KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

College of Architecture and Planning

Department of Architecture

DESIGN THESIS

SUAME MAGAZINE URBAN REDEVELOPMENT

(AUTO MACHANIC HEAVY DUTY EQUIPMENT REPAIRS)

(KUMASI)

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2009

DECLARATION

I hereby declare that this submission my own work towards the P.G. Diploma and that to the best of my knowledge 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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DEDICATION

This book is dedicated to almighty God, for given my life, strength and encouragement throughout my education.

ACKNOWLEDGEMENT

I wish to acknowledge my indebtedness to the Almighty God for his divine protection and assistance throughout my education.

I am also grateful to my lecturer and supervisor Mr. Eddy Botchway for his patience, constructive criticisms and valuable suggestions, which have made this, project a reality.

I am also grateful to the administration of Mantrac Kumasi Adum I say a big thank you for all the information you gave me in the research process. You have really been of a great help.

My sincere and uttermost appreciation finally goes to my parents Mr. and Mrs. Blay, my brothers and sisters, - Theresa Afriyie, for their relentless support and prayers. God bless you all.

ABSTRACT

Auto mechanics as it stands now has undergone numerous degrees of phases and changes over the years as man made one discovery after the other. The various stages of mans development in descriptive terms meant an agglomeration of certain types of goods and services within that particular era, which also can be interpreted into various systems and mechanisms of exchange within time and space.

Auto mechanic activities within the whole country – (Kumasi Suame Magazine) has developed to the stage whereby earth moving equipment which once used to be enjoyable and highly safe to use has now become a much dreaded experience due to leak of artisans in the country, low technical knowhow, and its negative socio-economic and health implications.

The thesis aims at solving or reducing this existing menace by providing the public with an alternative unit – one stop heavy duty equipment auto mechanical shops, which is designed principally to satisfy the needs of both the industrial companies and the prospective spare part seller. This outfit by design solves the problems of circulation, ventilation, lighting, storage spaces etc.

For this reason and more, this project is sited at Suame Magazine Kumasi. This means that prospective customers and sellers are really taken away from the congested zone to a less congested zone where commerce can go on with minimal spacial restrictions.

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CHAPTER ONE

1.0 INTRODUCTION

Urban, city, and town planning is the integration of the disciplines of land use planning and transport planning, to explore a very wide range of aspects of the built and social environments of urbanized municipalities and communities. Regional planning deals with a still larger environment at a less detailed level.

Base upon the origins of urban planning from the Roman (pre-dark ages) era, the current discipline revisits the synergy of the discipline of urban planning, architecture and landscape architecture. However, most settlements and cities reflect various degrees of forethought and a conscious design in their layout and functioning. The development of technology, particularly the discovery of agriculture, before the beginning of recorded history facilitated larges populations than the very small communities, and may have compelled the development of stronger, more coercive governments at the same time. The pre-classical and classical ages saw a number of cities laid out according to fixed plans, though many tended to develop organiselly. The study focuses on Suame magazine urban redevelopment as Suame magazine in itself is an industrial area. The development unit of Suame magazine, has led services of the mining industry, private company, and individual vehicle. SMIDO is the organization which is now running the whole industry area which is Suame Magazine Industrial Development Organization.

1.1 Problem statement

Suame magazine is engineering cluster settlement located in Kumasi, Ghana with a working population of over 200,000 people. Magazine emerged as an industrial estate in the 1930's and it's present area spans 20 square miles. Their main activities are vehicle repair, spare parts sales and metal fabrication such as welding and casting. The working population of suame magazine is considered to working in the informal sector live in poverty. Their activities were limited to certain aspect of technology and should be trained to expand their capability.

Appropriate technological innovation is not up graded, partnership, and marketing and enhance investment opportunities to establish the estate as the main to industrial propelling sector of Ghana and technological hub of West Africa.

1.2 Justification of Study

Mechanics are skilled workers who repair and maintain machinery. Most youth in our country after their basic education, they end their educational career but need to learn a trade to prevent any streetism, and criminalism in our country. Suame magazine as an industrial area was developed by a few number of two blacksmith and mechanics in Kumasi. Due to lack of intellectual urban industrial planning, the area organically grew up without any checks or monitoring. Suame magazine need a will organized layout and vehicle assembling centre to help artisan move, work, and transact business successfully for people of Kumasi Ghana. There are approximately 12,000 independent micro, small and medium sized enterprises located in the area whose main activities are vehicle repair, spare parts sales and metal fabrication such as welding and casting. The government of Ghana estimates that 25% of people working in the informal sector live in poverty. The entrepreneurs on this magazine industrial estates are renowned for

their ingenuity and their services are patronized by customers in the West African sub- region notably cote d'Ivore, Burkina Faso, Mali, Niger etc.

1.3 SCOPE

Suame magazine industrial estate need a will plan industrial urban setting to give a flow of urbanism for people in Kumasi and Ghanaian as a whole. A proposed heavy duty vehicle repairs should be considered and analyzed with respect to the various techniques.

Things to be considered:

- Socio economic values of the people.
- Willingness to participate as the study is going on.

1.4 OBJECTIVES

The objectives of this study are in general and specific objectives:

Generally, the aim of this study is

- To identify opportunities of Suame magazine as the urban industrial estate.
- To assess obstruction relevant to urban industries.
- To study the advantages and disadvantage of the present method of earth moving machines in Ghana.

1.5 METHODOLOGY:

- The study needs questionnaire to facilitate information from the study area, institutional and commercial operators.

- Personal interviews will be conduct to collect data from artisan, the vehicle repair shops, and spare part shops.
- Sketches and photographs will be taken throughout the study.
- The study will be approached from different direction, namely, commercial operators and institutional that is the K. M .A, SMIDO.

1.6 SITE LOCATION:

Suame magazine

1.7 CLIENT:

KMA and Mantrac.

1.8 SPONSORS:

The project is been sponsored by Ghana government and Mantrac Ghana limited.

1.9 TARGET GROUP:

Earth moving machine centre is expected to meet the need of the following groups of people.

- Building and road Construction Companies.
- Mining companies.
- Harbor.
- Bulk braking facilities

CHAPTER TWO

2.0 LITERATURE REVIEW

The history of machines dates back thousands of years. Although the date of the first use of simple machines is not known, the lever is believed to be the first simple machine that was utilized by humans. However, someone choosing a long, gradual approach up a mountain rather than walking up a steeper, shorter path would have been taking advantage of an inclined plane. The first levers were probably branches or logs used to lift heavy objects. People used a counterbalanced lever called a shadoof in ancient Egypt for lifting irrigation water. People also used such a device for lifting soldiers over battlements. Metal or stone wedges have been used since ancient times for splitting wood. People used wooden wedges to split rocks by placing dry wooden wedges into cracks in rocks and then allowing the wedges to swell by absorbing water. Historians believe the people of ancient Mesopotamia (an early civilization near modern-day Iraq) used wheels as early as 3500 BC. Chariots in Asia Minor used spoked wheels, which were lighter than solid wheels, as early as 2000 BC. The Greek inventor Archimedes (287-212 BC) developed a screw-type device known as Archimedes' screw for raising water. Some modern water pumps still use this principle. According to legend, Archimedes also used a block and tackle to pull ships onto dry land.

Machines can transform natural energy, such as wind and falling water, into work. Waterwheels, first used in ancient Greece and Rome, and later adopted by Europeans in the 12th century, used the water falling from a waterfall to turn large wheels (*see* Waterpower). The windmill also uses the same wheel and axle principle to magnify and change the direction of force to do work. Grinding wheels connected to waterwheels can grind grain for making flour or power large saws

for sawing wood. Pumps connected to windmills transform the rotary motion of a windmill into reciprocating (back and forth) motion, which is used to pump water from the ground. Waterwheels and windmills can also be connected to electrical generators to produce electricity.

Complicated machines such as the power loom (patented in 1786) helped cultivate the improvements seen in Great Britain during the first Industrial Revolution at the end of the 18th century. Later Industrial Revolutions elsewhere brought about the invention of even more complex machines, such as the cotton gin (used to separate cotton fibers from seeds), the mechanical reaper (used to cut grain), and the automobile. Some complex machines are very complicated. An automobile is one such machine. The engine contains many levers, wheels and axles, and pulleys. The whole engine is held together by threaded bolts, which are a form of inclined plane. The transmission uses gears, which are a form of wheel and axle with specially shaped teeth on the outside of the wheels. Two gears fit together and transfer force and power from one gear shaft to another. By choosing the size of the gears, the speed and direction of the rotation of the axles can be controlled.

2.1 HEAVY DUTY EQUIPMENT

There are many different opinions as to what machines should actually be classified as earth moving equipment. There are many different types of equipment that fall in this category, such as excavators, backhoe loaders, dump trucks, and even loaders. Other machinery that falls in between are articulated trucks, wheel and track tractors, and even scrapers. The thin line is normally drawn at motor grades, which are more than capable or light duty excavation, although they are mainly used to level lots and grade roads. If you take a glance at any equipment literature from leading companies such as CAT, Komatsu, or Case, you'll see right away that

they believe the biggest and most important change over the last several years is increased productivity. This is normally followed by greater comfort and safety. The increase in productivity is the result of many different advancements. CAT (Caterpillar) cites that more powerful engines with a faster rise in torque which allows machines to respond faster to increased power demands. Even though this new generation is far more powerful, it has a reduced impact on the environment as well.

