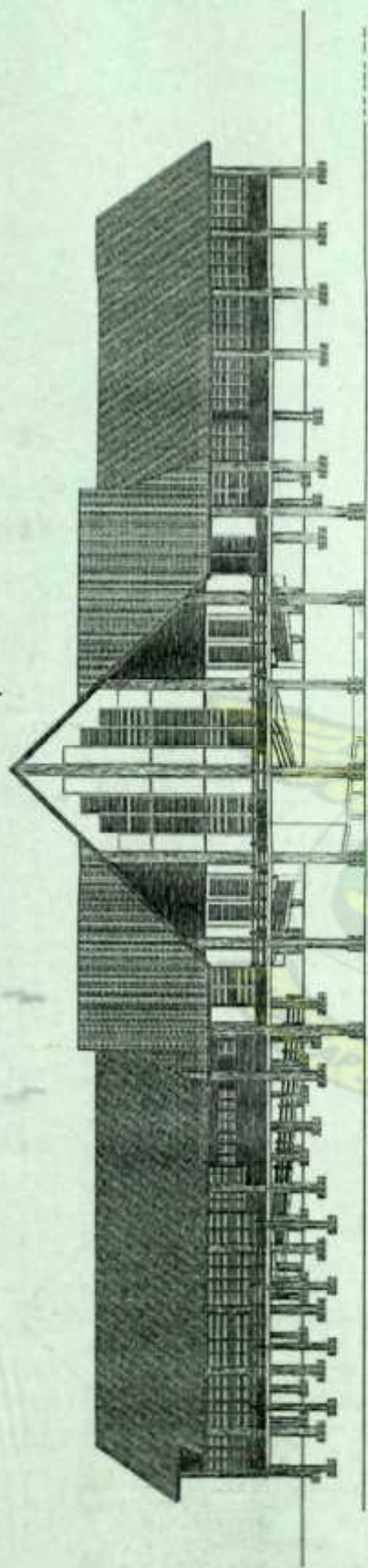




SUB-GROUND FLOOR PLAN ( DOCKING LEVEL)



