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MIXED COMMERCIAL AND RESIDENTIAL DEVELOPMENT-PRINCESS TOWN

THIS THESIS REPORT IS PRESENTED TO THE DEPARTMENT OF ARCHITECTURE AS
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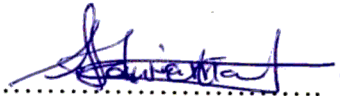
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Date

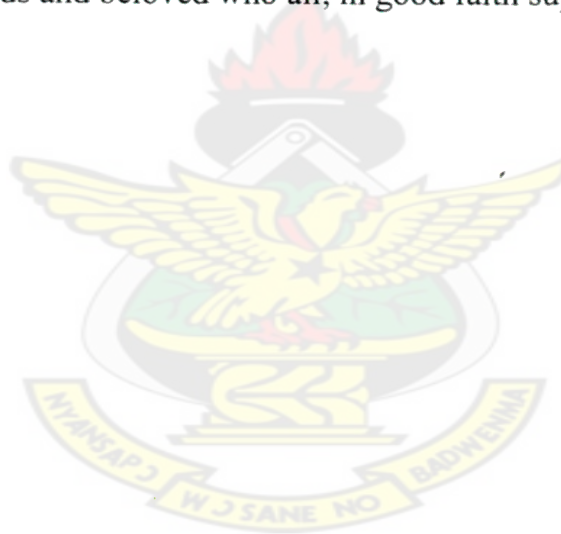
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DEDICATION

In reverence to my God, in whom I trust, I dedicate this dissertation first to my parents Mr. and Mrs. John Harry Adiamah and my entire family.

This also goes to friends and beloved who all, in good faith supported me in diverse.

THANK YOU!!



ACKNOWLEDGEMENT

BE STRONG, FEAR NOT, FOR I AM WITH THEE *JOSHUA 1:9*

If God had not been on my side where would I have been?

My foremost appreciation goes to my God in whom I trust.

A great deal also goes to my supervisor and lecturer,

Mr. Ebenezer Abaitey who, with his due encouragement,
has aided in this architectural piece.

This would definitely be incomplete and unsuccessful without
showing my heartfelt gratitude to all my friends.

ABSTRACT

The search of oil in large quantities over the years have proved fruitful. **What next?**

Many minds have wondered and as an architectural student as well, it has been a task to consider the probable situations that will arise and hence provide suitable and commendable answers.

One major situation, is that of the housing and economic needs that the oil companies are going to be faced with when manufacturing begins due to the discovery of millions of barrels approximately 65km offshore.

A mixed commercial and residential development which then is the solution to this need is proposed at a site close to this discovery, Princess Town.

A mixed commercial and residential development is that which combines the various needs as basic commercial needs, purely residential needs, health needs, recreational needs, religious needs, transport needs and any other associated form of need within a confined space. This space in question could be within a building or a confined environment.

This dissertation looks at the best means of combining these various needs in aspects of planning a confined community for the oil companies that will be managing the oil discoveries.

In view of this, planning principles as zoning, and design criteria as access, circulation, safety and functionality were considered to design the proposed community.

The application of existing architectural details in building forms and character, various case studies (*Saudi Aramco residential camp, Saudi Arabia and Akosombo Township*) and analysis as well as demographic contributions aided in the design and conclusion of a self sustaining community in Princess Town, West Cape Three Points to cater for expected population of 5000 people.

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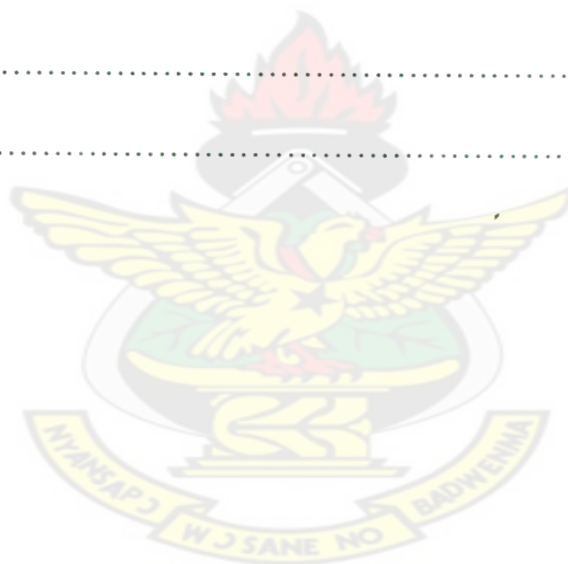
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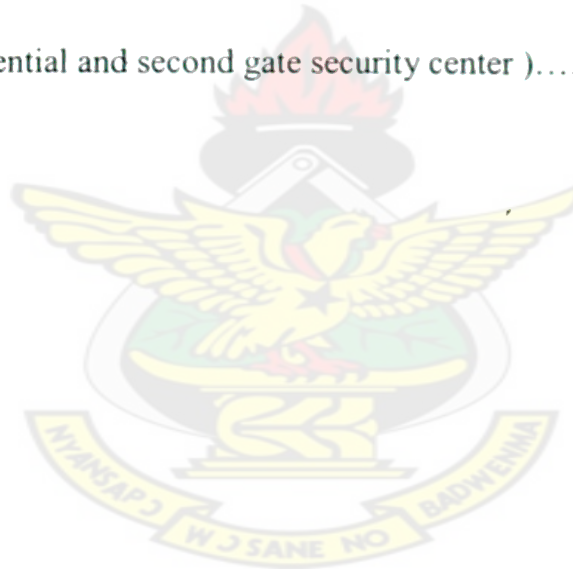
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CHAPTER ONE.

1.0 INTRODUCTION.

The sudden exploration of 'black gold', (oil) in the Ghana offshore basins, 65kms from the nearest coastal town of Effasu, has generated a lot of public interest and discussion. Ghanaians, foreign oil companies, foreign and private investors have found their interest in this exploration which currently is estimated worthwhile. The exploration and production of oil comes along with its needed infrastructure and consent.

Production of oil in other countries as Nigeria, Venezuela, Saudi Arabia etc since the early nineties, have in no doubt been the source of growth in the economic, socio-economic and infrastructural aspects of these oil producing countries.

Healthy communities and environments were and still are the quality developments for smart growth.

Mixed commercial and residential developments have been the type of developments that have catered for the variant needs of people, especially with the principle of 'Live and Mixed use was the norm before the development of modern zoning and land use practices.

Mixed- use developments brings compatible land uses closer together. This form of development is one of the principles in 'Smart' growth that has its objective of developing different types of compatible land uses close together in close locations to shorten trips and facilitate alternative modes of transportation, such as walking, bicycling and public transportation.

1.1 PROBLEM STATEMENT

In an attempt to discover the amount of oil Ghana is enriched with, many oil companies have blocks offshore which under contract basis, have been exploited and still in motion. Amongst the numerous oil companies such as Vitol oil company, Kosmos Energy Ghana, Tullow oil etc that have appreciable blocks to work on, crude has been discovered in the areas West Cape Three Points, Salt pond fields, Tano fields etc. These oil companies and other private investors, both foreign and local have acquired huge sums of land in Princess Town, Gyenbra and other close towns to the oil discoveries to put up needed and adequate infrastructure that will accommodate the activities of the oil industry such as warehouses, maintenance units, oil tanks reserves both off shore and on shore, mechanical plants, residential camps and associated ancillary facilities etc.

1.1.2 The Oil Industry.

Oil and gas production today accounts for 60% of global energy requirements. Crude oil is a mixture of organic hydrocarbons, water, salts and minerals. The quantities of these components vary from one oil deposit to another as does the depth at which the crude was formed. This results in there being an infinite number of qualitative variations in crude oil deposits. The presence of crude oil uncovers the general overview of the oil sector as follows:

Upstream: this relates to the finding, development and production of oil. This stage concentrates on more discovery, survey works, drilling processes, installation of the required infrastructure as drill ships, rigs and off shore pipelines and tankers.

Midstream: this relates to the transportation of crude from where it was extracted from the ground to the oil refinery, for processing, through pipelines, trucks and ocean tankers.

Downstream: this comprises the refining and marketing of oil. It is important to note that the value of oil is only realised once the crude has been refined, as it is the products derived from crude which are valuable in end consumer markets.

The BP statistical Review 2006 estimates that there are 1.2 trillion barrels [tn bbl] of proven oil reserves across the globe.

Oil deposits are owned by national governments and most control their oil resources via national oil companies. However, private companies and international oil companies e.g. Shell) also pay a major role in the oil industry and the ways in which the state and private companies interact in the production of oil varies according to each project.

In the initial stages of oil production, the labour force required comprises of international oil company workers who do not have support facilities as residences, entertainment grounds and civic facilities to support work to be done. Even if there are such facilities available in the country, areas along the coast which are most close to the oil discovery units have no such facilities to support such an up and growing industry.

In order to enable and facilitate work to be done, these essential facilities must be provided.

The essential facilities come in the form of residential units, commercial units, health support services, schools, offices etc. These combination of various facilities in the form of a mixed use development is essential to support the work and live services of the growing oil industry.

In compliance to this need, it is expedient to design a mixed residential and commercial development that provides essential support for the oil company workers and the anticipated private investors that will troop these coastal areas for production and business.

1.2 OBJECTIVES

The proposal will seek to pursue the following:

- To design residential facilities and other ancillary facilities that the various classes of the oil company workers need to live and work efficiently.
- To design a development that is able to provide a healthy mix of residential and commercial activities and their relationship to the environment through various transitional spaces as walk ways, open parks, streets etc.
- To bring out the necessity in planning settlements and the essential considerations to be considered.
- To design cost effective and energy efficient buildings and community that seeks to enhance the living standards of residents and users.

1.3 SCOPE OF THESIS

The Mixed residential and commercial development will encompass residential units in the form of detached housing units, semidetached housing units, town houses (flats), row apartments for all classes of workers in the oil company, guest houses for private investors etc. Recreational facilities (clubhouse, tennis court, swimming pool, open parks, play fields etc) health facilities(clinic), commercial facilities(retail shops, supermarkets, malls etc),educational facilities, religious facilities and utility in the form of waste management, drainage, power, water, multi-media services will be provided. Security, an important aspect of planning criteria will be catered for in terms of community edge treatment, security posts and gates, that provide limited entry and exit routs to the site area.

1.4 TARGET GROUP

The target group for this development are the different class groups of the work force of the oil company and their families (1000 oil workers with their dependants, amounting to approximately 5000 residents. These include workers of various professions as the engineers, Designers, office workers labourers and their families. Private investors in the oil industry and peripheral residences will be catered for in this neighbourhood.

1.5 CLIENT

Vitol Oil Company, Upstream.

1.6 CLIENT'S BRIEF

The following spaces are the recommendation of the client:

- Estate houses
- Offices and warehouses
- Restaurants
- Security services
- Telecommunication facilities

1.7 FUNDING

Vitol oil company Upstream is the major financier of the project. By virtue of the fact that Vitol oil owns the land for the project.

1.8 RESEARCH METHODOLOGY

Information used to write this thesis was acquired through the adoption of a number of tried and tested research methodologies. These research methods made the acquisition of information very easy and they are expatiated below. The information gathered was carefully evaluated to ensure that only the one that would aid the execution of the task was collected. Interviews, literature review, taking of photographs, measurement of buildings, personal observations, photographic recordings, case study and internet research were the research methods employed.

- Interviews

People with a lot of knowledge on town planning were interviewed. Members of the Princess town community where the community is to be situated were also interviewed to ascertain their response to having to live with such a facility. Interviews of clients and developers of the project – Vitol oil company Upstream-to know their direction with respect to the project and brief development was carried out.

- Literature Reviews

Published and unpublished literature on the topic was reviewed. This involved the examination of written material such as books, journals, periodicals etc. and video recordings. A lot of literature was also gathered from various web sites associated with town planning history and design and the concepts of mixed-use developments.

- Personal Observations

Some of the information used came about through careful personal observations made by the author. This was important because the taking of photographs was not allowed in a lot of interior residential spaces as well as office spaces of facilities visited.

- Photographic Recordings

Photographs of critical and important facilities and activities that will aid the completion of the project at hand were taken.

- Case Study

Local and foreign cases which serve some or all of the functions of the project to be undertaken were studied to enable the author draw conclusions on design decisions to be taken in tackling the scheme.

- Internet Searches

The World Wide Web, a giant library with extensive information, was greatly used in the research. It provided answers and clues to some problems encountered whilst undertaking the project.

- Economic Survey and Analysis

Data analysis of population, income levels, car ownership, and other economic indicators.

- Questionnaire

Questionnaires were developed to enable the author effectively interview oil companies as much as possible.

1.9 LIMITATIONS

This project has not been undertaken without limitations. The unavailability of published literature in Ghana made the study difficult. Data collection through interviews posed the greatest problems since the oil companies were not forthcoming with information.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 HISTORICAL BACKGROUND OF TOWN PLANNING

Man in the past, in order to protect themselves and their food supplies from raids by predatory nomads, built their dwellings within a walled area or in a naturally fortified place, such as the Acropolis of ancient Greek cities. Because the availability of water was an important issue, many settlements were found along a river. Such settlements led to specialization and the division of labor. Markets developed in which artisans could exchange their specialties for other types of goods. A growing priesthood contributed to intellectual life. Thus, towns were responsible not only for the rise of commerce industry but also of art and baring and they played an essential role in the emergence of all great civilizations (Rangwala, 2002).

A city, by definition is a large centre of population organized as a community. The word city is derived from the Latin word civil as, which denotes a community that administers its own affairs (Listokin and Burchell, 2002).

Among the most notable of the cities ancient worlds were, in the order of their development, Thebes Memphis, Babylon, Nineveh, Susa, and Jerusalem.(Listokin and Burchell, 2002).

2.2 TOWN PLANNING BEFORE THE 20TH CENTURY.

Man has come a long way till today, to provide for himself a good enough habitat and dwelling place. Consistent growth of towns is studied under the following heads:

- Ancient period; a) Indus Valley (Indian) period 300 B.C
 - b) Egyptian period (3000 BC)
 - c) Roman Period (150 BC)
- Medieval period
- Modern period

Before the 20th century, the planning of towns were mostly guided and conducted by governments on all levels. An archaeological study of ancient towns and cities revealed the evidence of some deliberate planning and this defined as the arrangement of housing in regular patterns and the prominent location of civic and religious buildings along main thorough fares (Listokin and Burchell, 2002).

Early civilization spread along the fertile valleys of the Nile, Tigris-Euphrates and Indus Rivers, where food, water and transportation facilities were easily available. In the Pyramid period of Egypt, permanent towns of burned brick were built along the Indus valley for the execution of the task of erecting pyramids. Roads were commonly on grid-iron pattern with dwellings compactly built about the interior court. An example of Egyptian town that shows careful planning was Kahn. Its composition exhibited a remarkable advance on regularity displaying the principle of symmetry of design (Rangwala, 2002)

The emphasis on planning broadened during the Greek and Roman eras. Greek Architect, Hippodamus of Miletus, (the father of city planning) planned important Greek settlements Priene and Pircieus. He emphasized a geometric design for towns. For example, Religious and Civic citadels were oriented so as to give a sense of aesthetic balance. Towns were planned in square form. Streets were arranged in grid patterns and housing was integrated with cultural, commercial and defense facilities. The Romans had these similarities.