Figure 1 Shows typical bulldozer with blade.

Figure 2 Bulldozers showing how it ripped ground

Figure 3 showing Bulldozer crawler on site

2.2 Dump truck

A dump truck or production truck is a truck used for transporting loose material (such as sand, gravel, or dirt) for construction. A typical dump truck is equipped with a hydraulically operated open-box bed hinged at the rear, the front of which can be lifted up to allow the contents to be deposited on the ground behind the truck at the site of delivery. In the UK the term applies to off-road construction plant only, and the road vehicle is known as a tipper or tipper lorry.

Figure 4 shows another kind of 8x4 dump truck: three rear (two powered) axles

Figure 5 shows articulated dump truck

Figure 6 shows example of a transfer truck and trailer

Figure 7 showing example of a Superdump body and trailing axle

Figure 8 shows end dump trailer.

2.2.0. Semi trailer end dump truck

A semi end dump is a tractor-trailer combination wherein the trailer itself contains the hydraulic hoist. A typical semi end dump has a 3-axle tractor pulling a 2-axle semi-trailer. The key advantage of a semi end dump is rapid unloading. A key disadvantage is that they are very unstable when raised in the dumping position limiting their use in many applications where the dumping location is uneven or off level.

Figure 9 shows bottom dump trailer.

2.3 Crane (machine)

A crane is a lifting machine equipped with a winder (also called wire rope drum), wire ropes or chains and sheaves that can be used both to lift and lower materials and to move them horizontally. It uses one or more simple machines to create mechanical advantage and thus move loads beyond the normal capability of a human. Cranes are commonly employed in the transport industry for the loading and unloading of freight; in the construction industry for the movement of materials; and in the manufacturing industry for the assembling of heavy equipment.

Figure 10 shows rough Terrain crane

Figure 11 shows self erected crane figure 12 shows level luffing crane

2.4 Forklift truck

A forklift (also called a lift truck, a high low, a stacker-truck, or a sideloader) is a powered industrial truck used to lift and transport materials. The modern forklift was developed in the 1920s by various companies including the transmission manufacturing company Clark and the hoist company Yale & Towne Manufacturing.[1] The forklift has since become an indispensable piece of equipment in manufacturing and warehousing operations.

Figure 13 shows forklift

The following is a list of the more common lift truck types. It is arranged from the smallest type of lift to largest:

- Hand pallet truck
- Walkie low lift truck (powered pallet truck, usually electrically powered)
- Rider low lift truck
- Towing tractor
- Walkie stacker
- Rider stacker

2.5 Tractor

A tractor is a vehicle specifically designed to deliver a high tractive effort at slow speeds, for the purposes of hauling a trailer or machinery used in agriculture or construction. Most commonly, the term is used to describe the distinctive farm vehicle: agricultural implements may be towed

behind or mounted on the tractor, and the tractor may also provide a source of power if the implement is mechanised. Another common use of the term is for the power unit of a semi-trailer truck. The word *tractor* was taken from Latin, being the agent noun of trahere "to pull". The first recorded use of the word meaning "an engine or vehicle for pulling wagons or ploughs" occurred in 1901, displacing the earlier term traction *engine* (1859). The first tractors were steam-powered ploughing engines. They were used in pairs either side of a field to haul a plough back and forth between them using a wire cable.

Figure 14 shows hawser brand modular subsoiler mounted to a tractor

Figure shows broadcast seeder mounted to a Kubota Compact Utility Tractor

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This deals with the methodology and the instruments used for the study. The chapter is organized under such topics as research design, library research, and population, sampling techniques and sample instrumentation, validity, reliability, administration of questionnaire, primary and secondary sources of data, data collecting procedures and data analysis plan.

3.2 Research Design

Best J.W. (1981) examines Qualitative Descriptive Research as a method, which uses quantitative methods to describe the data. It is also used in describing, recording, analyzing and interpreting conditions that exist .It involves some types of comparison or contrast and attempts to discover relationship between existing non manipulated variables. Quantitative Data analysis was used to describe the results of the study.

The descriptive research allowed the researcher in the collection of data and the analysis of the data using quantitative data analysis. The method enabled the researcher to produce a descriptive and analytical report that can be interpreted and put into good use. This Qualitative Descriptive Research was used to design the questionnaire in a structured and semi-structured questionnaire to collect data.

3.3 University and departmental libraries

The Researcher will visit the following Libraries to find information on the study; The KNUST Main Library, The College of Architecture Library, The Department of Architecture Library, (KNUST), Department of Planning library and Institute of housing and settlement studies library will be visited for the research. In all the libraries, great efforts will be made to collect the secondary data. The information will help me review the related literature.

3.4 Population

The target population for the study comprises all technicians in the fitting area of the Suame Magazine. Out of the many technicians, those at the fitting area will be selected for the study.

(A) Master technician in the auto repair industry at the Suame Magazine.

(B) Apprentice technician in the auto repair industry.

1. Category A - Master technicians in the repair industry..... (250)
2. Category B - Apprentices technician ..... (1500)

Total = 1750 Respondents

The total population for this research will therefore be One hundred (1750) respondents.

3.5 Sample and Sampling Technique

The sample of the study would be collected from auto fitting area , out of a target population of about two thousand (2000) people, thousand two hundred (1200) would be selected for the study.

The reason for the targeted thousand two hundred is that, out of the two hundred(200) workshops that will be visited, ten(10) technicians averagely in each workshop will be selected and averagely one master technician in each workshop that will be visited.

The sampling techniques used will be simple random and stratified random sampling to select participants for the study. On the selection of technicians, papers on which "yes" were written to the required number with a few "no" would be folded and put in a basket. This would be well shuffled for technicians to pick.

At the end, five apprentice's technicians would be selected from each workshop and one master apprentice making it a total of six for each workshop. On the whole, six technicians, multiplied by the total number of workshops that would be visited will amount to the total sampling size.

3.6 Instrumentation

- Photographic recordings

Photographs to critical activities at Suame Magazine were taken during the documentation of the existing situation to help me analyze strategic activities, the use of spaces and appreciate the visual impression of the area.

- Measured Drawings

Measured drawings of existing repairs' centre's were documented during various case studies to appreciate the square areas of the working spaces

3.7 Validation

The items chosen would be vetted by the supervisor and those found to be irrelevant would be rejected and others modified. The items in each questionnaire would be carefully chosen to establish both face and content validity. After screening and vetting by mates and other people concerned, the supervisor would finally approve the instrument.

3.8 Internet sourcing

I will employ the use of internet to get some of the primary data. I will use search engines such as Google.com and others.

3.9 Pilot Study

After the validation of the questionnaires was established, copies were printed and administered to six (40) apprentice technician and (5) master technician at Ahinsan Bonsum fitting area. The objective of the pilot study was to find out how the technician would understand the items and respond to them. Items that were poorly responded to were considered ambiguous and therefore reframed.

3.10 Administration of Questionnaire

For maximum response rate and effective collection of the questionnaire, it was administered personally. The researcher obtained an introductory letter from the Head of Department: Architecture, to be sent to the fitting area of magazine, a date was set for the administration. On the fixed date, copies of the questionnaire were administered. In order to obtain appropriate responses from the respondents, the instructions were explained to them. They were allowed

sometime to respond to the questionnaire. The researcher collected all the copies of questionnaire distributed from the technician.

3.11 Primary and Secondary Sources of Data

The primary data was solicited from apprentice technician and master technician. This consists of sixty (1000) technician apprentice and (200) master technician. The secondary data was collected mostly from documentary sources (books, publications, periodicals and unpublished thesis). In all the places visited, great efforts were made to collect the necessary data. Data collected from the field and libraries was assembled, synthesized, critically evaluated (analyzed), translated and conclusions drawn from them. The information was described and presented in descriptive form, tables, figures and charts in the thesis.

3.12 Data Analysis Plan

The data collected was coded and entered into the computer. They were analyzed by the researcher who converted the response entered into frequency counts, charts and percentages for analysis.

3.13 Limitation

There was the problem of finding a lot of current books on Suame Magazine at the university library. Some was of the information I got on the internet was difficult to understand since we didn't have such kind of glass in our environment. I talked to practicing architects but couldn't give me much information on the subject matter. Some workers at Suame Magazine were very busy and could not answer my questionnaire; others too wanted me to pay them before they answer the question

CHAPER FOUR

FINDING AND DISCUSSION

DOCUMENTATION OF EXISTING SITUATION AT SUAME MAGAZINE

4.1 SOCIAL CULTURE

Introduction

Suame is a major suburb in Kumasi. "suame magazine" (sm) is a huge sprawl somewhat plastered centray across a huge swathe of Kumasi's middle. As far as most folks can remember, sm has been an amazing labyrinth of garages, workshops, tool shacks, machine mini-marts, outdoor laboratories, greasy foundries, and assorted furnaces-on-wheels. It is a place awash with urban myth, and steeped in a changeless flux of activity.

Some 20,000 artisans, salespeople, technicians, and garage operators – the four main classes of inhabitant - supply the ceaseless buzz, and sustain sm's formidable reputation as the shop that never lacks. regardless your mechanical woe, particularly if it is auto-related, rest assured that a cure is lurking somewhere in the nooks and crannies of suame magazine.

Aerial view of Suame magazine

4.2 Justification

kumasi suami magazine since its existence, have played a major role in the transportation industry for the country as a whole.it serve as a solution center for about 90% of the vehicles on our roads.as a result of this,we deem it worth studying to up lift the image of swame magazine to enable it play it role in the modern environ.

