AN ECOLODGE AT KAKUM NATIONAL PARK

BY

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DECLARATION

I hereby declare that, this submission is my own work towards the Masters in Architecture and that , to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the university , except where due acknowledgement has been made in the text.

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ABSTRACT

This report is a detailed description of the design process of a proposed ecolodge at the Kakum National Park (KNP). The purpose of the study is to design an environmentally friendly ecolodge with a unique vernacular architecture to meet international standards. It is to serve as the link between the natural and cultural environment of KNP and its surroundings. Preliminary studies through literature study and literature review, case studies and technical studies revealed that: ecolodges should pay attention to the natural setting and respect vernacular architecture during the site planning and design; use environmentally sensitive materials especially local materials during development and maintenance; incorporate green technologies in the design. The proposed design adopts vernacular architecture from surrounding villages of the Kakum National Park. Materials for the proposed design are mainly adobe, timber and thatch. Green technologies like the use of solar energy, greywater treatment systems and composting toilets were considered at the planning stage of the design. The layout of the proposed design is based on the traditional courtyard concept with a system of interpreted trails to link them.

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DEDICATION

Dedicated to Kwame Akoto-Bamfo, for being there for me throughout.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

As ecotourism continues to establish itself in the global economy, the demand for well planned, and environmentally sound lodging facilities is enormously increasing. This phenomenon has competitively positioned ecolodges in the market. The reason for this is that ecolodges have enabled visitors to interact with the natural and cultural surrounding worldwide and prioritised conservation (Mehta, 2000).

Ecolodges continue to evolve. Consequently, many developers and investors all over the world, especially in the tourism industry, have opted to abandon conventional designs and facilities. Ecolodge designs are more profitable; less sophisticated and have minimum negative impact involved in their development as well as their positive impact on rural and bio diverse areas. (Ceballos-Lascurain, 2001, International Finance Corporation, 2004,). A World Bank study, conducted in 2004 reveals that, the ecolodge market is expected to grow by an average rate of 10% per year over five decades. (International Finance Corporation, 2004).

The potential however, may be adversely affected by negative development patterns and practices. Some of such practices are inadequate government regulations to ensure appropriate development, poor monitoring of impacts on communities and environment, lack of expertise to maintain ecolodge development standards, and many

more which all in the end have potential to destroy a destination for ecotourism like Ghana and Kakum National Park (KNP) in particular.

Despite such constraints, ecolodges as highlighted have broad market opportunities over the next few years to capitalise on the developing ecotourism in mostly African destinations (International Finance Corporation, 2004). However, those who will benefit from such market will be the ones who have been able to maintain consensual standards. Some of the standards recognised internationally for ecolodges and as many authors Mehta (2000), Ceballos-Lascurain (2001), Lubbe, (2003); Hawkins et al, (1995); Eagles et al, (2002) have suggested include;

1. Ecolodges should pay attention to the natural setting and respect vernacular architecture during designing and site planning.
2. Ecolodges should meet energy needs through passive design and renewable energy resources.
3. Ecolodges should use environmentally sensitive materials during development and maintenance.
4. Ecolodges should be managed sustainably
5. Ecolodges should involve and empower local communities during planning development and operation stages.

1.2 PROBLEM STATEMENT

The Kakum National Park (KNP) can be considered as the number one ecotourist destination in Ghana because it is one of the surviving rainforests in West Africa and also home to quite a number of endangered species of wild animals like the forest

elephant among others. The only canopy walkway in West Africa is also in this national park.

Because of its wide biodiversity and canopy walkway, the number of visitors has been increasing since the establishment of a visitor centre in 1997. In 2007 KNP registered a total of 112,309 visitors as compared to 52,193 in 1999 (Ghana Heritage Conservation Trust, 2008).

Accommodation facilities at the Kakum National Park are however inadequate and do not meet recognised international standards of ecotourism and ecolodge developments. Currently there is a basic camp site and a lodge. The camp site which is not in a very good condition attracts only tourists known as „dedicated" ecotourists who do not care about the accommodation but the natural experience. The Rainforest Lodge, which was built to supplement the camp site in order to target a wider range of eco tourists was not developed to the internationally accepted standards of ecolodges and is out of place in the environment.

Due to the lack of appropriate accommodation facilities at the park, visitors are not able to stay and enjoy the natural environment as they wish. This situation does not give the visitor the desired ecotourism experience.

1.3 AIM

The aim of this study is to come out with an ecotourism facility that fits into the objectives of the Ghana Heritage Conservation Trust who are the managers of the facilities in the park.

1.4 OBJECTIVES

The researcher seeks to pursue the following objectives

1. To design an ecolodge KNP to meet international standards.
2. To use the traditional courtyard and interpreted walkways as a basis for site design
3. To create a facility which will be a link between the natural and cultural environment

1.5 JUSTIFICATION

An international standard ecolodge at KNP will give the opportunity to all types of ecotourists to stay and experience the natural environments and its surrounding cultural attractions. Currently tourists are constrained to stay at Cape Coast and make a day trip to the park, spend a few minutes and return to Cape Coast. For those ecotourists who want to stay in and experience the place for more than a day there is no such place to lodge anywhere close. The current facilities are a basic campsite which is badly maintained and a newly built lodge which does not conform to any principle of ecotourism or ecolodge development. In effect the few people who patronise these two facilities do so out of necessity.

Currently, the park management and the surrounding villages who gave up the forest for conservation do not benefit economically because the tourists spend very little time at the park. An ecolodge at KNP will ensure that the communities and the management of the park get more revenue than they are recording now.

Around KNP are other small ecotourist destinations; like Kruwa, Masomagor tree tops and Dormama shrine. An ecolodge at KNP will serve as a point of contact to all these less known destinations. This could be a network of ecotourist destinations with KNP being the central point.

1.6 IMPORTANCE OF STUDY

The study will bring out some of the good and bad practices in the ecotourism sector of Ghana and it will serve as an evaluation of KNP. Based on this the Ghana Tourist Board can revise regulations or institute new ones to help the ecotourism sector of Ghana. It will also serve as a starting point for the research into the numerous undeveloped natural tourist sites in Ghana.

1.7 SCOPE

This study will comprise case studies and any other studies relevant to the design of an internationally recognised ecolodge. The main emphasis of this research is the design of ecolodges. This includes the master plan, elevations, sections and three-dimensional presentations.

1.8 TARGET GROUP

The facility will target both foreign and local ecotourists. This will include student groups, families, researchers, couples and individuals. The facility will provide facilities for both tourists with shoestring budgets and upscale budgets.

1.9 CLIENT

The client is the Ghana Heritage Conservation Trust (GHCT).

Background

GHCT is a non-governmental, not-for-profit organization set up in 1996, to promote the preservation and conservation of Ghana‟s historic monuments and sites and biodiversity of national and global importance. It was established to promote the unique concept of combining historical and natural resource conservation for socio-economic development, as originated by policy makers of the Central Region.

Mission

The mission of GHCT is to collaborate with relevant statutory bodies like the Ghana Museums and Monuments Board, Wildlife Division of the Forestry Commission and Ghana Tourist Board, to support and assist in the conservation, preservation, protection and maintenance of the Kakum Conservation Area, Cape Coast and Elmina Castles and Fort St. Jago, their environs as well as the economic growth and well being of the communities surrounding them.

Objectives

1. To stabilize, protect, conserve, and maintain the historic physical structures and resources around designated areas.
2. To create awareness of Monuments and Parks, for both visitor use and as a means of educating the public about the importance of conserving Ghana‟s heritage.
3. To support research in order to expand knowledge about designated monuments and conservation areas and to disseminate this information as appropriate

4. To enhance the quality of life in communities surrounding the designated monuments and conservation areas.
5. To undertake fund-raising activities for the preservation and conservation of these important resources.
6. To collaborate with statutory bodies to protect the resources
7. To involve the local communities as collaborators, advocates, and beneficiaries of conservation and protection.
8. To enhance and encourage appropriate economic growth in the local communities without detriment to the natural environment and historical context.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter conducts a study and review into existing literature concerning the topic. The purpose is to gain an understanding of what has already been done around the world and also pick relevant lessons from best practices worldwide. This study will help put this reseach in context.

2.1 THE CONCEPT OF ECOTOURISM

In 1983, a Mexican architect Hector Ceballos-Lascurain coined the term „ecotourism" and since then it has received a lot of publicity in the tourism sector because of the increasing concern for nature conservation. His preliminary definition of ecotourism was:

> that tourism that involves travelling to a relatively undisturbed natural area with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals as well as any existing cultural aspects both past and present found in these areas. Ecotourism implies a scientific, aesthetic or philosophical approach, although the ecotourist is not required to be a professional scientist, artist or philosopher. The main point is that the person who practices ecotourism has the opportunity of immersing him or herself in nature in a way that most people cannot enjoy in their routine urban existences. The person will actually acquire an awareness and knowledge of the natural environment together with its cultural aspects that will convert him into somebody keenly involved in conservation issues.
>
> (Ceballos, 1983)

Architect Ceballos- Lascurain reviewed this preliminary definition in 1993 to:

> an environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy, study and appreciate nature (and any accompanying cultural features both past and present) that promotes conservation, has low visitor impact and provides for beneficially active socio-economic involvement of local population.
>
> (Ceballos 1993).

This definition was officially adopted by the International Union for Conservation of Nature (IUCN) at the world conservation union in 1996. According to this definition ecotourism denotes nature tourism with a normative element. Ecotourism should be seen as a component of sustainable tourism. The term ecotourism has however, been abused and misused in many places. In many countries it is seen mainly as adventure tourism and carrying out extreme sports in a more or less natural environment, with little concern for conservation or sustainable development issues.

2.2 ECOLODGES

2.2.1 Definition

The term „ecolodge" is a tourism industry label used to identify a nature-dependent tourist facility that meets the philosophy and principles of ecotourism (Hawkins et al, 1995). Such a facility is developed and managed in an environmentally sensitive manner in order to protect its operating environment. Critical issues include nearby natural and cultural attractions, the way in which an ecolodge is operated and marketed, and the way in which local people are involved in the process of developing ecolodges (Ceballos-Lascurain, 2001)

2.2.2 Features

An ecolodge should be designed such that it blends in with its surroundings offering visitors an environmental experience of the natural world around them (Mehta, 2000). It should however not be imposed on nature and should not overwhelm it. According to

Ceballos-Lascurain, (1997), „the most important thing about the ecolodge is that the ecolodge is not the most important thing. It is the surrounding environment that most counts; the nearby natural and cultural attractions and the way ecotourism circuits are set up and marketed and also the way in which local populations are actively involved in the processes“ .

Any ecolodge project therefore requires the adoption of a different approach to architecture, commonly termed „ecological design“ or „ecodesign“ . Lubbe (2003) defines an ecodesign as the development of buildings and landscapes in a way that they:

1. Integrate themselves into the landscape and its features,
2. Enhances the usefulness of natural environment, takes into consideration all the components and aspects of the ecosystem.

To qualify as an ecolodge therefore, the facility is required to be constructed using natural and locally produced building materials. It should ideally rely on solar or alternative energy sources, recycle the waste and waste water it generates, serve locally grown and produced foods and usually donates to conservation and development efforts.

An ecolodge is different from mainstream tourist resorts. The major distinction between them is that in a mainstream tourist resort, the major attractions, facilities and activities are artificial in character. On the other hand the main attractions and activities in an ecolodge are directly related to the surrounding environment which is the natural and cultural environment. Ecolodges are also differentiated from traditional tourist resorts in design, food and activity. In terms of design, ecolodges are integrated into the natural environment while traditional resorts are developed as enclaves. Food served in

ecolodges is prepared by locals as compared to gourmet chefs at traditional resorts. Activities in ecolodges are nature and education based as compared to relaxation and facility based activities in traditional resorts.

2.2.3 Ecolodge Internationally Recognised Standards

As Hawkins et al suggests an ecolodge should be identified with six features as described below:

Location and Resource Protection

Protecting the ecolodge operational environment is critical to its successful performance. Such protection rests ultimately in the hands of the government officials, and will determine long-term investment security, tourist appreciation, and destination image. There are several options for protection. These include nature reserves, or pockets of land on the fringes of national parks. Within these natural environments what is important for an ecolodges‟ general atmosphere is the sense of „isolation‟ and „wilderness‟ and being away from the impact of civilization.

Natural and Cultural Attractions

The key to the success of an ecolodge is an environment of outstanding “natural beauty”. Cultural attractions, however, are also important. Incorporating local cultural resources in personnel, activity interpretation programs and with design and decoration of an ecolodges provide it with an authentic local flavour.

Facilities

An ecolodge is recognised by distinct design features that are intended primarily to blend with the natural environment. Sustainable site design requires holistic,

ecologically based strategies to create projects that do not alter existing site systems- such as plant and animal communities, soils and hydrology- but instead restores these systems if required. Aesthetically, the ecolodge should be integrated with the natural surroundings and should incorporate cultural characteristics whenever appropriate.

Capacity

A survey of existing ecolodges worldwide reveals that, typically, the capacity of an ecolodge is between 25 and 100guests (Hawkins et al, 1995). The key to deciding the optimum for any given ecolodge, however, lies in the environmental impact assessment undertaken for each site, as well as the natural setting in which the site exists and the type of atmosphere that the investor wishes to create for the ecolodge and its clients.

Activities

These are usually based on a sensory experience with the natural and cultural resources of the area to enhance the visitor‟ s appreciation of the resources and lead to a greater support for preservation. Examples include trail hiking, nature interpretation, bird watching, river trips, desert excursions, mountain biking and horse and camel riding. Facility based activities such as swimming pools and tennis courts are rarely available. The „nature‟ experience that ecotourists gain is a combination of both intellectual and physical challenges that together produce a dynamic and unforgettable experience.

General Atmosphere

Ecolodges are characterised by their friendly, relaxed, flexible and educational environment. The design of an ecolodge and activities provided within the facility encourage close interaction with the natural environment. This gives the visitor a feeling

of being somewhere special and imparts a sense of place and „a sense of belonging‟ . Each ecolodge must enjoy an atmosphere that is appropriate to the sites specific setting. It is this atmosphere that is a key ingredient in distinguishing ecolodges from traditional lodges or tourist facilities.

2.2.4 Types of Ecolodges

Ecolodge classifications are based on the setting of the lodge and the primary ecotourism activity that visitors engage in at the lodge. Four types of ecolodges have been identified (Osland and Mackoy,2004):

1. Dedicated ecolodges
2. Casual ecolodges
3. Scientific ecolodges
4. Agri- ecolodges

2.2.4.1 Dedicated Ecolodges

These lodges serve Weaver‟ s (2002) “hard ecotourists” who engage in specialised activities, such as birding, in areas with a limited infrastructure that tend to be rather inaccessible. An example is the Laguna Del Largato in Costa Rica which targets birders and other dedicated ecotourists, emphasising the large primary tropical rainforest owned by the lodge. Access to the lodge requires a four-wheel drive vehicle and accommodation is basic.

2.2.4.2 Casual Ecolodges

These are normally located in well serviced, accessible areas, with the majority of tourists engaged in general nature observation and relaxation. Eco Paraiso, located on

the Gulf of Mexico coast of the Yucatan peninsula of Mexico, is a typical example of a casual ecolodge. The lodge caters for upscale tourists who want to relax and observe nature in a comfortable setting. The lodge offers fine dining, a swimming pool, beach activities, guided nature tours in the area and well furnished cabanas with porches.

2.2.4.3 Scientific Ecolodges

Visitors at scientific ecolodges are involved in research and or education activities, often including student groups, in privately owned premises. An example is La Selva, near Braulio Caudillo National Park in Central Costa Rica. La Selva is a tropical research station owned by a consortium of universities. The station is currently expanding its activities for ecotourists, attempting to find new ways to integrate scientific research, education and revenue generation.

2.2.4.4 Agri-Ecolodges

These loges are based in agricultural or ranch setting and include farms and ranches now primarily denoted to ecotourism, as well as community ecotourism projects. Examples of such ecolodges include haciendas converted to ecotourism in Costa Rica and community-owned lodes in rural settings. Typical of this category is Turistica Yu‟ us, located in an agricultural village, Benito Juarez, in Oaxaca, Mexico, near a National Park of the same name.