# ADMINISTRATION



SOUTH ELEVATION

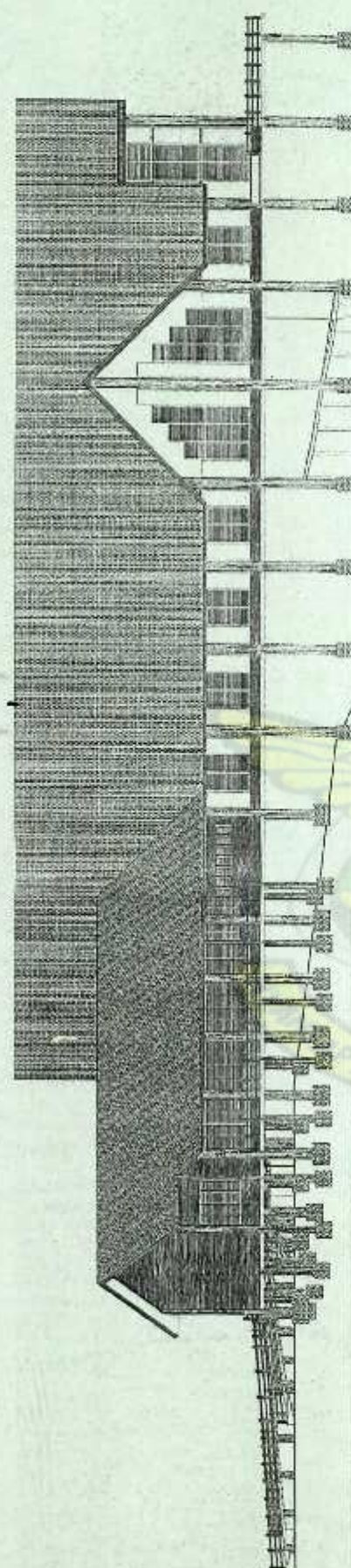
KNUS



NORTH ELEVATION

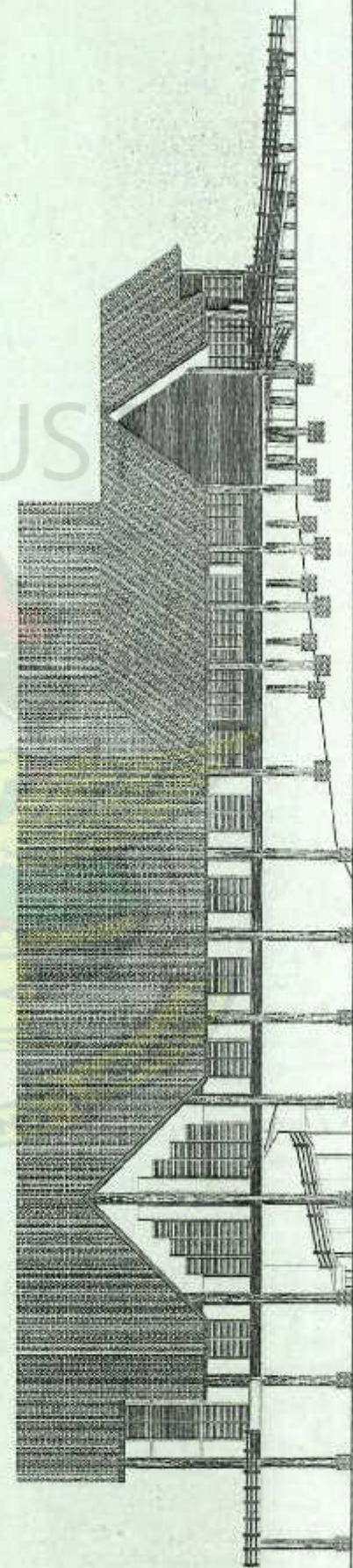


ADMINISTRATION



WEST ELEVATION

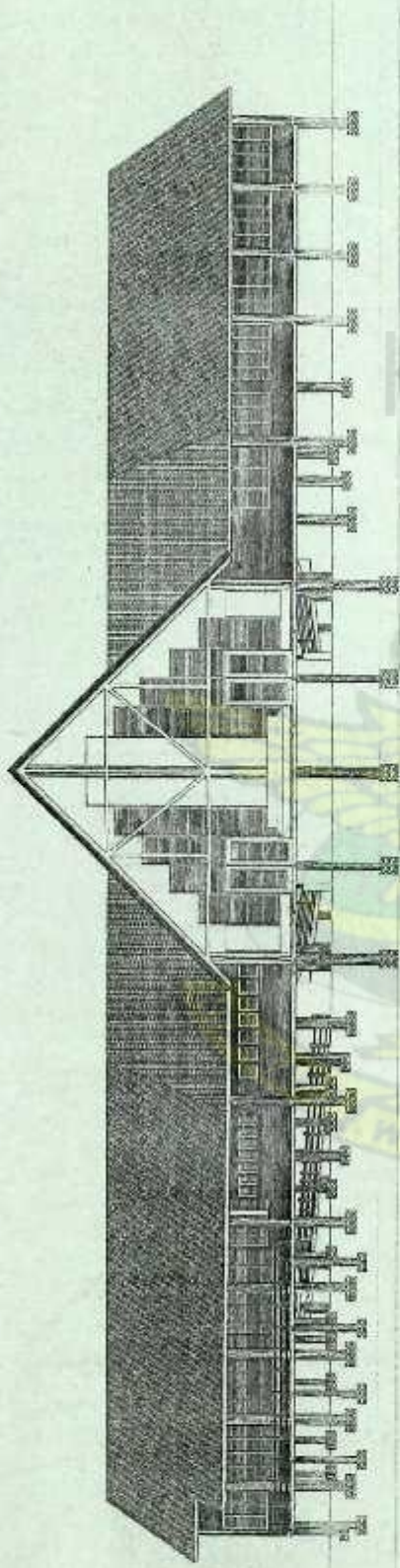
KNUS



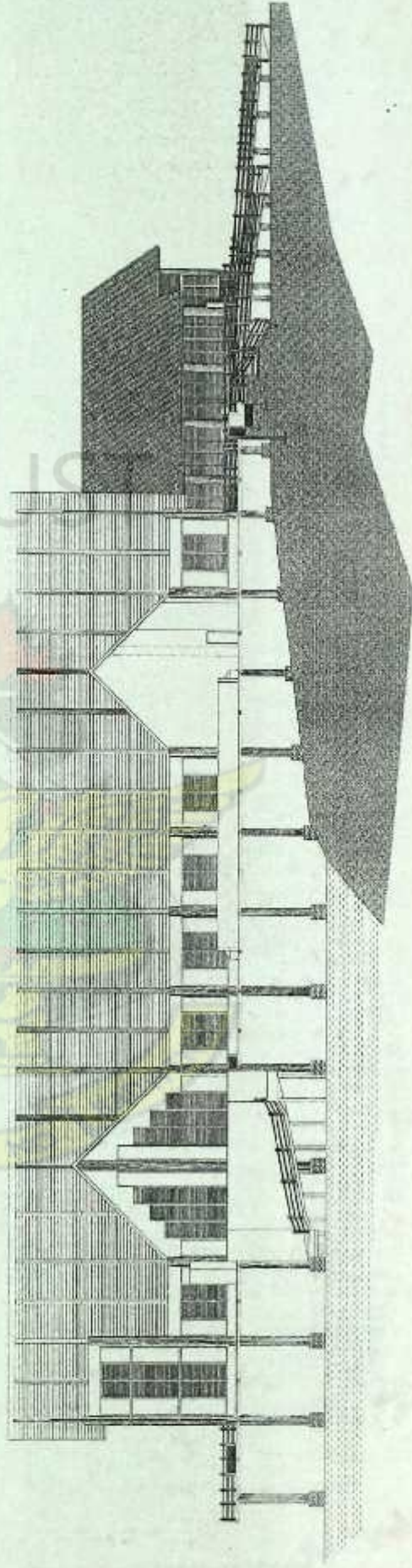
EAST ELEVATION



# ADMINISTRATION



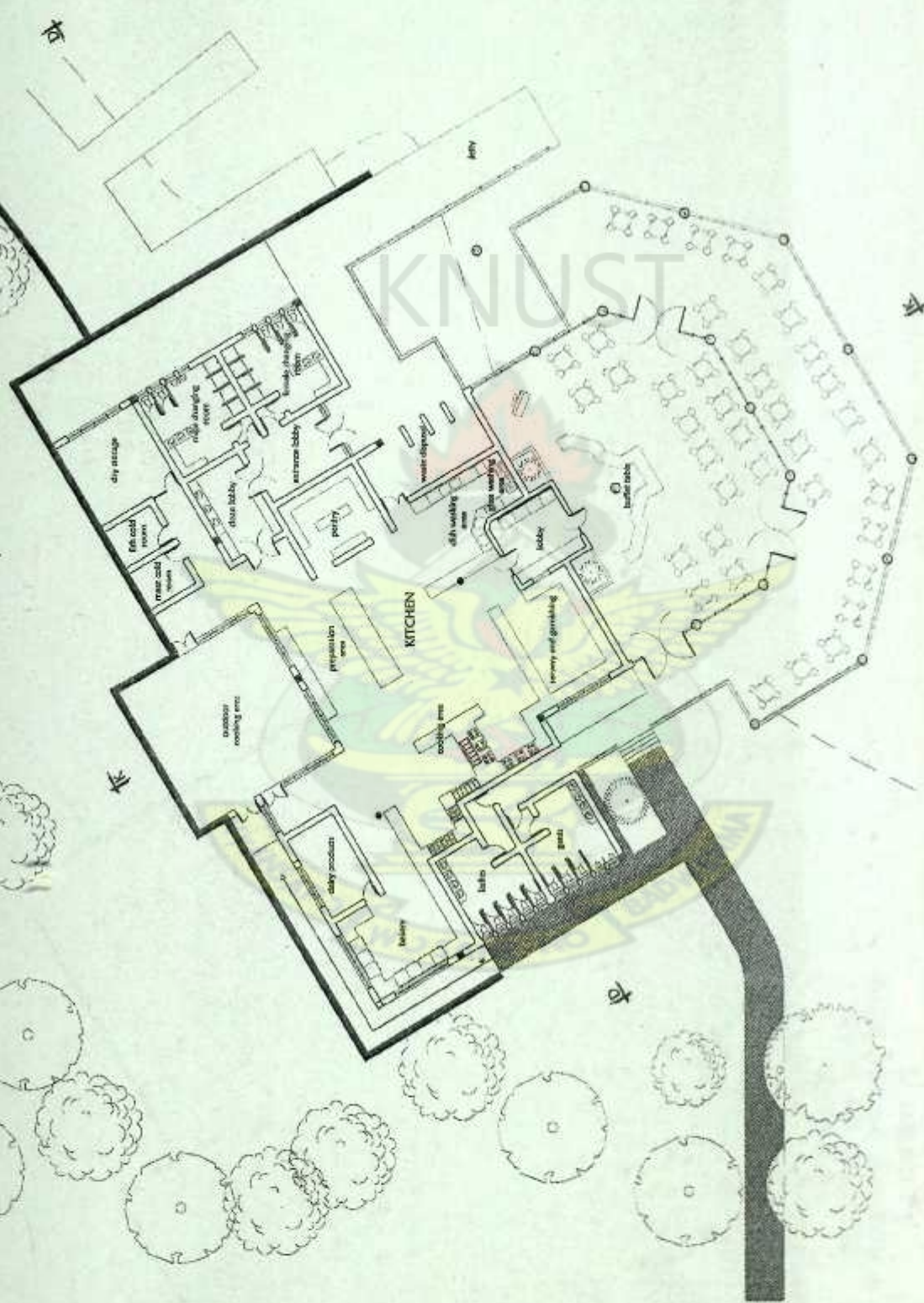
SECTION J-J



SECTION T-T



RESTAURANT



GROUND FLOOR PLAN (Restaurant)