4.2.1 Area of study

- Historical development
- population dynamics
- religious activities
- educational levels
- leisure and entertainment

4.3 Historical development

4.3.1 Origin of suame magazine

the term 'magazine' is a historical reference to military armories (or magazines) that were locate d in the area during colonialsuame magazine originally emerged in the 1930s and experienced si gnificant population growth in the 1950s and 1960s as a result of the removal of businesses from the city centre of Kumasi. Growth of the magazine was spurned again in the mid-1970s when re strictions were imposed on importation of new vehicles and parts. While some large enterprises s uffered, the small enterprises of suame magazine filled the gap that the policy created by craftin g spare parts that were originally imported

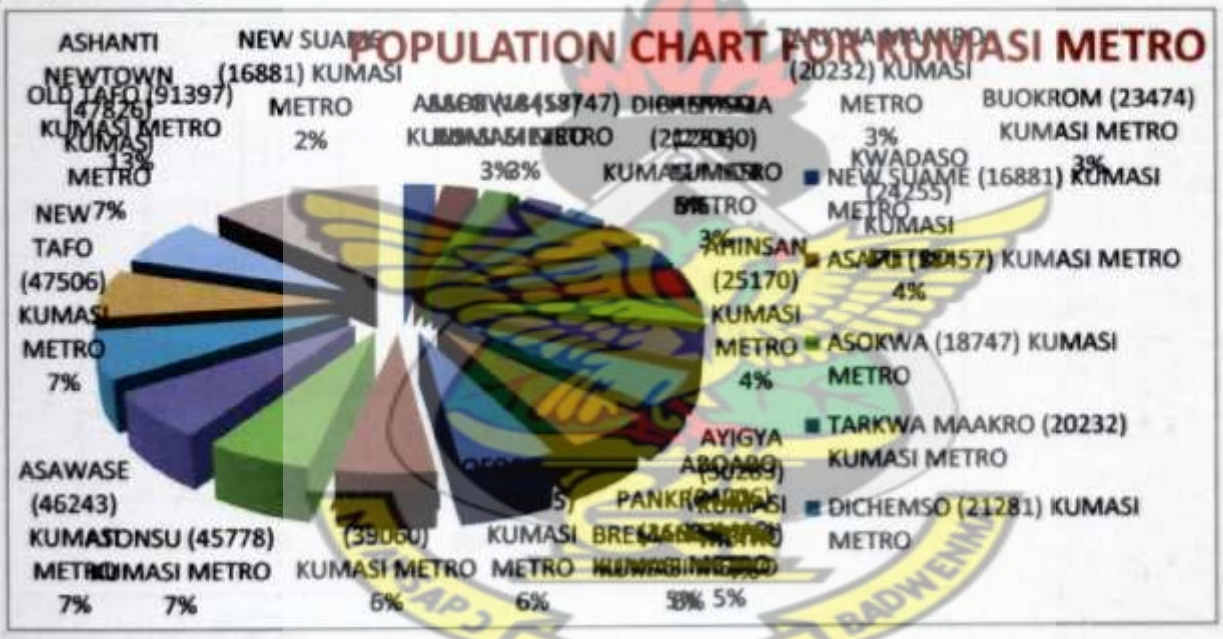
4.3.2 The transition

In 1983, under the guidance of the world bank and international monetary fund, the government of Ghana launched the economic recovery programme as an effort to reduce ghana's debt and im prove trading practices. As part of this initiative, the restriction on importation of vehicles an d parts were removed. Some large enterprises were able to re-establish themselves but now comp eted against the small enterprises in Suame magazine which had developed expertise.

4.3.3 Suame magazine today

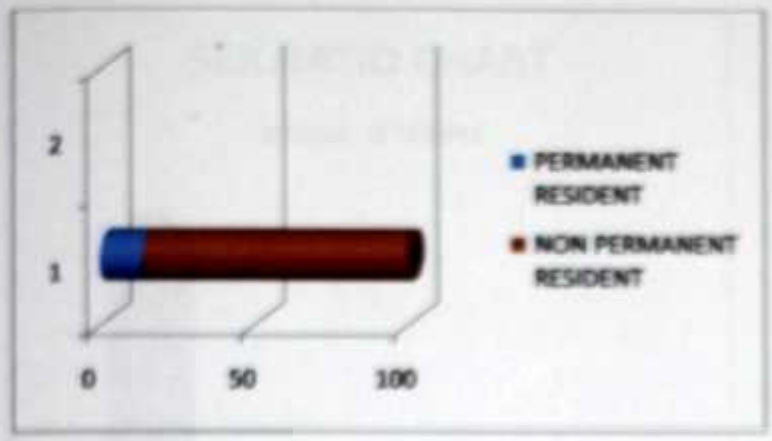
Today, Suame magazine has a working population of over 200,000 and approximately 12,000 shop-owning .Suame magazine is an artisanal engineering cluster spanning 20 square miles located in Kumasi, Ghana.

Population dynamics



Source: Author's field survey, 2009

Chart 1 showing the population of Kumasi metro

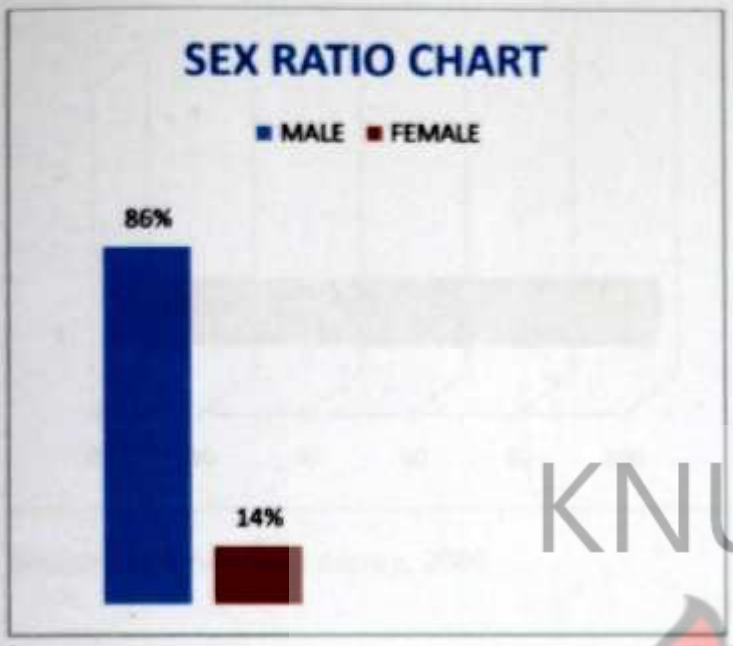


Source: Author's field survey, 2009

Chart 2 showing the population of permanent to non permanent population at Suame magazine