2.2.5 Site Selection and Site Planning

When a tentative site has been selected for the ecolodge development, it is recommended that an environmental and social impact assessment (EIA and SIA) be

carried out by a multi-disciplinary team. This facilitates the integration of environmental considerations put forward in the assessment into the actual plans for siting and design.

Apart from the EIA ensuring that the development is aligned to local environmental and social conditions, it may also provide information on local environment and social conditions in cases where this information does not exist. In the planning process, it is important to involve local stakeholders who should be given the opportunity to review and provide feedback on the results of the EIA and SIA.

Through master planning, negative impacts to the natural and cultural environments can be minimised. Two important elements to be considered as part of the master site planning process are zoning and access to the site.

Zoning: this facilitates the application of different management objectives to different areas of the site. These different use levels, example strictly protected zone, restricted tourism zone, moderate tourism zone, etc., help to proactively minimise the negative impacts on the natural and cultural environments.

Access to site: road construction to the site should be minimised. If a road has to be built, the canopy cover should be maintained unbroken to avoid the creation of barriers to the movement of birds and animals. Electric or hybrid powered vehicles should be considered for transporting supplies from the main road to reduce noise, water and air pollution.

2.2.6 Facility Design

The design of facilities should be based on an understanding of the ecolodge‟ s context, that is, the relationship between local cultures and the land. Traditional land use

and site design should be studied and sustainable principles and practices incorporated into the design of the facility.

2.2.6.1 Biophysical and Cultural Impacts

Nesting, feeding and roosting sites of threatened, endangered or other focal species should not be negatively impacted. Archaeological and other sites of cultural importance shall be respected and not negatively impacted.

2.2.6.2 Architectural Design and Construction

The infrastructure should be integrated harmoniously with the natural and cultural environments, rather than impose itself on the environment.The natural contours of the site must be followed as much as possible.

In Ceballos Lascurain‟ s master plan for Socotra Island, Yemen (1998-99), the facilities for the ecolodge were integrated into the rocky landscape of the site. The facilities were linked with winding pathways resulting in an organic layout which fitted naturally into the landscape.

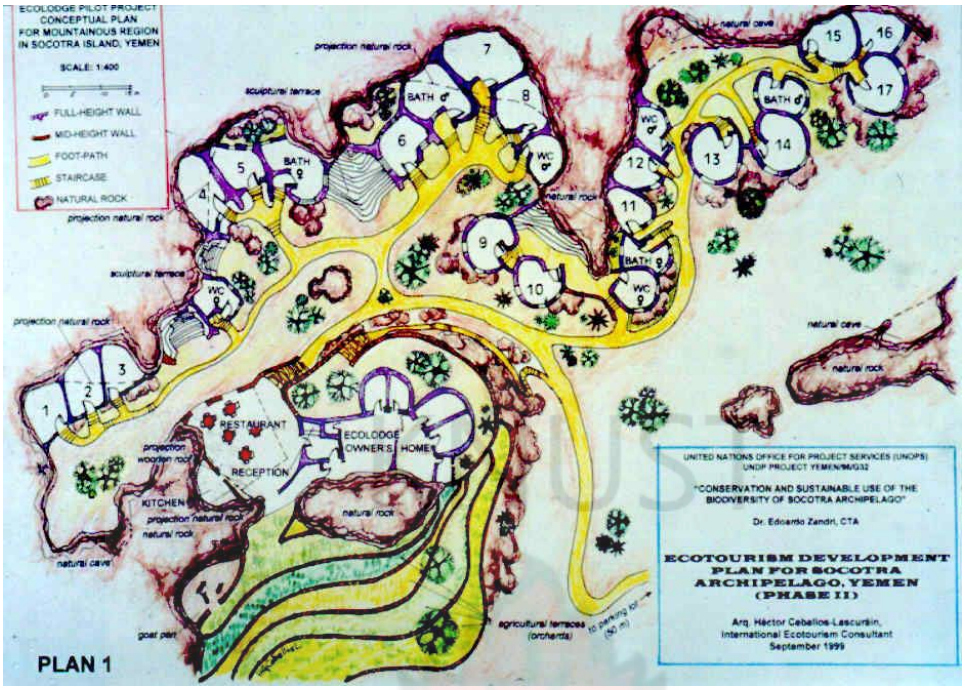


Fig. 2.1 Master Plan of Socotra Island, Yemen

Source:www.ceballos-lascurain.com/English%2004feb/prod02.htm (2009)

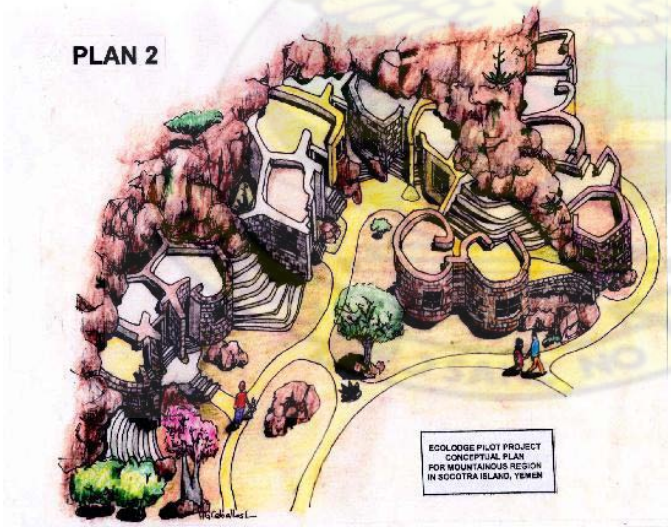


Fig. 2.2 Perspective view of Socotra Island Yemen

Source: www.ceballos-lascurain.com/English%2004feb/prod02.htm (2009)

In another example which was an entry for a design competition (world‟ s best practice eco-resort design competition, proposition 6707), the designer positioned all the facilities along the contours of the site. The buildings form and materials were in response to the local climate and environment.

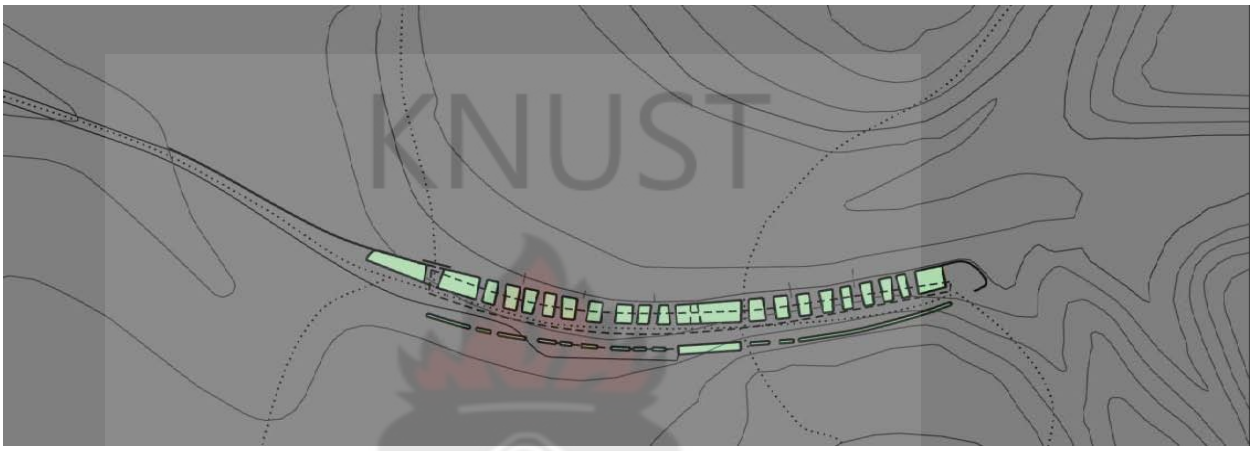


Fig. 2.3 Site plan for proposition 6707

Source:www.niche.com.au/pdfs/Majcen%20and%Morrell.pdf (2007)

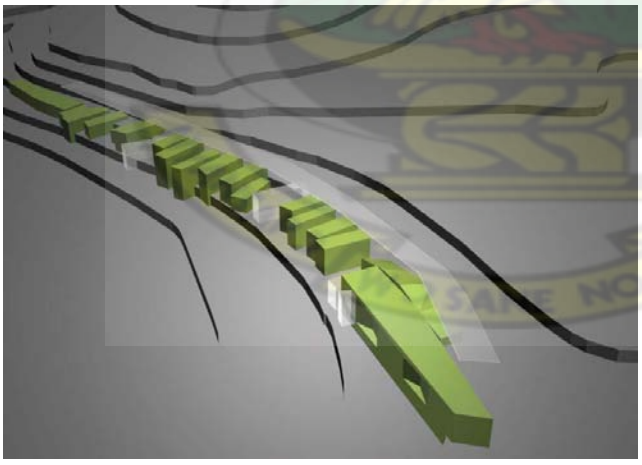


Fig.2.4 Building curves in response to land form and contours

Source: www.niche.com.au/pdfs/Majcen%20and%Morrell.(2007)

Comparing the above two ecolodge developments it can be seen there are no hard and fast rules about site planning of ecolodges but taking the unique characteristics of the site into consideration in addition to the above listed guiding principles gives a good master plan for an ecolodge.

Scale and colour of buildings

The scale of the buildings should also be carefully considered during the conceptual design stage. High structures should be avoided. In a forest setting for example, buildings should not stick high above the tree canopies imposing itself in the environment but rather the height of the buildings should be considered in comparison to the height of the tree canopy. Colours used on exteriors should blend not contrast with the colours of the natural environment.

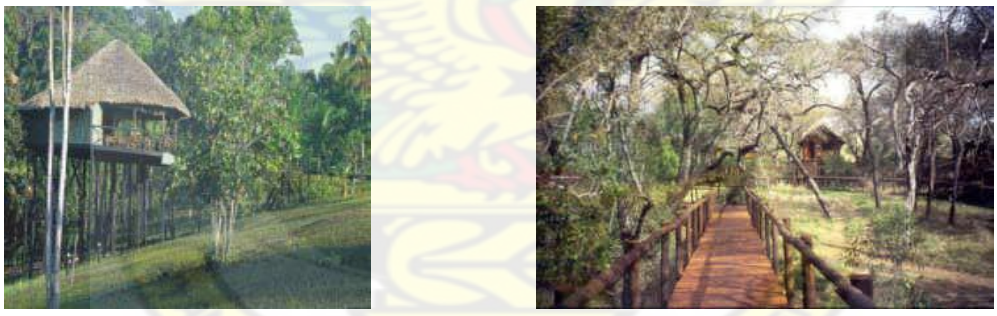


Fig. 2.5 Eolodges in Rwanda and Kenya.

Source:www.rwanda1.com/images/docs/biodiversity/nyungwe%20forest%20ecotourism%20development%20plan.pdf.,(2008)

Construction

Construction processes should be labour intensive and avoid the use of heavy machinery. The process may combine traditional and modern technologies and materials. The use of natural sustainably harvested materials should be maximised. However, modern recycled glass, wood and plastic materials can be used if sustainably harvested timber is in short supply. Concrete and steel should be avoided.

2.2.7 Trails

Trails should be designed as a vehicle for environmental and cultural interpretation. Attractions (views, wildlife observation, beauty, etc.) and sensitivity (least impact) are the primary determining factors in the placement of trails. The following important issues must be considered in the design of trails:

1. Trails should be offered for different levels of physical ability
2. The trails should form a closed loop bringing visitors back to the starting point. This prevents the visitors from having to retrace their steps, thus improving their experience
3. Erosion controls should be incorporated into trails
4. Trails should be clearly delimited to discourage visitors from leaving them.

2.2.8 Landscaping

Landscaping for ecolodge development is not the use of exotic plant species to create dramatic experiences but rather the use of native species for land regeneration. Lawns should be minimised or at best eliminated, buildings should as much as possible be invisible from the air and also on ground arrival.

2.2.9 Energy Systems

Renewable sources of energy should be the goal for all normal energy needs. Diesel generators and others should be considered for backup only. In using these generators, double skinned houses with state of the art silencers should be provided.

The use of photovoltaic for lighting and biogas for cooking and refrigeration should be considered very early at the design stage in order to make provision for facilities needed for their operation.

2.2.10 Waste Management Systems

The three R" s (Reduce, Reuse and Recycle) should be incorporated into the site and system design.

2.2.10.1 Solid waste

Biodegradable waste should be converted to compost that can be used on site or made available to local food producers. Non biodegradable waste should be separated on site and transported to a properly managed site for disposal. This may have the additional benefit of creating employment, provide environmental education and improve community infrastructure. As much as possible, consumables used on at the ecolodge like soap, fat, shampoos, etc., should be biodegradable.

2.2.10.2 Sewage

The relative impacts and merits of dry toilets, anaerobic bioseptic treatments, aerobic bioseptic treatments and constructed wetlands should be evaluated and the most suitable chosen for the development. Waste water should be treated to a level acceptable

for agriculture and released into an irrigation system for a small garden behind the facility. This accomplishes two goals at once: using wastewater instead of simply releasing it into the watershed and ensuring the extra availability of fresh organic produce.

2.2.11 Water supply

Water supply to the development site should be from a sustainable source. The impact on local communities should be considered. Rainwater harvesting as a sustainable source of water supply can be explored and considered in the conceptual site design.

2.3 CURRENT TRENDS IN ECOLODGES

Hitesh Mehta identified some notable trends in ecolodge developments at a lecture he delivered at New Delhi, India (2000). According to him these trends can be classified into four main categories; community empowerment, environmental and social awareness, conservation and design and technology.

The most successful current trends he noted is the process that empowers the native population-community based ecotourism. In Ecuador, community based ecotourism programs are growing at a very fast rate in the Amazon region. According to him two of such programs led to the Quehueriono and Kapawi ecolodges. At Quehueriono the community used local knowledge, labour and appropriate technology to build a cabin in the traditional Huaorani style. At Kapawi, the developer Canodros used a participatory mapping process whereby people from several communities helped to collect the information which was based in the Achuar knowledge of their land.

He also noted that environmental and social awareness has been achieved through interpretation at most ecolodges. At Jean Michel Casteau Fiji resort for example, special huts have been built for educating children about the ocean. They have also taken a step further in the educational program to teach guests about less consumptive lifestyles. The cultural experience in Il Ngwesi (Kenya) is well orchestrated and provides lifelike representation of traditional Masai village life.

Conservation he noted; is another major trend in ecolodges. Galdessa camp in Tsavo East National Park, Kenya, donates money and transport for Rhino conservation. Tiger Resorts, who operates two jungle lodges in Madhya Pradesh (India), uses forty percent of the revenue generated from accommodation receipts to actively support the tiger conservation programme in the area. In addition, a trust has been formed that helps educate local people and also provides medical services.

In terms of Design and technology Mehta (2000) noted that trends that respect the ecosystem are becoming quite common. Lodges are being designed to be in harmony with the physical and cultural environment. In the case of Bhandhvgah jungle lodge in India and Zepo camp in Northern Kenya, the lodges are designed to look like local villages. Taking the external concept inside is a design trend that is gaining momentum. An example is the Borana Lodge (Kenya) which had its interiors published in the internationally acclaimed interior design magazine, Architectural Digest. Many ecolodges are striving to balance technology and ecology. Sukau Rainforest Lodge in Malaysia uses state of the art electric motors for the boats so as not to pollute the water with diesel. Compact sewage treatment plants are being frequently used and so are solar systems that can provide electricity for 30 room lodges.

A notable trend in the design of ecolodges is in the use of materials. While some lodges are sticking with traditional natural materials, others are using recycled modern materials. At Bwindi Ecolodge in Uganda, timber, stone and thatch were used throughout but at Aquila Ecolodge in Australia modern materials were used extensively in addition to stone. Probably the most notable technological trend according to Mehta (2000) is the new paradigm of „Designing for Deconstruction" (DCD). It is the process by which the building can be dismantled with minimal demolition impact on the environment. At Kingfisher Bay Resort, the accommodation units have been constructed in a way that if they were to be dismantled, there would be minimal impact on the existing fragile ecosystem and within a couple of years there would be no sign of the lodge.