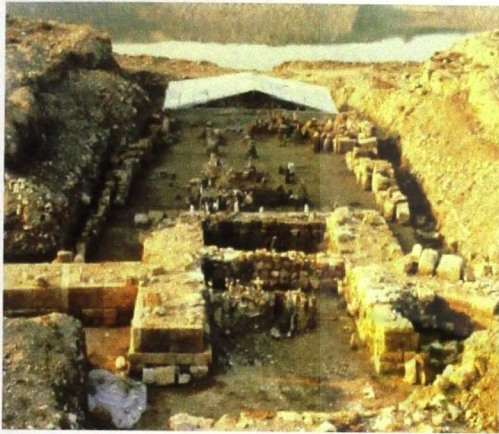


Fig.1a. Early Greek cities form

Source (www.google.com/early_greekcities)



Fig.1b. Remains of the early cities forms

Source (www.google.com/early_greekcities)

With the Romans, the art of town planning was lowered to mechanical plans. such plans had to be simple to set out and the building blocks to measure; naturally, in this case the grid iron plan proved to be successful. The Roman display crude symmetry and artistic rigidity. Public space Forum was a dominating element of town planning. Their design for monumental temples, arches, gymnasium and forums are classical examples of town planning based on strict regards

for symmetry and axial system of planning. After the fall of Roman Empire, cities declined in population and importance.

Although the Roman towns were mechanical, the abounded fertility and resource, the variety of solution and mobility of conception of the Romans have made their town the classic examples of planning (Listokin and Burchell, 2002).



Fig 2 The nature of early Roman Towns showing their order in planning.

Source (:www.google.com/earlyromancities)

From the 5th to 6th Century, medieval Europe planned towns around castles, churches and monasteries with formal street arrangement. The emulation of Greco-Roman classism during the Renaissance revived city-planning efforts along classical lines.

In sharp contrast to the narrow, irregular streets medieval settlements, in Renaissance planning stressed, wide irregular radial and circumferential street that is forming concentric circles around a central point with other streets radiating from that point like that of wheels. These themes of Renaissance planning were transplanted to the new world in British and Spanish colonial cities settled in the 16th and 17th century. Among them are Mexico city, Virginia, Georgia, Peru (Listokin and Burchell, 2002).

During the era of the Industrial Revolution a few design standards that were introduced often neglected basic physical and aesthetic considerations. This became evident in New York City planning. By the end of the 19th century the largely unfettered growth of New York and other major cities led to serious over crowding with a host of attendant problems. These conditions became the basis for a new era of town planning during the 20th century (Nelson, 2003)

2.3 MODERN TOWN PLANNING IN THE 20TH CENTURY

With the continuous growth over the years, urban/town planning was devoted to decentralizing towns and setting up self-sufficient garden suburb. Town planning in other countries broadened in the late 1960's beyond a pure process that concerns not only physical design but also considerations on the social, economic and social environmental issues of a community. The extensive physical rebuilding of cities that followed after the World War II, gave urgency to town planning. It emphasized physical planning on new towns after the Second World War. Major urban reconstruction took place in the Netherlands, Hamburg, West Germany, and Helsinki, Finland and elsewhere new towns were also built; among them were Tapiola, Pans and Berlin City (Burchell, 2002).

2.4 EMERGING CONCEPTS

Trends:

The practice of allowing more than one type of use in a building or set of buildings, in planning zone terms, that is a combination of residential, commercial, industrial, office, institutional, or other land uses became the current trend. This usually took place in city centres where land value

and cost were very high and acquisition of land was difficult and town outskirts where there is less activity. This is commonly known as 'mixed use developments'.

Mixed use development is an ambiguous, multi-faceted concept but essentially it is an aspect of the internal texture of settlements. The texture of a settlement is a major determinant of its character and quality and its key features are grain, density and permeability-derived from the layout of roads, streets and paths.

2.41 MIXED USE DEVELOPMENT CONCEPTS

The concepts of mixed use developments embraces at least seven principles and these are:

- Grain - the manner in which an area's components (people, activities, land uses, buildings and spaces) are mixed together;
- Scale or setting - within buildings, street blocks, districts, neighbourhoods and towns;
- Location - city or town centres, inner cities, suburban, or edge of town;
- Approaches to maintaining or promoting mixed-use setting - conservation, development, or conversion and refurbishment;
- Transactional quality - the 'comings and goings' generated by different activities and uses;
- Tenure and occupation - how property is held and by whom; and
- A time dimension - sharing space and changing patterns of use through time.

Mixed use developments are best suited to those who prefer public amenities to private, regulated personal space. The lack of private outdoor space for kids and pets is anathema to some.

2.4.2 BENEFITS OF MIXED USE DEVELOPMENTS:

- Activates urban areas during more hours of the day.
- Increases housing options for diverse household types.
- Reduces auto dependence and enhances time management.

2.4.3 GENERAL LAYOUTS OF SETTLEMENTS

Classification of types of towns is also done with the type of road patterns found. The following are a number of layouts.

- The grid iron plan: This is also known as the chess board plan or the rectangular stretch system. In this pattern the streets are usually of equal width and they cross at right angles. The buildings are arranged along the streets.

This system has advantages like, low traffic congestion, comfort convenience in the regularly and also, it is economical and waste of land is minimized. Its disadvantages are that there are too many junctions liable to accidents and mostly inefficient when used on leveled land. It lacks variety as well.

- The grid iron plan with superimposed diagonal street system: This is basically the grid iron plan pattern and has some diagonal streets intersection usually at a point. Example of a city is Washington in the U.S.A.

- The Radial plan: In this pattern, the several streets are shooting from a focus. This focal point can be the civic town centre, a palace, a historical monument, market place, public office building or beauty sports et cetera.

This is usually termed a nodal town. This system has the advantage of enhancing a focal point but its disadvantages seem to way in that there is waste of land, thus it's not economical to build.

An example of such a town is Accra in Ghana.

- The concentric street plan: In this pattern the streets are in the form of ring roads and are connected by radial streets. It is also known as the spider web plan. This plan aids in reaching almost everywhere of the town. An example such towns is Kumasi in Ghana.

Irregular plan: In this plan there is no defined line of road network. It may be due to the presence of unalterable natural features such as mountain, rivers et cetera. In this case distances are long and extra land is required, there is thus waste of land.

Others: This is usually a combination of any two of these road patterns. For example:

Combination of grid Iron plan and Radial system.

2.4.4 THE IMAGE OF A SETTLEMENT

It is important for towns to or settlement to possess the usual quality, that is; it must be legible.

Legibility here refers to the ability and ease to identify the various elements of the town that is paths, edges, nodes, districts et cetera.

- Paths

These are movement's ways and are in the form of the streets, transit lines, walkways, canals, railways, et cetera.

- Edges

These are linear elements not considered as a path by the users but are bounding between two phases. Example, shores, railroad cuts edges of development walls.

- Districts

These are sections of towns structured with nodes, defined by edges, penetrated by paths and sprinkled with landmarks; elements regularly overlap and pierce one another (Lynch, 1972).

It is also necessary for the town to have an identity, a structural form as well as meaning to the observer and dweller. A planned environment should have an impact on an observer. The physical form which a town takes to evoke a strong image on the observer is the quality of imageability. It must have a form which can have a change in the observer activities or lifestyle.

2.5 EXAMPLES OF MODERN MIXED USE DEVELOPMENTS.

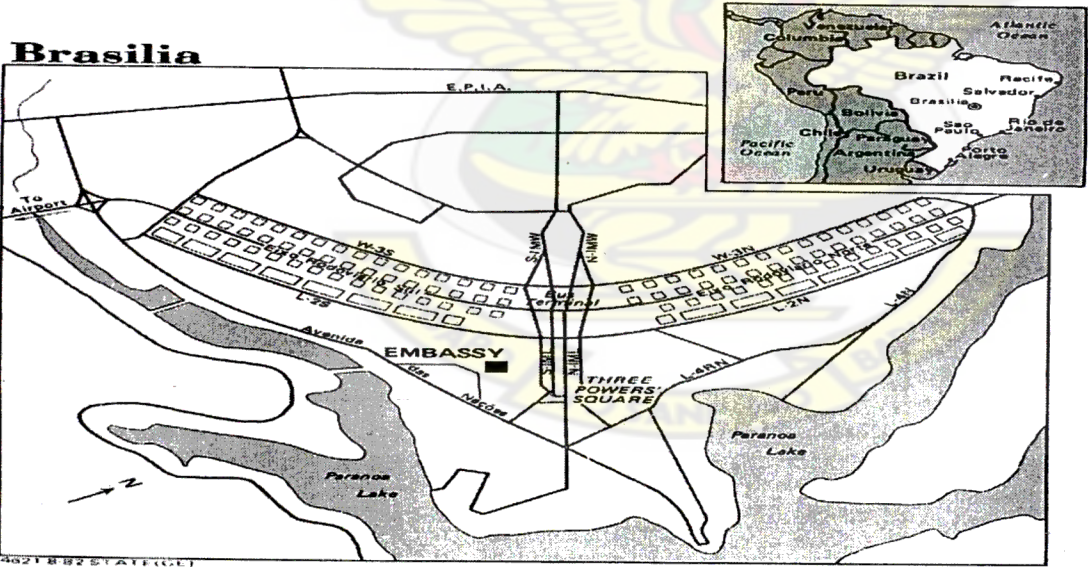
2.5.1 BRASILIA

When democracy set foot in Brazil in 1945, the break through into a new era was also symbolised in architecture in a most extraordinary way. In the mid 1950s, the architect, Oscar Niemeyer, who was a council communist, and Lucio Costa, the town planner, were commissioned by President Juscelino Kubischek to plan a new capital in the interior of Brazil that was to be Brasilia (Konemann, 1999). Brasilia is situated in the Savannah at an elevation of about 1000m, located in Latin America. It lies between the equator and the Tropic of Capricorn that is latitude 20° S and 40° W. Located near the geographical centre of the country, it replaced Rio de Janeiro as the capital in 1960. Built in only three years, under the direction of Brazil's leading architects, Brasilia was intended to draw development to the country's

interior(Nelson,2003). It was constructed between 1956 and 1963 for a population of 500,000 inhabitants. Brasilia was built to replace the crowded old Rio de Janeiro as the national capital. It was inaugurated in April 21, 1960. Due to migration from other towns and cities, Brasilia has grown rapidly and the city has begun to achieve its goal of furthering the development of the interior of Brazil (Konemann, 1999).

2.5.2 THE BASIC PLANNING OF BRASILIA

Planning concept of Brasilia (an expression of progress and modernity) was conceived in the shape of an air plane. It sought to adopt the sign to the local topography, the natural drainage of the area to the best possible orientation.



Map 1. Plan of Brasilia

Source : (www.infrobrasil.com.br/bsbi.htm)

Natural ways of access, made into fast central long and side lanes for local traffic fell into place and along this areas, places the bulk of the residential districts. As a consequence of this concentration, the civic and administrative centres, the cultural, entertainment and sporting centres, the municipal administration facilities, the barracks, the storage and supply zones, the sites for small local industries, and the railway station, naturally fell into place along the transverse axis, which became the monumental axis of the system.

Lucio Costa's thoughts in zoning criteria considered the commercial, residential, industrial and civic or administration, recreational open spaces at the intersection of the monument and the highway-residential axis, the entertainment centre for the city, with the cinemas, theatres, restaurants, etc that is the great social centre was placed. The recreational, commercial and civic areas were placed in the heart of the city, including parking areas, bus stations, entertainment and cultural centres. Industrial sites were placed at the ends. These zones thus created large open spaces especially in the interior (the heart of the city) (Nelson, 2003).



Fig. 3 Aerial view of the entertainment zone in Brasilia

Source: www.infrobrasilia.com.br/bsbi.htm

Brasilia was envisioned to vary in principles that include proportion, structure and materials all in unison and relating to one another. The sculptural character with different geometric shapes achieved simplicity and nobility. Principal buildings including President Palace in the lake, the Plaza of the Three Powers placed on the East Wing of the Monumental axis which includes the Bow shaped Congress, the Twin Towers and the Dome of Senate exhibit the this character (Nelson,2003).

In deed with these different styles in design, beauty and simplicity were exhibited.



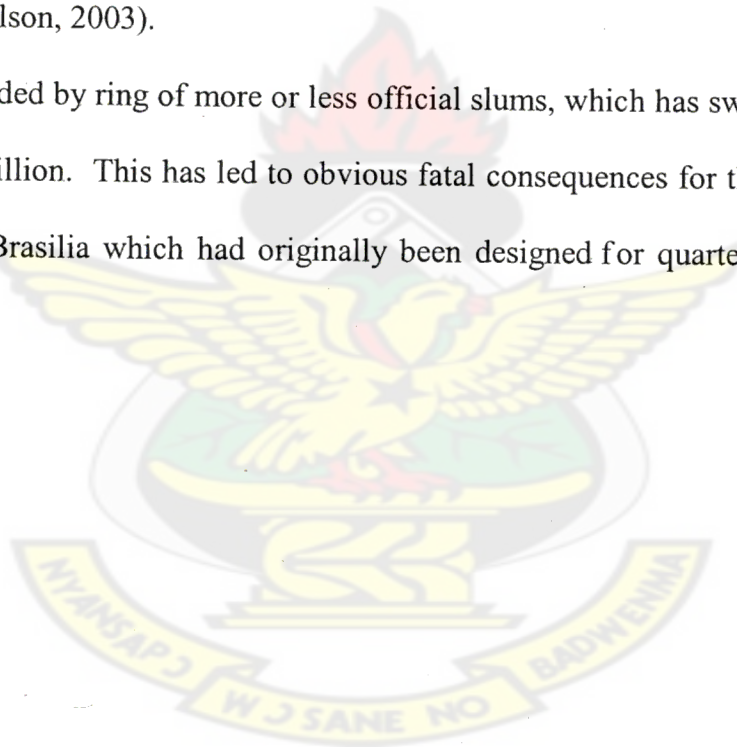
Fig. 4 Aerial view of the residential zone in Brasilia showing the residential flats for mass housing.

Source: www.infrobrasil.com.bn/bsbi.htm

Housing for residential purposes was one other feature consciously looked at by the principal designer Oscar Niemeyer. The Pilot plan was built to house 500,000 people, primarily in super-blocks. These super blocks were large groups of apartment buildings, grouped in a very orderly manner. Each group of four super-blocks was supposed to serve as a single neighbourhood unit

with each group having a church, school, movie house, youth club and adequate field space for children to play on. The most important aspect of these super-blocks was that they were intended to be egalitarian, so that people of all income levels could live together and would interact on a personal and classless level. Social gradations was easily regulated by giving a higher value to certain blocks, for example, along the residential highway axis, the blocks closer to the highway will naturally be valued more highly than the inner blocks, which will permit gradations inherent to the economic system. Nevertheless, the grouping of the super-blocks in sets of four will favour a certain degree of social co-existence, avoiding undue and undesirable class distinctions (Bradshaw, 1997 and Nelson, 2003).

The city is now surrounded by ring of more or less official slums, which has swollen the number of inhabitants of two million. This has led to obvious fatal consequences for the over burdened civic infrastructure of Brasilia which had originally been designed for quarter of that number (Nelson, 2003).



CHAPTER THREE

3.0PRECEDENCE , CASE, TECHNICAL AND SPECIAL STUDIES

3.1 PRECEDENCE STUDY ONE – SAUDI ARAMCO RESIDENTIAL CAMP, DHAHRAN (SAUDI ARABIA)

3.1.2 LOCATION:

Saudi Aramco residential camp is located within the city of Dhahran (Arabic) in Saudi Arabia's Eastern Province. It is located near the US consulate as well as the military airbase, which was formerly the international airport of the Eastern Province. This has since been moved to King Fahd International Airport near Dammam.

Saudi Aramco Residential Camp in Dhahran, casually known by its inhabitants as the Dhahran Camp, is the residential community built by Saudi Aramco for its employees.

The Dhahran camp is one of three original expatriate oil company compounds or "districts" in the east of the country (now four), which also include camps in Ras Tanura (the refinery and port), and Abqaiq and more recently in Udhailiyah. Dhahran camp was the first of the group, founded in the late 1930s, and is still the largest, with 11,300 residents, including approximately 6,200 North Americans. The town consists of two main divisions: Dhahran "main camp" (the oldest section) and Dhahran hills.

3.1.3 REASONS FOR STUDY

The decision to study Saudi Aramco residential camp in a bid to design a mixed residential and commercial development was influenced by the following-

- The camp is one mainly built for the oil company employees and their dependants.