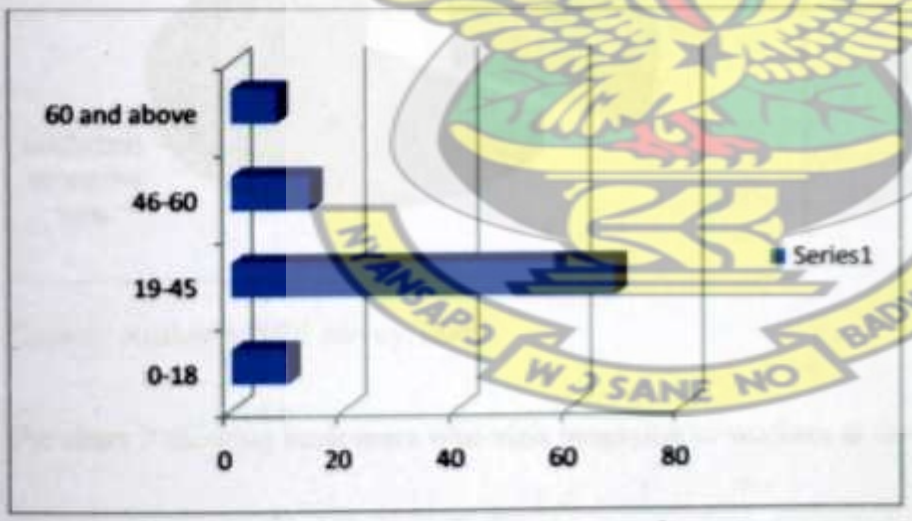
Source: Author's field survey, 2009

Chart 3 showing population of Kumasi metro to population of Suame magazine



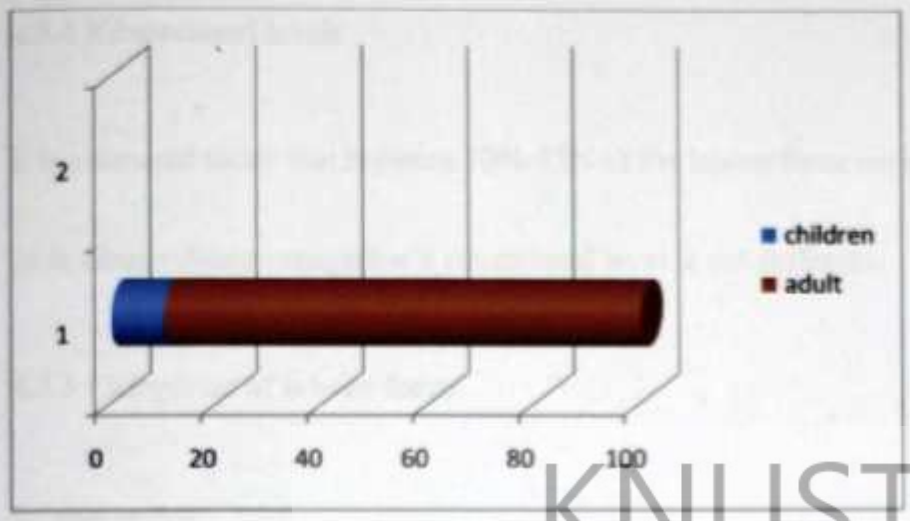
Source: Author's field survey, 2009

Chart 4 depicts male to female at Suame magazine



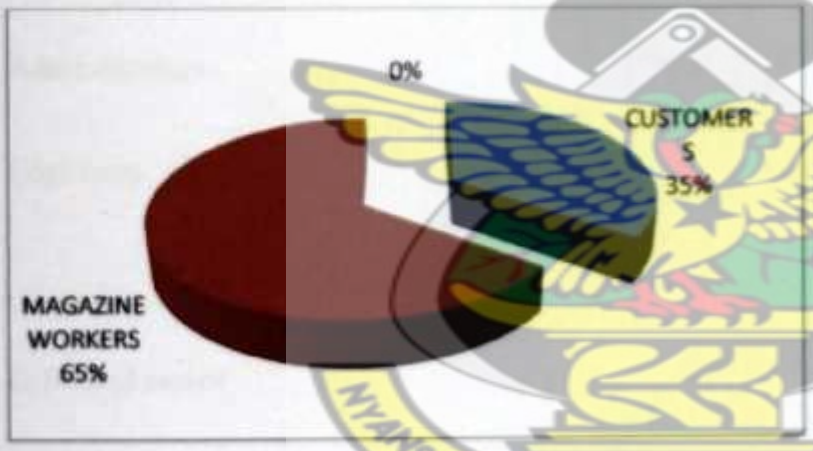
Source: Author's field survey, 2009

Bar chart 5 showing age distribution of the population at Suame magazine



Source: Author's field survey, 2009

Chart 6 showing children to adult of Suame magazine's population



Source: Author's field survey, 2009

Pie chart 7 showing customers who visit magazine to workers at the magazine

4.3.4 Educational levels

It is estimated today that between 70%-75% of the labour force are employed in the informal sect or in Ghana .Suame magazine's educational level is not defferent.

4.3.5 Categories of labour force

formal sector

Bankers

Health workers

Administrators

Engineers

Informal sector

Shop owners attendants

Whole sellers

Petty traders

Spare parts dealers

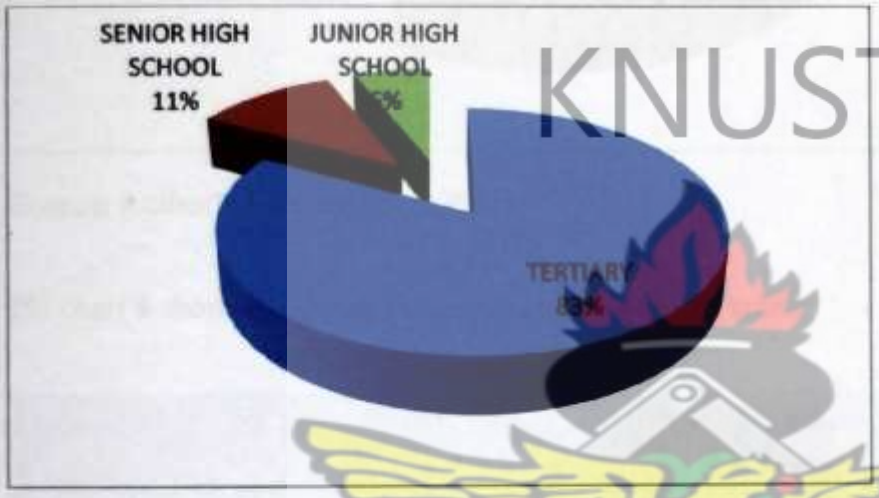
Mechanics

Fabricators

Hawkers

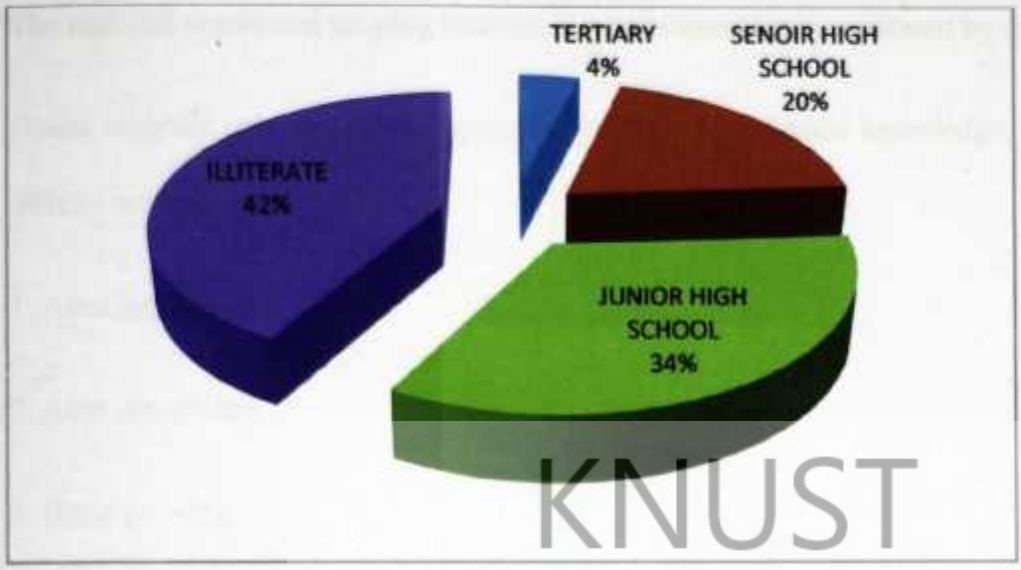
Food sellers

Artisans



Source: Author's field survey, 2009

Pie chart 7 showing educational levels in the formal sector



Source: Author's field survey, 2009

Pie chart 8 showing educational levels in the informal sector

Source: Author's field survey, 2009

Figure 16 showing of both the formal and informal sector

The national vocational training institute is a vocational center operated by the government of Ghana with the sole aim of equipping the youth with technical knowledge. Some of the courses offered are

1. Auto mechanics

2. Auto electrician

3. Basic printing

4. Auto body works

Source: Author's field survey, 2009

Figure 17 showing NVTI tainting school

The Suame magazine industrial development organization (SMIDO) has the vision of moving the magazine from the ancient way to the modern way of repairs. This vision led them to the establishment of

a training school called Suame magazine automatics training center. It was recently opened by the Vice President of Ghana, His Excellency John Mahama.

Source: Author's field survey, 2009

Figure 18 of SMIDO automatics training center

Religion

Source: Author's field survey, 2009

Chart 9 showing religion distributions

Source: Author's field survey, 2009

Figure 19 showing Methodist church-Suame

The Methodist church occupies their own land and therefore have been able to developed it to suite their purpose.

Source: Author's field survey, 2009

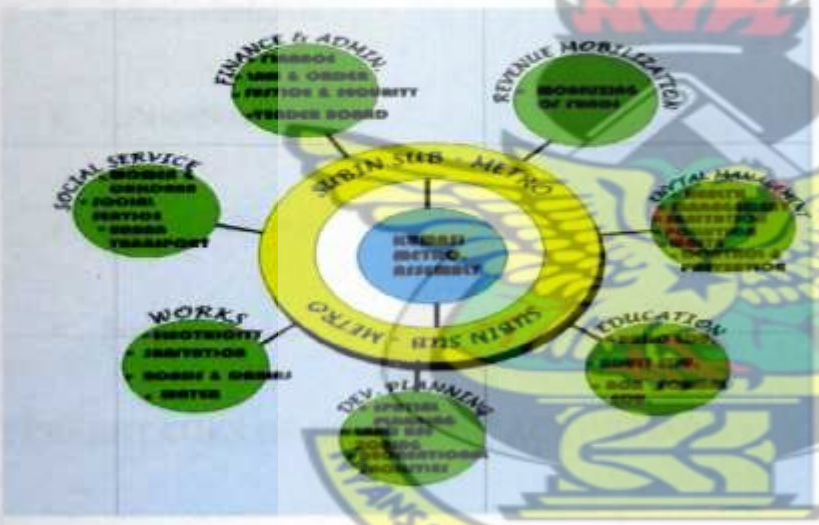
Figure 20 showing Love chapel-Suame

The love chapel which is a charismatic church is on a rented apartment on the 2nd floor of a mixed use building of which the first two floors are shops.

4.3.6 Social control and administration

The Kumasi metropolitan assembly is the central core of administration with supporting government departments. Subin sub-metro which is one of the sub-metros controls the suame magazine.

There are also several committees for specific functions under the Subin sub-metro.