2.4 SUSTAINABLE STRATEGIES

This study deals with sustainable and eco friendly means of power supply, waste disposal and sewage treatment. The aim is to understand alternative means of providing these services with conservation of the natural environment in mind. Composting toilets which have proven worldwide to be one of the most eco friendly means of disposing human waste will also be studied.

2.4.1 Solar Electricity

Solar Electricity is created by using photovoltaic (PV) technology by converting solar energy into electricity from sunlight. PV systems use sunlight to power electrical equipment for example, household appliances, computers and lights.PV systems consist of modules or panels, inverter, charger and batteries. The PV modules generate DC electricity and send it to the inverter which transforms the DC electricity to AC

electricity and also regulates the charge of the batteries. The batteries store electricity that can be used at right or during blackouts. PV systems can be used as a system on its own (off-grid standalone system) or can be connected to the main grid (grid-tie system).

Advantages of the PV System

1. PV equipments have no moving parts and as a result require minimal maintenance.
2. It generates solar electricity without producing emissions of greenhouse or any other gases and its operation is virtually silent.
3. Provides an alternative source when there is a problem with the main electricity grid.
4. PV cells are modular; it can be initially installed with small systems and gradually expanded to meet increasing needs.

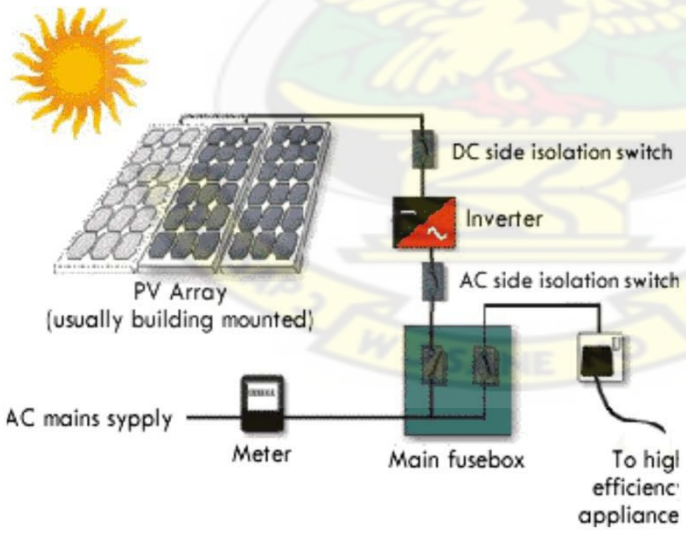


Fig.2.6 PV Components

Source: www.electricityforum.com/solar_electricity (2008)

Grid Tie System

In this system the PV system is connected to the local electricity grid. Excess solar electricity is sold to the Electrical Company. When there is not enough solar electricity power is bought back from the main grid. In effect the grid is acting as a storage system which means this system does not require battery storage.

Stand- Alone PV System

This is operated independent of the main gird. Excess power is stored in batteries. If larger amount of power is required they can be combined with another source of power - a biomass generator, wind turbine or diesel generator to form a hybrid power supply system. This type of PV system is normally used in remote areas where it is difficult to connect to the main grid.

Case Study - "Electric Sunflowers"

This study is about the creative application of the PV system by Solar Design Associates. A client wanted to power their country residence and vineyard in northern California with solar which was efficient, reliable and enjoyable to look at. Solar Design Associates proposed a large array of "Electric sunflowers" (PV panels designed to look like sunflowers) on the steep, south sloping hillside at the north end of their property. The sunflowers track the sun from sunrise to sunset and then return in unison to wait dawn. Tracking enhances the solar harvest while creating what the clients refer to as a Hillside of kinetic art".

Fig.2.7 'Electric Sunflowers'

Source: www.solardesign.com(2008)

Fig.2.8 'Power Kiosks'

Source: www.solardesign.com(2008)

Necessary power electronic components are located in "power kiosks" which are sprinkled throughout the multi-acre array field.

2.4.2 Grey Water Treatment

Grey water is all waste water from the kitchen, bathroom and laundry. This does not include waste water from the toilet or food wastes. There are two treatment technologies studied in this paper. These are the aerobic pre-treatment and the anaerobic to aerobic pre-treatment.

Aerobic Pre-treatment

This system is suitable for showers, hand washing and laundry water treatment. This is therefore suitable for public facilities where the principal source of grey water is hand washing and showers. The aim of this stretch filter treatment technique is simply the removal of large particles and fibres to protect the subsequent infiltration pipes from

clogging and transferring it as soon as possible for treatment in a biologically active aerobic soil-zone environment where both macro and micro organisms can thrive. If this type of filter is used to remove food wastes, these will accumulate in the filter which then becomes anaerobic and makes the effluent malodorous. The result is often too frequent changes of the stretch-filter become necessary thus creating an undesirable, high maintenance situation.

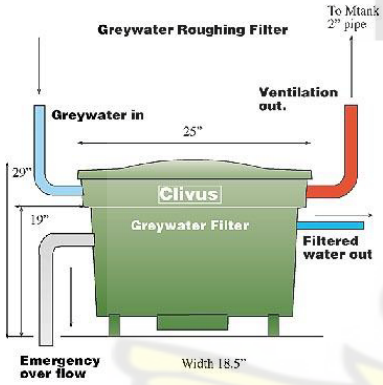


Fig.2.9 Grey water filter

Source:www.greywater.net/treatment.htm (2008)

Anaerobic To Aerobic Pre-Treatment

If any significant quantity of food wastes enters the system from dishwashers and kitchen sinks receiving cooking grease and a fair account of food residue this option is recommended. A typical installation is not very different from a traditional system, but the treated effluent is of much better quantity and does not pollute nearly as much. This system consists of a three-stage septic tank for sludge and grease separation. The separated sludge can be removed less frequently (every fourth year instead of bi-yearly as is standard practice with most conventional systems). The outgoing effluent in the

septic system is anaerobic. Following the septic tank is a sand filter designed for restoration of aerobic conditions. The final treatment stage leading to a purified water of near potable-quality is treatment in a planter bed. This is not the most inexpensive solution. It is however one of the most effective simple to maintain on-site treatment technique available today.

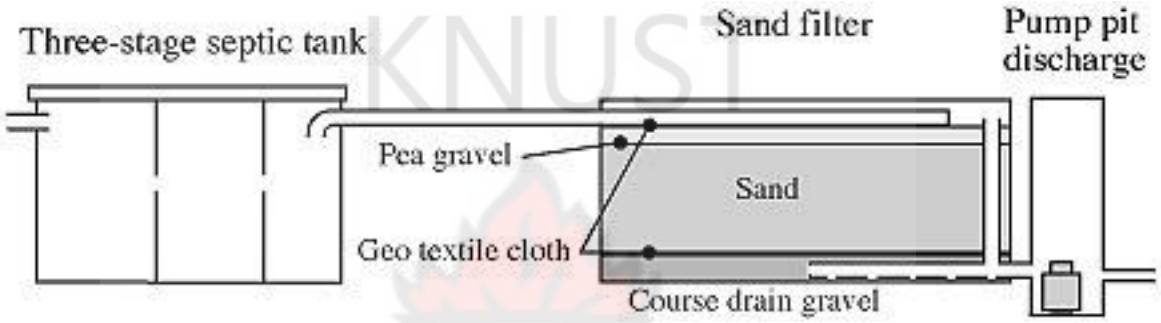


Fig.2.10 Anaerobic to aerobic grey water treatment system

Source: www.greywater.net/treatment.htm (2008)

Planter Soil Box Design

Soil boxes have been used for grey water purification since 1975 with excellent results. The planter bed has to be well drained to prevent the formation of a waterlogged zone in any part of it. Therefore, its bottom contains a layer of polyethylene "actifill" or pea gravel to provide effective drainage. A layer of plastic mosquito-netting on top of the actifill prevents the next layer of coarse sand from falling through. On top of the coarse sand is a layer of sand, while the top two feet consist of humus-rich top soil. Clay soil must not be used.

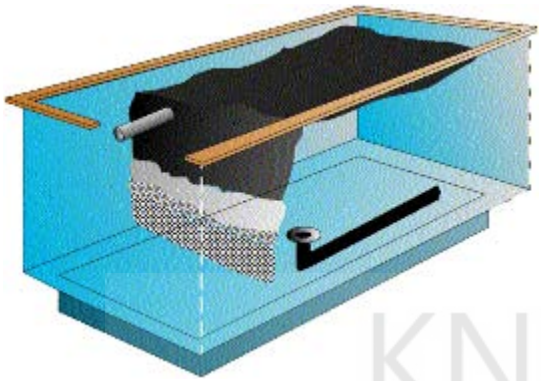


Fig.2.11 Planter soil box

Source:www.greywater.net/treatment.htm (2008)

2.4.3 Composting Toilets

A composting toilet is any system that converts human waste into an organic composand usable soil, through the natural breakdown of organic matter into its essential minerals. Aerobic microbes do this in the presence of moisture and air by oxidizing the carbon in the organic material to carbon dioxide gas and converting hydrogen atoms into water vapour. There are many brands of composting toilets on the market. The one under study is Envirolet® Composting Toilets.

The Envirolet® composting toilet consists of a toilet bowl and a composting unit. The aerobic breakdown of the organic waste takes place in the composting unit. These units can be emptied as little as once in a year.

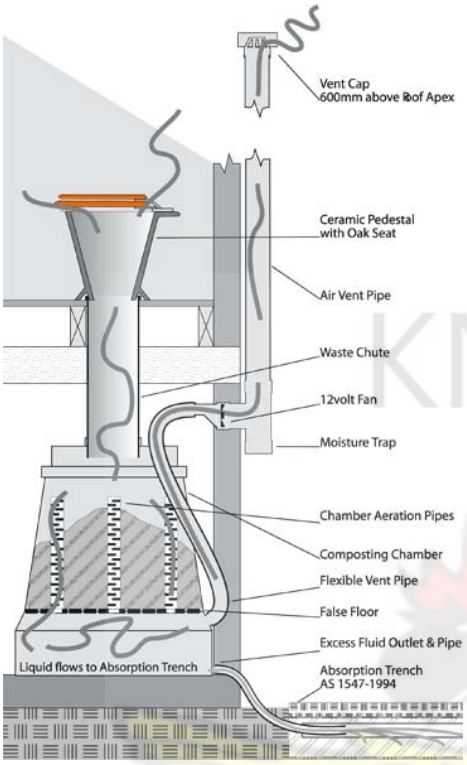


Fig. 2.12 Section through a composting toilet system

Source: www.nature_loo.com.au/toilets(2008)

2.4.3.1Types

There are mainly two types of composting toilets - the waterless self-contained system and the remote system which can be waterless or with little water. All these systems are available in choice of non-electric, 12vdc battery and 120vac electric.

Self Contained Units -This type of system completes the compositing “in-situ” and is mainly waterless. It is ideal for installations or locations where there is little or no room below the bathroom.

Fig.2.13 Waterless Self Contained Unit

Source:www.envirolet.com(2008)

Remote System-Remote systems have toilet bowls in the bathroom with the compositing unit installed outside. The composting unit has to be below the toilet bowl if it is the waterless type because it uses gravity. The low water remote system can have its composting unit beside the bathroom outside.

Fig. 2.14 Remote System

Source: www.wikipedia.com(2008)

2.4.3.2 Envirolet® Low Water Remote System

This system which uses as little as a glass of water can have up to three low flush toilets connected to the composting unit located below the bathroom or on the side of a wall. The ceramic toilet bowl can be cleaned like a standard flush toilet (with environment friendly cleaning products).It is available in choice and non-electric, 12vdc battery and 12vac electric. The capacity of this unit is 6 persons per day on vacation and full-time usage is 4 persons per day. The persons per day rating based on three uses per person per day.

Dimensions

Composting Unit Size: 25" W x 33" D x 28.5" H

Low flush Toilet Size: 15.25"W x 20.5" D x 18.75" H.

Fig.2.15 Toilet bowl and composting unit of the Envirolet® low water remote system

Source:www.envirolet.com(2008)

Installation

Most Envirolet® composting toilet system comes completely assembled and ready for installation.In the Low Water Remote System, the composting unit does not have to be directly below the low flush toilet because it uses water to flush. The system includes flexible drain and vent pipes that easily connect or disconnect. An excess liquid drain is required and most connect to a proper drain site.

Venting

Proper venting is the most important element of installation. The venting system works with a patented Automatic ™ Six-Way Aeration in the evaporation process. The vent connects to the composting unit and installs above the root with either a 4" wind turbine or a special ventilator depending on the model. Ideally, the vent should be installed vertically (straight up) through the roof. This is highly recommended for nonelectric models to improve aeration and drafting.

Examples of Installation

Fig. 2.16 different types of compost toilet installation

Source:www.envirolet.com(2008)

2.5 CASE STUDY

Ecolodge Project For The Sian Ka'an Biosphere Reserve, Quintana Roo, Mexico (2003)

Fig. 2.17 Aerial view of restaurant section of Sian Ka'an ecolodge

Source: www.ceballos-lascurain.com/English%2004feb/prod02.htm(2009)

2.5.1 Reason for study

This case study was chosen because it is an ecolodge designed according to international ecotourism standards in a natural protected area. In addition it was designed by the architect Ceballos Lascurain-the architect who coined the term ecotourism.

2.5.2 Background

This is the first ecolodge designed according to international ecotourism standards to be carried out in a Mexican natural protected area. It is located at the Sian Ka‟ an biosphere reserve, Quintana roo (145 km south of Cancún): northern coastal zone. The clients are: Secretaría de Medio Ambiente y Recursos Naturales -SEMARNAT (Mexican Ministry of the Environment), Comisión Nacional de Areas Naturales Protegidas - CONANP (National Commission for

Protected Natural Areas), Fondo Nacional de Fomento al Turismo -FONATUR (National Fund for the Promotion of Tourism), United Nations Development Program (UNDP).

2.5.3 Main Objective of the Project

The ecolodge constitutes a self-financing mechanism for the Federal authorities in charge of conserving the natural environment and protected areas: SEMNARNAT and CONANP. The ecolodge should contribute to alleviate the serious budgetary restrictions of these institutions, since a part of the revenue generated by the operation of the ecolodge will be channelled to CONANP. Another relevant objective is that the ecolodge produce tangible socioeconomic benefits to the local communities.

According to the architect, the basic principle of the project is to achieve a harmonious integration with the natural and cultural environment. The design of the ecolodge is based on characteristics of the natural milieu, respecting native vegetation and wildlife, soil (including dunes, which are particularly fragile), beaches, and adjacent sea (including coral reefs). Ecodesign criteria have been applied, so that the ecolodge seemingly sprouts naturally from the environment, by utilizing organic forms, based on traditional local materials. Building materials include: timber, thatch, native grass, and „zascab" (local limestone)

2.5.4 Ecodesign criteria

1. Use of solar energy (for heating water and photovoltaic generation of electrictity)
2. Ecological waste treatment
3. Water harvesting and recycling
4. Use of local building and decorative materials
5. Natural cross ventilation (instead of air conditioning)
6. Cyclones and strong winds taken into account

2.5.5 Architectural Program

20 ecological cabins (each with an area of approx. 100 m2) in a 1st Phase, growing to 30 in a 2nd Phase (in a minimum period of 3 years) and to a maximum of 40 cabins in a 3rd Phase (in a minimum period of 6 years),

- Lobby-reception-bar area
- Restaurant (for 100 persons) with kitchen and pantry
- Spiral staircase and look-out point (22 m high)
- Swimming pool and Jacuzzi
- Gymnasium-spa
- Solarium
- Temascal (pre-Hispanic steam bath)
- Boutique for selling hand crafts, books, diverse products
- Library and reading area (natural and cultural subjects)
- Management offices
- Outdoor areas with native vegetation (avoiding exotic species)
- Interpretative nature trails (with unobtrusive sign posting) Scuba
- diving and snorkeling shop
- Guest parking area (space for 19 cars)
- Staff and service parking area (space for 6 cars)
- Machine room (including solar energy equipment)
- Storeroom-workshop
- Elevated tank
- Anaerobic bio-septic tanks

- Staff living quarters (8 cabins)
- Staff dining room

2.5.6 Ecotechniques Applied

Each one of the guest cabins has a 75 watt photovoltaic module measuring 1.50 x 0.50m, generating an electrical power of 200-300 watts. Photovoltaic panels are placed on the roofs (timber structure with grass), placed at an angle of approx. 20° orientated towards the south, for maximum insulation. Motorcar-type 12 volt batteries are used. For heating water, each cabin has two solar collectors measuring 1.50 x 1.00 m, framed with black-colored calibre 18 sheet steel (painted black for greater solar absorption) and ½"copper piping coil. A thermotank with capacity of 230 liters (measuring 0.90 m long with a diameter of 0.57 m) is provided. Inclination is likewise 20° with a southerly orientation. For each group of two cabins, a prefabricated anaerobic bioseptic (enzymatic) tank is provided (15-person model).