- Its purpose of existence is in line with the proposed mixed use development in Princess Town.
- It spells out the main character and features that such mixed developments should have
- Modernity of the facilities, equipment and services is worthy of study.

3.1.4 MAIN FEATURES

The main features of Saudi Aramco Residential Camp are as follows:

- Various types of residential units(town houses, individual units, guest houses etc)
- Educational unit (schools, library).
- Entertainment areas(golf courses, putting areas, club houses, open parks, theatre and museum, recreational complexes)
- Offices and administrative area.(work places, banks etc)
- Religious areas(mosque)
- Health center
- Commercial centre (mall, shops, etc)
- Good and accessible roads.
- Security gates



Fig. 5 Al Mujamma service center
city

Source: www.infrobrasil.com.br/bsbi.htm

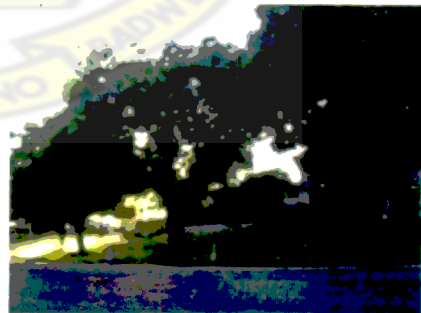


Fig. 6 Hamilton house (guest house) in Dhahran



Fig. 7 Abu Hadriyah Street in the Hills



Fig. 8 Rolling Hills Country Club House

Source: www.infrobrasil.com.br/bsbi.htm

3.1.5 MERITS

- Accommodation and other important facilities have been provided for the oil workers and this makes the concept of work and live, efficient.
- Proximity to all facilities on site in relation to housing needs, aids in little travel to work and back.
- Provision for future expansion was considered and planned for.
- There are good transport routes and services to aid circulation.
- Other necessary utilities like water and electricity as well as telecommunication services have been provided for.

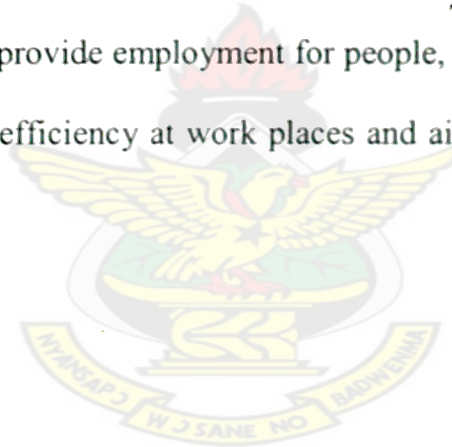
3.1.6 DEMERITS

- The presence of all facilities within a fenced wall, cuts off residents from all other activities and places around this settlement.

KNUST

3.1.7. CONCLUSION

It is important that in an attempt to provide employment for people, all other associated facilities be considered in order to facilitate efficiency at work places and aid in comfortable and secure living.



3.2.0 PRECEDENCE STUDY TWO –ONNE OIL AND GAS FREEZONE, NIGERIA.

3.2.1 LOCATION:

Onne oil and gas freezone is located off the dual highway to Port Harcourt in the Ikpokiri area in Nigeria.

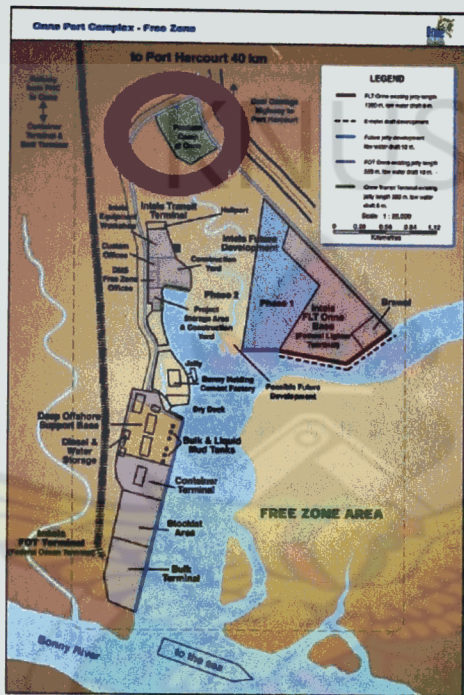


Fig.9 Layout of ONNE Freezone, Nigeria.

3.2.2 REASON FOR STUDY

Onne oil and gas freezone development is another development that took into consideration the housing needs of its workers.

3.2.3 MAIN FEATURES

- Residential camp
- Catering services
- Helicopter landing area

- Parking lots
- Swimming pool area
- Open parks/spaces



Fig.10 Residential camp area.

3.2.4 GENERAL OBSERVATION

- The residential camp was developed to cater for the workers on site thus its proximity to the warehouses, factories and offices.
- Oil companies chose to build close to ports or areas on the coast with helicopter pads to aid in managerial affairs on site.
- There is ample land around the residential camp that allows for future expansion.

3.2.5 MERITS

- Accommodation, and catering have been provided for the workers
- Closeness of all facilities on site in relation to housing needs aids little travel to work and back.

3.2.6 CONCLUSION

More ancillary facilities as educational facilities and commercial facilities will be needed in this community due to its growth.

3.4 CASE STUDY ONE-AKOSOMBO

3.4.1 PROFILE OF AKOSOMBO

Akosombo has been in existence since 1960, when the Hydro-electric dam was built to provide the country, as well as other countries, electricity and drinking water. Geographically, the Akosombo dam and the river form a boundary around the community with a range of hills enclosing the whole area in discussion. (www.google.com/akosombo.html).

There are two main Communities, Community One known as 'Mess' and Community Two popularly known as 'Down town'. The dam can be located north of community one. Akosombo is bounded in the north by towns such as Datroko, Sedom, Aglobo. At the south it is bounded by Ajenakonawple, Chiasi, Osukwau and Akwatin. Also in the east by Ajobom and in the west by Ajenadawm (source www.google.com/akosombo.html).



Fig.11 Aerial view of Community one



Fig.12 Aerial view of Community two

Source (www.google.com/akosombo.html)

Community two spreads more largely to the west and is enclosed by another range of hills. Community One is about 1/3 the size of Community Two, and can be a basis for finding major activities within Community Two, for example the commercial activities (market). The approximate population for 7 km radius 19941 with space set aside apart form residential spaces, spaces for education, leisure and entertainment, commercial and services. Provision made, however for the mass of people for future habitation proves adequate.

From the previous chapters on literature review, origin of settlements clearly defines Akosombo as an industrial as well as a residential town.

3.4.2 PLANNING CONCEPTS OF AKOSOMBO.

Classification of types of towns can also be done with the type of road patterns available. From the literature review made, many road patterns were studied and in comparism from the master plan of the Akosombo community, it reveals that:

- The grid- iron plan system of road pattern was used in planning of Akosombo. But due to the nature of the land, interplay of hills and valleys as well as plateau areas, a perfect grid pattern was not achieved. Roads were constructed to wind around the hills to decrease steepness in road level. All the minor roads were constructed to join the main road.
- It reveals that the various housing units are arranged ,along these roads for easy accessibility and circulation in and around the community area.

- It also shows the position of the dam and the relationship between the working or industrial area and the residential area of the whole environment. It reveals that the official areas are closer to the dam site thus the community grows big further away from the industrial area.

3.4.3 CRITERIA IN ZONING.

Zoning is one principle followed to achieve a planned community. Zoning, in town planning terms, is used to include the following.

Allocation of land for specific purpose and

Control of the use, height and construction of the buildings automatically regulating the density of population of the buildings in question.

Thus "zoning was defined as the regulation by law of the use of land and or buildings and of the height and density of buildings in specific areas and for the purpose of securing convenience, health, safety and general welfare of the community (Rangwala,2002).

From the basic definition of the term zoning, Akosombo community can be said to have followed this principle of town planning. Within the zoning descriptions, allocation of land for specific purposes is evident from the master plan of Akosombo community. These zones are residential, entertainment zone, industrial zone, commercial zone, educational zone. These different zones can be found in both communities.

As mentioned earlier, Akosombo has more housing type buildings. These buildings, as part of zoning principles have different building plan types that can take different population densities.

The managing directors reside at the highest point of the community that is known as ‘directors’ or ‘Domeabra’ in community One.



Fig. 13 House type in Domeabra

Source (www.google.com/akosombo.html)

Community Two, the larger of the two communities, has the commercial zone, entertainment zone and also residences for the middle and low class workers.



Fig. 14 Commercial zone showing market area.

Source (www.google.com/akosombo.html)



Fig.15 Akosombo International school



Fig.16 Akosombo JSS complex (community 2)

Source (www.google.com/akosombo.html)

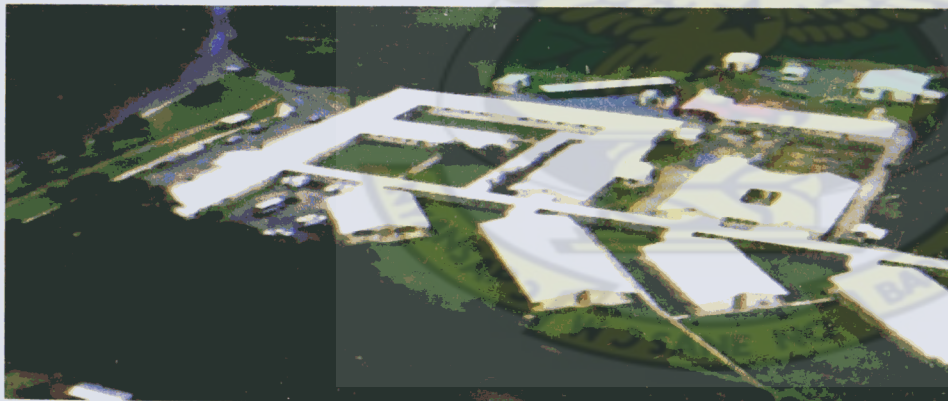


Fig.17 The health zone showing the VRA general Hospital, Akosombo

Source (www.google.com/akosombo.html)

Thus with the purpose of zoning principles, the Community, has as a plus, achieved the objects of settlement planning, which are: beauty, convenience, environment and health. Justification of

this point is the evidence in the orderly arrangement and functionally of zoned areas, which bring about beauty. Facilitation of activity is convenient because one does not have to move all around the area just to engage in one activity. Convenience is achieved, in that provision for local amenities and services such as cheap power and electricity, easy disposal of sewage and industrial wastes is catered for. Interplay of open spaces such as play grounds, open parks and other spaces reduced the rigidity of the environment atmosphere.

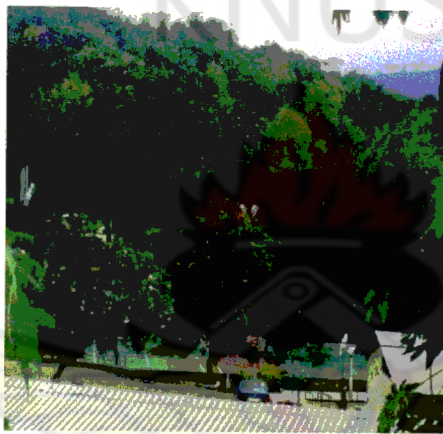


Fig. 18 The Club House area

Source (www.google.com/akosombo.html)

3.4.4 PRINCIPAL BUILDINGS IN AKOSOMBO.

Akosombo is honoured with principal buildings such as the famous Five Star Hotel known as the Volta Hotel; it has facilities such as conference halls, leisure areas, as shown in figures 28 and 30, the Roman Catholic Church, the presidential chalet and others.



Fig. 19 The Entrance of the Volta Hotel



Fig.20 The rest rooms of Volta Hotel

Source (www.google.com/akosombo.html)

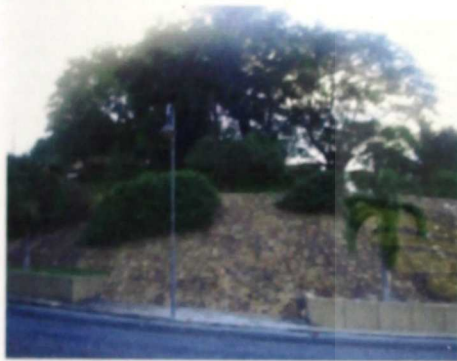


Fig.21 Landscaped area of Volta Hotel



Fig. 22 Conference hall of the Hotel

Source (www.google.com/akosombo.html)

The Presidential chalet on the hydro-electric dam which has a view of the town, is where the president resided each time he visited Akosombo.

3.4.5 CIRCULATION AND OPEN SPACES

Open spaces in the form of parks and play grounds should be provided in our towns. They are also said to serve as breathing spaces and attractive areas for refreshment to both mind and body (Rangwala, 2002).



Fig.23 Open spaces grown with trees with the Volta Lake flowing through giving a sense of relaxation and beauty.

Source (www.google.com/akosombo.html)



Fig.24 Relaxing and open spaces with seating and natural greenery.

Source (www.google.com/akosombo.html)

Well mowed lawns are kept with seats for relaxing and greens to aid in aesthetics and the functionality of a relaxed atmosphere for picnics. Lake Side resorts are found as entertainment spaces for relaxation and visualization of natural beauty.

Other open spaces available are play grounds for both children and adults to keep them active and lively as this keeps healthy minds for studying.



Fig. 25 The play ground area.

Source (www.google.com/akosombo.html)

3.4.6 HOUSING PROJECTS IN AKOSOMBO.

It is not enough to provide structurally stable structures as houses. But they must be located and designed that they afford convenience, amenity, health and social life to the community (Rangwala, 2002).

In deed the successes in the effort to plan good housing structures for the inhabitants of Akosombo has honoured it as so planned. The various types of buildings mostly residential ones were designed from observation analysis, with various factors considered such as the height of buildings since their single volume structure was in proportion with the width of roads. Orientation is such that maximum day light is allowed in the habitable spaces and wind direction is allowed for good ventilation of rooms.

Privacy and security is a plus to this community as a number of housing units usually of individual families are located within an area to promote communal living and thus security is assured. The designs of the various types of units aid in provision of privacy. The floor space as

well as total area of the unit could be said to be adequate since from observation each individual family seem to have no problem with space and congestion.

The orderly arrangement of these housing units as shown in figure 12 and 13 have affected the provision of utility services such as electricity, water, drainage facilities as well as waste disposal at no cost of the dwellers but a little proportion which is almost insignificant to the bearer Company Volta River Authority.

There are detached houses, semi-detached houses as well as row houses and these are found at their respective locations depending on what class level of workers. This explains that the area reserved for the Directors of the Company, known as “Domeabra”, which has 10 Detached houses. These houses each have boys Quarter’s.

Other forms of detached houses, this time without quarters are also provided for other employees such as managers, principals and so on. Semi detached houses are available and they can be found at various sections of both communities. Row of houses, commonly known as “Long Dom” by the employees are available to hold individuals newly employed until they are identified with their respective house units.