Source: Author's field survey, 2009

Chart 10 showing social control and administration

4.4 ECONOMIC ACTIVITIES

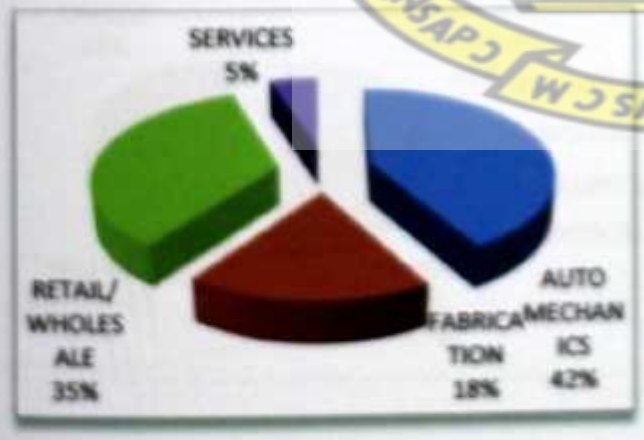
Introduction

The major control to the growth of a nation is its economy. Kumasi Suame magazine being the biggest of its kind in the country and West Africa as a whole facilitate this activity. the Ashanti regional capital which houses the Suame magazine lies in the middle of the country and support and link both the southern and northern sectors of the country.

The main activities that go on at Suame magaziney are categorizes under the following

- Retail/wholesale
- Fabrication
- Auto mechanics
- Services

PERSENTAGES OF ECONOMIC ACTIVITIES



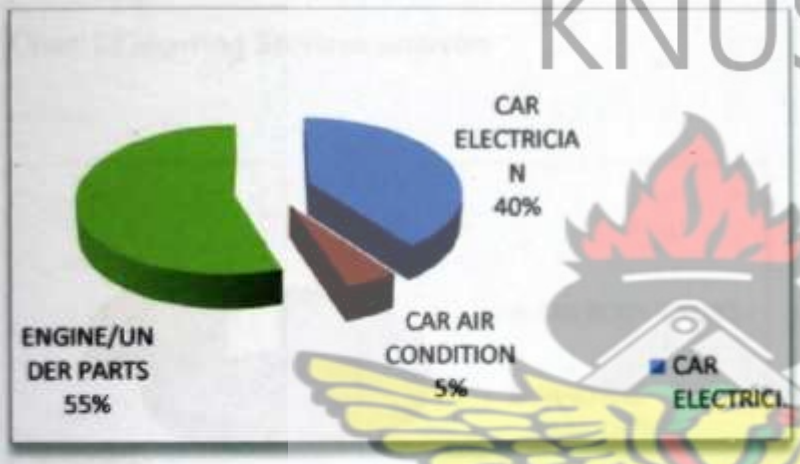
Source: Author's field survey, 2009

Chart11 showing Retail/Wholesale activities include:

1. Car spares parts. e.g. doors, finders, absorbers etc

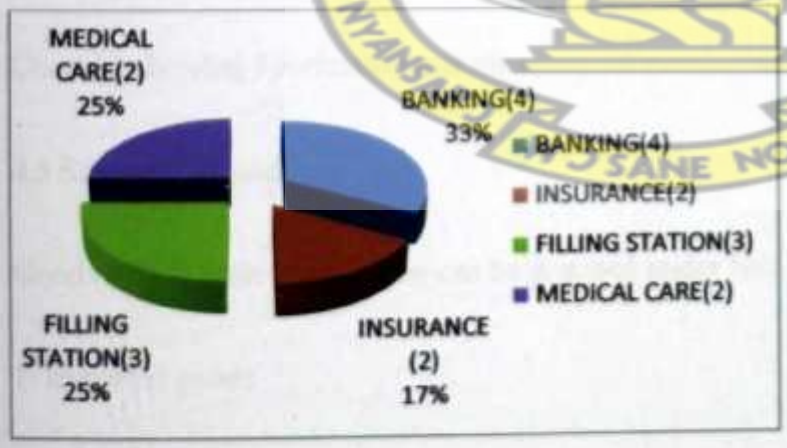
2. Car decoration.eg 4x4 front guards, sit covers etc

3. Car accessories .e.g. Engine oil, brake oil, grease, electrical parts etc.



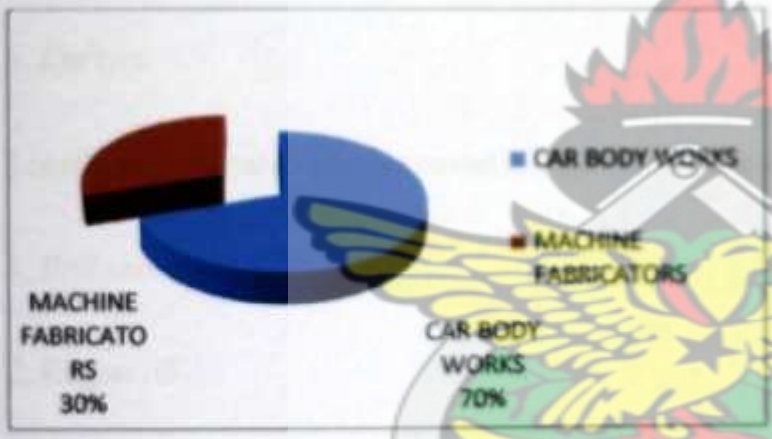
Source: Author's field survey, 2009

Chart 12 showing Auto mechanics activities



Source: Author's field survey, 2009

Chart 13 showing Services activates



Source: Author's field survey, 2009

Chart 14 showing Fabrication activities

4.5 Sources of goods

Goods sold at Suame magazine can be grouped under two.

1. Imported goods

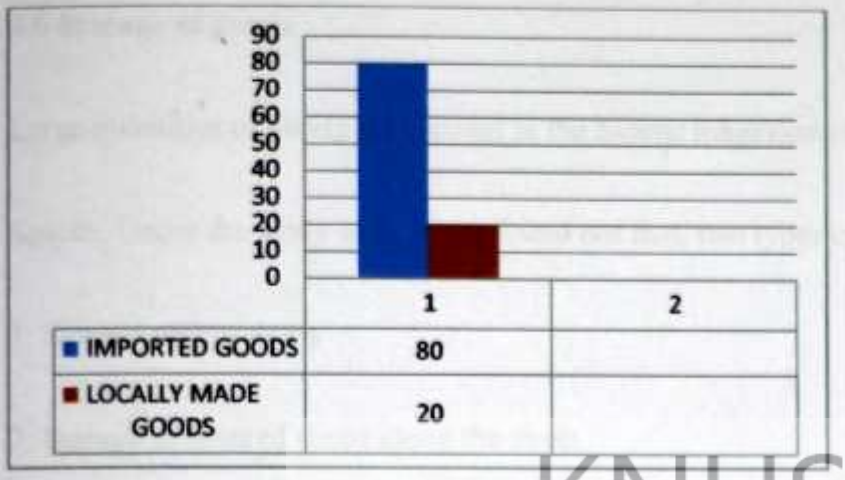
2. Locally manufactured goods

Goods brought to Suame magazine from outside the country amount to 95% of total goods. They normally Come from Korea, United Kingdom, China, Dubai, France, Germany, and Spain. Goods imported includes

1. Car parts
2. Engines
3. Brand new cars
4. Used cars
5. Car tyre

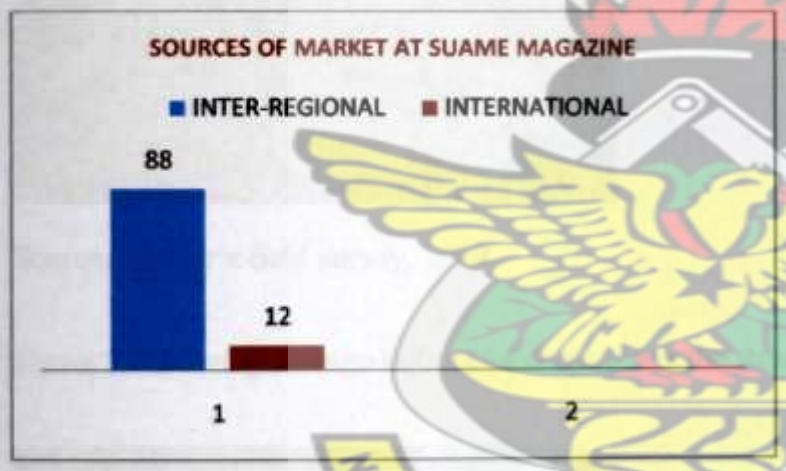
Locally manufactured goods amount to 5%of the total goods. They include

1. Bolt and nuts
2. Engine oil
3. Brake bands
4. Rubbers'



Source: Author's field survey, 2009

Chart 15 showing percentage of imported goods to locally manufactured goods



Source: Author's field survey, 2009

From the above chart16, 88% of the market is inter-regional and 12% is international. The international markets include Mali, Burkina-Faso, Togo etc.

4.6 Storage of goods

Large quantities of goods are brought to the Suame magazine and therefore the need for storage Spaces. Under the study area, it was found out that, two types of storage exist.

1. Storage within shops

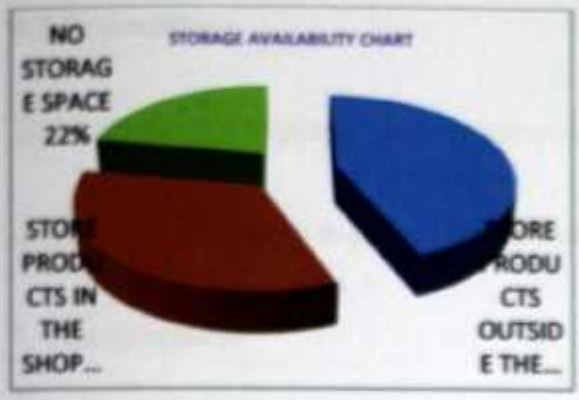
2. Storage in front of shops along the street.