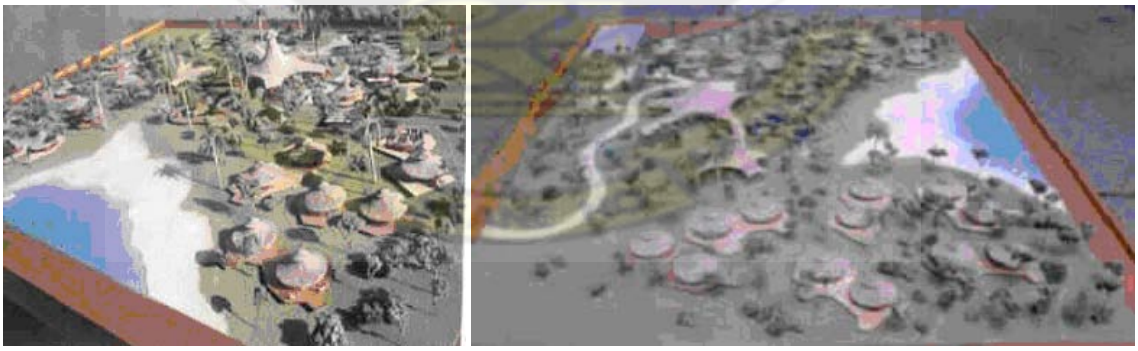


Fig. 2.18 Aerial views of Sian Ka'an ecolodge

Source: www.ceballos-lascurain.com/English%2004feb/prod02.htm(2009)

Fig. 2.19 Roof Plan

Source: www.ceballos-lascurain.com/English%2004feb/prod02.htm99(2009)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter discusses the methodology for this research. Because the main aim of this research is to come out with a design of an ecolodge at KNP, the approach used in the research was a combination of case studies and extensive site survey. Various means of gathering data on the field including photography, interviews, measurements and observations are explained.

3.1 CASE STUDIES

The case studies used in the research were in two categories- foreign and local cases studies. The foreign case studies were done as part of literature review. These case studies were selected based on the following criteria:

- Innovative use of materials
- Enhanced experience of the natural environment
- Use of environmentally friendly practices

3.1.1 Foreign Case Studies

The foreign case study was an Ecolodge Project For The Sian Ka‟ an Biosphere Reserve,Quintana Roo, Mexico (2003).The source of this case study was the World Wide Web and the information presented in the write up was limited to the original information presented by the original author.

3.1.2 Local Case Studies

Two local cases were studied into detail- Anomabo Beach Resort and the Kakum Visitor Centre.

Anomabo Beach Resort is a small scale resort which mimics the local village setting. It is located at the shores of Anomabo in the central region of Ghana. Kakum Visitor Centre is a facility located at the southern end of the Kakum national park and it serves people who visit the park.The study of these two facilities included the layout, materials, services and construction technology.

3.2 FIELD PROCEDURES

The under listed field procedures were employed in order to collect detailed information in the terms of spatial dimension; functional performance of the spaces; aesthetics; and user satisfaction on the case under study for very good analysis to be made.

3.2.1 Measured Drawings

Facilities in the places chosen for the case studies were measured and later drawn out in AutoCAD. All measurements were taken in metric units.

3.2.2 Photography

Interior and exterior photographs were taken of the facilities existing in both case studies. These photographs provided means of presenting existing conditions vividly. Some photographs were scanned and added to the dissertation.

3.2.3 Observations

In some cases involving human activity visual observation was the best means of gathering information. These activities could not be captured in still images and making these observations helped in analyzing the cases very well. These observations were made as the activity arose so it was rather spontaneous.

3.2.4 Interviews

Interviews were conducted with various stakeholders of the facilities. The owner/designer of the Anomabo beach resort was interviewed and the manager of the Ghana Heritage Conservation Trust was also interviewed. Workers and a few patrons of these two places were also interviewed. These interviews were not formally structured but were conversational and the aim was to get opinions from both workers and visitors alike.

3.2.5 Maps and Site Plans

The maps and site plans obtained for this dissertation were scanned and added to the write up.

3.3 LIMITATIONS

Access to literature on the design of ecolodges in the library was very difficult. Because of this I had to rely heavily on the World Wide Web to access most of the literature I reviewed. These were in the form of eBooks and WebPages.

CHAPTER FOUR

FINDINGS AND RESULTS

4.1 INTRODUCTION

This chapter discusses two case studies; Anomabo Beach Resort (ABR) and Kakum Visitor Centre (KVC) and continues to analyse the chosen site for the development. The case studies and site analysis provides a basis for the design which is described into details in this chapter. The chapter ends with a description of the proposed design from its conceptual stages to the final design.

4.2 CASE STUDY ONE: ANOMABO BEACH RESORT

4.2.1 Location

Anomabo Beach Resort (ABR) is located along the Accra Cape Coast highway in a town called Anomabo in the Central Region of Ghana. It is about 116 km away from Accra.

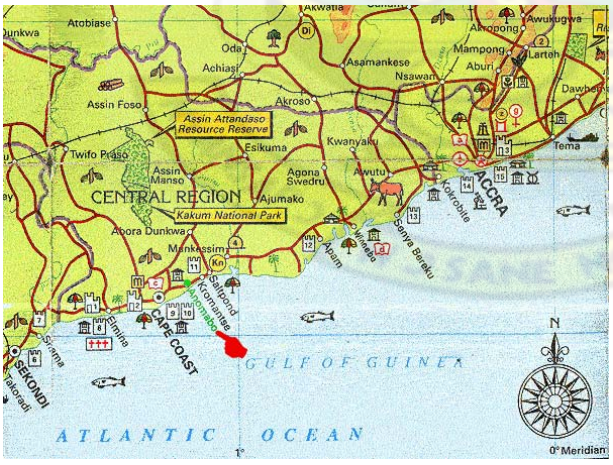


Fig. 4.1 Map showing the location of Anomabo (shown in green with red pointer)

Source: www.anomabo2.digitafrica.com/location.htm(2009)

4.2.2 Reason for Study

The decision to study ABR was based on the unique architectural character of the place.

4.2.3 Background

Anomabo beach resort was started as a small resort with about 5 sleeping units by a Dutch couple. The concept was to create an environment that will look like a typical coastal village setting. They later sold it to the current operator who also continued with the same concept.

4.2.4 The Setting

The Anomabo Beach Resort is located in a unique coconut grove along the shores of a small coastal town called Anomabo. It is bounded on three sides by private properties. The resort is bounded on the south by the gulf of guinea. Anomabo was a major slave-trading centre and has one of the many castles that dot the Ghanaian coast. During February, March and April leatherback turtles return to the beach to lay eggs. In addition to this there are traditional shrines in the Anomabo Township. These are the unique attractions that pull tourists to the place apart from the beach.

4.2.5 Layout of Anomabo Beach Resort

The layout of ABR is divided into five major zones:

1. the sleeping area
2. service area
3. parking
4. public areas
5. beach front

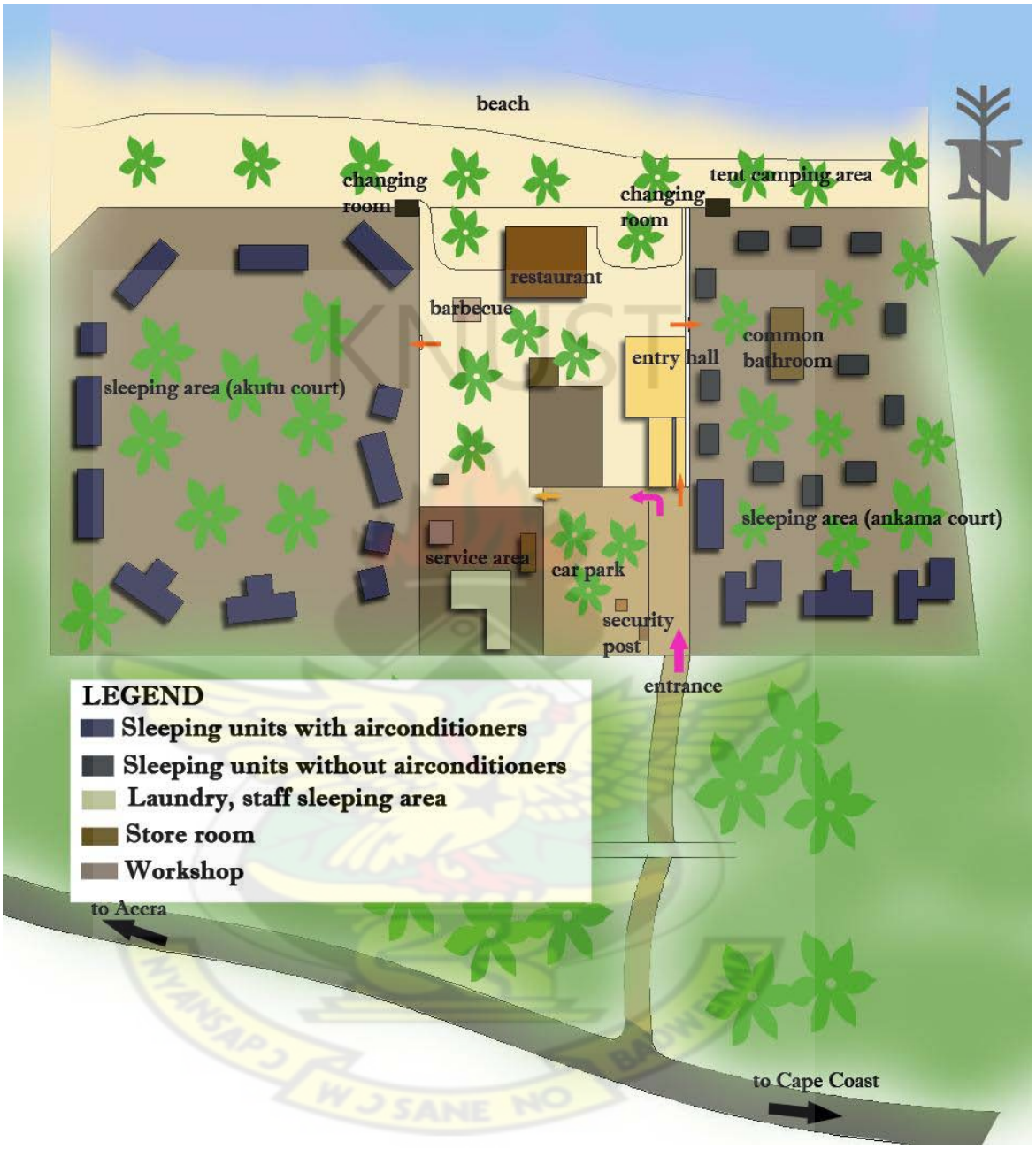


Fig.4.2 Layout of the Anomabo beach resort

Source: Authors field survey(2008)

The sleeping area is made up of two compounds (Ankama and Ekutu) that are at opposite ends of the resort. In between them is the public area, service area and the car park. The public areas which include a restaurant overlooking the beach, a barbecue, an entry hall with management offices and a gift shop. The parking area and the services area are adjacent to each other and they are located close to the main entrance to the resort from the Accra cape coast highway. Within the compound of the public areas and in front of the sleeping compounds at the beach front are camping areas.

Ankama (Lime) Compound

Fig. 4.3 Layout and views of the Ankama compound

Source: Author's field survey (2008)

This compound was the starting point of the resort. The planning concept of this compound was based on communal living in compound houses where everyone shares a common bath. In the s compound there is a central bathroom with the sleeping units dotted around it. These units are a variety of single and double rooms. There are however two family units with a private bath. These were the units built by the original owners of the resort. The current owner later added semidetached self contained units to this compound.

Akutu (Orange) Compound

Fig. 4.4 layout and views of Ekutu compound

Source: Author's field survey(2008)

This compound was developed by the current operator. All the sleeping units in this compound are self contained with air conditioners. According to the current owner this was added to satisfy the demand for air conditioned rooms.

Public Areas

This comprises the entry hall, restaurant, and beach front. The entry hall houses a gift shop, reception and management offices. The compound between these units and the areas at the beachfront close to the Ankama and Akutu compounds are for camping. These camping areas are serviced with two changing rooms at the Ankama and Akutu ends of the beach.

Service Area and Parking

These two areas were well positioned to serve the sleeping and public areas. The service area is made up of a workshop, store rooms, laundry, an outdoor traditional kitchen and sleeping quarters for the workers.

4.2.6 Architectural Character

The architecture of the resort was based on the traditional mud and thatch roofed houses. The materials used were mud, timber, bamboo and thatch. A few of the recent buildings such as the entry hall was built in cement block and finished with mud. The concept of used for the exterior was extended into the interior spaces. Local bamboo furniture was used in the living areas with cane woven lampshades. The bedspreads were also traditional batik and tie and die fabrics.

Fig. 4.5 interior views of Anomabo beach resort

Source: Author's field survey(2008)

Fig. 4.6 exterior views of the entry hall of the Anomabo beach resort

Source: Author's field survey(2008)

4.2.7 Site Specific Response

Energy

The entire resort is powered by hydro electrical power from the Ghana electricity company. In the restaurant liquefied petroleum gas is used for cooking. However in the traditional kitchen a combination of firewood ad charcoal are mostly used.

Water supply

Water supply to the resort is from the Ghana water company. There is a pump located in the service area to increase the pressure of the water from the mains. Poly tanks mounted on wooden supports is the main water storage. Water from these polytanks are then distributed to the bathrooms and kitchen.

Ventilation

The resort uses a combination of passive and active systems of ventilation. In the very old units in the Ankama compound, many openings were provided in the rooms to ensure adequate ventilation. The new units in both the Akutu and Ankama compounds depend entirely on air conditioners.

Lighting

Both artificial and daylight systems are used in the resort. During the daytime the facilities are well lit with daylight. Artificial lighting is only used in the evening.

Waste management

Solid organic and inorganic wastes are disposed off within the service area. They are then burnt. Waste water from the kitchen and bathrooms are channeled into the sea. Waste from the toilets is channeled into a soak away system where the soil waste decomposes naturally. At the time of the visit they were in the process of constructing a septic tank to replace this system.

Building materials, Construction and Maintenance

Building materials for the resort were locally sourced which includes coconut fronds, mud, bamboo, timber and thatch. Because of the corrosive nature of the sea breeze, no iron rods were used in the construction of the entry hall. Bamboo was used instead to provide reinforcement. In all the units the roof members were exposed. For the entry hall which had a long span, teak columns were used to support the roof.

Maintenance at the resort is targeted mostly at the thatch roof and mud walls. The thatch roof is changed every 4 years. The mud walls are retouched when the need arises. There is a small retaining wall constructed with logs to curb the erosion by the sea waves.

4.2.8 Observations

The following are some observations made

Merits

1. The choice of materials and the building style gives the place a unique sense of character.
2. The various zones are well coordinated to facilitate activities.
3. The variety in sleeping units ensures that tourists with different budgets can also experience the place.

Demerits

1. Currently the waste disposal system is not eco friendly. Waste waster channeled into the sea will pollute the water and organisms will be affected.