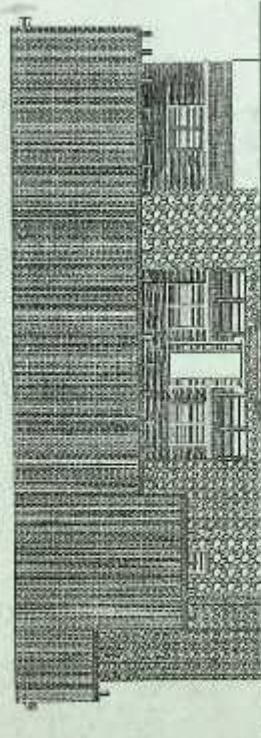
# RESTAURANT



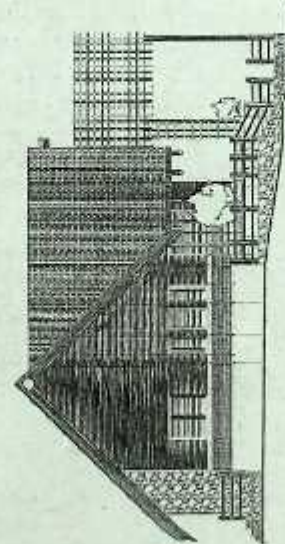
SOUTH ELEVATION



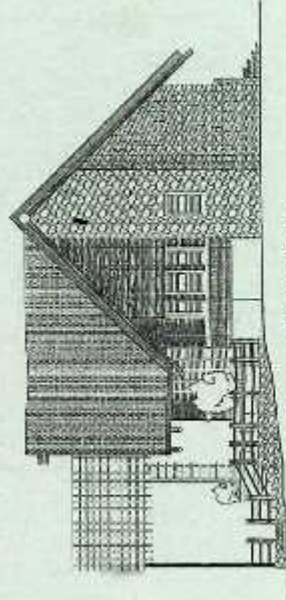
# 3 BEDROOM CHALET



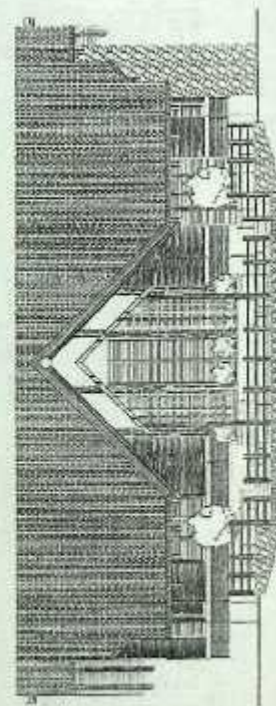
EAST ELEVATION



NORTH ELEVATION



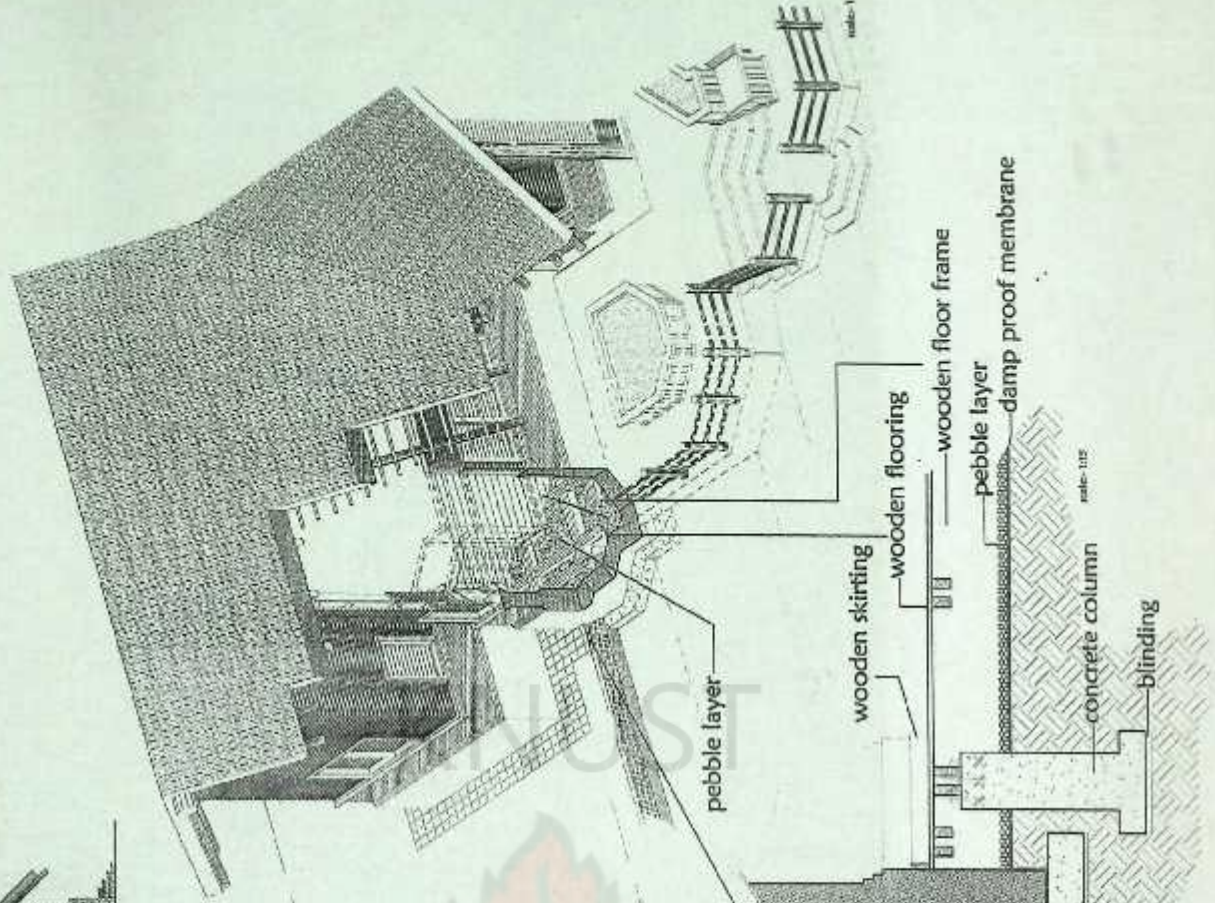
SOUTH ELEVATION



WEST ELEVATION

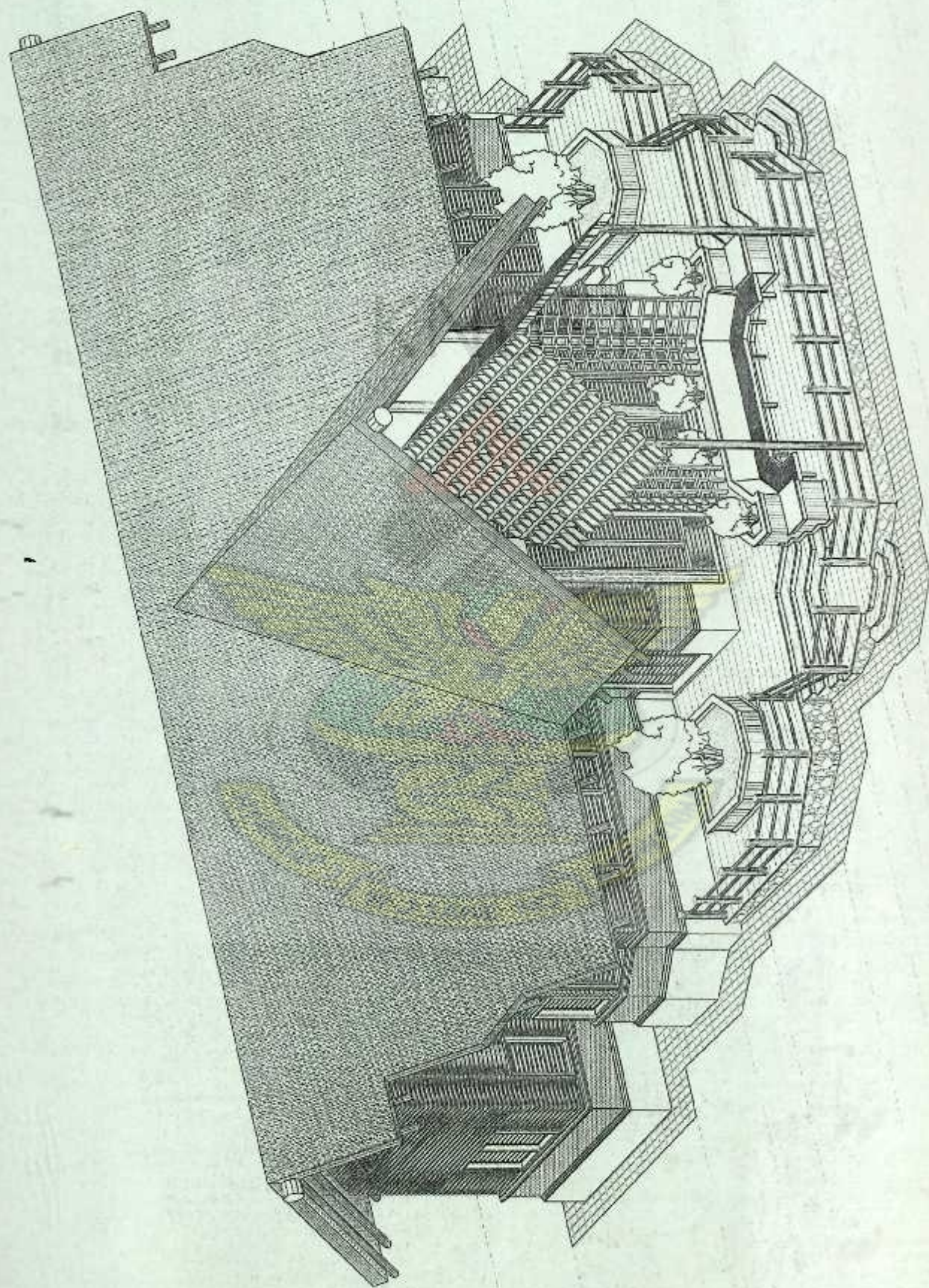