Source: Author's field survey, 2009

Figure 21 showing Storage in front of shops along the street.

Source: Author's field survey, 2009

Figure 22 showing Storage within shops



Source: Author's field survey, 2009

The chart 17 above depicts about 24%of shops without storage spaces.

Some of the shop owners own storage spaces in their Homes. They transport them into the shops when the need arises by the use of pick ups, trucks. With some of the spare parts dealers, they order for wares when customers need them.

Security

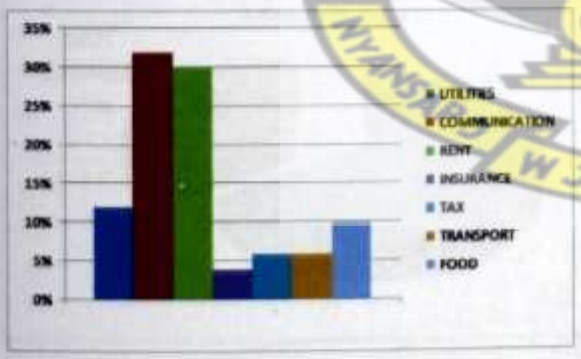
Source: Author's field survey, 2009

The chart 18 above shows the number of shops with hired security to those without security.

4.7 Expenditure

There are several expenses that are incurred in the daily running of businesses. The businesses in the study area make expenses on the following.

1. Transportation
2. Taxes
3. Communication
4. Food
5. Insurance
6. Waste
7. Utilities
8. Rent



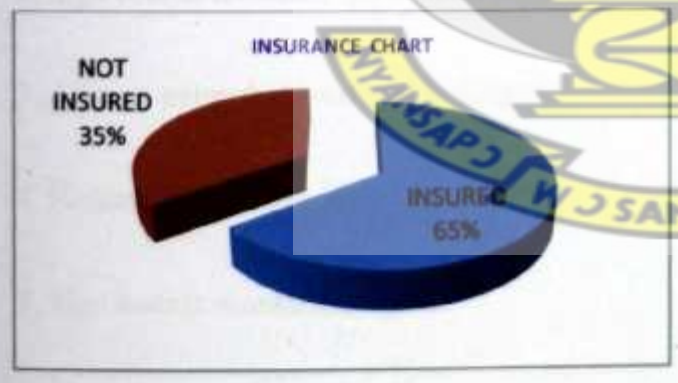
Source: Author's field survey, 2009

The chart 19 above shows the forms of expenditure of the people of Suame magazine.

4.8 Insurance

A number of insurance company's representatives exist at the suame magazine to provide a diverse insurance policy. This include

1. Life policy insurance
2. Motor insurance
3. Burglary
4. Child education
5. Retirement policies
6. Funeral policy
7. General business
8. National health insurance



Source: Author's field survey, 2009

From the chart 20, the percentage of people covered with any form of insurance, for which the health insurance scheme is the biggest to those uncovered by any form of insurance.

The national health insurance scheme is a scheme introduced by the government of Ghana to provide free health care to people.

4.9 Advertisement

The various shops and workstations at the Suame magazine employs various means to sell their products and render services to customers by the means of the following

1. Media: redio stations, news papers, television stations

   the internet etc

2. Bill boards and sign boards

3. Banners

Types of billboards and sign boards

1. Signage mounted directly on buildings

2. Sign boards mounted from metal supports

3. Adverts painted on walls of buildings

4. Banners tired to supports

5. Sign boards mounted on poles

Figure 23 showing Signboards mounted on poles

Figure 24 showing Adverts on walls

Figure 25 showing Adverts mounted in front of shops

Source: Author's field survey, 2009

The bar chart 23 above shows the savings pattern at Suame magazine.

4.9.2. Peak seasons

The peak seasons can be grouped under

four main groups. Namely

1.1st quarter

2.2nd quarter

3.3rd quarter

4.4th quarter

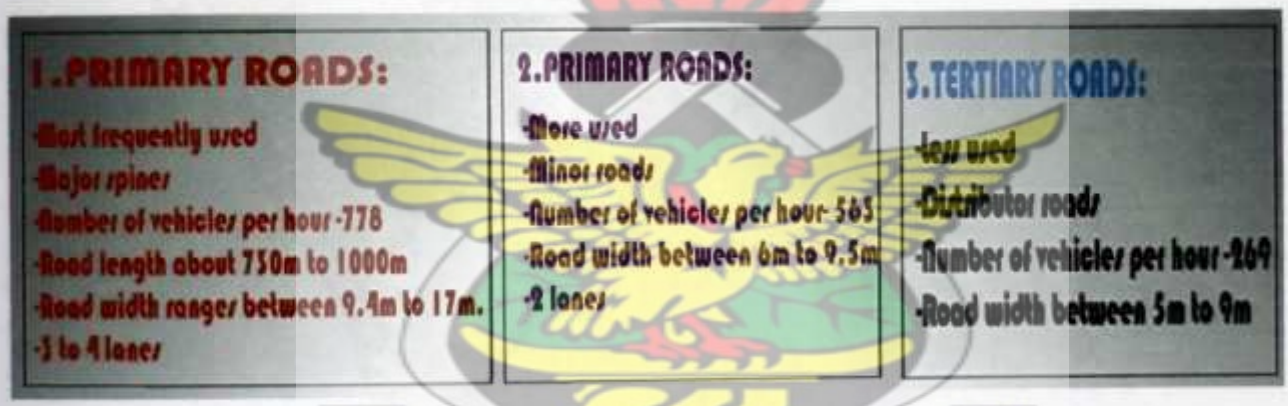
4.10 INFRASTRUCTURE

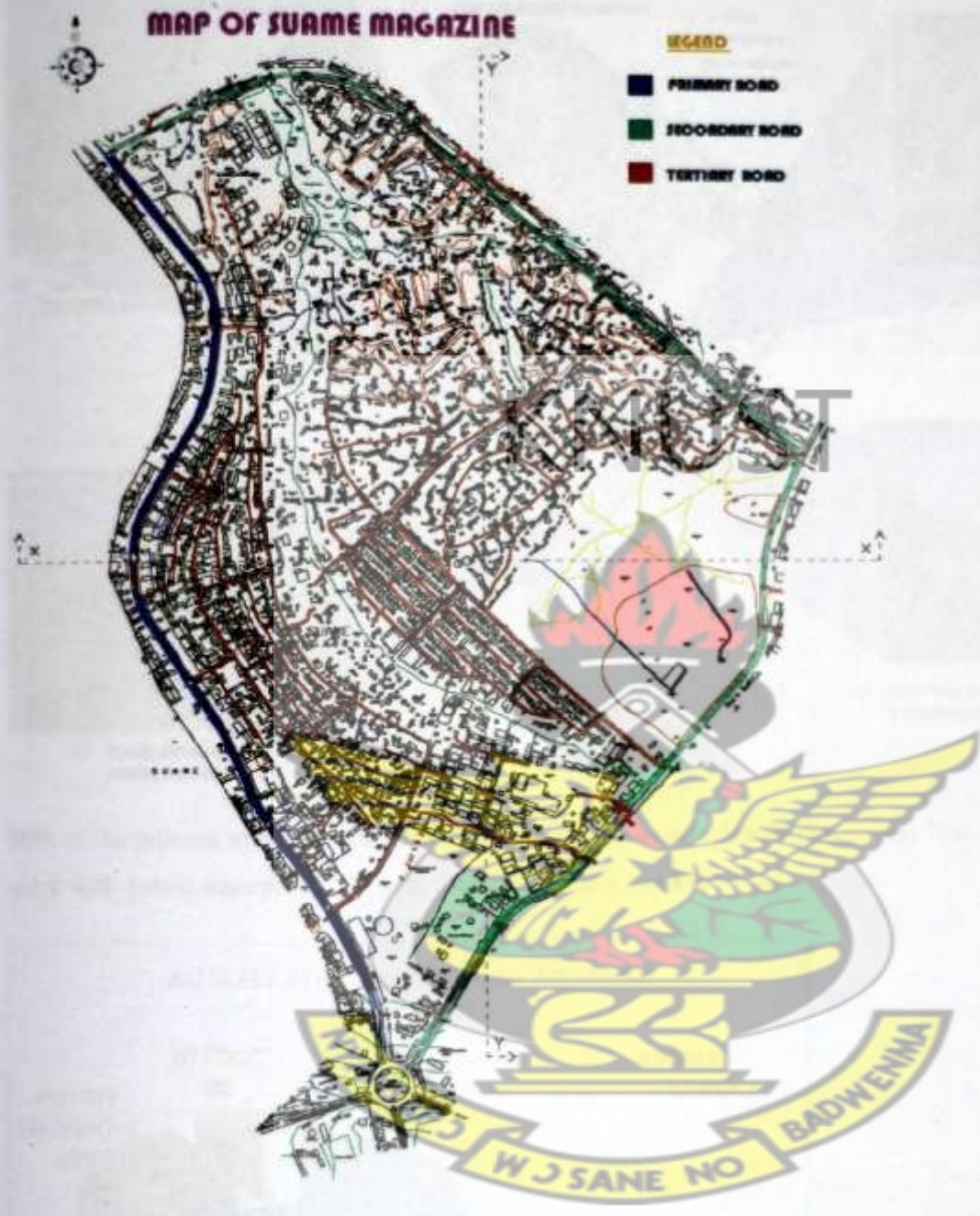
We will consider the following element under infrastructure:

1. Transportation
2. Security and Fire services
3. Water supply
4. Electricity supply
5. Waste management

4.11 TRANSPORTATION

Types of roads





OFFINSO ROAD IS AN EXAMPLE OF A PRIMARY ROAD

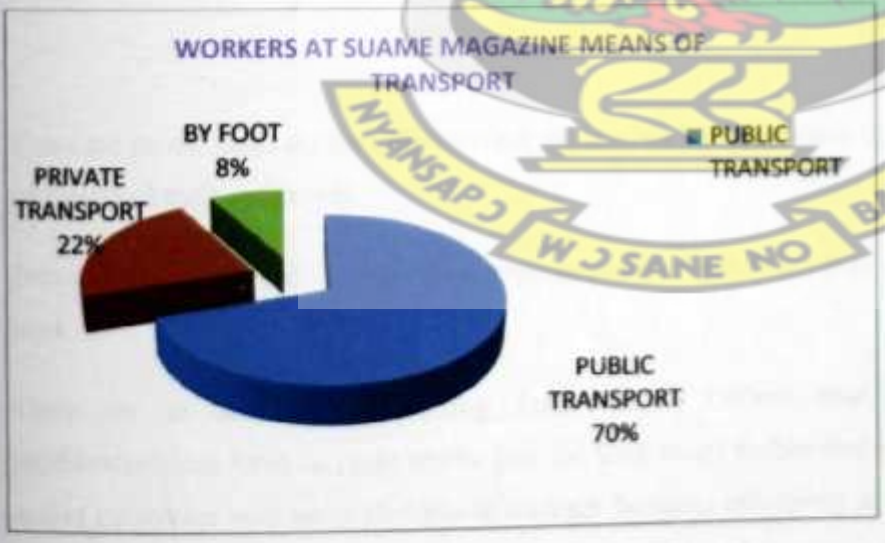
MAP OF SUAME MAGAZINE

AN EXAMPLE OF A TERTIARY ROAD.

FROM OFFINSO ROAD HEADING TO SUAME ROUNDABOUT.

THE TAFO ROAD IS AN EXAMPLE OF A ROUNDABOUT ROAD.

86% of the artisans at Suame Magazine stay outside the working environment and 70% of them come to work with public transport. 22% with their private cars and 8% by foot.



TAXIS TRANSPORTING PASSENGERS & GOODS ON THE OFFINSO ROAD.

MAP OF SUAME MAGAZINE

PRIVATE VEHICLES TRANSACTING THEIR DAILY ACTIVITIES IN AND OUT OF SUAME MAGAZINE.

A WORKER AT SUAME MAGAZINE GOING SOMEWHERE WITH A KID.

There are no car parks on the Offinso road; the lay-bys have therefore been turned into parking spaces for retailers and their customers.

Drivers stop on the road to drop off passengers and load which result in a lot of traffic congestion on the road.

There are no thoroughfares linking Tafo road to Offinso road so customers looking for any products/services have to be in traffic jam for long hours before finding what they're looking for. This makes customers very uncomfortable to transact business effectively at the Suame Magazine.

Trucks load up spare parts from the harbours and transport them Suame magazine where they are off-loaded into shops and in front of shops where they are stored.

4.12 Traffic count

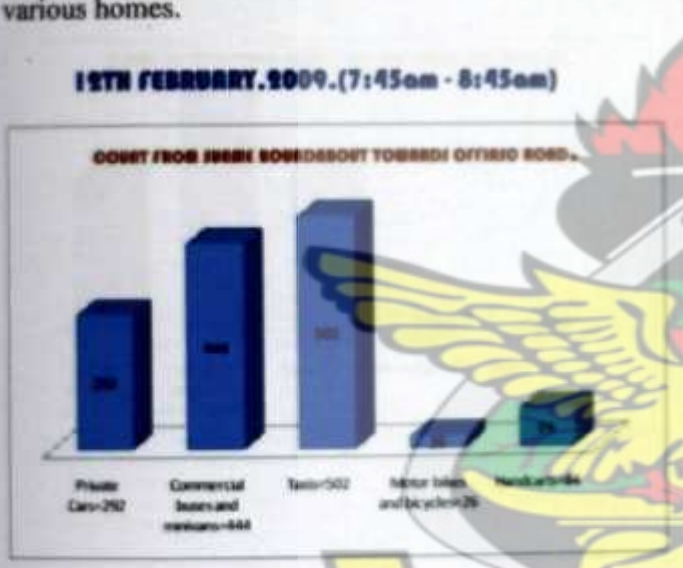
Traffic is at its pick between the hours of7am-9pm in the morning and from 5pm-7pm in the evening.

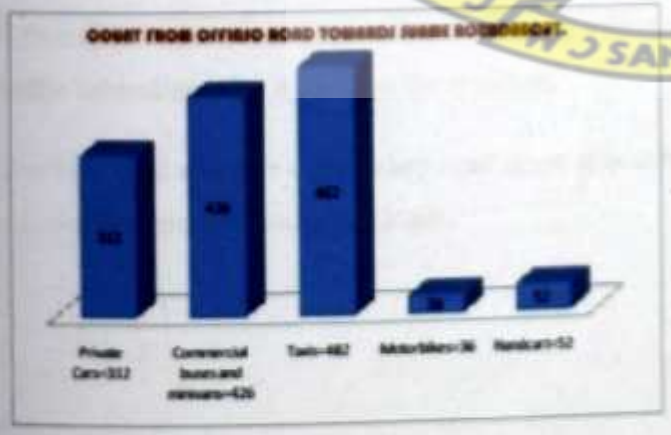
Mini vans"trotro" and taxis constitute 72% of the vehicles on the Offinso road.

The traffic jam is as a result of the absence of a traffic light at the intersection of the Offinso and Tafo new road. Also drivers using unauthorized roads to join the Offinso road, heading to Suame roundabout.

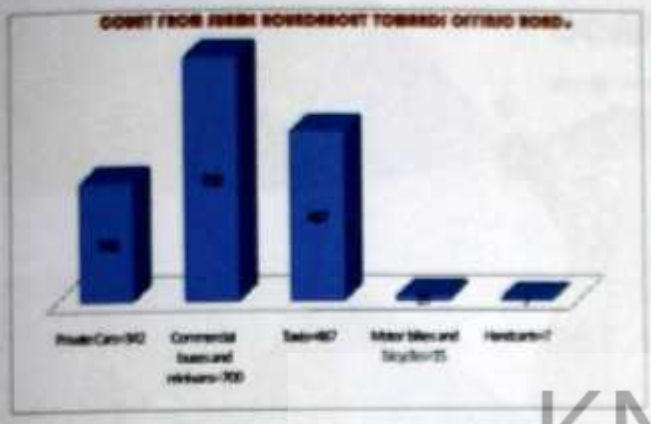
Drivers who stop on the roads to pick passengers due to the inefficiencies of the layby also contributes to the traffic jams.

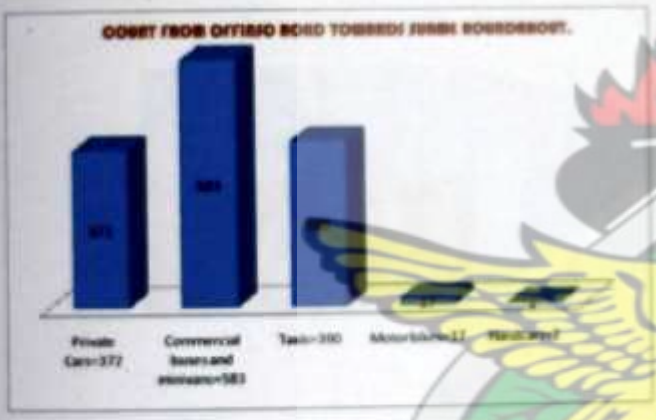
Approximately 14,000 of the artisans of at Suame road pick Cars mostly on the Offinso road to the various homes.





12TH FEBRUARY.2009.(5:00am - 6:00pm)





4.13 Conflict zones

The loads on Offinso and new Tafo road create a serious conflict at their intersection. There is no traffic light and no roundabout. Drivers have to struggle their own way to pass through. Occasionally, there are traffic controllers who help calm the situation.

The Tafo road which is a secondary road is not able to handle the current load of vehicles on it because it was not designed for such high loads.