2. The use of cement blocks for building and facing it with mud is not in keeping with the original concept. If the mud is difficult to get then a more sustainable and eco friendly material should be used. An example is pozzolanna.
3. No particular attention was given to the ground treatment in the sleeping compounds. There are evidences of erosion in the compounds and if this is not seen to the foundations of the mud structures will be affected.

4.3 CASE STUDY TWO: KAKUM VISITOR CENTRE

4.3.1 Location

Kakum Visitor Centre (KVC) is located on a private land close to the Kakum National Park (KNP) in the Central Region of Ghana.

4.3.2 Reason for study

This case study was conducted by reading available literature about KNP and onsite observation. The decision to study KVC in a bid to design an ecolodge was influenced by the following:

- KVC is one of the purpose built ecotourist facilities in Ghana
- The proposed ecolodge is going to be on the same site as this facility.

4.3.3 Background

KVC complex is made up of high quality visitor facilities which started operations in august 1997. It is managed by the Ghana Heritage Conservation Trust. This facility serves as a visitor contact for the KNP and is the gateway to the canopy walkway and Kakum‟ s trail system.

4.3.4 The setting

The visitor complex is on a site which covers 512 acres and is bounded on the north by the KNP. A nearby village Abrafo-Odumasi bounds the southeastern part of the site. The Cape-Coast -Twifo Praso road bounds the southwestern side of the site.

Timber harvesting cleared the site of the native forest vegetation and current agricultural practices, including small farms and various plantations, maintain a visual and biological contrast to the forest of KNP. Once covered by with transition type forest found in Ghana where rainfall is moderate, the site is now covered by plants associated with food crops and plantations including cocoa, oil palm and teak.

4.3.5 The Development Site- Issues and Constraints

The visitor centre had to be built based on the principles outlined in the Kakum Conservation Area development guide. The main principles outlined for the development included:

1. Locating all major facilities outside the National Park
2. Allowing the landscape characteristics to determine the suitability of development
3. Using innovative and sustainable design elements and materials.

4.3.6 Layout of the Kakum Visitor Centre

The KVC is located on a hill that is accessed from the Cape Coast - Twifo-Praso road located at the bottom of the hill. KVC is made of five major structures. Four of these structures are grouped together forming a court on top of the hill. These four structures are the restaurant, gift shop, rest room and exhibition centre. At the lower end

of the hill is the rainforest lodge-the only accommodation facility at the centre. Opposite this lodge are an amphitheatre and a garden. At the foot of the hill very close to the entrance is a picnic area. There is a basic campsite located within the forest and is linked to the rest of the facilities by a foot trail.

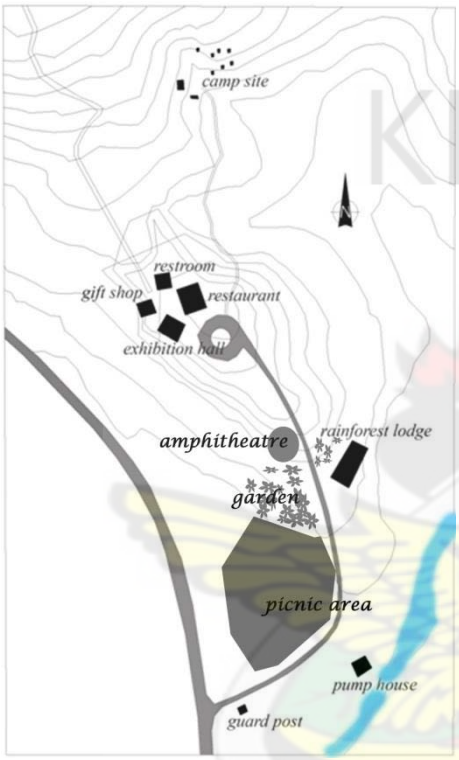


Fig. 4.7 Layout of KVC

Source: Author's Field Survey(2008)

4.3.7 Site Specific Response

Energy

The entire complex except the campsite is connected to the National Grid. Liquefied petroleum gas is used for cooking in the restaurant.

Ventilation

Passive system of ventilation was used throughout. In the exhibition area, fixed jalousie windows on the perimeter of the structure provides cross ventilation while a sky window in the roof produces a stack effect. The same system of ventilation is used in the gift shop. The restaurant is however an open area with no walls so the space is well ventilated naturally.

Fig. 4.8Fixed jalousie windows at the top and bottom of the walls provide cross ventilation while leaving the middle portion for exhibits.

Source: Author's field survey(2008)

Lighting

All structures are naturally lit because of the use of wide openings and in some cases sky lights. Extra daylight comes into the interior of the structures because there are no ceilings.

Fig. 4.9 Wide openings with sky lighting provides very high levels of day lighting in the exhibition area

Source: Author's field survey(2008)

Water Supply and Waste Management

Water to the complex is from a well dug very close to a perennial stream on the site. A pump house aids in the distribution of water to the whole complex. Solid organic and inorganic waste is disposed off in a dug pit. Waste water from the restrooms and kitchen and soil waste is disposed of using the system of a septic tank and leach field

4.3.8 Materials and Construction

Materials used for the construction of the complex were selected based on their sustainability, availability and above all how eco friendly they are. These include timber, stone, concrete and aluminum roofing sheets.

A variety of timber is used for the walls, floors and as structural supports. All doors and windows are also made from timber. The walls are made with mahogany, the floor with a type of timber locally called Awiefosamina (Albizia ferruginea) and teak columns for structural support.

Stone from a nearby quarry is used for piers to support the structural timber components. It is also used for paving the grounds around the facilities and at the campsite it is used for building the sanitary facilities. A stone feature wall was used to separate the kitchen from the eating area in the restaurant. Corrugated aluminum sheets are used as roofing materials. They are painted green to blend with the tree canopy. Concrete was used sparingly in the facility. It was mostly used as a binder in for the piers that supported the teak columns.

Fig. 4.10 Stone used for ground pavement, wall and pier to suppot column

Source: Author's field survey(2008)

Structural system

In all the facilities, the structure is made up of teak columns on piers with timber beams to support the floor. These teak columns are braced horizontally by a ring beam at the top and diagonally by steel cables. The roof structure which is made up of timber trusses are then fixed to this structure. This forms the structural component of the building and timber panels are used as cladding on a timber framework. This is offsetted from the structural components by 300mm.

Fig. 4.11 Teak columns supported with concrete piers with floor beams bolted to teak columns.

Source: Author's field survey(2008)

Innovative details

The doors to the exhibition area and gift shop are top hung and operated by a pulley system. This allows free movement of people without any obstruction. Windows also work on a similar principle but in some cases the windows were bottom hung.

Fig. 4.12 Top Hung Doors And Windows Operated By A Pulley System

Source: Author's field survey(2008)

The stone wall at the campsite is well treated to blend in very well with the tree stems. Another innovative detail observed by the author is the combination of stone and timber to make a garden seat which is very simple and yet functional.

Fig. 4.13 various innovative uses of stone in the facility

Source: Author's field survey(2008)

4.3.9 Observations

From the study the following observations were made

Merits

1. The materials used for construction was locally available and environmentally friendly.
2. Passive thermal design principles were used in the design of the facilities.
3. In terms of materials the facility blends very well with the environment.

Demerits

1. The system of Refuse disposal practiced at the centre impacts negatively on the environment. Both degradable and non degradable waste materials are dumped into an open pit in the forest on the way to the campsite.
2. The rainforest lodge which was developed recently does not follow the original concept of design. The choice of materials and its design falls short of the standards of development in that area.
3. Picnic area and amphitheatre were not properly linked to the rest of the facilities. In addition the furniture in the picnic area is not comfortable. Due to this these two facilities are not patronized often.

4.4 SUMMARY

From the above two cases studied the following observations were made.

The layout of a particular development depends largely on the unique characteristics of the site coupled with the basic concept and intended use of the facility.

In the case of the KVC, since it was designed to serve as a visitor centre to serve the canopy walkway, the structures were positioned to enhance that activity. The land from also played a major role in the way structures were positioned on the site. Because of the hilly nature the facilities had to be spread out on the few flat surfaces available. Anomabo Beach Resort however had the sea as its main attraction so the facilities were designed to allow visitors enjoy the coastal environment. This was evident in the position of the restaurant and the entry hall (there is a view of the beach from the entrance of the entry hall).

There was an attempt to reduce the impact of the development on the environments in the two case studies. This was evident in their choice of materials. KVC was built mostly with timber and stone while ABR was built with mud, thatch and palm fronds. In terms of waste disposal both facilities fall short of the environmentally friendly standards of waste disposal.

In conclusion, both facilities satisfy some of the internationally recognized standards of ecotourism. If they improve their waste management system and adopt sustainable means of water and energy supply they can be among the world‟ s recognized ecolodges.

4.5 APPLICATION

The following will be adopted from the case studies and considered in the proposed design:

- local materials and traditional architecture will be used as the basis of design

- the concept of grouping sleeping units into compounds will be considered in the site design.

4.6 THE DEVELOPMENT SITE

4.6.1 Location

The site is located thirty kilometers northwest of Cape Coast near the village of Abrafo - Odumasi in the Central Region of Ghana. The site is adjacent to the Kakum National Park (KNP) and it covers 512 acres. The site lies between latitude $5^0$15‟ N and 5^0 30‟ N and longitude 1015‟ N and 1030N4. The site is bounded on the north by the Kakum national Park which is made up of the Kakum Conservation Area and the Attadanso Reserve. To the southeast is the village of Abrafo-Odumasi. The south western boundary is made up of a primary road which is the Cape Coast -Twifo-Praso road and private woodland. The site serves as the gateway to the Kakum National park.

4.6.2 Site Selection

Two locations were considered for the ecolodge, the first location, A considered was the area including the visitor centre and campsite. The intention was to design a new ecolodge to replace the campsite and link it to the visitor centre. The second location, B considered was along the Gyaware road.

The second location B was chosen because it will enhance community involvement since the access to that part of the site is through the Abrafo-Odumasi village. It will also give the chance to tourists to come into contacts with the natives of Gyaware and Abrafo-Odumasi and experience their culture. The proposed ecolodge will

be an addition to the visitor centre but these two facilities will be linked with a system of interpreted trails.

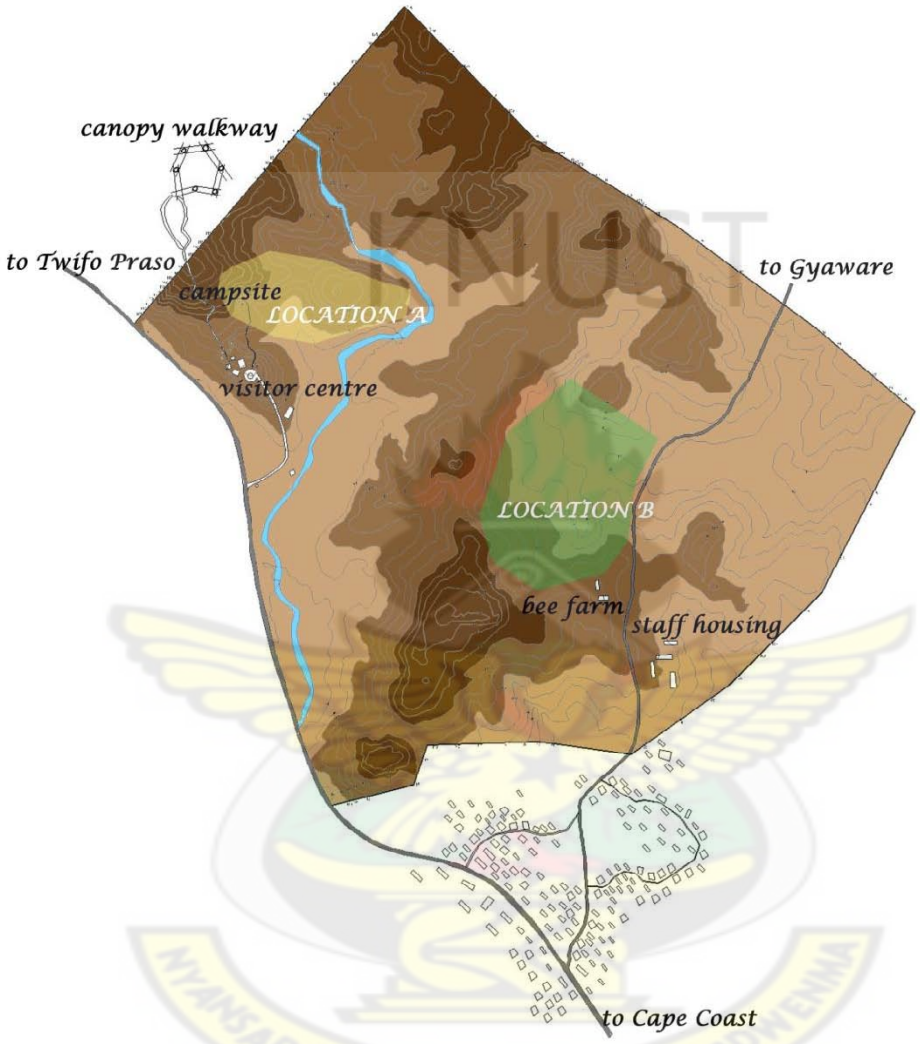


Fig.4.15 The development site

Source: GHCT Archives(2008)

4.6.3 Site Inventory

4.6.3.1 Access

The site has its main access from a primary road which is the Cape Coast - Twifo-Praso road. A short secondary road leads to an existing visitor complex. A jeep trail, the Gyaware road leads from the primary road to access an existing staff housing.

4.6.3.2 Vegetation

Vegetation on the site consist mainly of a managed forest at the northern boundary close to the Kakum National park, palm and teak plantations and a wide variety of tropical forest plants.

4.6.3.3 Hydrology

A perennial stream follows a southwesterly course across the northwest quadrant of the site. Natural waterfalls and ponds are found along the stream and several manmade ponds and abundant bird life are located along the Gyaware road.

4.6.3.4 Soil

The soil on the site is mainly red on the upper slopes, angular quarts stones and sand increasing down the slope and clay along the shallow valleys. pH of the top soil is between 5.5 to 7.

4.6.3.5 Climate

The climatic conditions existing on the site is equatorial having double rainfall maxima with the major season occurring between March and July.

Below are some climatic data.

Mean Annual Rainfall……...855m - 1500mm

Average No. of Rain Days in a year…….110-120 days.

High temperature …….32^0C - 33^0C

Low temperature……17^0C - 19^0

Mean monthly temperature…….27^0C

4.6.3.6 Topography

The landscape is undulating and varies from a high of 155 metres to a low of 80 metres above sea level. A ridge bisects the site on the north south axis and a system of shallow valleys; weave their way around eight prominent rounded hills.

4.6.3.7 Existing Infrastructure

Existing Buildings

On the northwestern side of the site close to the KNP is a visitor complex. A few minutes‟ walk from these facilities is the basic camp site which is made of up seven sheds with an open air bathroom and a Kumasi Ventilated Improved Pit (KVIP) toilet system. On the south eastern part of the site close to the village of Abrafo-Odumasi is the staff accommodation along the Gyaware road. There is also a bee farm close to the staff accommodation.

Water Supply

A well located at the lowest part of the site close to the perennial stream supplies water to the developed parts of the site. A pump has been installed to facilitate the distribution of the water from the well to the developed areas.

Power

Power supply to the site is from the main grid. Apart from the camp site which has no power supply, all the other facilities are provided with electrically from the main grid.

4.7 SITE ANALYSIS

The site was analysed using the SWOT analysis presented below

Strengths

- Easy access from the Gyaware road
- Topography of the site will enhance good views

Weakness

- Because of the topography of the site, erosion might occur if the landscape is not well treated.

Opportunities

- Water supply to the site can be tapped from the pump which has capacity to serve the whole site
- Electricity can be tapped from the nearby staff housing or solar energy can be used.

Threats

- No threats were identified on the site because it is surrounded mostly by bush land which does not pose any threats.

Possibilities

- Access can be tapped from the lower part of the site.
- Solar panels can be installed on the south sloping hillside at the northern part of the site
- Buildings can be position on the more gently sloped part of the site
- Sewage treatment can be located at the lowest portion of the site.