GROUND FLOOR PLAN



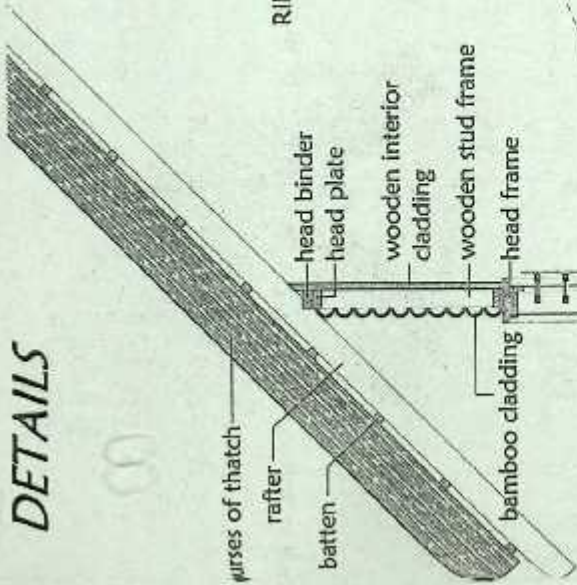


# 3 BEDROOM CHALET

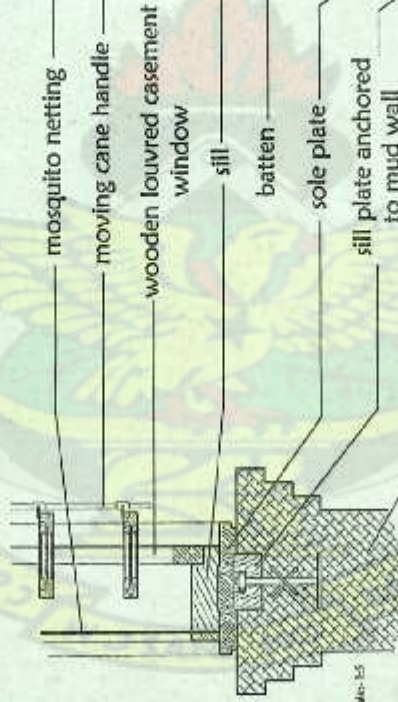
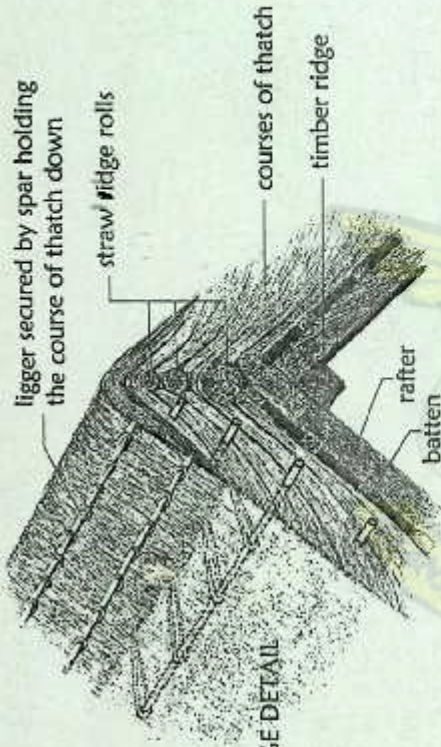




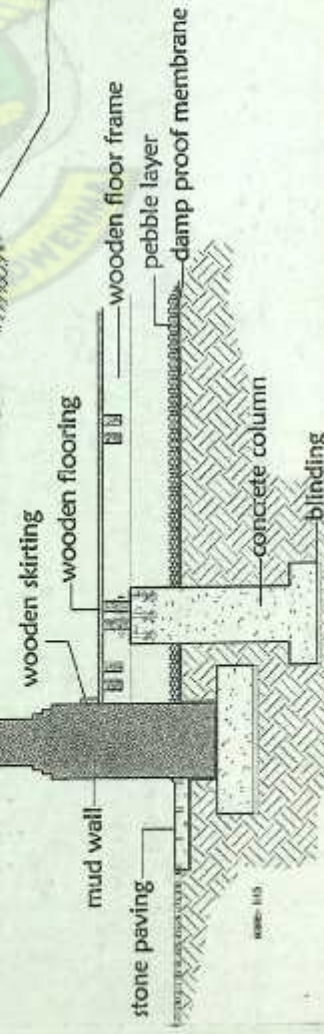
# DETAILS



RIDGE DETAIL



NDATION - ROOF  
DETAIL

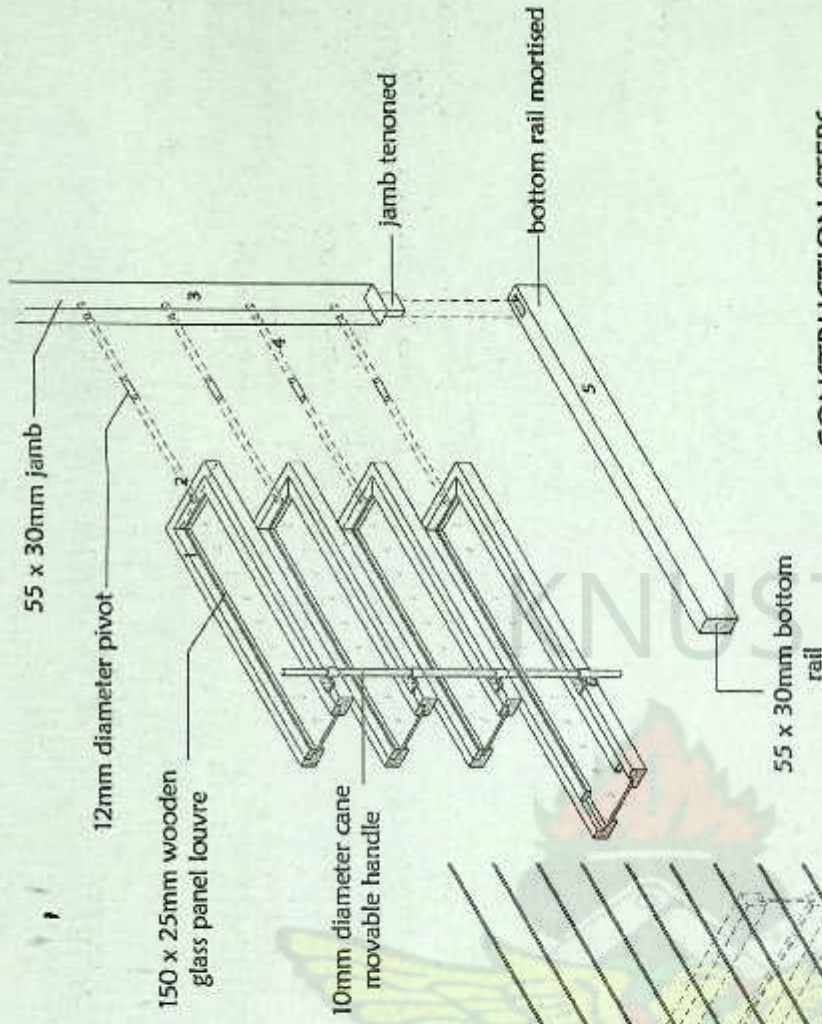
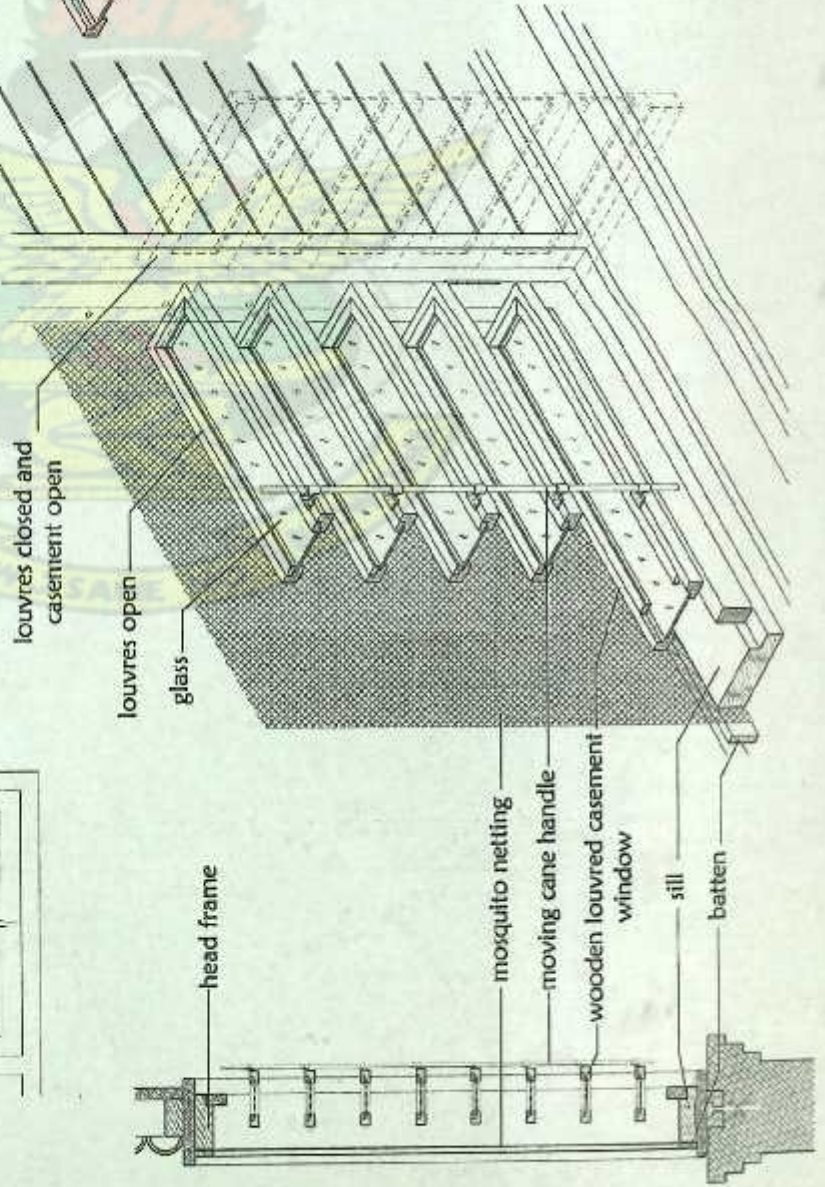
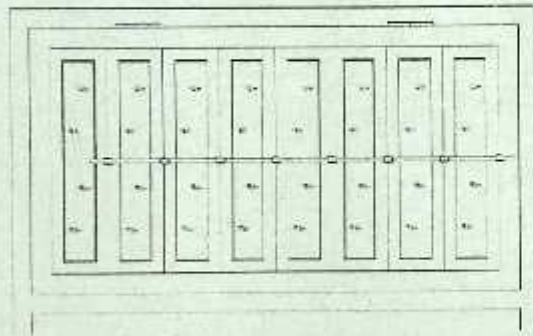