Fig.26 Detached housing in Community One

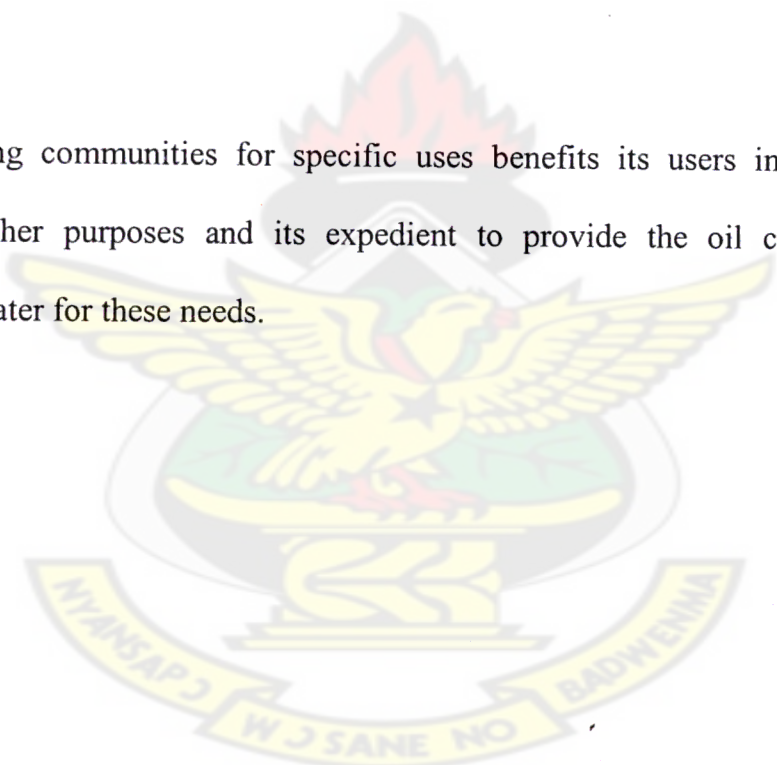
Source (www.google.com/akosombo.html)

It must be mentioned that with all these forms of housing units, the order of arrangement has given no problem to house identification in the form of numberings, thus they all have individual house numbers and this has aided in easy location.

As a form of brief description of these various classifications of housing types, they have certain common features such as the building materials used. Aluminium roofing sheets are for general roofing. Reinforce concrete walls and paint as general finish. Timber sections, highly polished are used for the window and doors as well as the immovable features within the housing units.

3.4.7 CONCLUSION

The essence of planning communities for specific uses benefits its users in its economic, cultural, social, and other purposes and its expedient to provide the oil companies with supporting facilities to cater for these needs.



3.5 TECHNICAL AND SPECIAL STUDIES

3.5.1 PLANNING STANDARDS CONSIDERED:

1. RECOMMENDED OCCUPANCY RATES

From 1.5 persons per room (PPR) in low density areas to 2.0 persons per room in high density areas.

2. RESIDENTIAL DENSITIES

- a) Low density (or high class) area-30 persons (Min) per acre (PPA) to 40 PPA (Max)
- b) Medium density (or middle class) area -40 PPA (Min) to 80 PPA (Max)
- c) High density (with high rise apartments) 80PPA (Min) to 150PPA (Max)

3. RECOMMENDED PLOT SIZES FOR DETACHED HOUSES

- a) High density residential area plot size -60ft. x 80ft. (Min) and 80ft. x 80ft. (Max)
- b) Medium density residential area plot size- 70ft. x 100ft.(Min) 80ft x 100ft. (Max)
- c) Low density residential area plot size -100ft. x 100ft.

4. RESIDENTIAL NEIGHBOURHOOD BOUNDARY DEFINITION

The boundaries of a residential neighborhood will be determined by significant landmarks such as natural physical barrier e.g. a stream or by major roads and or by a catchment population of between 5000 persons and 15000 persons.

5. BASIC SUPPORTIVE FACILITIES TO BE PROVIDED IN A NEIGHBOURHOOD

A designated residential neighbourhood should have the following basic community facilities.

- A nursery
- A primary school
- A junior secondary school
- A neighbourhood shopping center or a local market with attached retail shops adjacent to a parking space

- A health post, a postal agency, public refuse bin, a police post , a neighbourhood open space for out of door meetings ,at least a football field and a children's play area.

6. Settlements with populations below 5000 persons each will be grouped together where distance between villages are less than 5km. and regarded as a neighborhood or more and provided on a location all the basic community facilities.

3.5.2 VENTILATION SYSTEMS

Ventilation may be natural or mechanical. Natural ventilation requires effective temperature difference or wind to induce air movement. With mechanical ventilation, air movement is induced by power driven fans. These can be either axial or centrifugal type and may be mounted on walls, glazing including shop front or roofs. The methods which can be used for ventilation can be classified as follows:

- Natural inlet and mechanical extract this method is supply for supplying fresh air but not for extracting smoke unless the supply of air is adequate to balance the volume, which has to be extracted.
- Mechanical inlet and extract: this method is capable of the widest application because distribution , pressure and temperature man all be controlled.
- Mechanical inlet and natural extract: this method delivers air to the interior through ducted systems, allowing extracted air to pass through door and openings. Facilities for filtering and heating air are usually in cooperated.
- **Air conditioning**

Air conditioning systems aims at delivery of air which has been warmed or cooled and has had its humidity raised or lowered. In the tropics, the requirement is the supply of fresh air which has been cleaned and cooled: as the cooling increases the relative humidity of the air, a

dehumidifying process is required. This may be achieved by exposing the air to cooled surfaces or cold spray whereby the excess moisture is condensed. Air conditioned may be suitable for use in any of the following building types:

- Detached housing types for the high class workers.
- Semidetached housing types for the middle income earners
- Office spaces and management.
- Special plant rooms and warehouse.

Heat gains

Solar heat gains: Solar heat gains can considerable and may make up a significant part of total heat gains.values are dependent on geographical location, site orientation, extent of verbal or horizontal plane occupied, month of the year and other complex factors.

Heat from occupants: heat emits from the human body at approximately the following rates:

ACTIVITY	HEAT EMMITION PER OCCUPANT (Watts)		
	Total	Latent	Sensible
Light desk work (offices)	140	40	100
Walking (customers)	160	50	110
Light manual work (sales staff)	235	105	130
Heavy work (goods handling)	440	250	190

Table1: Heat from occupants at 20°C and 60% relative humidity

Heat emitted from human beings is partly sensible heat and partly latent heat from perspiration and vapour in the breath. Sensible heat alone the internal temperature of a room. The number of customers at peak periods may be taken as one person per 2.32sqm. of floor areas.

Heat from lighting: Heat produced by lighting can be easily calculated by adding up to the wattage ratings of all lamps without involving any conversions.

Heat from machines: machines, in particular plant rooms, can produce considerable heat gains.

Where the wattage consumption is known, the formula to estimate heat output (Q) is:

$$Q=W(I-E) \text{ watts}$$

Where E is the efficiency ratio (usually between 0.75 and 0.92). Where the wattage is not known, but the motor rating is given in the horse power, the formula to achieve the heat output is

$$Q=746 \times H.P. ((1 \div e) - 1) \text{ watts}$$

▪ Distribution system

Electricity may be distributed in a combination of different distribution systems. Some of them include the following:

- Trunking
- Conduits
- Plastic sheath
- Mineral insulated metal sheath
- Socket outlets: they may be single or multiple, switched or unswitched, surface or flush mounted and with or without indicator lights.

▪ Demand loads

In order to determine what the total current capacity of an electricity system is going to be, the rating of the conductors which will be used in it, and whether it should operate on a single or three-phase supply it is necessary to make separate calculation for the respective demand loads which will be placed on it by lighting and by electrical equipment.

- Lighting load.
- Electrical equipments loads

The loading produced by an electrical equipment can be established by making an overall assessment from the manufacturers specifications for all the equipments which is to be used including heating, air conditioned equipment and specialised items.

- Emergency Power

Stand by generators may be required to provide power for emergency lighting and essential services such as fire fighting pumps in case of mains power failure. They should be installed in a non-combustible enclosure with adequate air supply for the prime mover. Exhaust gases must be safely dispersed and any noise reduced as much as possible.

Deductions

- A central electrical plant should be provided to house electrical installations monitoring system. This may monitor fire fighting equipments and security system in general
- A generator will be installed as an alternative power supply for specific spaces.

3.5.3 WATER SUPPLY

Water supply is required for the purposes of drinking, cleaning, washing, heating, and fire fighting.

■ Cold water

WATER USAGE	REQUIRMENTS
Drinking	Pipe water direct from mains; otherwise a supply of pure water must be kept in containers and be renewed daily; drinking vessels if not disposable must be raised in clear water.
Personal washing	Running hot and cold water or at least clean warm water drawn from a storage.
Cleaning	General water from storage tank
Water closet and urinal Cisterns	General water from storage tank
Boilers, heating plants etc.	Stored and circulated independently
Fire fighting; sprinklers	Water mains pressured storage tanks
Hoses	Water mains or break tanks

Table 2: Water usage and requirements

■ Hot water

Hot water may be supplied either by central or from a local system.

Central: Water is heated in the boiler room by a cheap fuel, which is also used for space heating and distributed to taps throughout the building. This method is only suitable where there is large continuous hot water demand.

Local: Water is heated by gas or electricity adjacent to the appliance from which it is to be drawn. This method is suitable where use is intermittent. There are two types of heaters: the

instantaneous (which provide constant flow of hot water) and the thermal storage type. The instantaneous ones operate with electricity range of between 3kw to 12kw and deliver a flow of about 2 to 5 litres per a minute.

Deductions

- Storage tanks will be available on site to aid water supply in specific areas.

3.5.4 REFUSE DISPOSAL

- **Waste management system**

The aim of this study is to outline the strategy for the method of storage and disposal of all the refuse generated by the proposed development.

There are three types of refuse namely;

- Wet and semi-wet.
- Dry crushable
- Dry non crushable

Refuse containers

The popular forms of refuse containers are as follows:

- Paladins
- Box containers

Measurement: 1.0 x 0.5 x 3.0

- Dustbins

460mm in diameter x 610 mm high, its approximate full weight is 15 to 20kg

- Disposal sacks

These are wet strength paper or plastic bags fixed to a metal ring with a hinged cover ; they may be free standing or bolted to the well. They measure about 400mm in diameter x 750mm high; their approximate capacity is 0.10cubic metres.

Refuse yards

The yards should conform to the following guidelines:

- The floor of the yard should be of a smooth and impervious material.
- The floor should be able to withstand impact on loading without damage.
- Yard should be supplied with hoses and water supply for washing.
- Yards should securely closed to avoid unauthorised entries and animals.

Deductions

- A centralised refuse collection system will be employed
- Dustbins and other collectors will be located at vantage points in and around the development.

3.5.5 FIRE FIGHTING

The degree of fire fighting and prevention will depend on the requirements of fire authorities.

Fire protection

In order to reduce the risk of fire from spreading, ample surrounding space is given around individual houses at the least of 6meters between two detached housing units and 12 metres between town houses(flats).

- Fire fighting equipment and systems

The following equipments are considered:

■ Fire extinguishers

They provide adequate fire protection and are cheap. Some of the most common types are the water based; dry powder or foam type and the ones that use carbon dioxide.

■ Sprinklers

It extinguishes fire by soaking the burning material and charging the atmosphere with excessive water so that it will not support combustion. Sprinkler heads are supplied by water mains or by pressurised storage cylinders of 22.5 to 50cu.m capacity.

■ Fire hoses

Unlike sprinkler, which is indiscriminate, the fire hose is directional and controllable. They may be connected to the mains all long as the mains pressure is adequate. Other wise, tanks (usually, 1150litre capacity) are require to feed the hoses by gravity or pumps.

The hydraulic requirements is that, the hoses should be able to deliver 22 litres of water per minute at a distance of 6metres from its nozzle and that three nozzles should be in operation at a time. These will be provided in the office blocks, commercial spaces and the oil warehouses and plant areas.

■ Fire alarms

Fire alarms may be automatic or manually operated. For the purpose of this discussion, the automatic type will considered. The automatic alarm system operates in a command chain. Fire alarms will be placed at sensitive areas within all the types of housing units and public buildings.

3.5.6 TRANSPORTATION

Transportation standards have been studied to aid the design. The studies dealt with standards and required dimensions with respect to turning angles and road sizes. Particular attention was given to the following areas:

- Parking lots
- Lay bys and bus stops
- Turning Radii
- Service bays

3.5.7 OFFICES LAYOUT

▪ Design Motives

Offices can be speculative or custom design. Speculative offices are for lettable purposes and thus there is the need for flexibility to accommodate changes. Custom-built offices on the other hand are designed to occupy/satisfy a specific organisation or need which will be needed by the oil company in question.

Thus, both designs will be employed in the office block designs.

The most common forms of office designs are the open and cellular forms. The cellular layouts have partitions set off the perimeter walls. It may be double banking with corridor in between for circulation or single banking. The open plan on the other hand is a large office with no partition.

Furniture is used to define the spaces. This system is often used for speculative office design since its layout easily make room for changes in tenancy. From the above, the open plan layout will be used to take advantage of its flexibility.

3.5.8 LIBRARY SPATIAL PLANNING

The performance of the library to be incorporated into the design includes a reading room, reference library, periodicals and a lending section. These libraries stock periodical, brochures, games or new media (video, PC software, CDs). The internal climate in library user area should be $20 \pm 2^{\circ}\text{C}$ with $50 \pm 5\%$ relative air humidity and air change of 20m^3 per hour per person. It is possible to reduce the need for air conditioning, since slight air circulation is necessary for preventing mould. Security is important in user areas, fire precaution measure should be considered.

3.5.9 RESTAURANT, COFFEE SHOPS AND FOOD COURT

The most important areas studied under this area are the eating area layout as well as the backstage design, which include cooking and service areas. Restaurants should be designed so a variety of seating arrangements can be achieved. Interior deco, lighting and ventilation all aimed at customer as well as worker comfort should be an integral part of the design. Factors considered for the design include the following:

- Aisle width
- Layout arrangements
- Seating arrangements
- Circulation
- Standardised area requirements

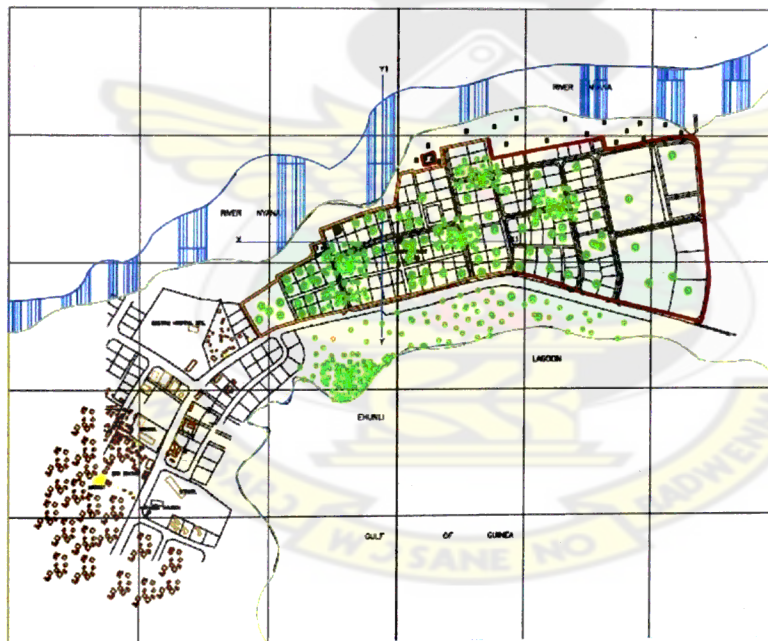
Rules and regulations guiding spatial requirements, orientation and services were studied.

CHAPTER FOUR

4.0 THE SITE

4.1 LOCATION

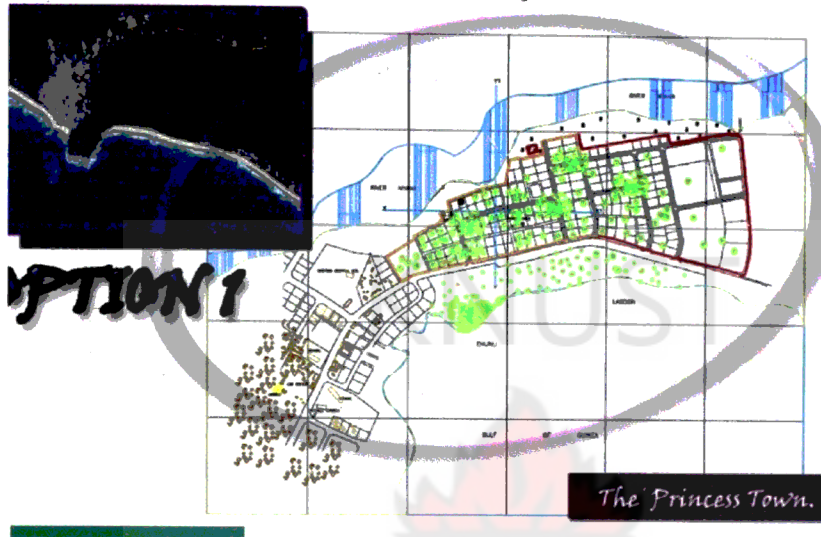
The site is located in the Ahanta west district of the Western region, precisely west of Cape Three Points. It lies between latitude 4-45 n and longitude 1-58 w. the site is approximately 1 hour 15 minutes drive from Takoradi the capital twin city of Western region, Ghana. The site is bounded by the Tumentu-Princess town road on the South, to the North, the Nyan river to the East, existing residential houses and to the West, a proposed road. Proposed site extent is a 100 acre piece of land that is owned Vitol Oil Company.