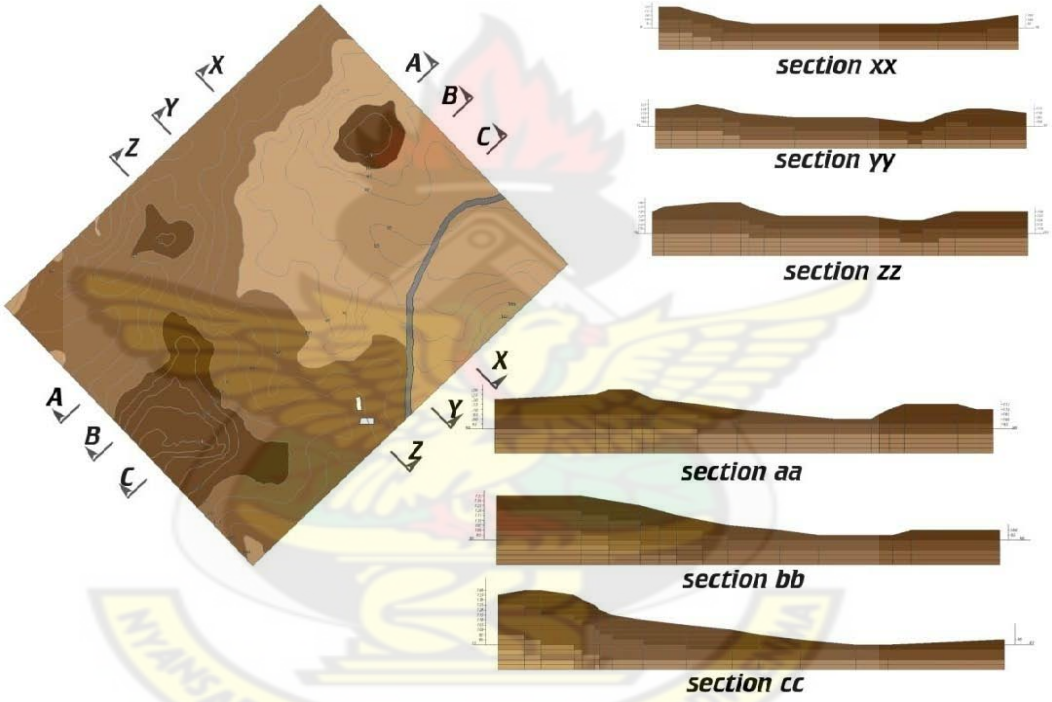


Fig.4.16 Topography of chosen site B

Source: Author's field survey(2008)

4.8 DESIGN PHILOSOPHY

"Maximization of the natural and cultural experience; for the total ecotourism experience."

4.8.1 Planning Concept

The layout of the facility is based on two concepts. Interpreted walking trails are combined with the traditional courtyard concept to achieve the design philosophy. Accommodation units are grouped into courts and linked by winding interpreted walking trails which takes the contours of the site into consideration.

Grouping the accommodation units into courts provide a smaller social mixing area for guests apart the public areas. This gives the guest a cultural experience of staying in courtyard buildings with other people. To further enhance guests‟ cultural experience, the courts are named after animals and tropical plants found in the Kakum National Park. Landscape elements like sculptures are situated at vantage points along the walking trails to enhance guests‟ knowledge about the forest and the people living around it.

4.8.2 Spatial Concept

The concept of being in touch with nature is used extensively in the design of the spaces. Semi-open areas are incorporated into the public areas to give the indoor/outdoor effect. Enclosed spaces also have very large windows to give views outside. Outdoor living areas have been incorporated into the design of the guest accommodation to give this same effect.

4.8.3 Contextualization

To place the facility in both the natural and cultural context, locally available materials are used. For example the use of mud and timber is extensively used in the design. Simple structures typical of the villages nearby are also considered in the design.

4.9 DEVELOPED BRIEF AND ACCOMMODATION SCHEDULE

4.9.1 Target User Analysis

Anticipated target users include dedicated ecotourism and general tourists who want to experience ecotourism. This includes people of all age groups and the table below shows the characteristics of these target users and kind of facilities to be provided for them.

Table 4.1 Table Showing Anticipated Target User Preferences

Type Of Tourist	Characteristics	Accommodation Type
Students school children	Shoestring budget during and adventurous	Provide Camp Site Play grounds
Families	Mostly want to stay together in a homely environment. Kids may be included	Provide family units Play area for lads
Upscale couples and newly weds	Prefer high levels of luxury	Provide luxurious suites
Research scientists	Need a place to research and analyze data	Provide a library and media centre
Individuals	Varying budgets	Provide a variety of lodges.

4.9.2 Developed Brief

Table 4.2 Table Showing the developed brief

Restaurant	Entry Hall	Camping Site	Multi -Purpose Area
Eating area Kitchen Store room Changing room Matron" s office	reception offices shop library conference room sanitary lounge bar	Camp Area Washroom Entry Hall Store room	Swimming pool Pool bar Stage Amphitheatre lounge area changing rooms
Service area	Lodges		
Laundry Office Store room Service yard Waste collection point Solar panel area	Type A……. Family unit for 4 Type B……. Low cost lodge for 12 people Type C…….. Detached unit on with living area Type D……. Semi-detached unit without living area Type E…….. Luxury suites		

4.9.3 Accommodation Schedule

Table 4.3 Table Showing the Schedule of Accommodation

Facility	Area (m^2)	Facility	Area (m2)	Facility	Area (m^2)
Restaurant (80)		Service area		Camp site	
Eating area	80	Laundry	30	Camp area	500
Kitchen	42	Office	24	Washroom	50
Store room	20	Store room	80	Entry hall	30
Changing room	30	Service yard	100	Store room	20
Matrons office	16				
Sanitary	30				
Total	218	Total	234	Total	600
Entry hall		Lodges		Multipurpose area	
Reception	20	Type a	160	Swimming pool	54
offices	64	Type b	200	Pool bar	20
Shop	48	Type c	120	Stage	36
Library	40	Type d	120	Amphitheatre	200
Hall	100	Type e	200	Lounge area	500
Conference room	150			Changing room	
Lounge bar	40				
Total	462	Total	800	Total	810
Grand total…….3,390					

4.10 PLANNING AND DESIGN

4.10.1 Planning Considerations

Site planning considerations for space allocation and orientation are as follows

1. Accessibility to the site
2. Physical conditions of the site which include topography and climatic conditions
3. The user requirements of the various spaces

4.10.2 Spatial Distribution

Based on the design philosophy, the public areas were clustered together close to the parking area and the accommodation unites which are grouped into courts were spread out along winding walking trails.The trails are laid out in an organic manner to follow the contours of the site and in a conceptual sense to mimic the way shallow roots of trees wind their way around obstacles in order to grow. This gives a very organic feel to the layout of the facility.

Vehicular activities are limited to the service yard and a car park close to the public areas. The rest of the circulation paths are pedestrianised in a bid to reduce pollution of the natural setting by toxins from the vehicles.

Particular attention is paid to the design of the landscape because of the topography of the site. The site is terraced to position structures and also to check erosion during wet seasons.

4.10.3 Conceptual Site Planning

The site was conceptually zoned taking into consideration the topography of the site. With an undulating landscape varying from a high 125 metres to 80 metres above sea level, access to the site is taken from the lowest portion of the site which is at the

northern part. The facilities are located along the hillside which rises from the access point of 90metres to about 125 metres above sea level. This location will enhance long distance views of the forest around. The rest of the site is left green with a system of trails and gardens.

Fig. 4.16 Preliminary Site Zoning

Initial conceptual site planning is analyzed below.

4.10.3.1 Alternative One

In this alternative, the camp site is separated from the rest of the accommodation units with the public areas located in between. Access to the service area and the main facility are the same with separate parking for buses and smaller vehicles.

Merits

- Campers who come with trailers can easily access the campsite with their vehicle

Demerits

- Location of the camp site is the ideal place to locate solar panels.
- Same access for services and guests might create some conflicts

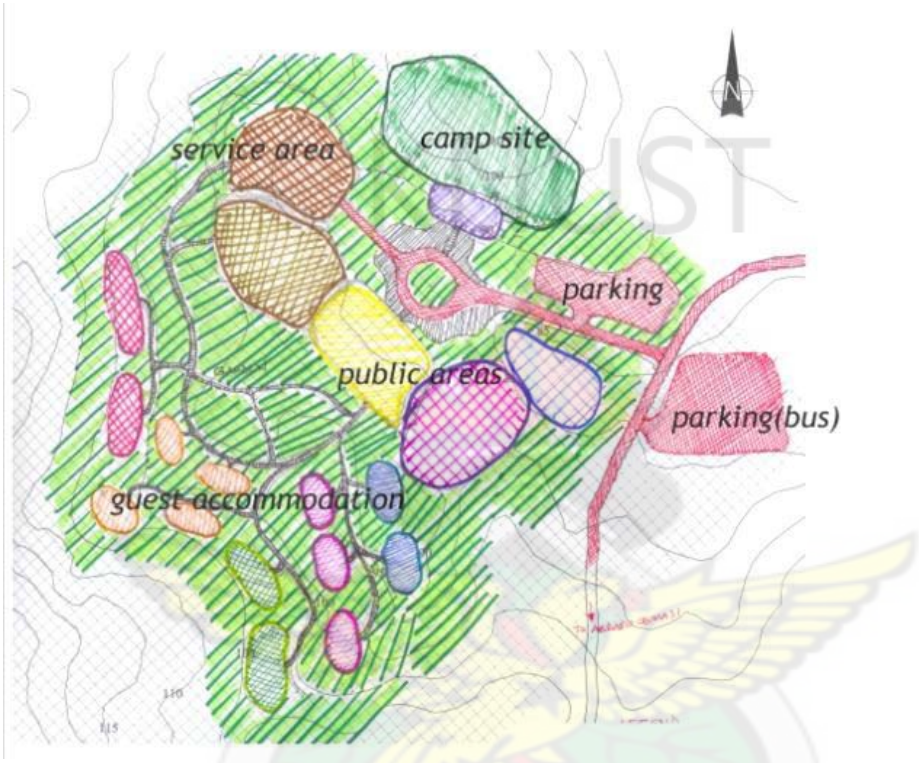


Fig. 4.17 Conceptual site planning alternative one

4.10.3.2 Alternative Two

This is an improvement on the first alternative. The camp site and the accommodation units are grouped together and different accesses created for services and guests.

Merits

- Different accesses for services and guests
- Grouping campsite and accommodation units together gives a better zoning.

- South facing hillside at the northern part of the site can be the location for solar panels.

Demerits

- Arrangements of the guest accommodation might cause some of the guests to be isolated.

Fig.4.18 Conceptual site planning alternative two

The second alternative was chosen and further developed to get the final master plan.

4.11 PROPOSED DESIGN

The following paragraphs describe into detail the proposed ecolodge at KNP. The description covers the building character, layout, services and construction. The drawing to support the text is presented in the appendix.

4.11.1 Building Character

The proposed ecolodge is designed in the style of the traditional architecture in the villages surrounding the park. The buildings are characterized by curved rectangular forms to fit into the contours of the landscape. Simple double pitched thatched roofs are use in all the buildings with exposed roof members.

The scale of the structures in the ecolodge varies according to the function of the structure. The main facility where most communal activities take place is the biggest both in size and height. The accommodation units are at a domestic scale. The concept of courtyards was used as a cultural element and also to achieve the indoor and outdoor experience. Materials used in the design are local materials. Sun dried adobe bricks were used for the walls and natural stone was used for the base course. Stone was used because it can stand against erosion by splashes of rain water. The roof structure is made up of timber members with thatch covering. The bonds in the adobe walls were exposed to give the buildings a rustic look.

Ornamentation is in the form of reliefs on the walls and sculpture pieces along the footpaths. All materials used in the design are left in their true form as a finish to give a rustic feel to the facility.

4.11.2 Site Layout

The proposed ecolodge takes its access from the Gyaware jeep trail at the lowest portion of the site. The stone paved drive branches into three: one to a stone paved car park; the second one to the service area and the third to the main facility of the lodge. The car park is located very close to the main entrance. Access to the rest of the facility is by foot on interpreted trail systems.

The facility has three major zones; the service area, sleeping area and the public areas. The public area separates the service area and sleeping area. The sleeping area is made up of accommodation units and a serviced campsite. The proposed facility is linked to the existing Kakum Visitor Centre by a system of trails with designated resting spots.

4.11.3 Main Facility

The main facility is the biggest structure on the site. The stone driveway from the Gyaware jeep trail leads to a roundabout in front of the main facility with a covered drop-off point. This facility is made up of an entry hall in the middle which ushers visitors to all the parts of the facility. To the right of the entry hall is the restaurant overlooking a swimming pool and an amphitheatre. This is where entertainment activities take place. A conference room with a capacity of 40 and a library is on the left side of the entry hall.

The form of this facility resulted from the existing contours of the site. The building meanders along the contours to fit perfectly into the landscape. Courtyards were also used extensively in this facility.

4.11.4 Accommodation Units

The sleeping areas are made up of individual units grouped into courts. This concept was used to achieve some level of privacy without a feeling of isolation. From the target user analysis four accommodation types were provided in the design. Individual units are linked by fence walls to form a court. These individual units are

interplayed with outdoor living areas within the courts. These courts are identified by names in the local language (Twi).

The „Osono‟ (elephant) court is made up of two family units. The „Adowa‟ (deer) is made up of two detached single units and a semidetached unit. The „Afafranto‟ (butterfly) court is made up of two honey moon suites with a shared swimming pool. Finally, the „Opurow‟ (squirrel) court which is targeted at students and hard ecotourists is made up of two units with single and double room with shared bathroom facilities. This court is the entry into the campsite. A third unit which serves the campsites completes this court. The facility has bathrooms and an entry hall to serve campers. It also has a store where camping equipments are kept for visitors who come without camping equipments.

4.11.5 Green Technologies Incorporated Into the Design

In order to ensure the development fits well into the existing ecosystem with minimal impact during the use of the facility, studies were made about existing green technologies and the most appropriate ones incorporated into the design.

Power source for the facility is solar energy. Solar panels designed to look like sunflowers were chosen for the development. These are located along the south sloping side of a hill at the northern part of the site. The panels collect solar energy and convert it into electricity for use in the whole facility. A structure has been provided in the service yard to accommodate the equipments needed for this function.

Waste water from the facility is recycled into clean water through a greywater treatment plant located at the lowest portion of the site.

Composting toilets are used in the entire facility. This system ensures that solid human waste is broken down into humus which is not harmful to the environment. The humus is used as manure for a vegetable garden located close to the service area.

Organic refuse is recycled into humus through composting on site. A structure has been provided in the service area for this purpose in the design. Another facility has been provided to store inorganic waste temporarily on site before it is transported to a demarcated damp site. An existing well with a pump at the Kakum Visitor Centre which has the capacity to serve the new development is the main source of water supply.

4.11.6 Landscaping

To maintain the unique forest setting for visitors to experience, plants making up the landscape are the existing vegetation on site. The same species of plants found in the forest will be used in landscaping areas affected by construction. All walking trails are paved in stone. Retaining walls are a common feature in the landscape because of the sloping nature of the site. All these walls will be constructed in stone.

To increase the visitors‟ awareness of the natural and cultural environment, sculpture pieces are used extensively as a landscape design element. These pieces which depict cultural activities and animals in the forest are located at vantage points and nodes of walking trails.

4.12 SERVICES AND CONSTRUCTION

4.12.1 Services

Electricity

The facility is powered by solar electricity. A stand alone photovoltaic (PV) system is used because of the remote location. PV panels designed to blend into the environment are located on the south sloping hillside at the north end of the site. Batteries, converters and chargers are housed in a small structure close to service area at the base of the hill. This is where dc electricity from the solar panels is converted into ac electricity for consumption.

Water Supply

Water supply to the facility is tapped from the well at the Kakum Visitor Centre. According to the research conducted on the site, the well and its pump has the capacity to distribute water to all parts of the site. Water from the pump is pumped into overhead tanks which are then distributed to the various courts.