WALL DETAIL

scale 1:5



# DETAILS(window detail)

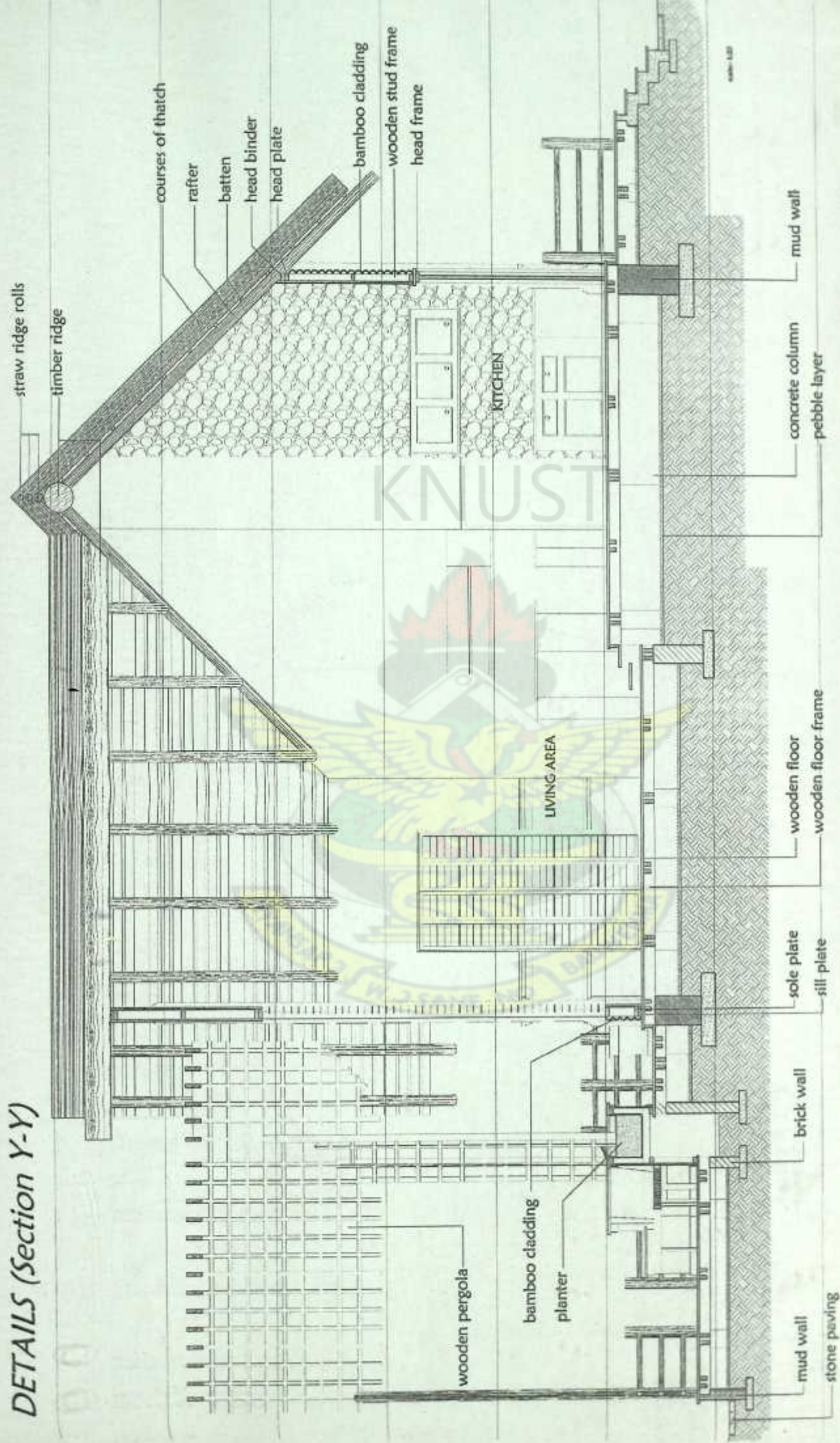


## CONSTRUCTION STEPS

- STEP 1 - fix glass into wooden louvre frame
- STEP 2 - permanently fix pivot into the louvre frame
- STEP 3 - bore pivot holes into the jambs at 150mm centres and smoothing holes
- STEP 4 - fix louvre frames to jambs(make sure its movable)
- STEP 5 - fix both the top and bottom rails to jamb
- STEP 6 - screw cane handles to louvres



# DETAILS (Section Y-Y)



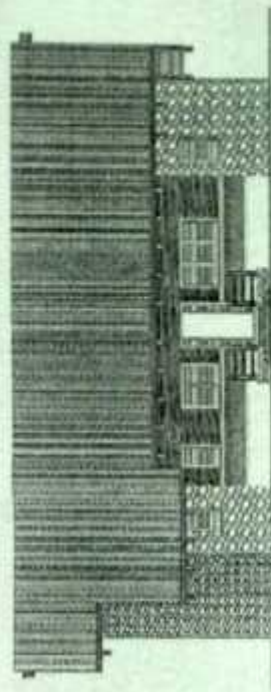
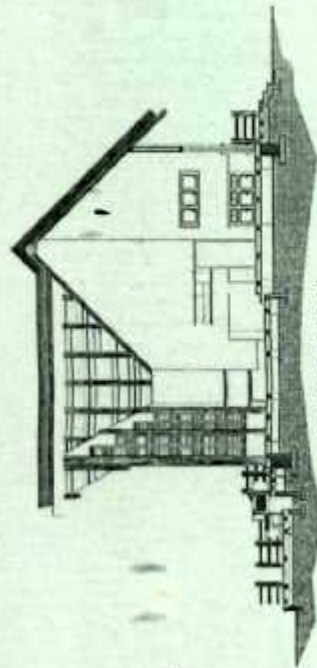