Map1: Proposed site for mixed residential and commercial development.

4.2 SITE SELECTION CRITERIA AND JUSTIFICATION

4.2.1 OPTION ONE:



Map 2: Site plan of Princess Town, Western Region.

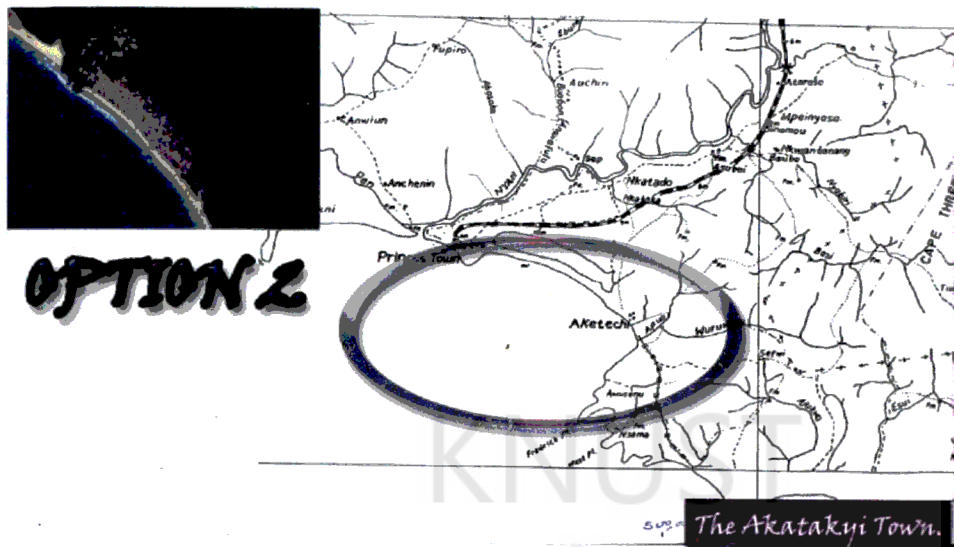
4.2.2 MERITS:

- The princess town is the closest to the oil rigs location.
- The site is accessible and predominantly by first class road from Agona.
- There is easy access to services such as water electricity.

4.2.3 DEMERITS:

- Major building materials for construction would have to be long distant transported to the site.

4.3.0 OPTION TWO:



Map 3: Location map of Akatakyi, Town, Western Region.

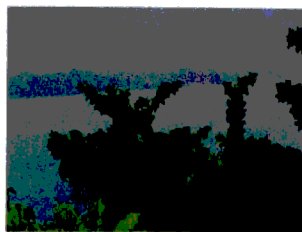
4.3.1 MERITS:

- The akatakyi site is also close to the of the oil rigs location.
- There exist services such as water & electricity.
- The site is accessible but only by feeder roads.

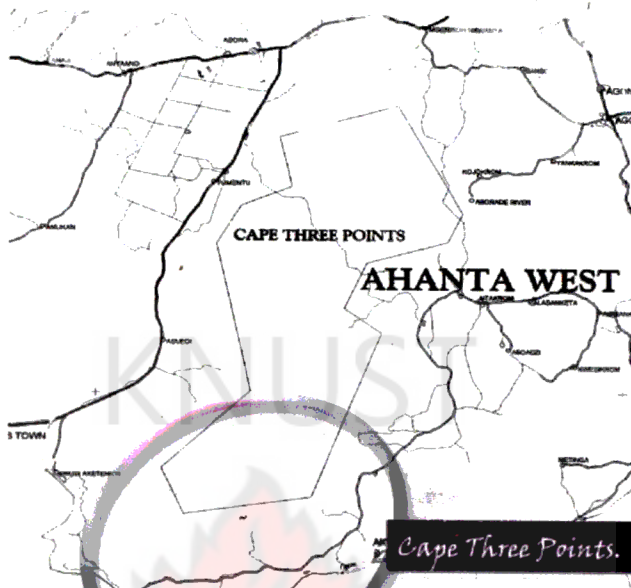
4.3.2 DEMERITS:

- Akatakyi is yet to be developed in terms of infrastructure.
- Lack of utilities as water, electricity etc impedes the promotion of the new development.

4.4.0 OPTION THREE:



OPTION 3



Map 4: Location map of Cape Three Points, Western Region.

4.4.1 MERITS:

- Cape three points is also close to the location oil rigs.
- The site is accessible by second class road from Ntakrom.

4.4.2 DEMERITS:

- There is enough land that can be developed but will be costly since there is no development yet.

4.5.0 CONCLUSION:

OPTION 1 is chosen based on:

- The Princess town is the closest to the largest volumes of the oil exploration (approximately 65km offshore.)
- Cost to be incurred for development will be much cheaper, considering already available utilities.
- Access is good and it takes an hour and quarter to get there from Takoradi.

4.6.0 EXISTING SITE CONDITIONS AND INVENTORY

4.6.1 Climate

The site is found within the south-western equatorial climate zone of Ghana ranging from 20 degrees to 34 degrees Celsius in mean temperature

4.6.2 Vegetation:

The site falls largely within the high rain forest vegetation zone capturing several hectares of plantation of the rubber plant to a large extent, this contributes significantly to reducing the problem of global warming, since a chunk of CO₂ emissions by the automobile are absorbed.

4.6.3 Soil type:

The soil type ranges from loose sand (near the sea) clayey type, then to the loamy soil. (toward the inland area.

4.6.4 Accessibility:

The Tumentu-Princess town road on the southern side of the site is a first class road, which is well drained at both sides with a 800 mm u-drain. This is advantageous to the site since it

provides the main access to the site. The un-tarred routes form 70 % of the access routes within Princess town. There are foot paths that lead to the various compounds and this makes it cheaper to construct and improve.

4.6.5 Available services:

The essential social amenities mainly pipe borne water and electricity are available. This provides prove that water connection to the proposed site will cost less and easily done.

There is a transmit ion pole that is 5 metres away from the site this proves available communication for the needed of the facility to be provided. The availability of electricity on site makes it easy to provide power and necessary services to the proposed site. Solar panels are available to provide light systems.



Fig.27 Available water services



Fig.28 Available electricity services



Fig.29 Available solar panel services

4.7.0 ANALYSIS

4.7.1 Strengths of Site:

- The site is accessed via a first class road. This strengthens the accessibility of the site.
- There are good drainage ways for surface water runoff which run along the main access route to the site.

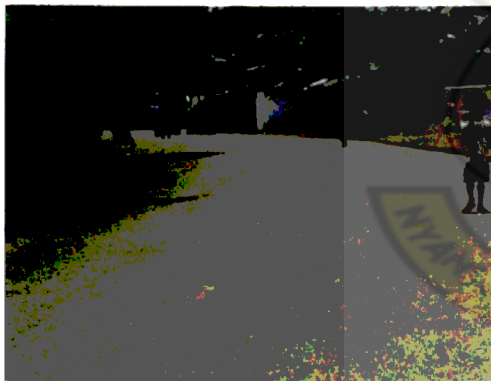


Fig.30 Good access roads to the site

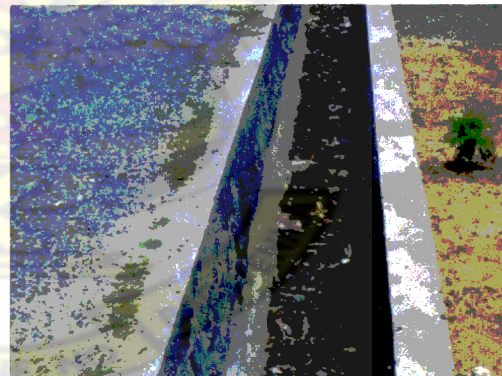


Fig.31 Good drainage gutters

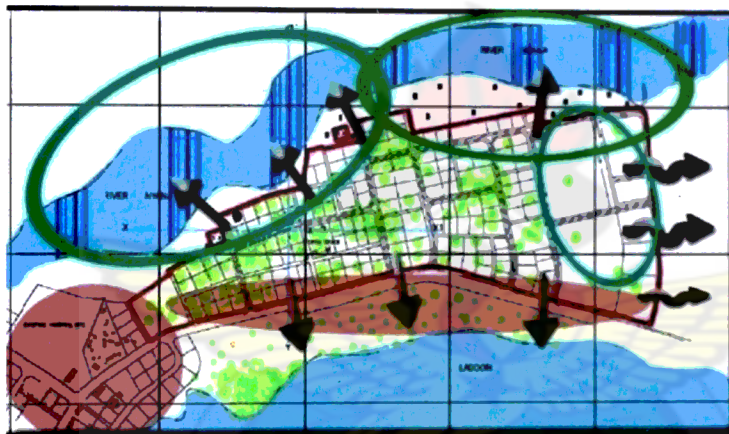
4.7.2 OPPORTUNITIES ON SITE:

- The quit zones around the water bodies give a serene atmosphere for residences.

- The general low lying plane of the site will aid in quick and less cost building and construction.

4.7.3 WEAKNESSES ON SITE:

- There are marshy areas around the site that will be costly to develop and maintain.



KEY.

- NOISY ZONES AROUND SITE.
- BLURRED VIEW FROM DENSELY VEGETATION.
- GOOD VIEWS FROM SITE.
- QUITE ZONES ON SITE.

Fig.32 Views and noise zones

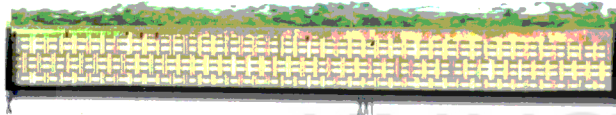
4.7.4 Topology and drainage of Site:

The land is generally low-lying and it slopes gently towards the south into the sea,

Topography of Site:



SECTION XX1



SECTION YY1

Fig.33 Slope of site

4.8.0 SITE PERIPHERAL STUDIES AND EXISTING ARCHITECTURE

4.8.1 BUILDING FORMS:

98 % of the buildings in the area are rectangular in shape this is basically due to the proximity to the coast. Cross ventilation was considered. The basic type of roof in Princess town is the gable type 98 % of the building are pitched. The remaining 2 % is for flat roofed buildings

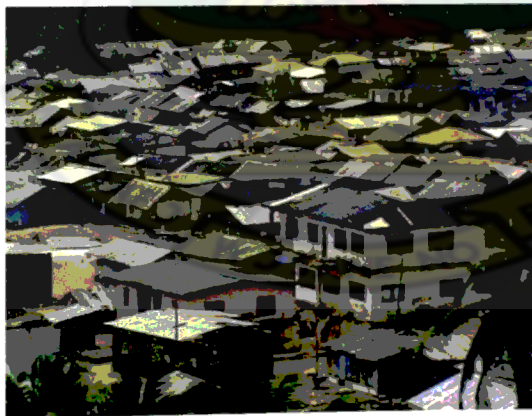


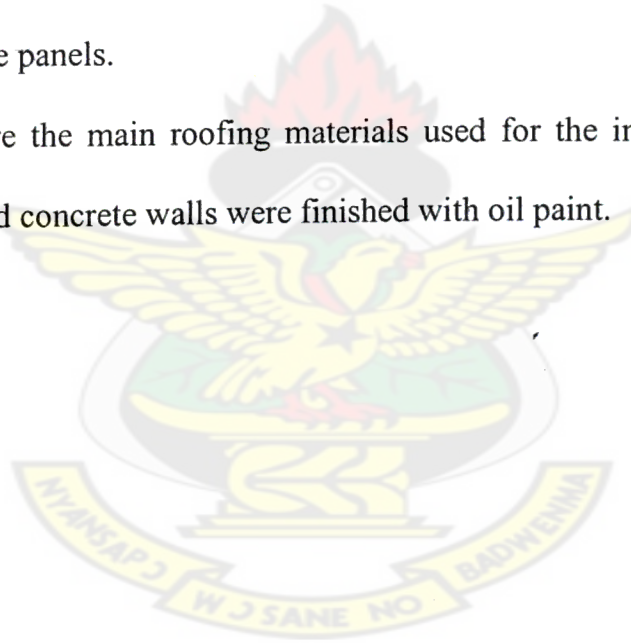
Fig.34 Peripheral building forms

4.8.2 BUILDING DETAILS:

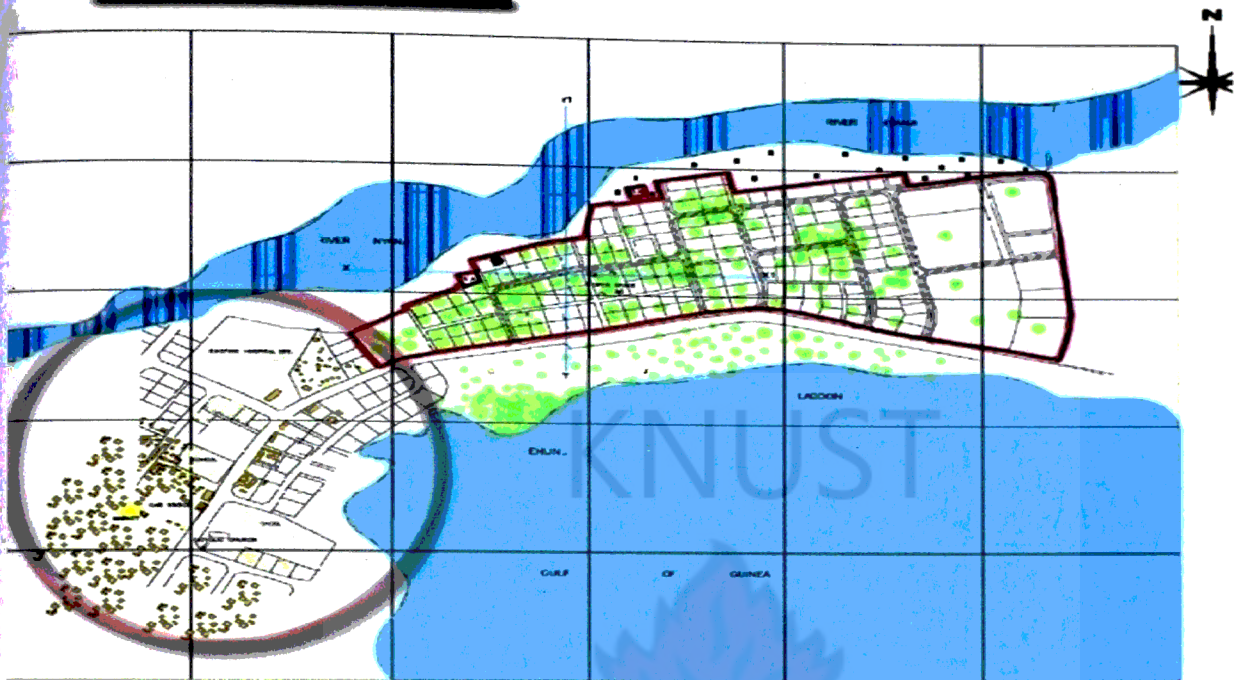
The building details refer to detailing and decorations on columns, windows doors and walls. it is observed that no form of detailing was done or considered on residential buildings. Only the fort, had much of details on it. Columns were built in rectangular cross section. Windows are jalousie windows and doors are of single panels.