Sewage Treatment

The sewage to be treated in the facility is grey water from the kitchen and washrooms. There will be no black water because composting toilets are used. The grey water is recycled using the anaerobic to aerobic pretreatment. This system consists of a three stage septic tank, a sand filter and a planter bed. Recycled water is used to water the gardens. This system is located at the lowest side of the site.

Humus which is the recycled material from the composting toilets is used as manure in the gardens.

Waste Management

Waste is sorted into organic and inorganic waste. Organic waste is recycled into humus by composting on site. The humus is used to as manure in the garden. The inorganic waste is temporarily stored on site and transported to a recycling unit off site periodically.

4.12.2 Construction

Materials are selected based on their availability locally and their low impact on the environment. The construction methods chosen are also simple methods so that the facility can be constructed by the locals.

Foundation

Strip foundation is used in all the buildings. The foundation wall is constructed in stone with a 75mm concrete blinding. The foundation rises 600mm above the ground level to prevent the wearing of earth walls by rainwater.

Floor

The floor slab in all the accommodation units is compacted earth. A concrete floor slab is used in the main facility because of a sub basement. The floors are finished with fired clay tiles.

Walls

Sun dried adobe bricks are used for the walls of all the facilities. The bricks are exposed as the final finish.

Roof

Bamboo trusses are used as the roof structure and the roofing material is thatch. The bamboo trusses will be exposed with bamboo mat as the ceiling material.

Landscape and External Works

Due to the site‟ s undulating nature, it is terraced and the soils are held in place by retaining walls. This is to prevent erosion on the site. All footpaths are paved with natural stone.

CHAPTER FIVE

RECOMMENDATION AND CONCLUSION

5.1 RECOMMENDATIONS

The recommendations suggested are two faceted; one pertains to the Kakum Visitor Centre and Kakum Conservation Area management and the other one is some general suggestions for the Ghana tourist board and other agencies that are concerned with the protection of natural and cultural environments in Ghana. These recommendations are outlined below.

The Ghana Tourist Board in conjunction with other bodies like the Environmental Protection Agency and the Wildlife Division should put together local standards based on the internationally recognized ecolodge standards to guide developments on ecotourism sites. This could be in a form of a license one has to obtain in order to develop any ecotourism site and has to be renewed periodically based on assessment by the Ghana Tourist Board.

The board can also organize annual ecotourism development awards to honour the best practitioners and it will also serve as environmental conservation awareness to the general public. It will also serve as an incentive to the developers to strive to practice sustainable ecolodge developments.

In addition, a system of rating ecolodges should be developed to rate ecolodges. This will be similar to the star ratings of hotels.

A maintenance and future development plan should be developed with the contribution of all stakeholders to ensure that future developments at the Kakum Visitor Centre do not conflict with its original concept.

The amphitheatre and picnic area should be redesigned and linked properly to the visitor centre. A skywalk can be constructed to link these two areas to the rest of the facilities on top of the hill. This could add to its attractions.

From the case study of Kakum Visitor Centre it was observed that no special facilities were provided for children. I will recommend that a facility be built for children because they from a good percentage of the patrons.

5.2 CONCLUSION

The construction of an ecolodge at the Kakum National Park will be very strategic because KNP records a large number of visitors. The ecolodge will serve as a converging point where tourists can visit the numerous less known cultural and natural attractions around the National Park. This include the Masomagor Bamboo Orchestra, Kruwa, Domama shrine, etc which can form an ecotourism circuit.

The proposed ecolodge if developed will offer tourists the complete ecotourism experience. As compared to the existing rainforest lodge, the proposed ecolodge has facilities to meet the needs of tourists. Apart from this, the ecolodge has the appeal of traditional architecture and an environment which educates visitors.

Throughout the design of the ecolodge, particular attention has been paid to details to meet internationally accepted standards. Green technologies such as grey water treatment systems, the use of solar energy and composting toilet systems were

incorporated into the design of the ecolodge to make it environmentally friendly. The character of the ecolodge depicts the traditional style of the villages nearby and this puts the ecolodge in context.

This project if developed will be the first of its kind in Ghana. Activities of the ecolodge will benefits various stakeholders at different levels. The lodge will attract more tourists and this will increase income at the national level. Natives will also benefit economically through providing services like transport, selling of souvenirs and they will also be employed in the management of the ecolodge. If this project is developed with social and environmental impacts in mind it will go a long way to contribute to the economy of Ghana on one hand and the environment will be protected on the other hand. It will also serve as an incentive for government policy makers and local people to conserve natural and cultural resources to attract more tourists.

An ecolodge at KNP is a viable project which will help establish Kakum National Park in the top world ecotourism destinations.

REFERENCES

1. Ceballos-Lascurain, H. (n.d.) International Projects, www.ceballos-lascurain.com/english%2004feb/prod02.htm, (Accessed January 15, 2008)

2. Conservation International (CI) and Park Plan Partnership (1997). Preliminary Site Plan for Visitor Centre Complex/Demonstration Areas

3. Munanura, I. (Msc), (April 2005), Ecolodge development guidelines for Nyungwe forest National Park, Rwanda, www.rwanda1.com/images/docs/biodiversity/nyungwe%20forest%20ecotourism%20development%20plan.pdf, (Accessed December 21, 2007)

4. Sinclair, J. (2000), Ecotourism-An Overview, www.sinclair.org.au/thailand/OverviewofEcotourism.html, (Accessed December 13, 2007)

5. Mehta, H. (n.d.), Current trends in ecotourism, ecolodges and green hotels. Lecture presented in New Delhi, www.eco-mon.com/presentations/pf.doc, (Accessed December 21, 2007)

6. Osland, G.E and Mackay, R. (2004), Ecolodge performance goals and evaluations, Journal of Ecotourism/1472-4049/04/02 109-20, Vol.3, No. 2, 109-128, www.multilingual-matters.net/jrt/default.htm, (Accessed April 13, 2008)

7. Teye, V. B. (2005), Tourism development experience in Ghana, www.unpan1.un.org/intradoc/groups/public/documents/IDEP/UNPAN002474.pdf, (Accessed November 27, 2007)

8. Weaver, D. and Lawton, L. (2001), Attitudes and Behaviour of Ecolodge Patrons in Lamington National Park, www.crctourism.com.au, (Accessed April 13, 2008)

9. The Nature Conservancy (n.d.), International Ecolodge Guidelines, www.nhbs.com/international_ecolodge_guidelines_tefno_126815.html, (Accessed December 27, 2008)

10. Treatment Technologies (n.d.), www.greywater.com/treatment.htm, (Accessed May 10, 2008)

11. Nature Loo (n.d.), Composting Toilets: How It Works, www.nature_loo.com.au/toilets, (Accessed May 10, 2008)

12. Envirolet (n.d.), Composting Toilets, www.envirolet.com, (Accessed May 10, 2008)

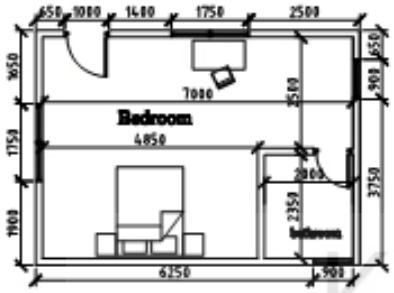
13. Solar Design Associates (SDA) (n.d.), SDA Case Studies, www.solardesign.com, (Accessed April 4, 2008)

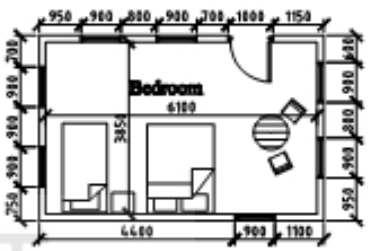
14. The Nature Conservancy (n.d.), Ecolodge Guidelines, www.conserveonline.org/workspaces/tncecotourismprogram/publications/publications-1/ecolodge_guidelines_v1.pdf, (Accessed December 21, 2007)

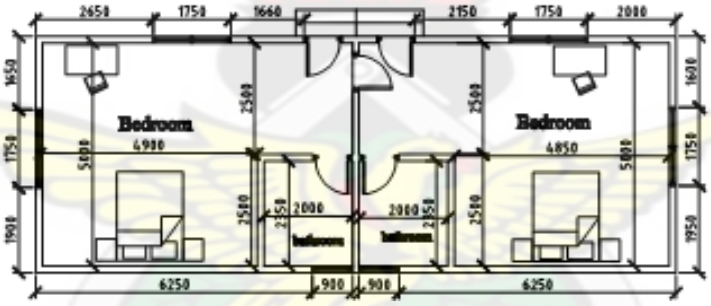
15. World‟s Best Practice Eco resort Design Competition (n.d.), www.niche.com.au/pdfs/Majcen%20and%20Morrell.pdf, (Accessed December 21, 2007