# 2 BEDROOM CHALET

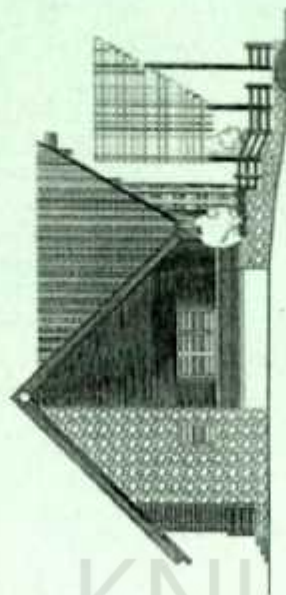


GROUND FLOOR PLAN

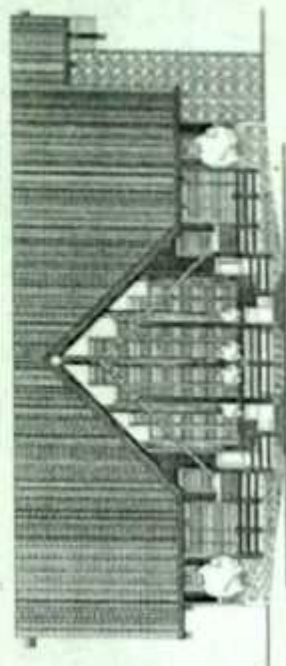
SECTION H-H



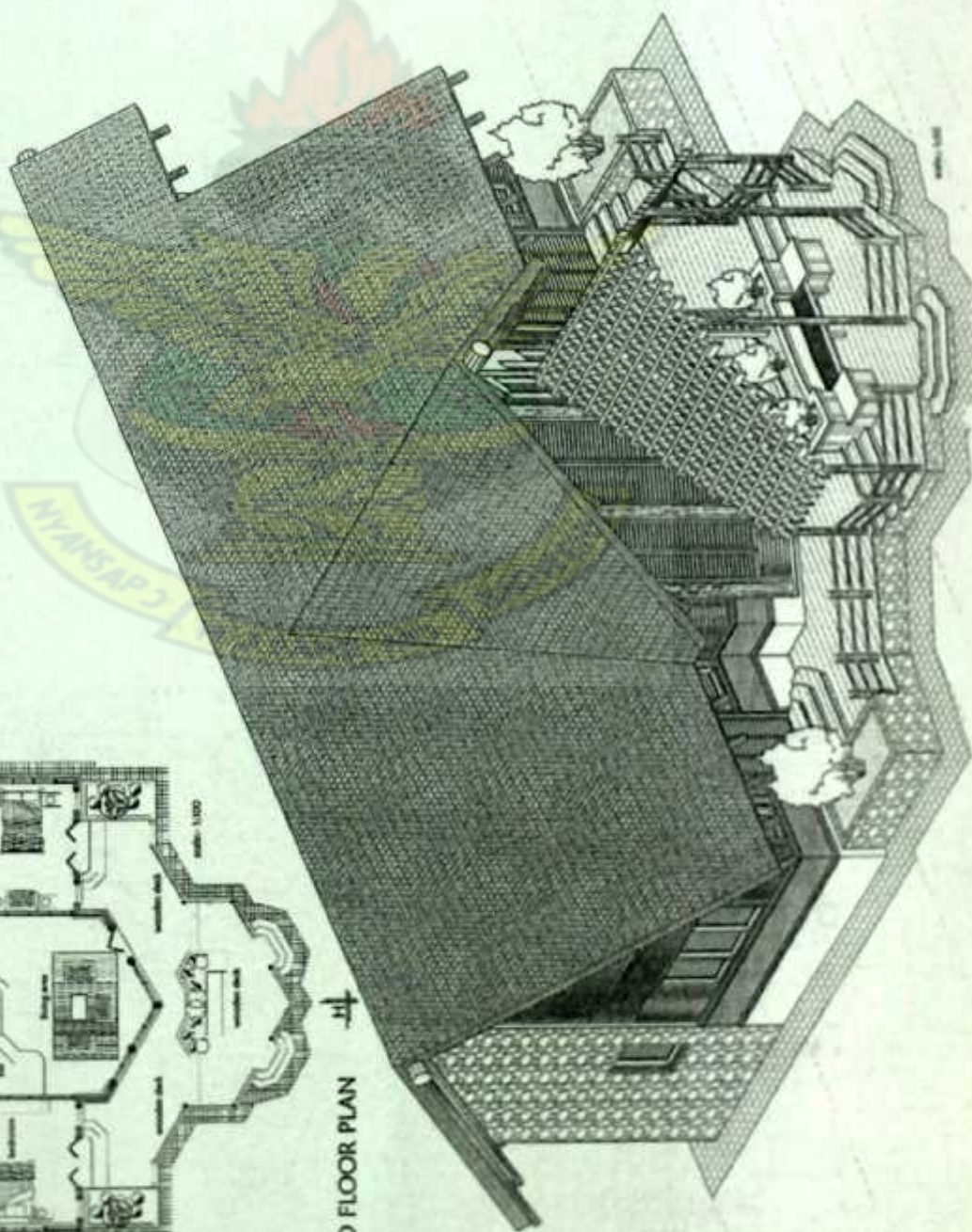
EAST ELEVATION



NORTH ELEVATION

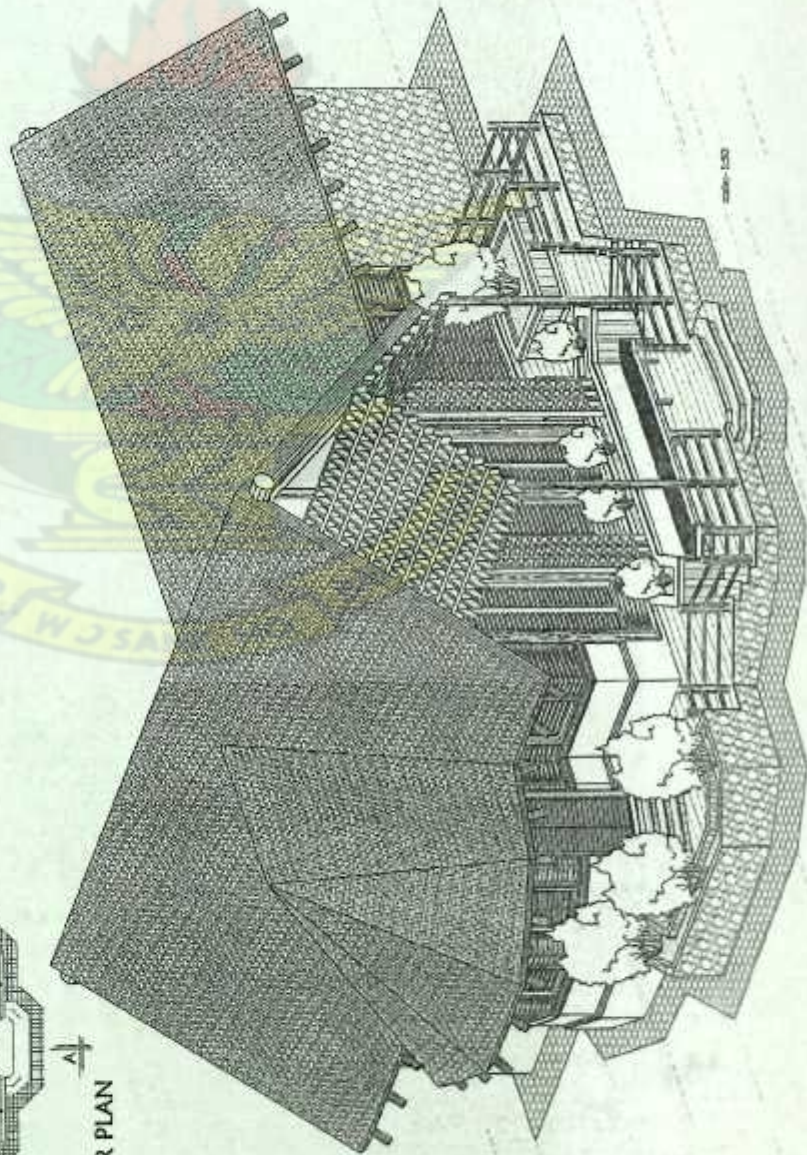
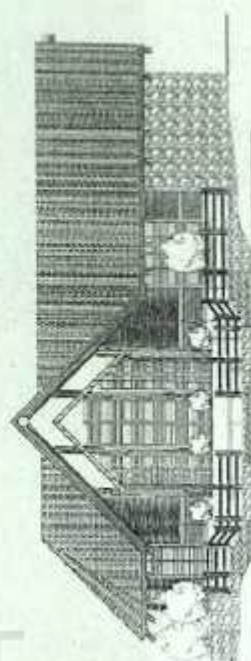
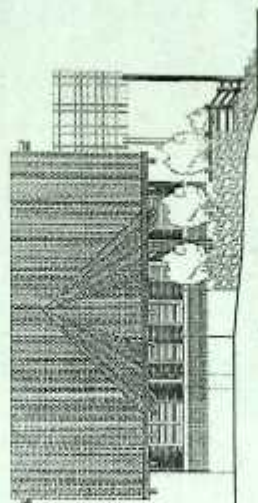
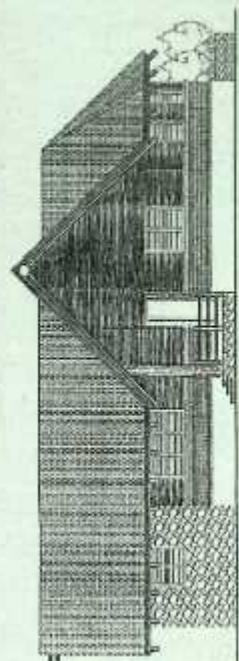
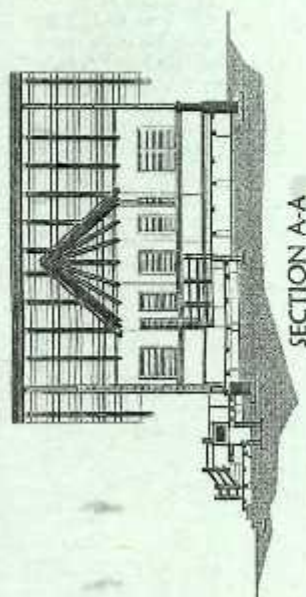