Aluminium roofing sheets were the main roofing materials used for the individual buildings.

Basic block work and reinforced concrete walls were finished with oil paint.



LAND USE



KEY



RESIDENTIAL UNITS



COMMERCIAL FACILITY



WATER BODY(SEA)



DENSE VEGETATION

Map 5:Existing Land use of the whole area.

4.9 CONCEPTUAL SITE PLANNING:

4.9.1 OPTION ONE

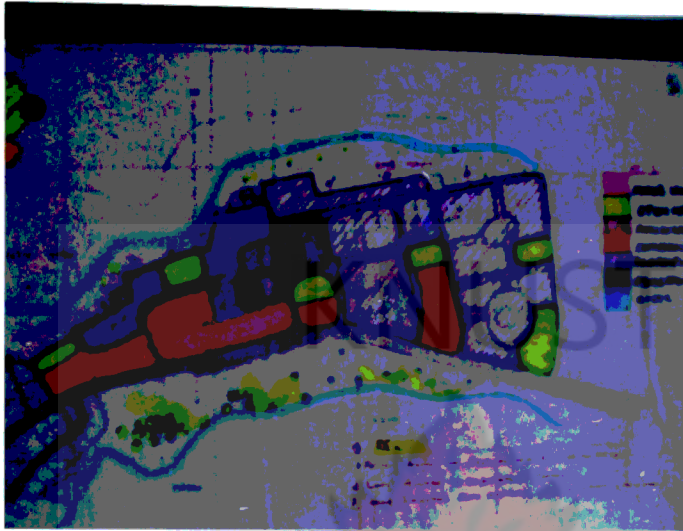


Fig.35 Option one of conceptual site planning

4.9.2 MERITS

- Noisy area is secluded from residential areas.
- Easy access to commercial centres
- Good transition zone between old and new development.

4.9.3 DEMERITS

- Little attention was given to the mixed use zone and its access to the residences was merely considered.
- Does not bring out the major idea behind the concept.
- Orderly planning is poorly done.

4.9.4 OPTION TWO

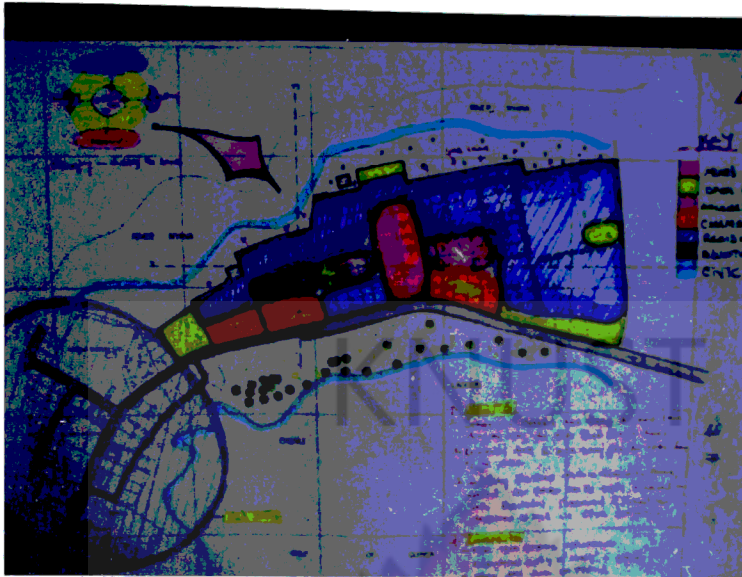


Fig.36 Option two of conceptual site planning

4.9.5 MERITS

- Commercial centres have easy access
- Residential zones are quiet.
- Easy access to ancillary or mixed use zone.

4.9.6 DEMERITS

- Open parks and spaces were ignored.
- Layout is filled with built up residential area
- Educational facility is biased placed

4.9.7 OPTION THREE

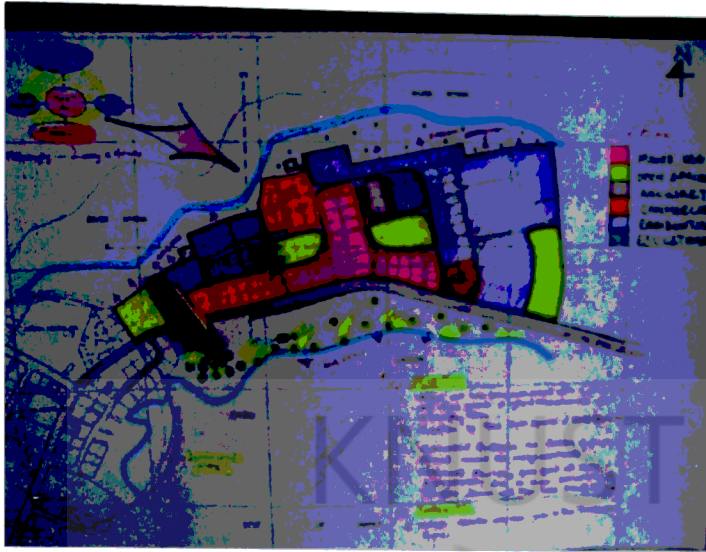


Fig.37 Option three of conceptual site planning

4.9.8 MERITS

- A healthy mixed zone has been obtained that is easily accessed by every user.
- Open parks and spaces are available and easily accessed.
- Traffic zones are evenly sprad with enough parking areas.

4.9.9 DEMERITS

- Residences configuration can be reconsidered.

4.10 CONCLUSION:

OPTION 3 was the preferred option and was developed.

CHAPTER FIVE

5.0 DESIGN PHILOSOPHY AND CONCEPT

This design, mixed commercial and residential development seeks to address the primary issues of purely commercial centres and purely residential against that of a mixed between the two 'organisms'. thus the philosophy.....LINKED HEARTS

To achieve this:

- The core provides a mix of the commercial and residential facilities.
- Siting of facilities would be at close proximity to each other linked with good access ways and shared ancillary facilities (car parks, restaurants, open parks etc) that enforce dependability of the two extreme cases of commerce and housing.
- The spacial leaks are to serve as buffer zones between the main 'hearts' this in the form of open spaces (greenery), play grounds, plazas, access ways etc.

5.1 ACHIEVING THE CONCEPT



Fig.38 Different zones to achieve the philosophy.

5.2 DESIGN EVOLUTION.

5.2.1 BRIEF DEVELOPMENT (this based on clients brief and case studies).

The site will be developed into the following spaces:

- Residential area:- detached housing(3 bedroom units)
 - : - Semidetached housing (2 and 3 bedroom units)
 - : - town houses (flats 1, 2 and 3 bedroom units)
 - : -temporal apartments (cubicle room long dormitories)
- Commercial area:- supermarkets
 - : -lettable shops
 - : -banks
 - : - oil market ware houses
- Health post :- clinic
- Educational facility:- crèche
 - : -full stream school(nursery-secondary level)
- Civic area:- offices for the oil company
 - : - lettable office spaces
 - : -fire station
 - : -police station
 - : -post office
- Oil ware house and work area.
- Recreational area:-open parks
 - : -playfields

:club house

:tennis court/swimming pool

- Helicopter pad

- Parking:-

 - :-Customer

 - :-Employee

 - :-Public transport

 - :-Service

- **Eating and Drinking**

 - :-Restaurants

 - :-Fast Food

 - :-Coffee Shop

 - :-Food vendors

5.3 POTENTIAL USERS

- Oil company workers and their respective families
- Various types of vehicles that ply the roads adjoining the site.
- Other private investors that will be attracted to the oil company.
- Peripheral dwellers

USERS	TRAFFIC NEEDS
	OWN CARS
Civil servants (middle management)	own cars
Workers of various professions	own cars
Businessmen	own cars
Professionals	own cars
Employees	own cars
	PUBLIC TRANSPORT
Civil servants (lower level)	public transport
traders	public transport
children	public transport
Young adults, students	public transport
drivers	public transport
travellers	public transport

Table 3 Users and traffic needs

Types of vehicles

- Private cars
- Taxis
- Trotro
- Public buses
- Large goods vehicles
- Long distance passenger vehicles
- Cooperate and institutional vehicles

5.4 NEEDS ACCESSMENT

Working class	Number of workers	Average family size	Area per family	Plot size per family	Housing type recommended
1. High class	30	5	180*5m	900m ²	detached
2. Middle class	150	6	90*6m	540m ²	semidetached
3. Low class	220	6	60*6m	360m ²	flats

Table 4 Needs accessment

5.5 PLANNING AND DESIGN CRITERIA

5.5.1 PLANNING CONSIDERATIONS

Site planning considerations employed for space allocation area as follows:

- **Access** to site: two main vehicular access routes were provided into the residential area, another to the main warehouse and office area.
- **Safety**: road system adopted is the grid-layout type with cul-de-sacs. Roads are not left too long but are gently curved to prevent over speeding in the residential areas.
- **Security**: the edge treatment of the community is left landscaped to act as a buffer zone between the old and new communities. As much as possible isolated zones were prevented to eliminate theft insecurity.
- **Zoning**: this is in two classes. Zoning with respect to land use and zoning with respect to classes of workers to be housed. Land use was zoned into residential, commercial, civic,

educational, health, recreational and mixed uses etc. This aids in orderly planning and gives a sense of place. Activities are limited to certain areas and this prevents noise from regulated areas.

Zoning with respect to classes were into high, middle and low income classes.

- **Utility services:** this is with respect to power supply, water storage, telecommunications etc.

A power plant area where electricity is stepped down and transmitted to the various electricity poles via cables to the various distribution boards are used.

For the shared apartments there is equally shared number of distribution boards by flat mates. Gas is another means of energy that will be used as well as the use of solar panels.

Water is stored in poly tanks and also bore holes as secondary means.

Telecommunication is fixed in every household. This technology is similar to that used in Akosombo, where it is an internal communication means which requires no payment.

Calls made to other areas outside the community is paid for.

- **Waste management:** a filtration farm technology is adopted to recycle liquid waste for landscaping etc. Solid waste dumping area is provided for which is secluded enough to receive collected waste from bins and shouts. Burning is basically the means of disposing off unwanted gabbage.

Rain water is collected via roof system and stored for cleaning and also landscaping.

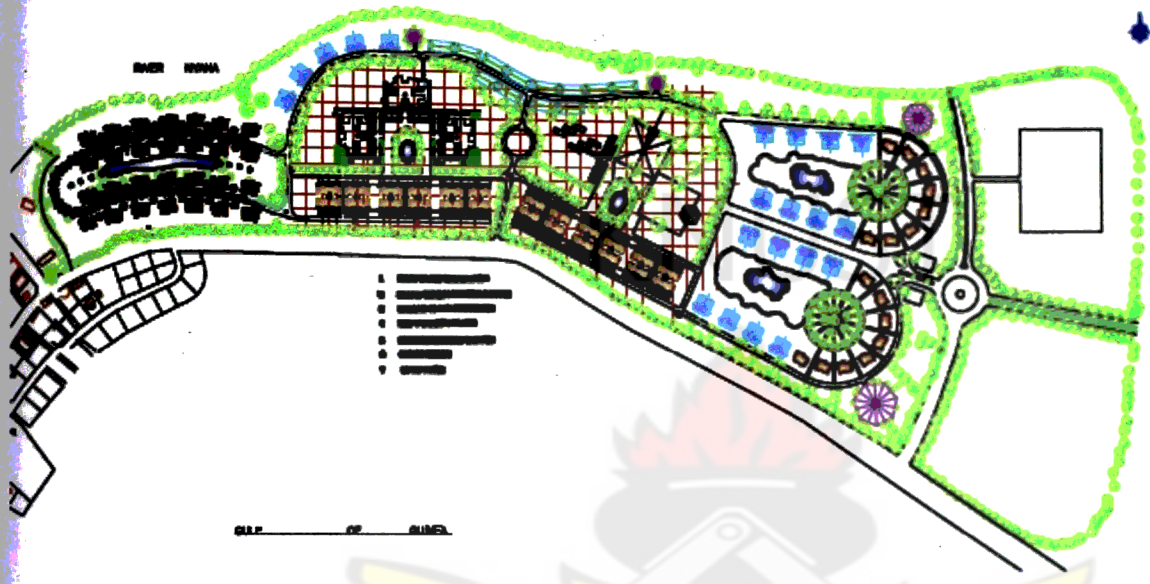
It is cheaper to adopt the use of share septic tanks that are primarily channelled into the major collection point within the filtration farm.

- **Environment conditions management:** good climatic conditions are created by the open spaces around each building or facility to enhance cross ventilation and good natural lighting. The buildings are consciously oriented north-south for these purposes. The individual facilities are raised above the ground (600mm) to prevent flooding. Roads are consiously curved on top to allow for site drainage and 800mm u drains are provided along roads for good drainage.

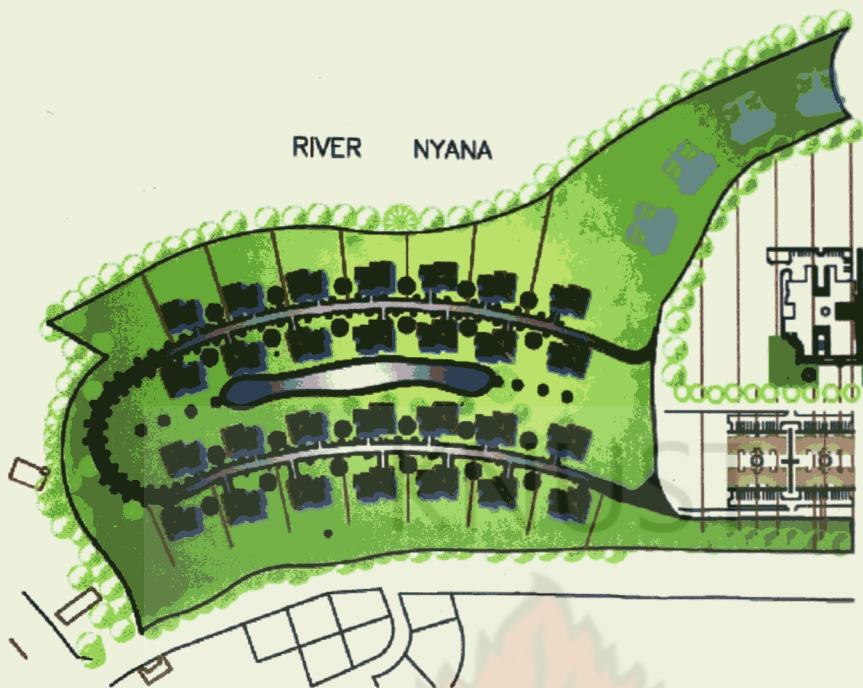
5.5.2 DESIGN CONSIDERATIONS

This was done with the following aspects in mind:

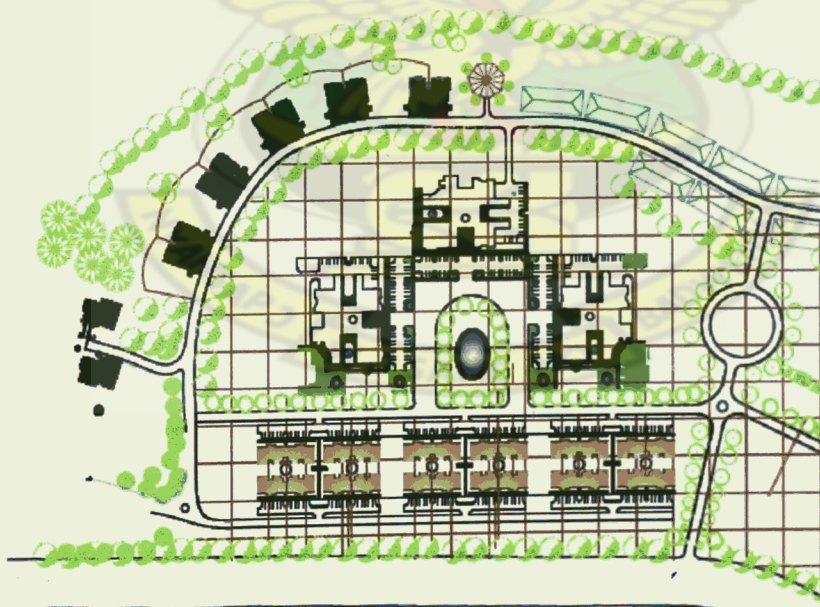
- **Access :** provision of security gates
- **Functionality and circulation**
- **Technology :** materials used and mode of construction
- **Durability:** this considers how sustainable the community is and maintenance activities to keep the community healthy.
- **Efficiency:** this is with respect to designing the entire community to use less energy and cost effective both in building and maintenance.