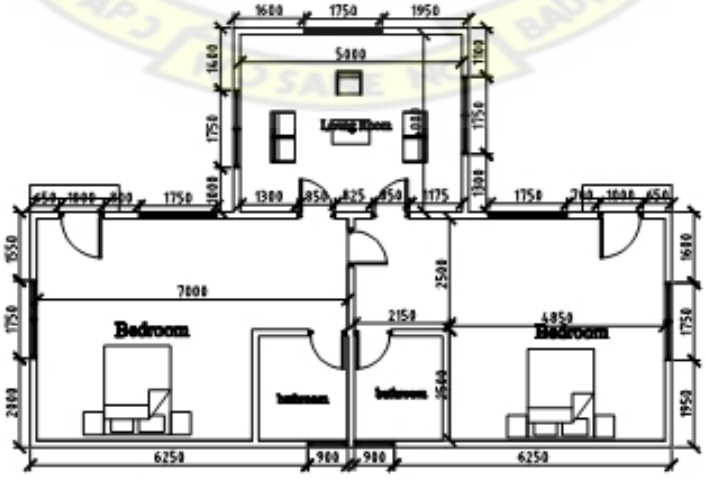
APPENDIX A

MEASURED DRAWINGS OF ANOMABO BEACH RESORT







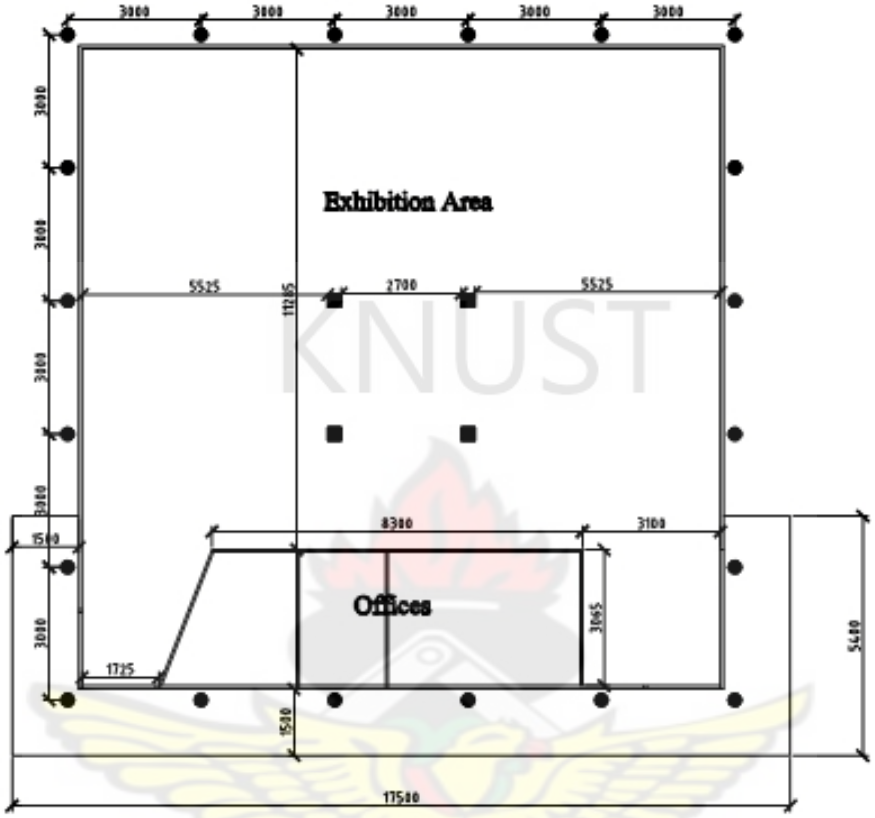


Accommodation Types

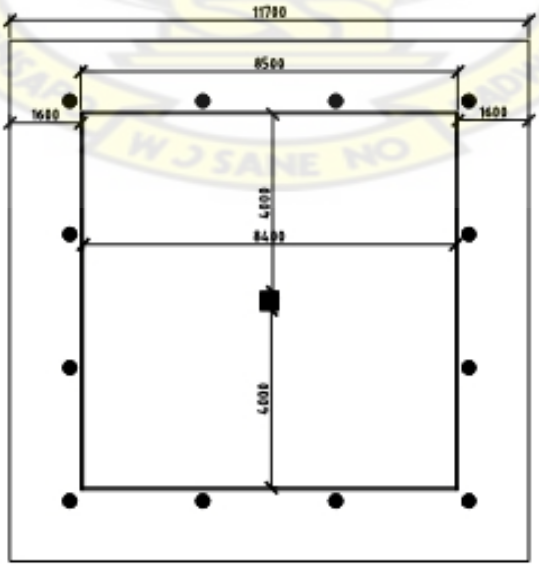
Not to Scale

APPENDIX B

MEASURED DRAWINGS OF KAKUM VISITOR CENTRE



Exhibition Facility

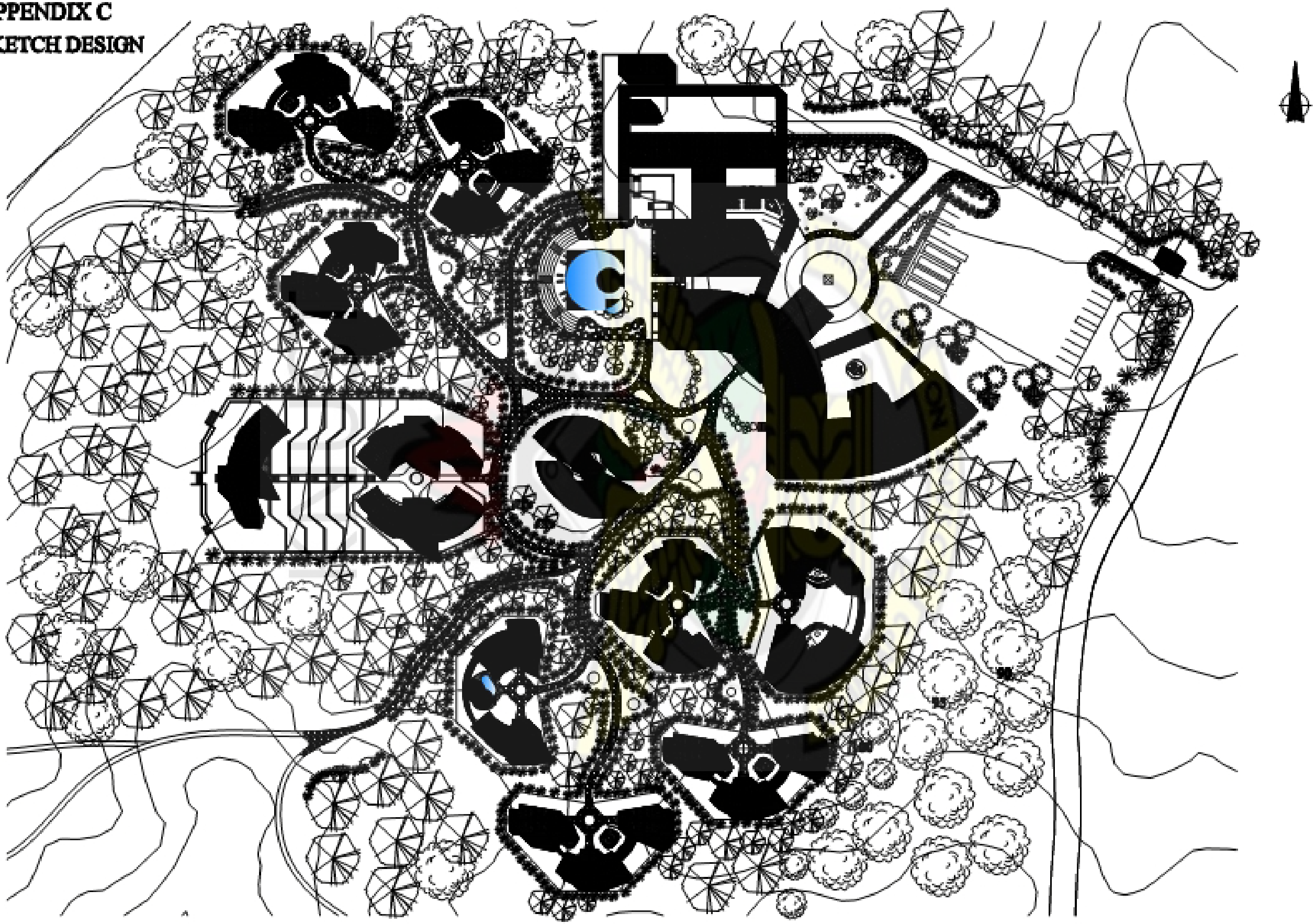


Gift Shop

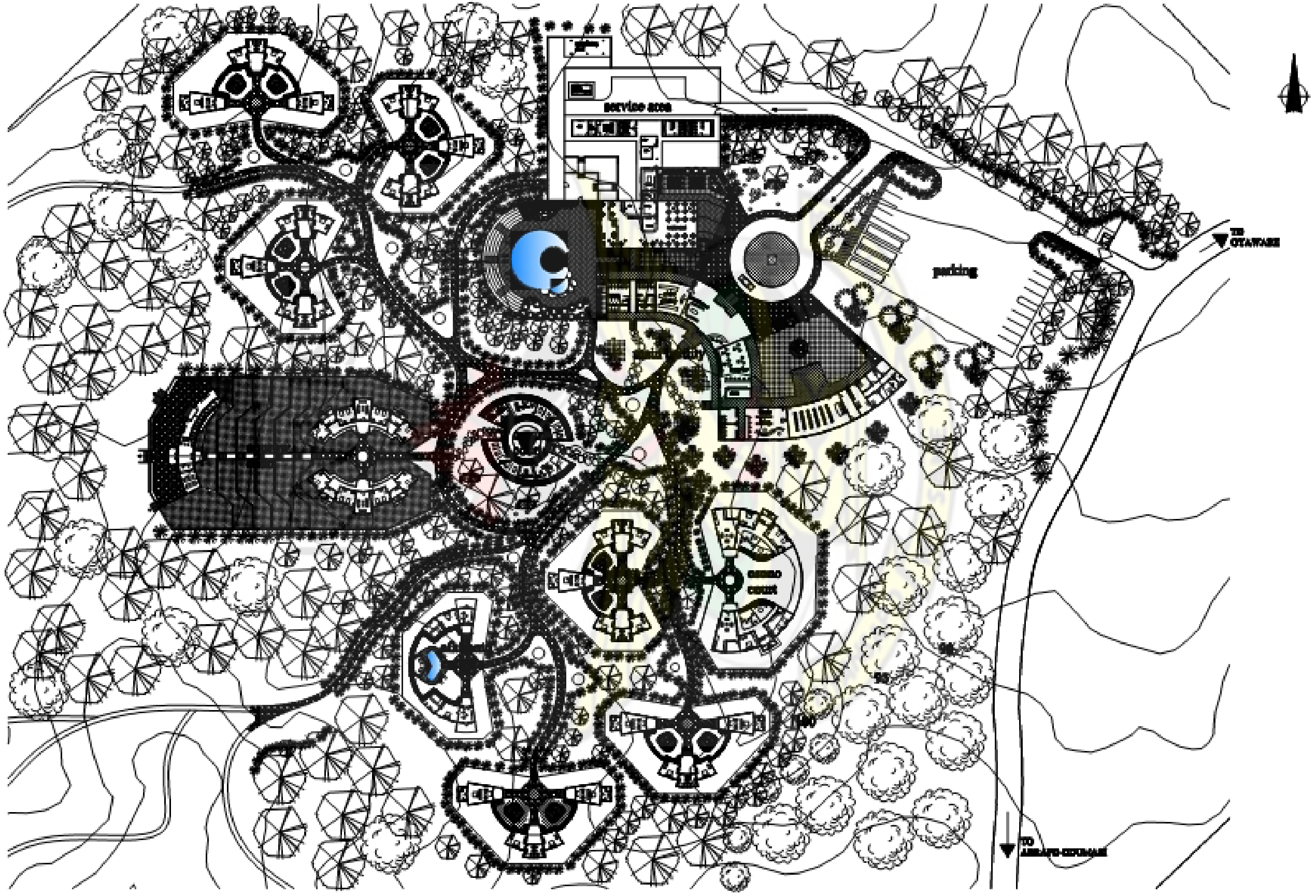
Not to Scale

APPENDIX C

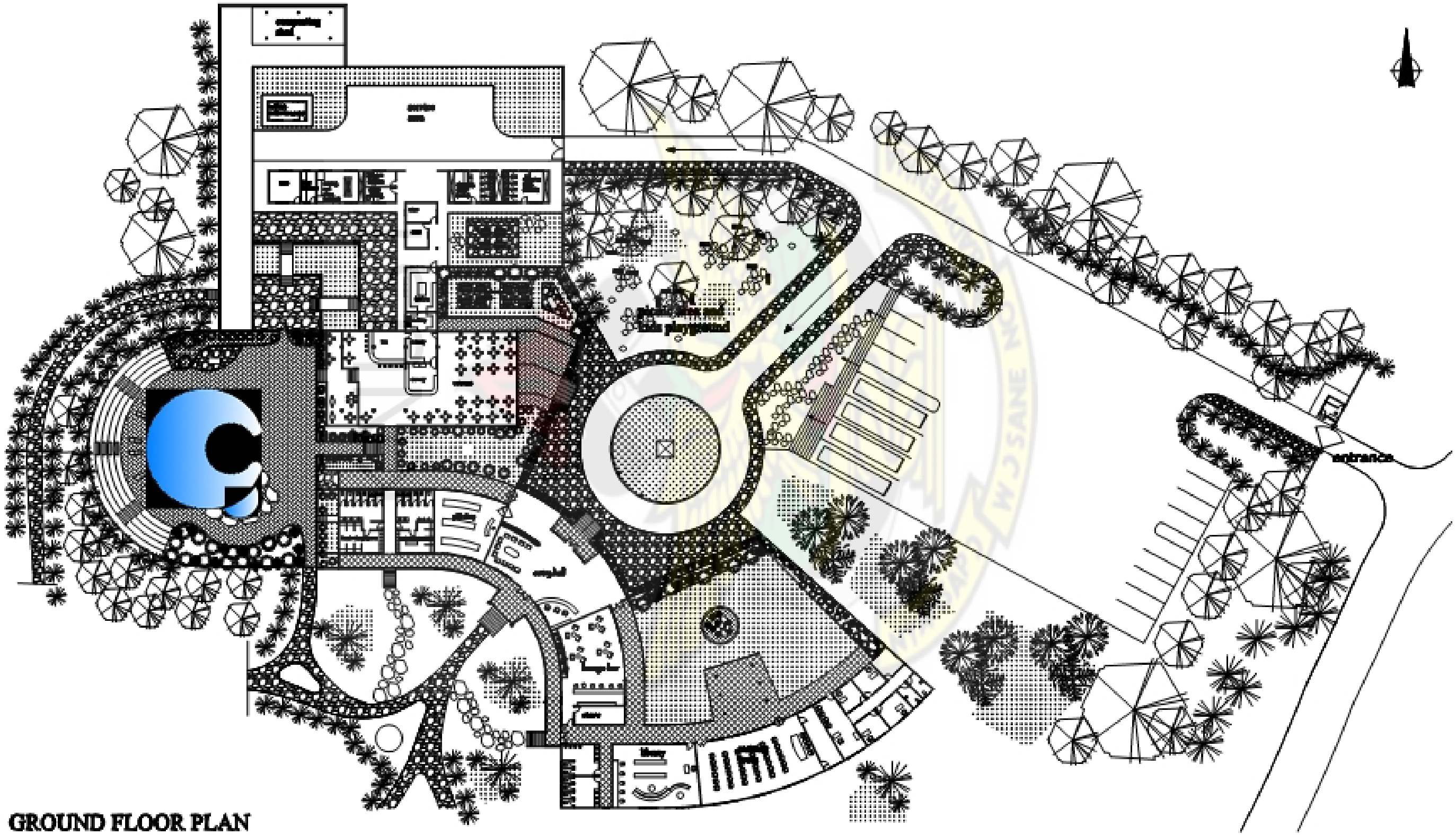
SKETCH DESIGN



BLOCK PLAN



SITE PLAN

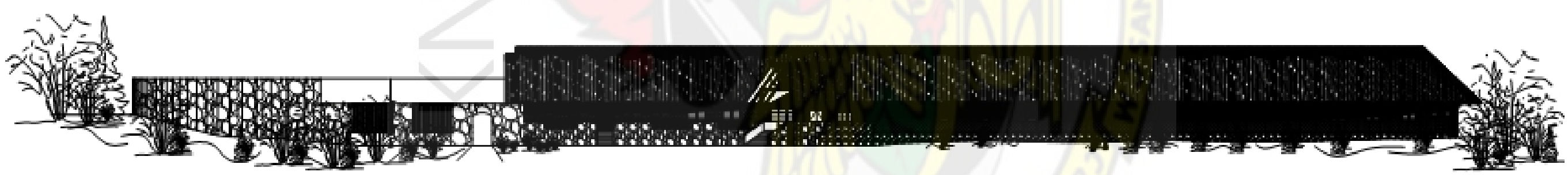


GROUND FLOOR PLAN

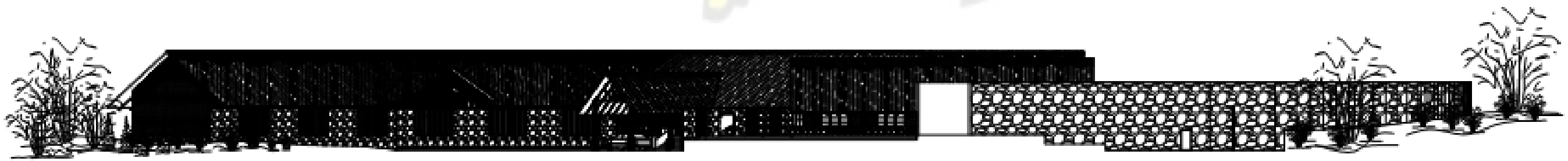
MAIN FACILITY, SERVICE AREA

EAST ELEVATION

WEST ELEVATION

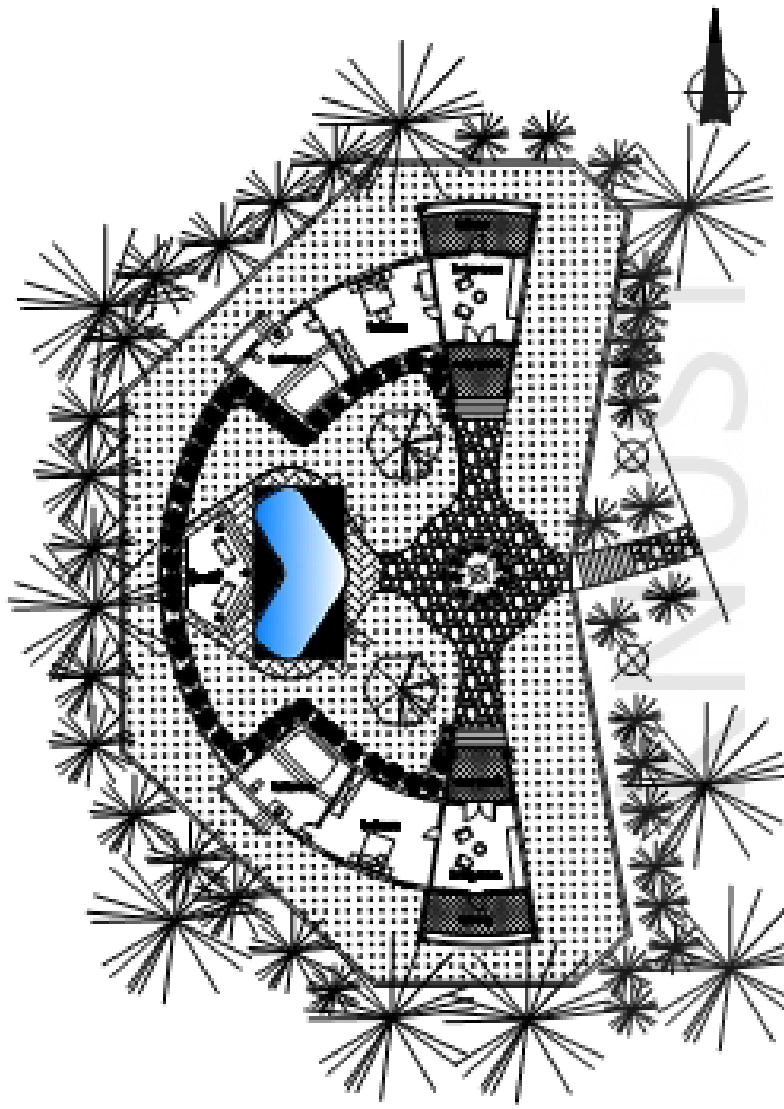


SOUTH ELEVATION

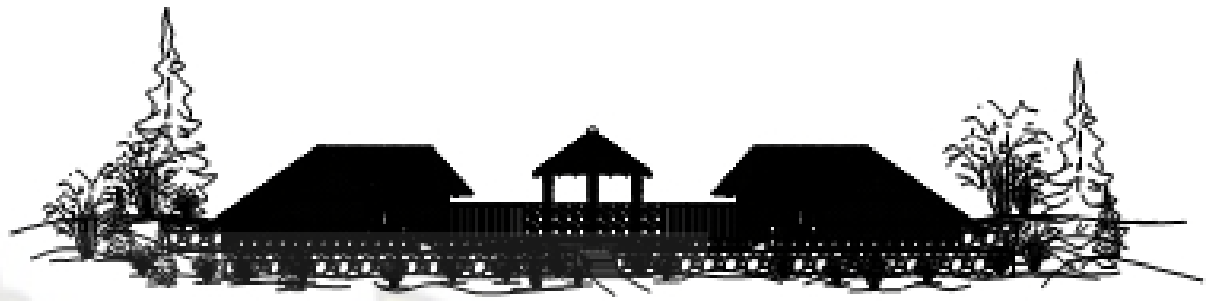


ELEVATION XX
(NORTH ELEVATION)

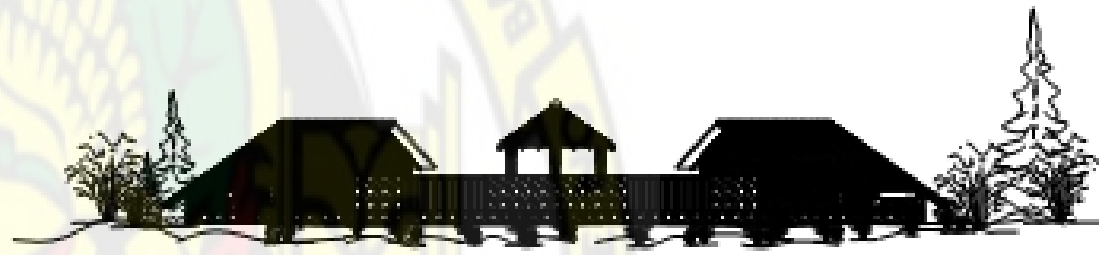
Views of the main facility



GROUND FLOOR PLAN
Afafranto Court



EAST ELEVATION



WEST ELEVATION

WEST ELEVATION

EAST ELEVATION

Views of the Afafranto court