WEST ELEVATION



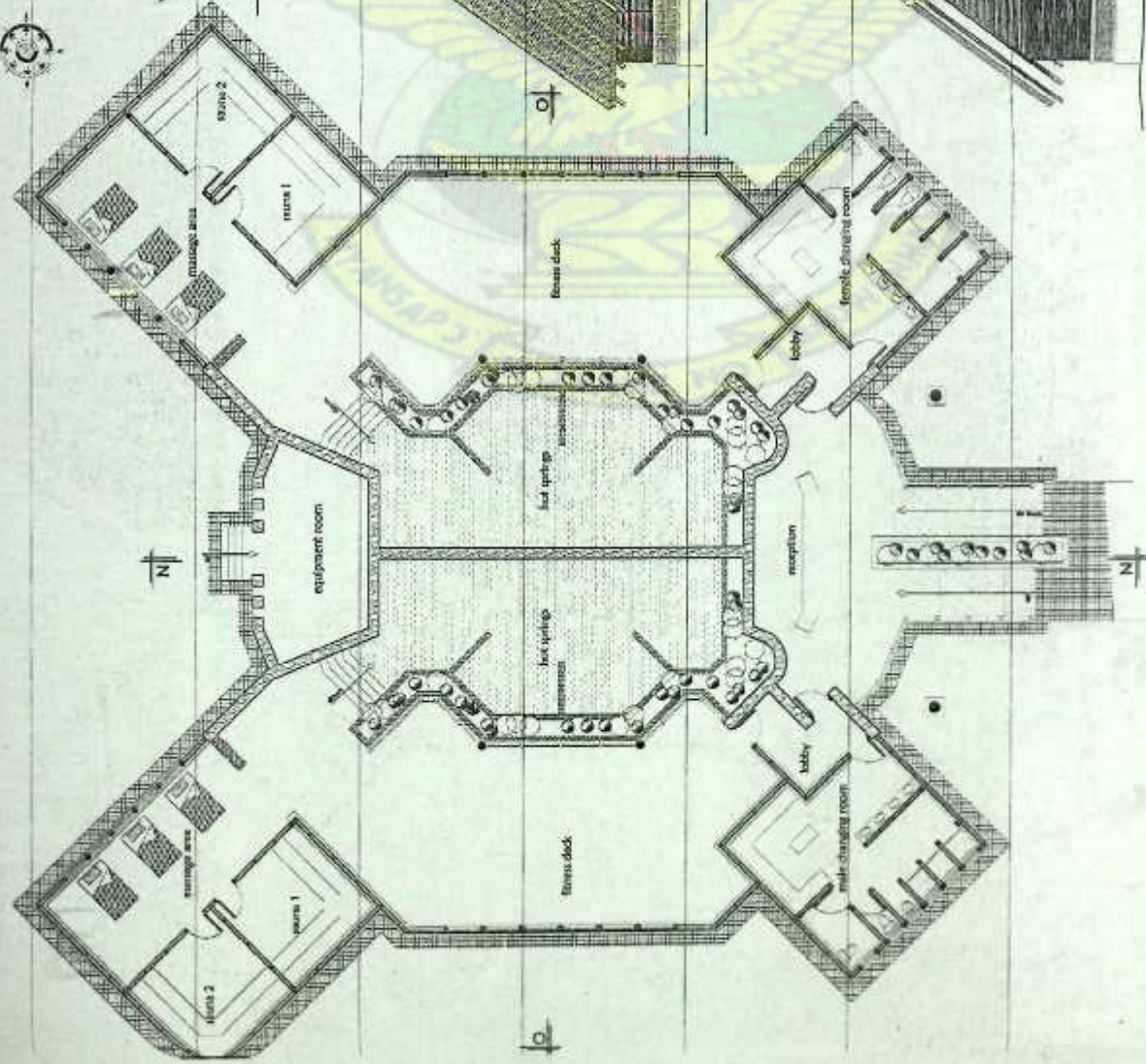


# 1 BEDROOM CHALET

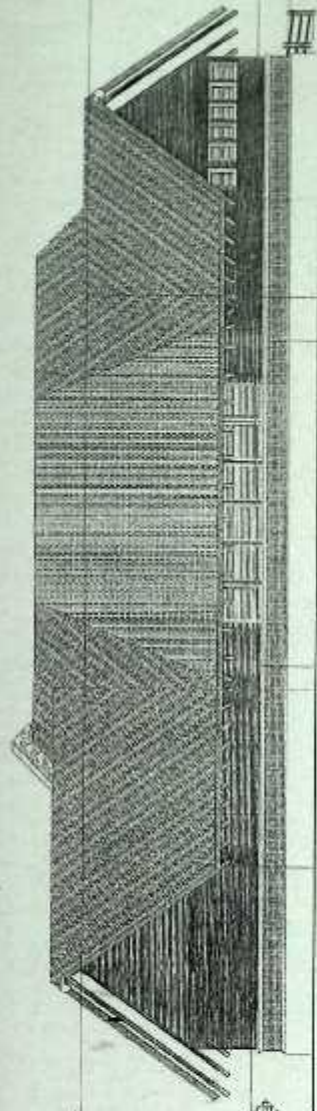




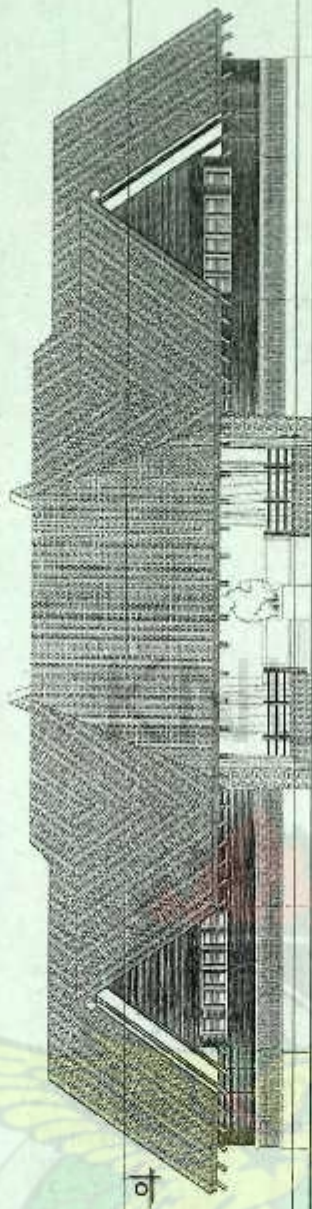
# HEALTH CLUB



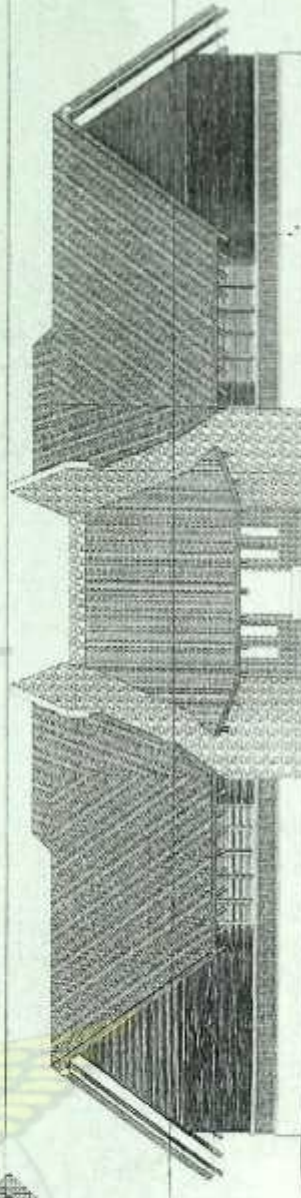
GROUND FLOOR PLAN



WEST ELEVATION



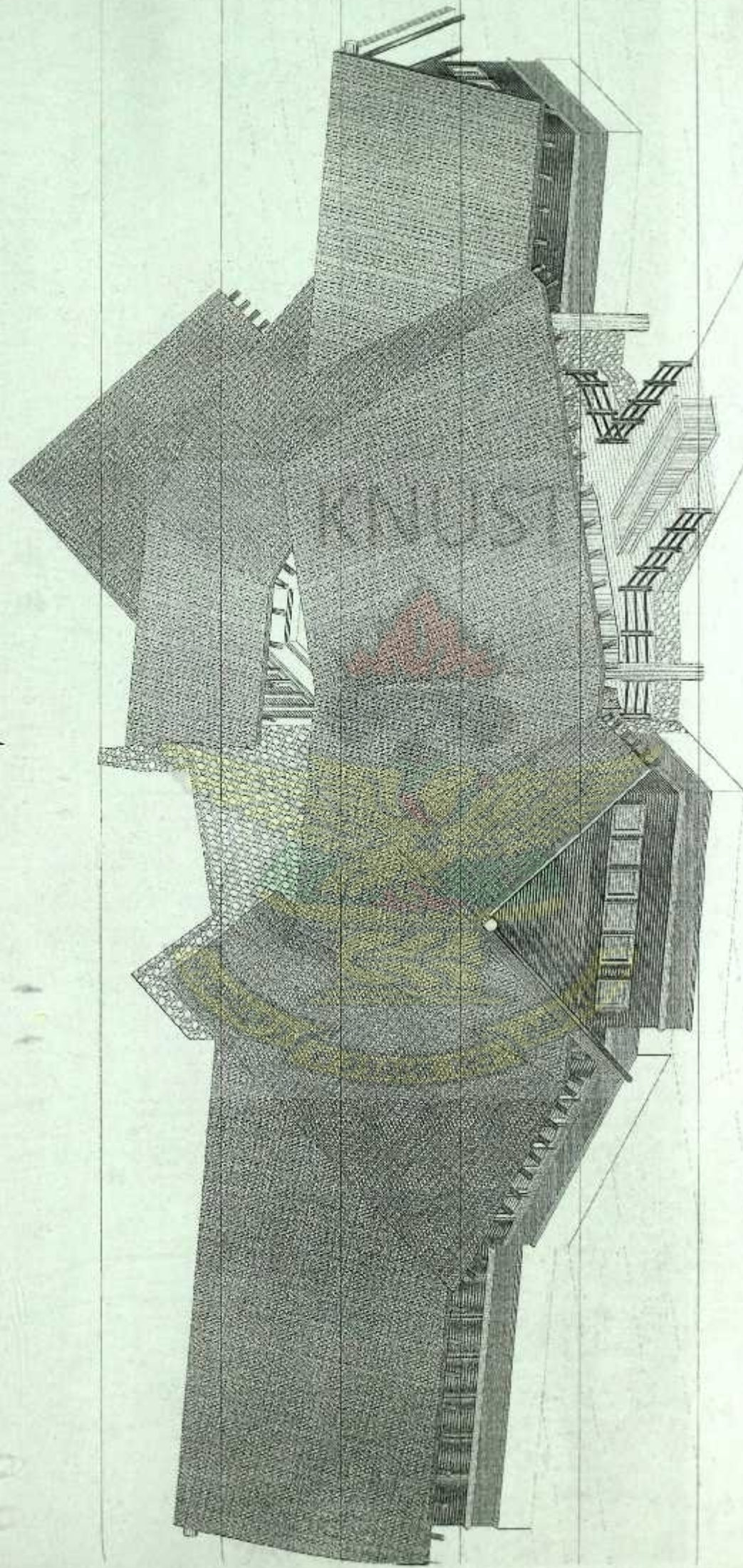
SOUTH ELEVATION



NORTH ELEVATION

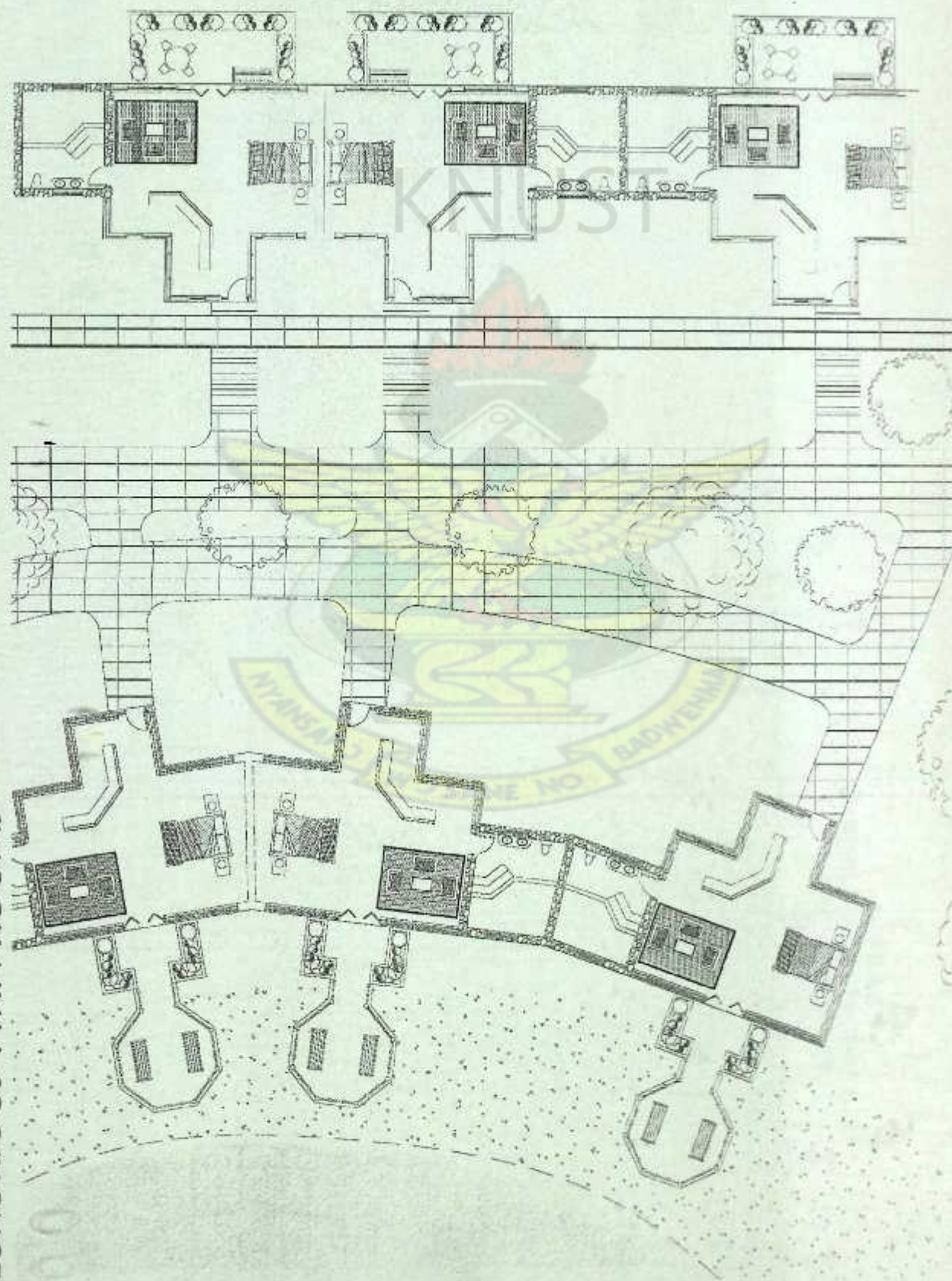


HEALTH CLUB

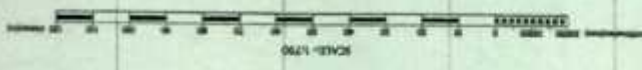




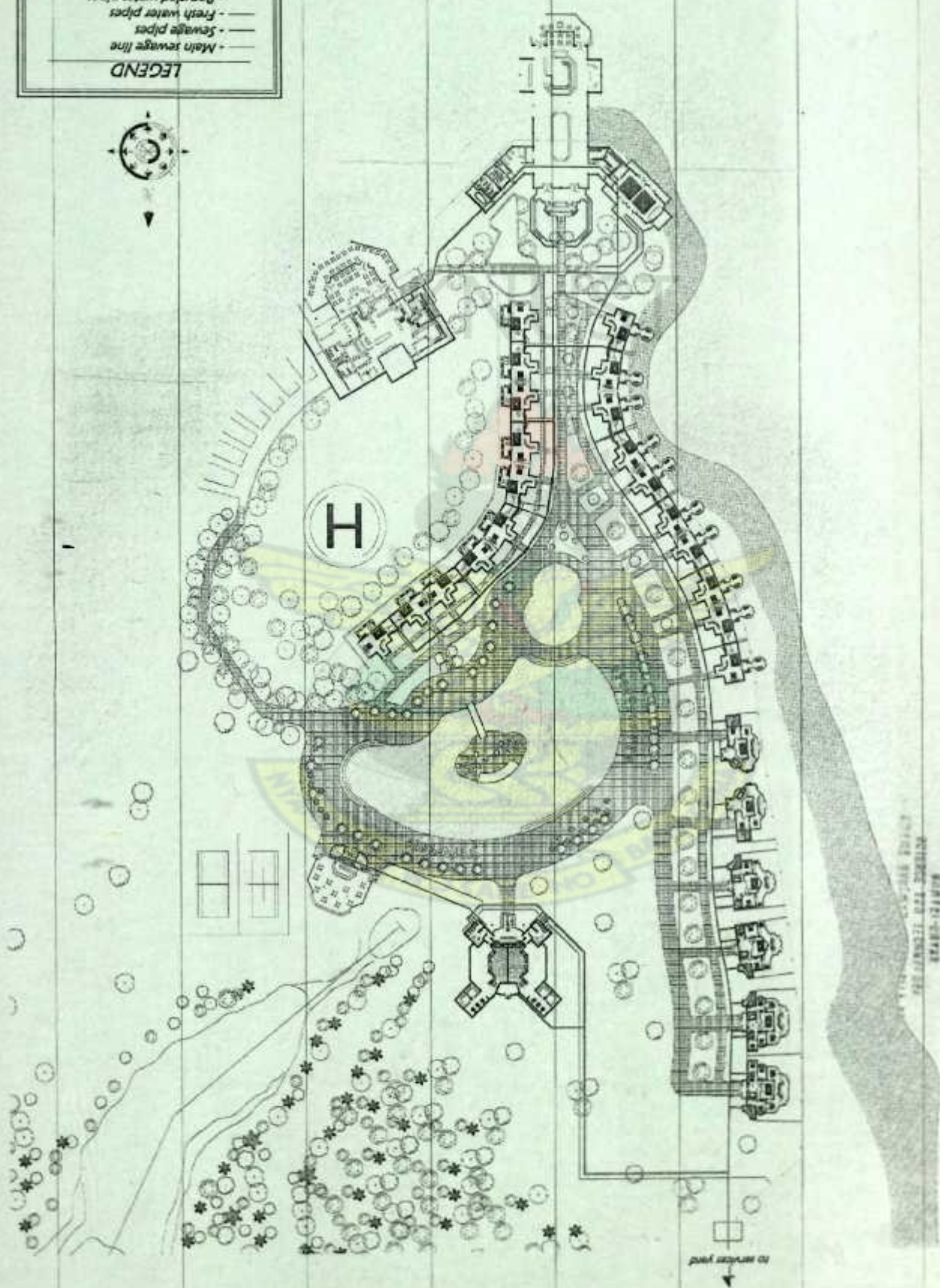
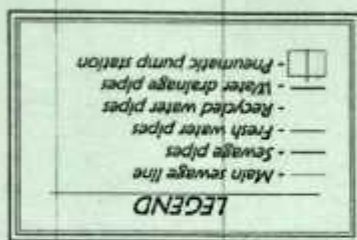
LUXURIOUS TWIN ROOMS