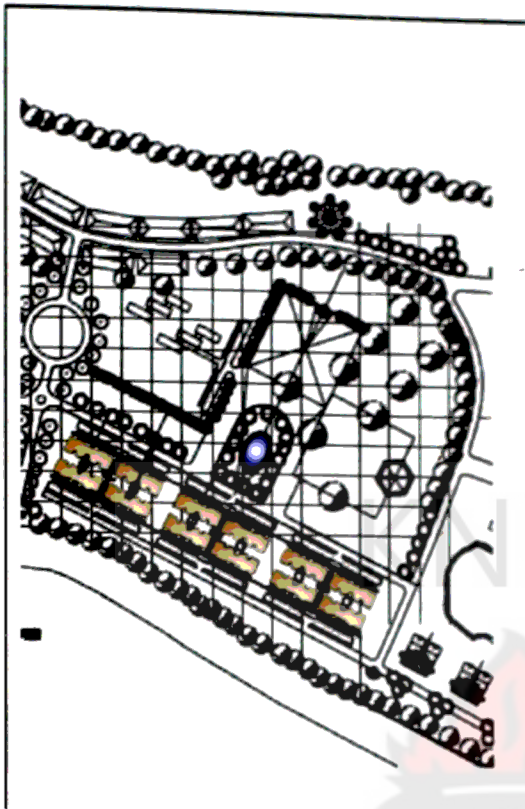
Map 6: Proposed master plan for the mixed use development.



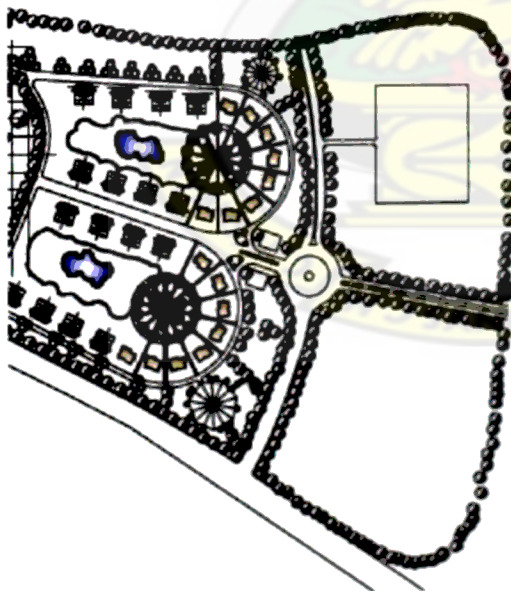
Map 7: Zone 1 of site(residential zone)



Map 8: Zone 2 of site(mixed zone area:residential and commercial)



Map 9: Zone 3 of site(mixed zone area: residential and educational and recreational)



Map 10: Zone 4 of site(residential and second gate security center)

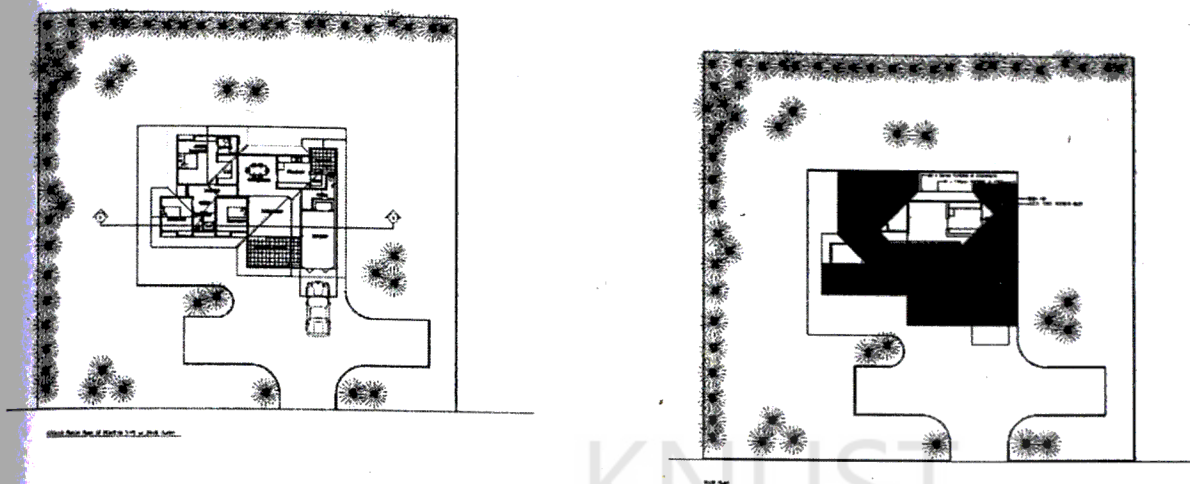


Fig.39 Ground floor plan of housing type 1a (High class).

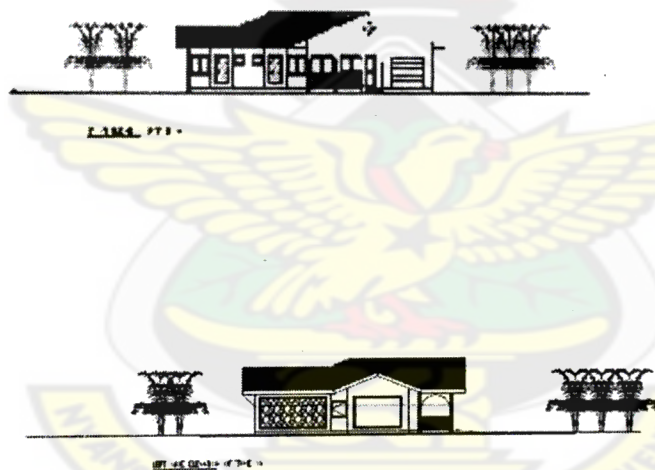


Fig.40 Elevations of housing type 1a.

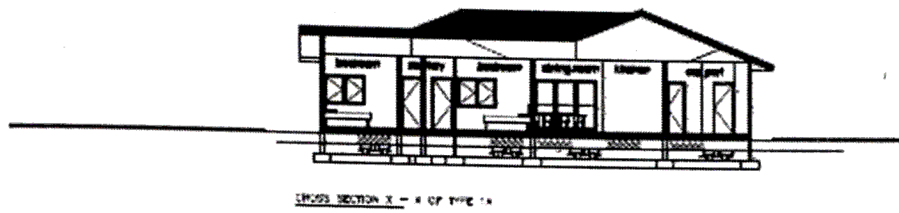


Fig.41 section x-x of housing type 1a

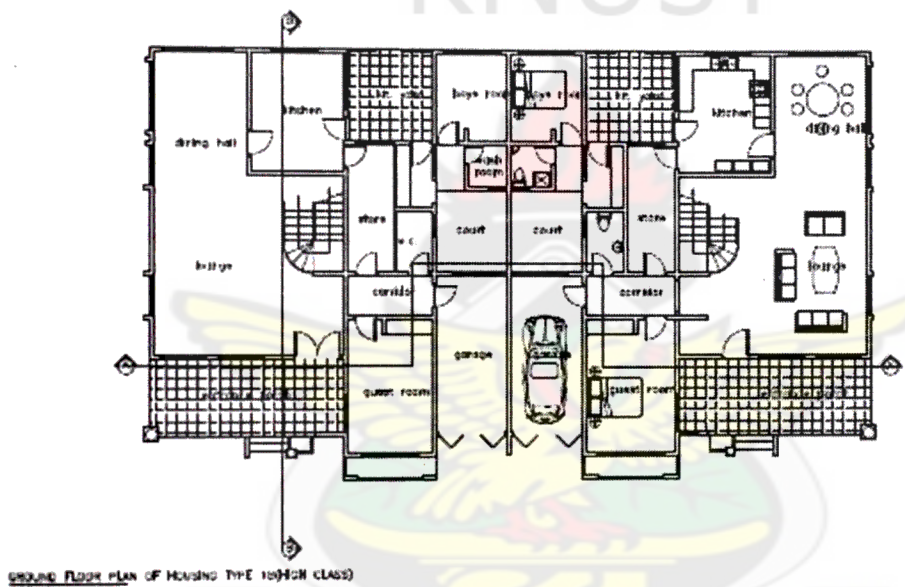
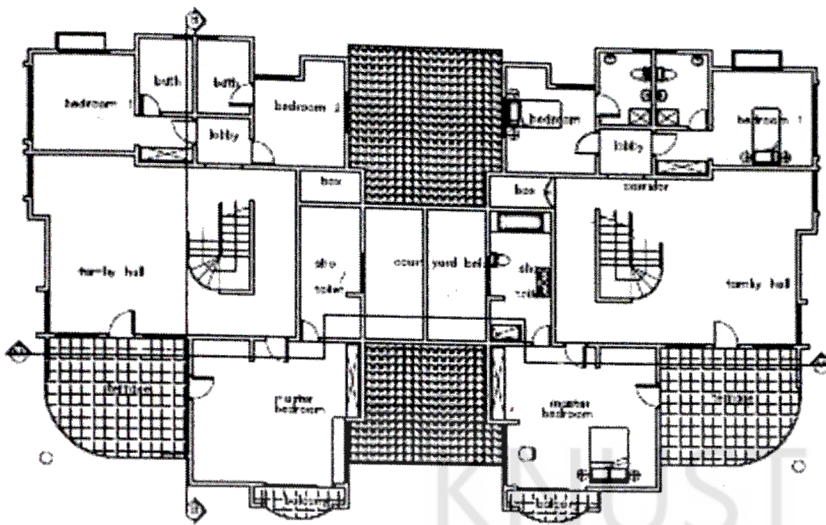
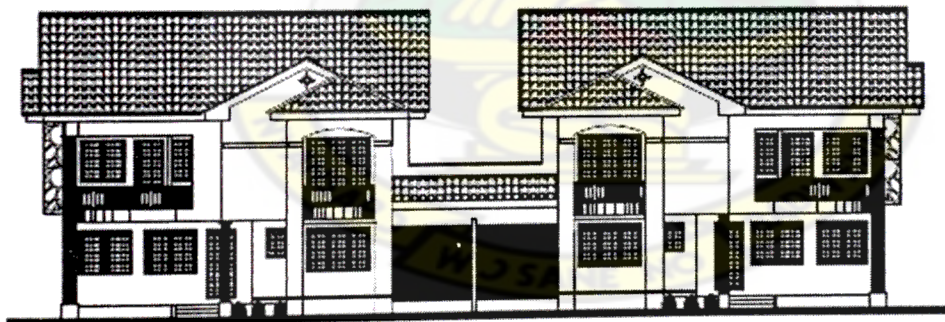


Fig.42 ground floor plan for housing type 1b (semi-detached high class)

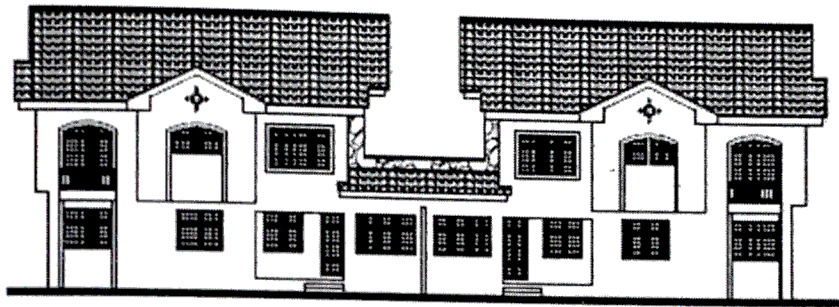


FIRST FLOOR PLAN OF HOUSING TYPE 1b

Fig.43 First floor plan for type 1b(semi-detached)



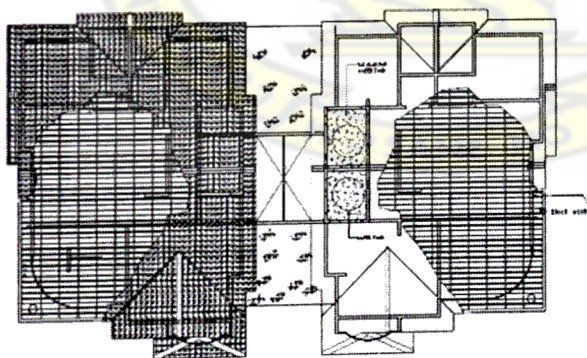
FRONT ELEVATION OF TYPE 1b



REAR ELEVATION OF TYPE 1B



RIGHT SIDE ELEVATION OF TYPE 1B



ROOF PLAN OF TYPE 1B

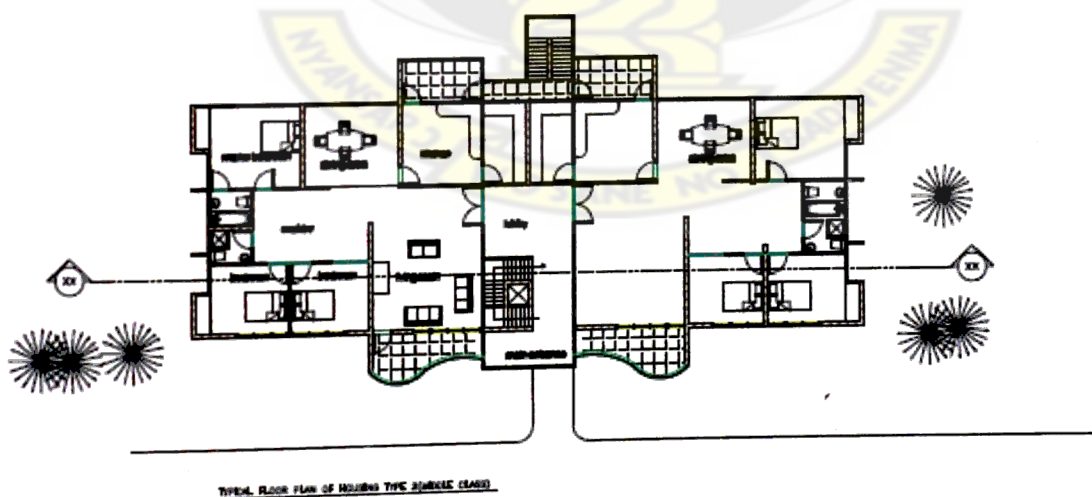
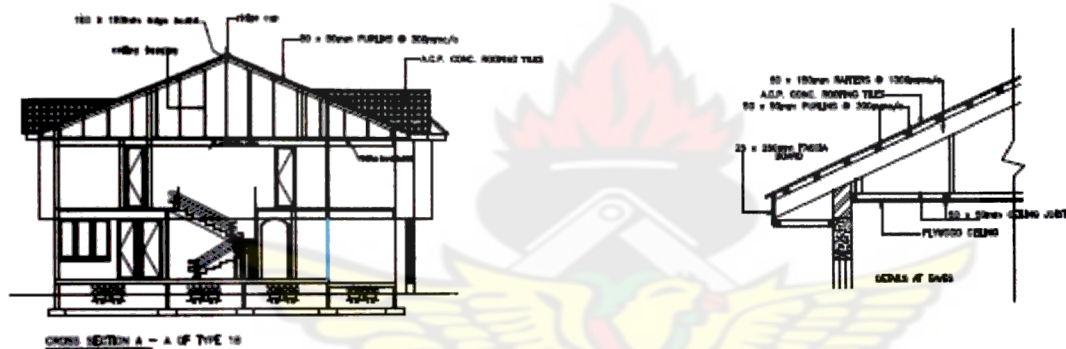
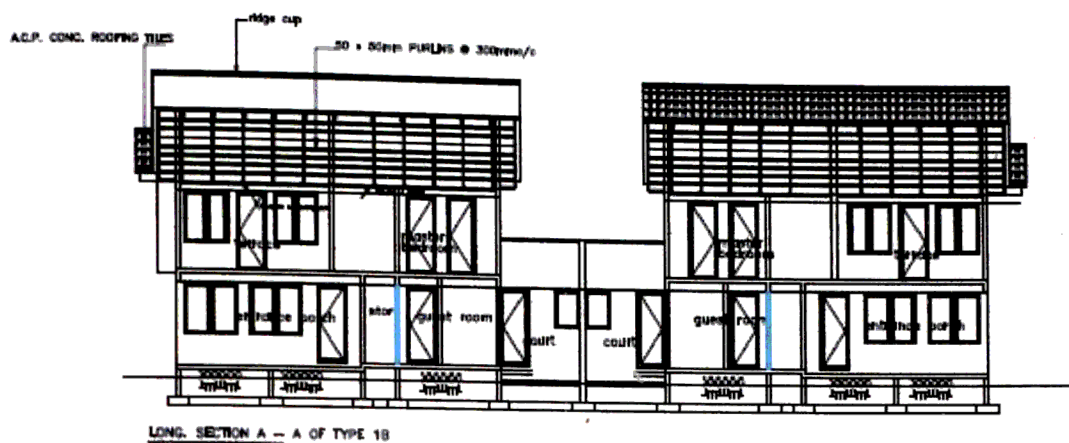


Fig.44 First floor plan for type 2a(semi-detached flats, middle class)



FRONT VIEW OF HOUSING TYPE 2(MIDDLE CLASS)



LEFT VIEW OF HOUSING TYPE 2(MIDDLE CLASS)



SECTION X-X OF HOUSING TYPE 2(MIDDLE CLASS)

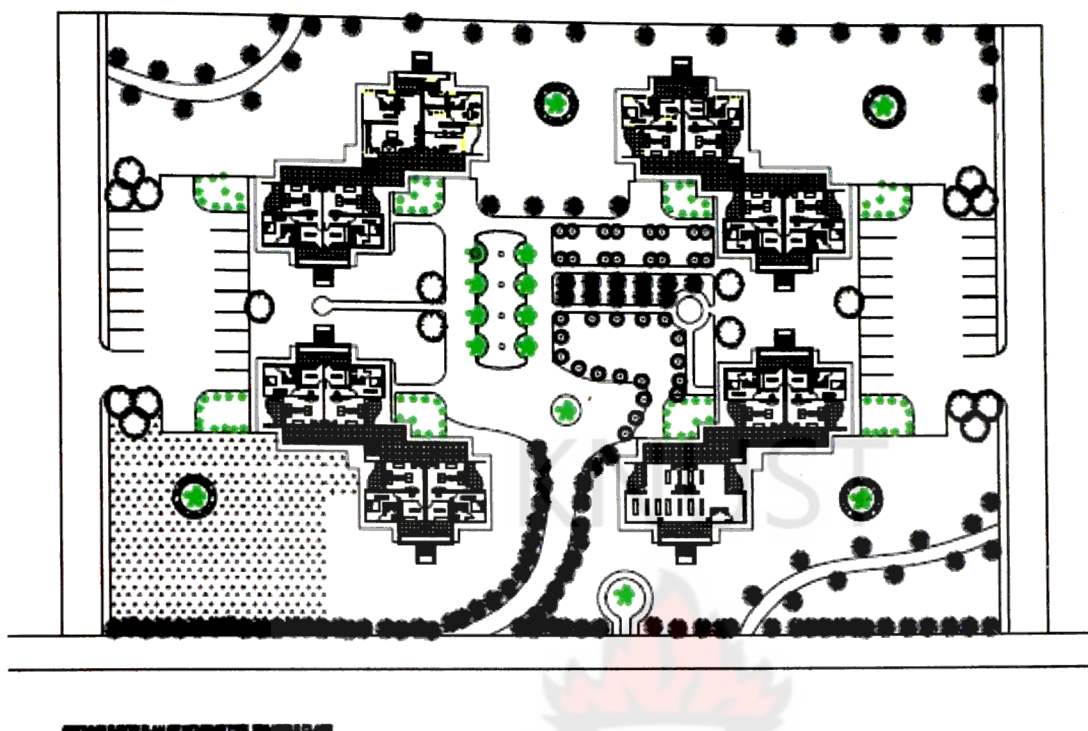


Fig.44 Typical floor plan for type 2b(semi-detached flats middle class)

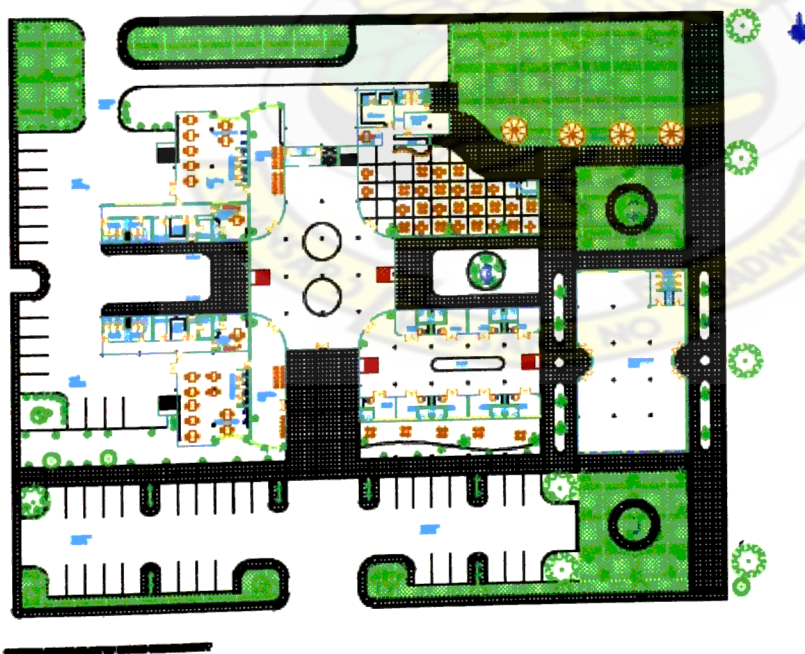
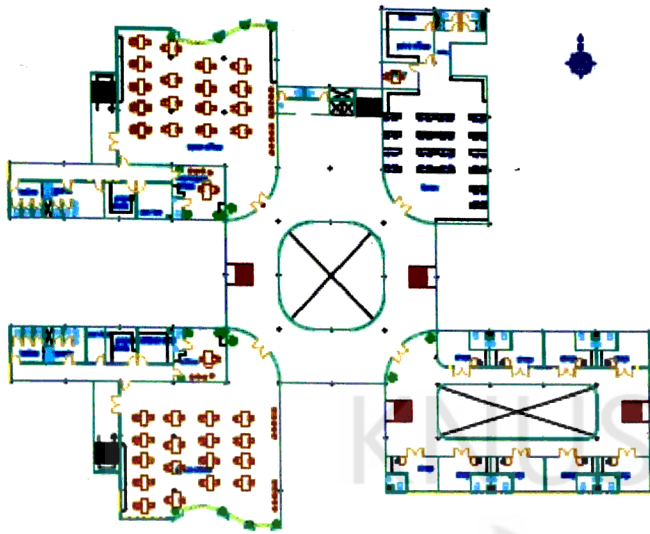
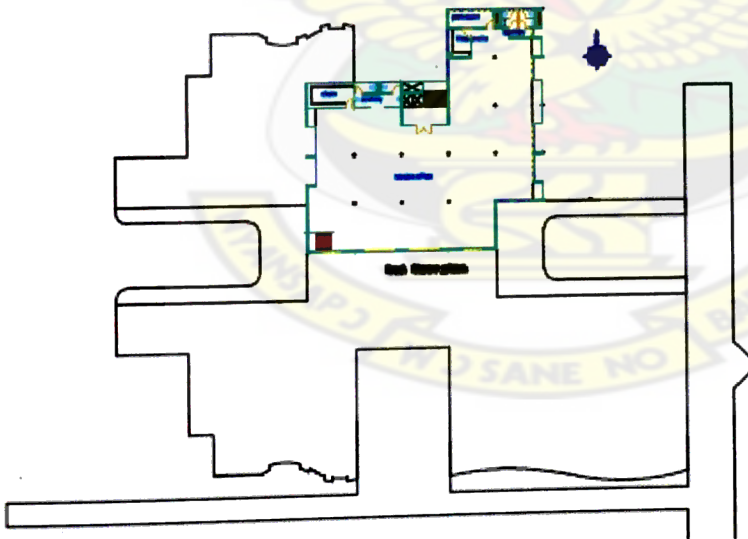


Fig.45 Ground floor plan for type mixed use building.(commercial and civic)



First Floor plan



Second Floor plan

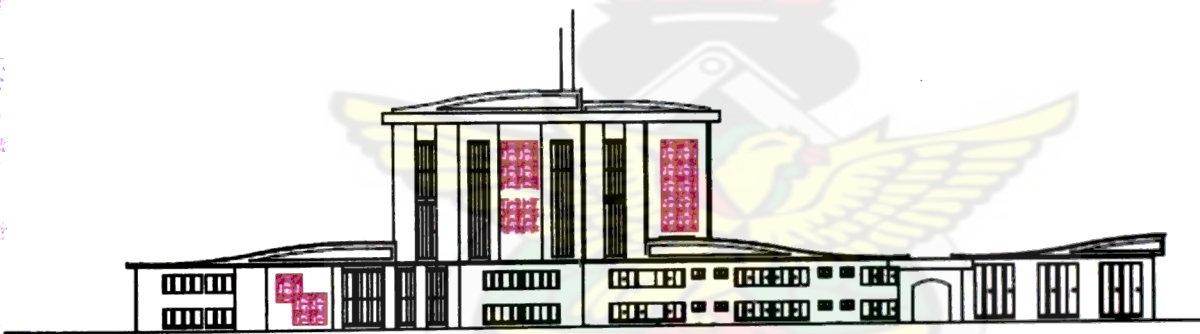


Fig.45 Front elevation of mixed use facility.

MATERIALS, CONSTRUCTION, SERVICES AND LANDSCAPING

5.1 MATERIALS AND FINISHES

Walls

Sandcrete blocks, finished with mortar and emulsion paint are the major wall material. In cases of office spaces and commercial space divides wood partitions are employed.

Sculptural murals of Adinkra Symbols are also employed on some of the wall surfaces for example on the walls of the recreational facilities and the entrances of all the other facilities.

Floors

For residential floors, non slip tiles are the general finish. Some commercial spaces such as let table shops are also finished in tiles. Other commercial spaces, office spaces and recreational interiors are finished with screed and wall to wall carpeting.

Patterned pavement blocks are used for the parking lots as well as connecting walkways in-between facilities and open spaces.

Fenestrations

Doors – Residential facilities have wooden doors, commercial and civic facilities have glass sliding doors as the general make. In decorative spaces as the recreational spaces, a blend of metal and glass doors with ornamentations are used for aesthetic purposes.

Windows – Wooden casement windows for residences, sliding glass windows for commercial and civic buildings. For the recreational spaces, treated and polished wood is used for decorative purposes for windows.

Ceiling – Wooden and Plastic T&G paneling, Plaster Of Paris (P.O.P) are employed as some of the materials used for the ceilings.

Roof

The main roofing system used is the rafter and purling system and finished in burnt clay tiles. For the larger facilities as the mixed use block and the recreational facilities, steel trusses are used and finished in aluminum roofing sheets. Thatch roofs, are used for the outdoor sheds for open spaces. The fascia boards are finished with treated and polished wood.

5.2 STRUCTURAL SYSTEMS

Due to the proximity of this proposed site to the coast, the foundations have extra treated steel reinforcements for strengthening and firmness, and the floors have been insulation with impermeable material to prevent any form of seepage.

A majority of the structures will be done in reinforced concrete post and beam system with non-load bearing infilling members basically of sancrete blocks for external walls.

Much lighter materials as plywood or plastics are used for partitioning large spaces into the necessary rooms needed for occupancy.

The designs will also be within a four meter grid which is necessary to determine the columns spacing.

Structural system of the roof is basically made up of wooden rafter and purlins. This is applied mostly in the residential units. Larger facilities as the mixed use offices, recreational facilities are designed w

5.3 SERVICES

5.3.1 ELECTRICITY

Due to the large extent of proposed site, which is approximately 100 acres, the site is electrically serviced in blocks. These blocks are based on the various zones within the site. The demanding loads of these different zones determine the type and capacity of transformers needed for good and efficient service provision.

5.3.2 LIGHTING AND VENTILATION

Both active and passive lighting is considered in the design. Most of the interiors of the facilities will be lighted with energy saving bulbs and the exteriors of the facilities will employ fluorescent tubes.

Both active and passive ventilation techniques are used in the design. There are installations of fans and air condition systems for some of the interiors though a majority of the spaces are ventilated passively because of the ecological nature of the designs.

5.3.3 INFORMATION SYSTEMS

Provision is made for a wireless mast to provide the facilities as the homes, offices, and shopping areas with wireless internet access and services.

There is a phone system that is basically an intercom service that is used only within the confined environment of the development. Any local call placed within the confined environment of the development is free. Calls placed for external purposes are billed and paid for by the users.

5.3.4 SECURITY CONTROLS

Most of the security controls are mechanical and few electronic ones are employed in various parts of the design.

Security patrols and their respective location stations are employed to effect efficient security checks within and without the site development since, again this development is gated for its purposes.

5.3.5 FIRE

The response to fire was considered right from the initial stages of the design. Building materials thus used are 'fire-friendly' for example the sandcrete blocks.

Again the openings and exit points mainly in highly populated facilities are large enough to allow for easy escape in the event of fire.

5.3.6 SECURITY LIGHTING

There are security lightings at the exteriors of the built up areas especially along the streets, walk ways and the landscaped gardens in and around the site.

5.3.7 SURFACE DRAINAGE

Gutters are provided along the contours of the site which drains water from the site into the main drain. From the main drain, surface run-off and other collected water is collected into a recycling plant that treats dirty water into clean water for the purposes of cleaning and landscape uses but not for drinking.

5.3.8 WATER SUPPLY

Pipe lines are connected from the main streams around the site for clean water.

In addition to this, bore holes are located at strategic places on the site to provide the various zonal units of water. Provision was also made for overhead tanks to store water.

5.4 LANDSCAPE

Hard landscaping

These are in the variety of stone pavements, pavement blocks, stone chippings, curbs etc

Soft landscaping

Different form of trees, shrubs and grass, as well as flowers, were used in the best capacity to protect the surface of the environment and most of all to provide aesthetic features of the development.

5.5 PHASING AND COSTING

There are four major zones in the proposed site, and thus the project will be constructed in phases. The first phase deals with the construction of the main mixed used buildings that contain the offices and its supporting spaces, as well as the guest houses to house the primary workers on site. This portion is zone two. As construction works are extensive on zone two, work will be started in zone one and four which are primarily housing areas. Zone three (supporting facilities as the school and the recreational spaces) will be initiated as work is completed in zone two.

CONCLUSION:

In an attempt to provide a work and live conducive environment for the number of Vitol oil workers and properly other oil workers and their dependants, a number of mixed use facilities and single use facilities have been proposed on the Princess Town site approximately 65km offshore.

These facilities are believed to be managed by Vitol oil company and other prominent oil companies that will be resident on the site.



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