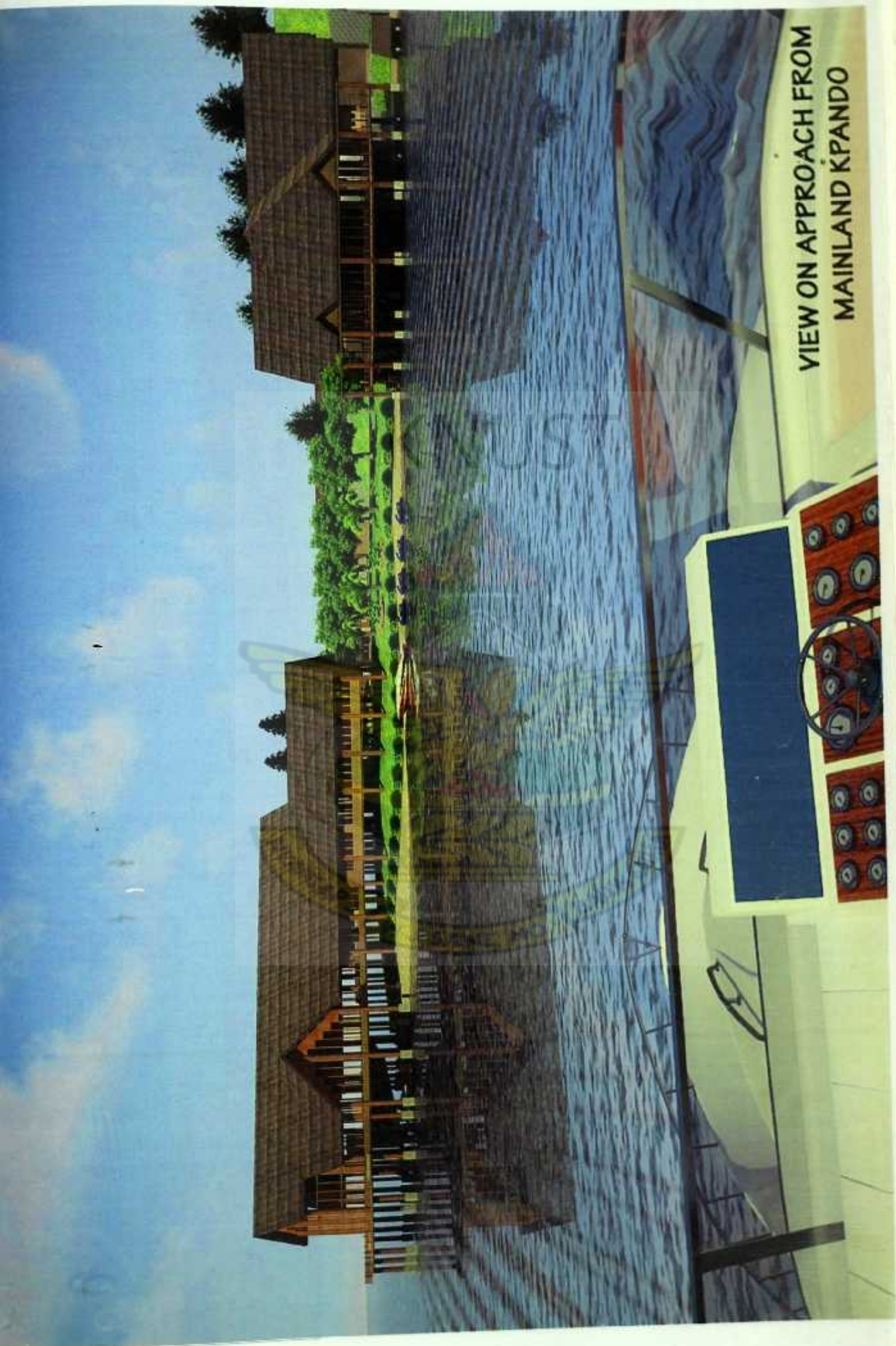


SCALE: 1:750

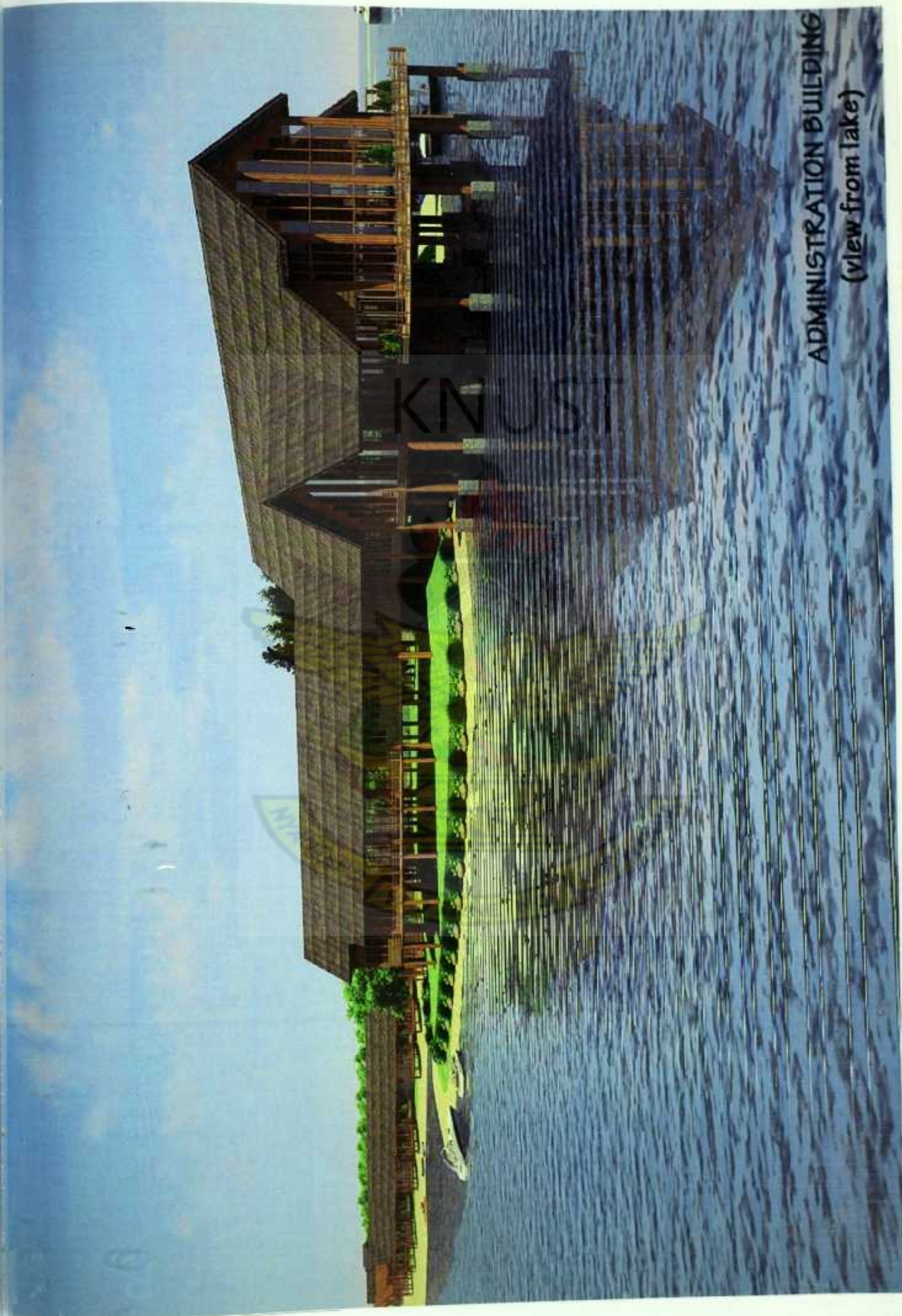




VIEW ON APPROACH FROM  
MAINLAND KPANDO

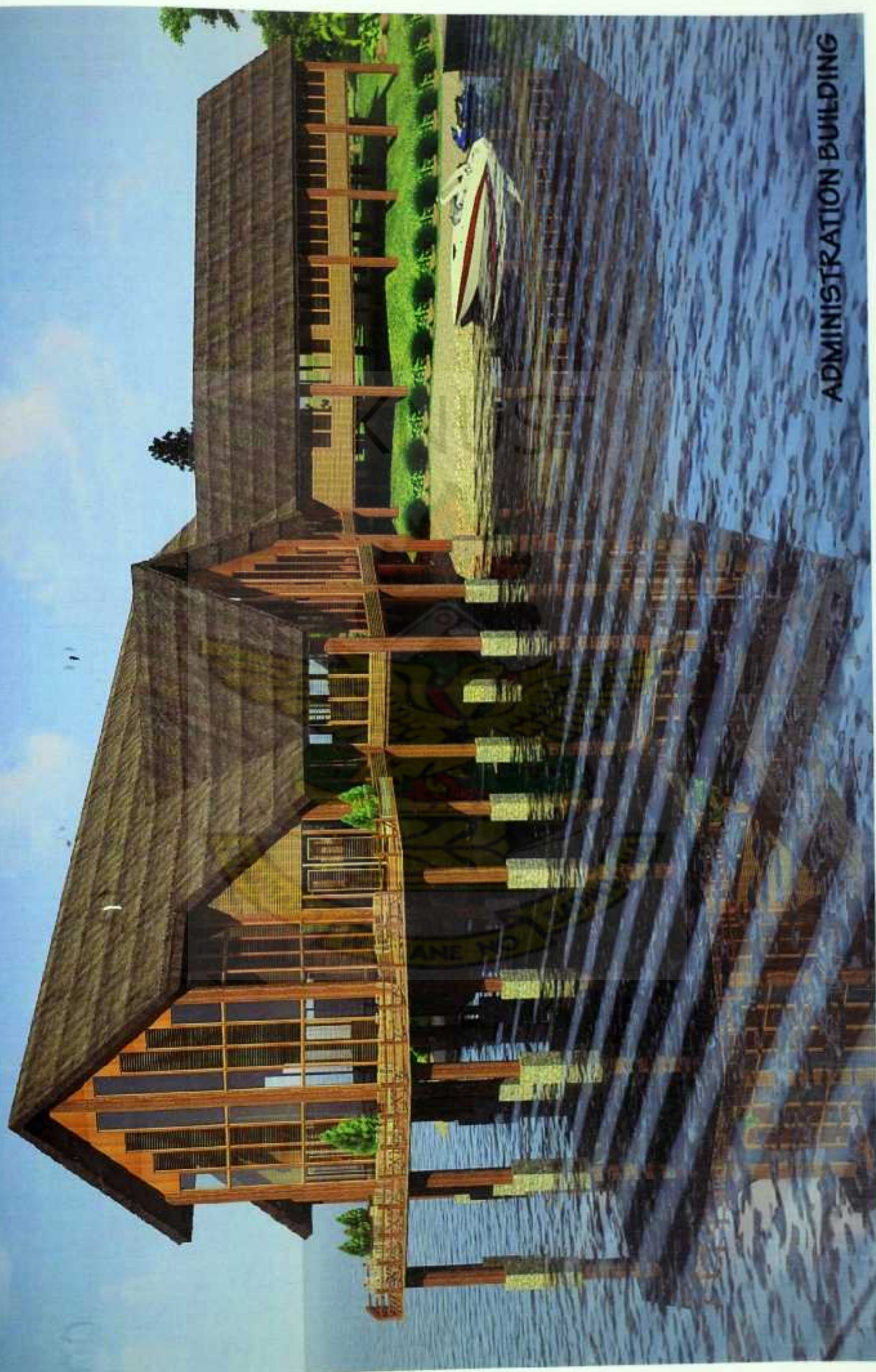






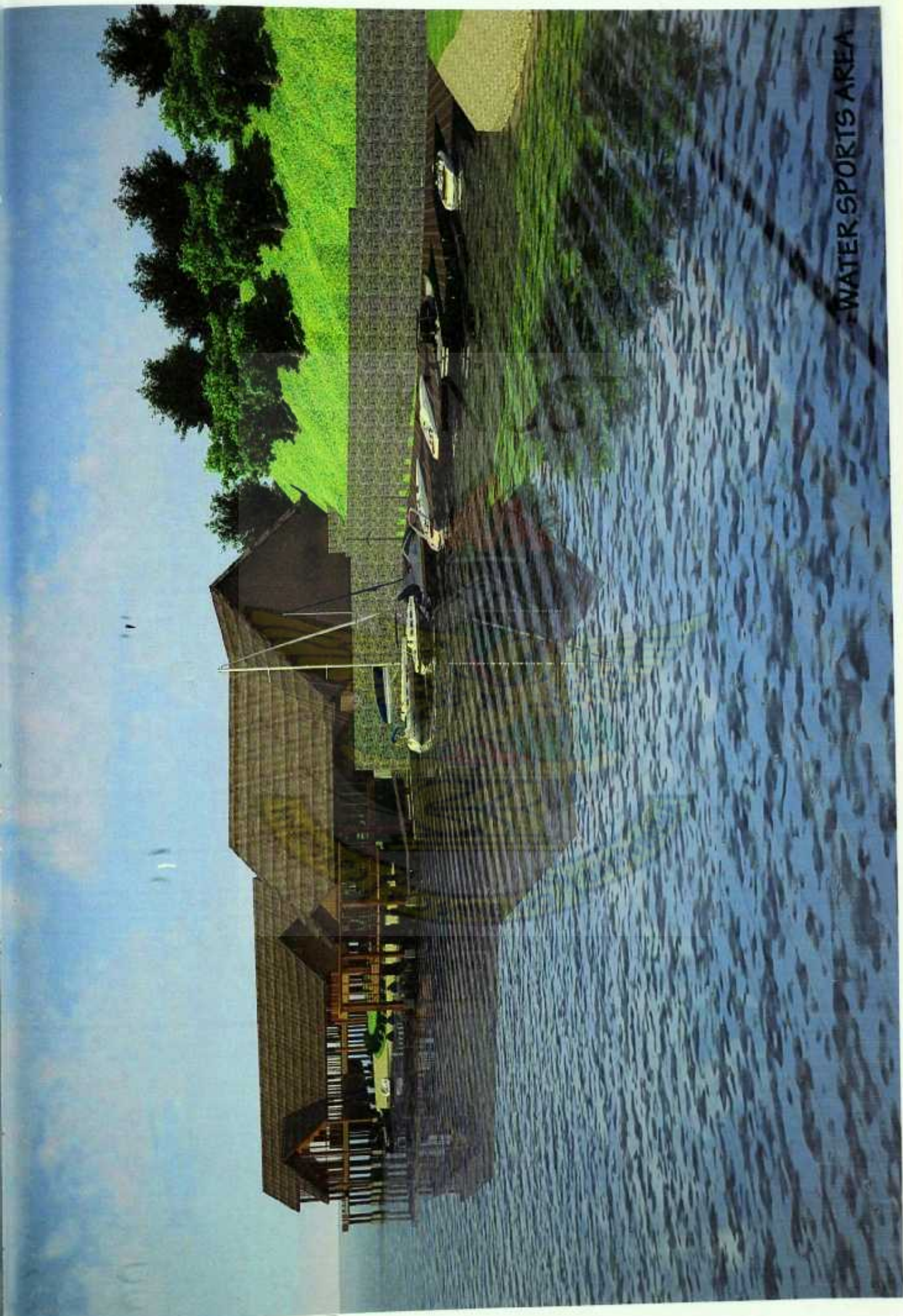
ADMINISTRATION BUILDING  
(view from lake)





ADMINISTRATION BUILDING





WATER SPORTS AREA

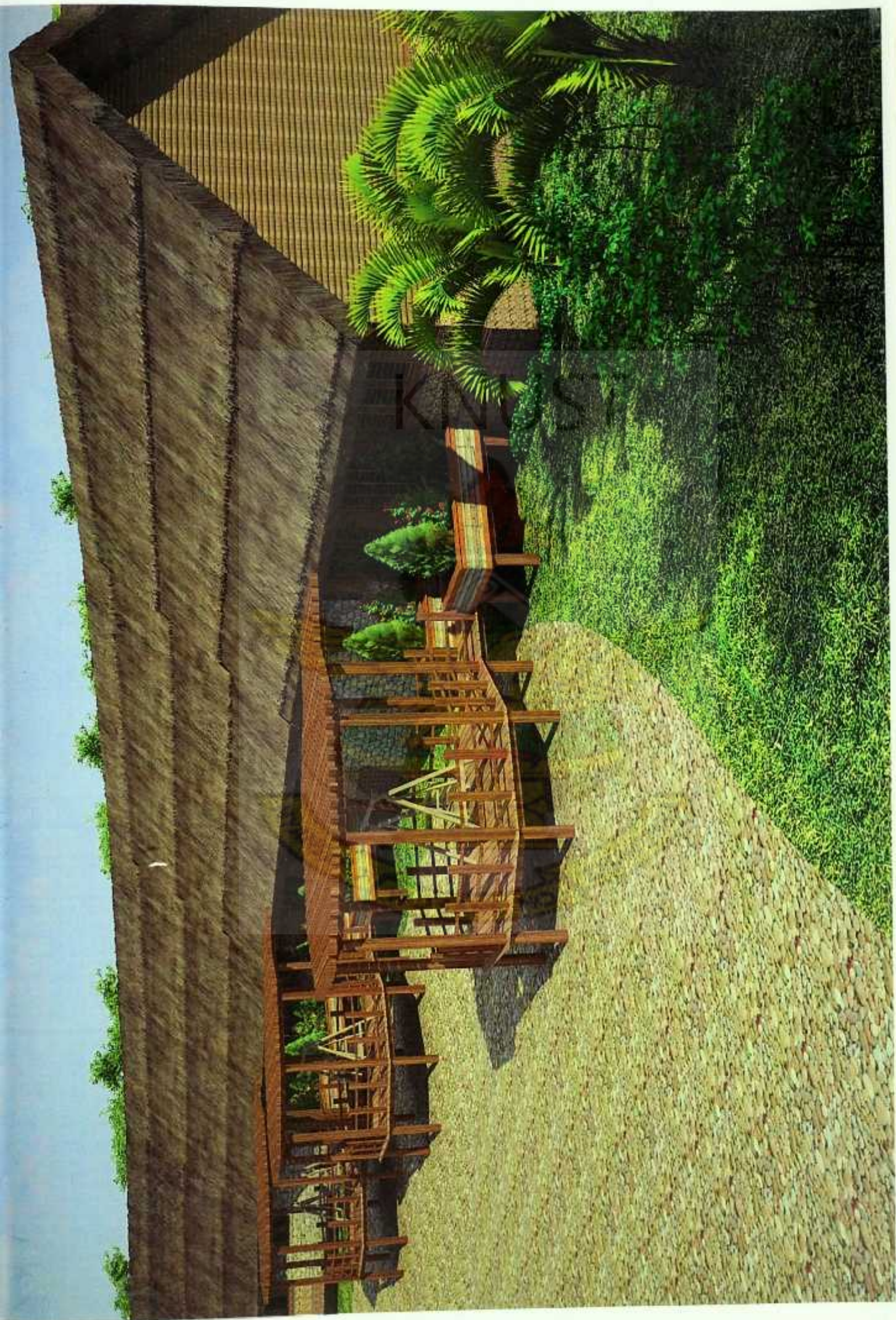


























# BATHROOM