4.14 SECURITY AND FIRE SERVICES

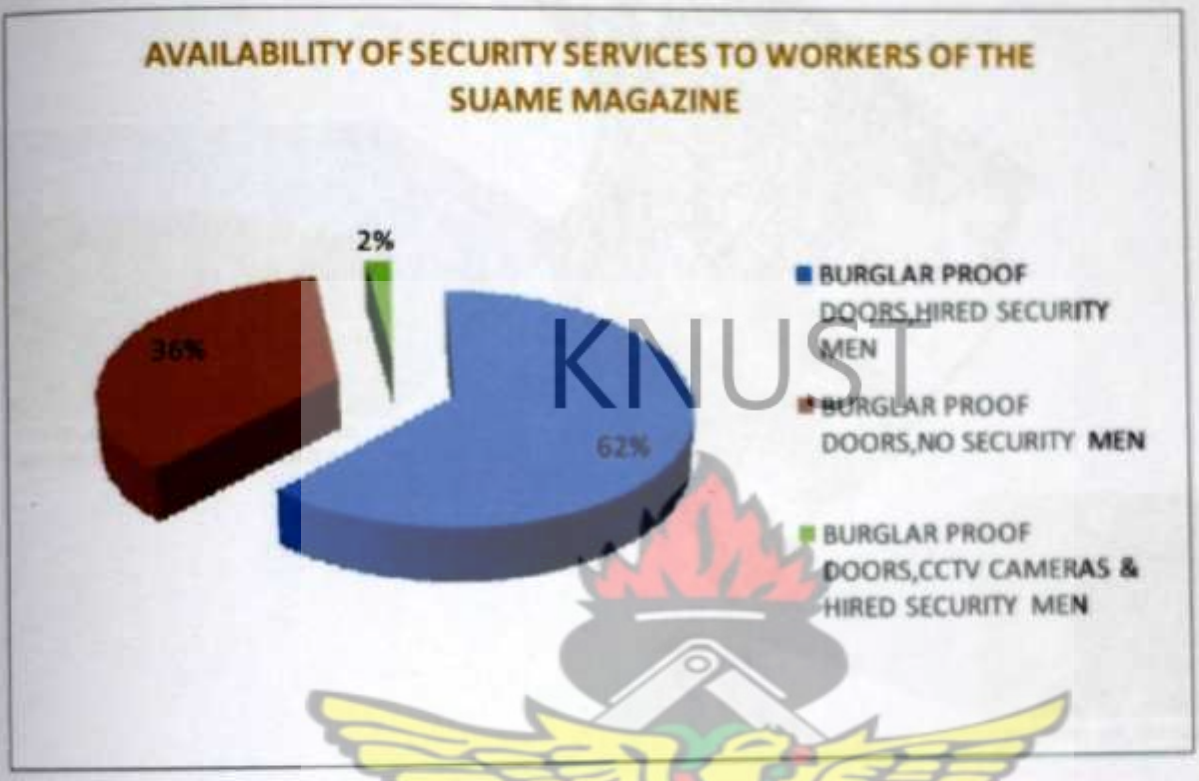
62% of the hired security men at Suame magazine are untrained. This has made the combat of crime cases very difficult. There is no coordination between them and the police service in the area.

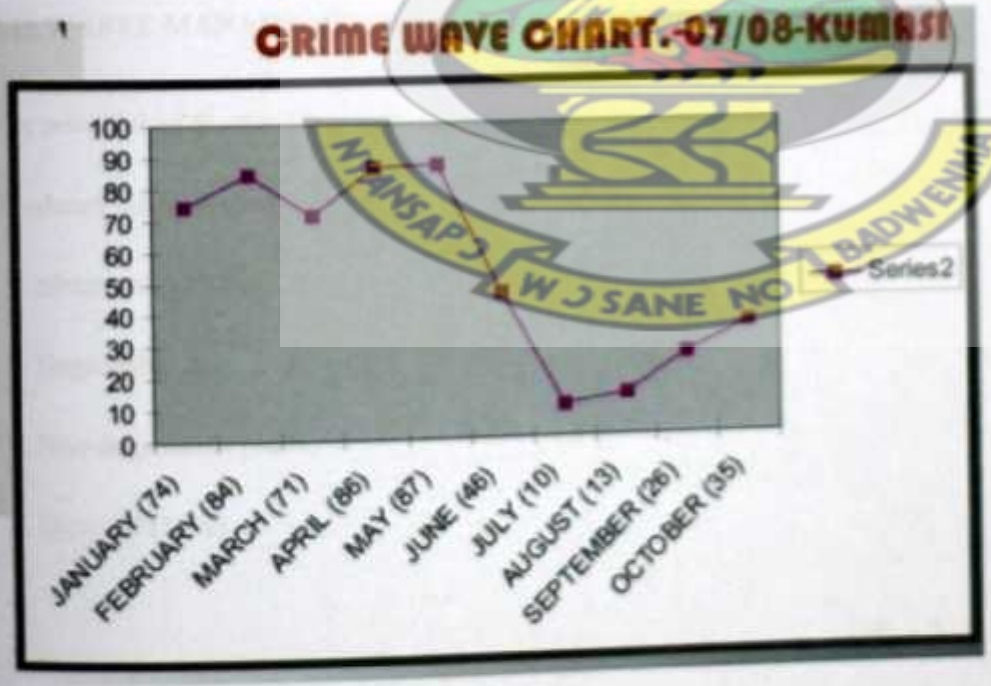
70% of the streets are not well illuminated and this creates the conducive environment for criminals to perpetuate their activities.

There is a police station at Suame but their presence in helping to combating crime is not felt by the artisans.

Poor road network and planning of the structures in Suame has made it difficult to apprehend criminals if they're seen since its easy for them to hide anywhere.

36% of the retailers use burglar proof doors with at least two padlocks as a means of securing their products.





PICTURE OF SPARE PART SHOPS BUILDING BURGLAR PROOF DOORS

PICTURE OF THE SUAME POLICE STATION

4.15 WASTE MANAGEMENT

The activities of Suame Magazine

Produces the following

1. Metal scrap (40%)
2. Degradable &

   Non-degradable (46%)
3. Dirty oil (14%)

There are no waste bins placed at vantage point for people to drop their waste materials as one walks through Suame Magazine.

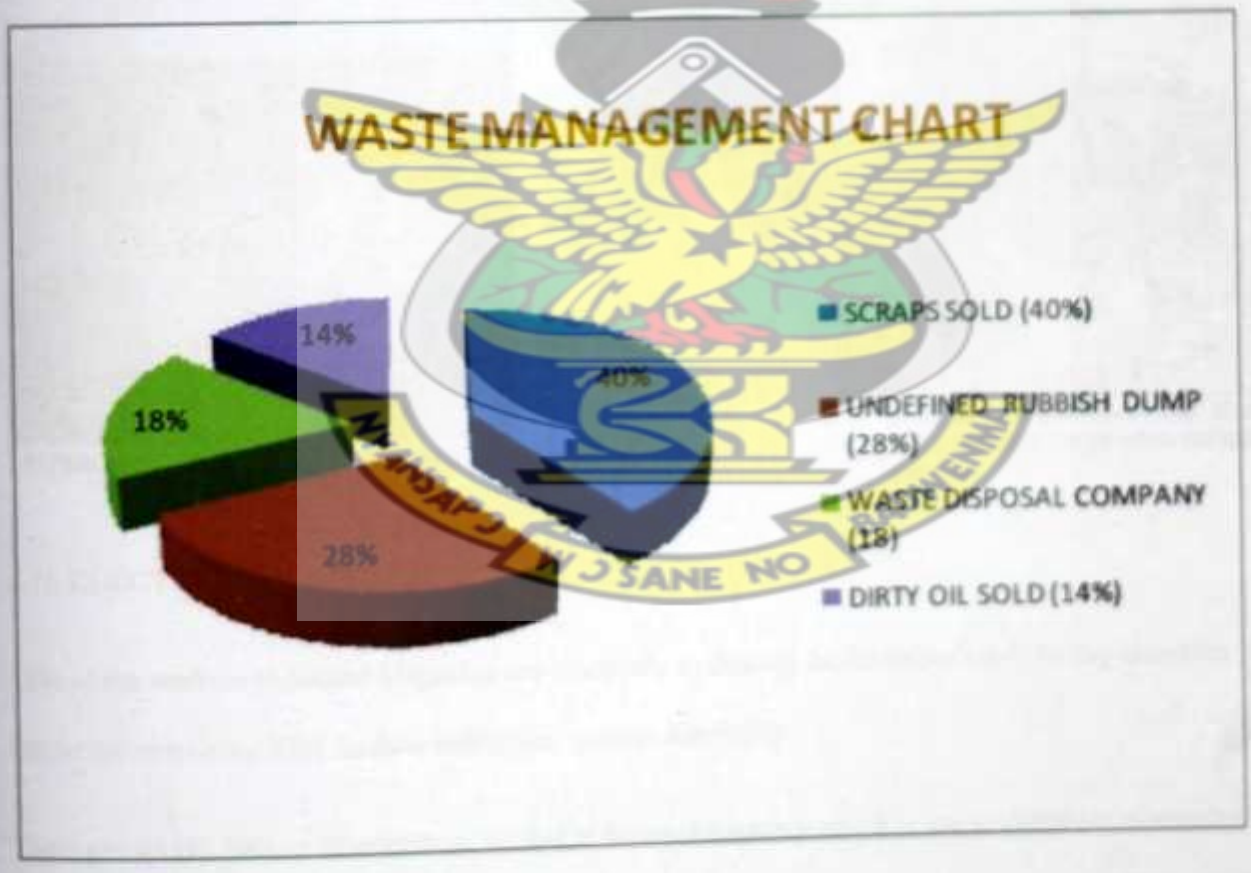
People just throw their solid waste anywhere on the ground and in the gutters.

Liquid waste (urine, water, dirty oil.etc.) are poured in gutters to drain away.

Zoom lion workers sweep the main roads early in the morning but they're not able to cover the whole area before the business day starts.

When it rains, it drains into river Bunkonfuom running through the valleys of Suame Magazine.

BELOW IS A PIE CHART SHOWING HOW THESE WASTE ARE MANAGED



4.16 **ELECTRICITY** SUPPLY

18% of the workers at Suame Magazine use electricity to directly facilitate their day to day activities whilst the remaining 82% do their businesses without electricity.

There are six (6) 500kva transformers located at Suame Magazine which is use to distribute electricity power to the artisans.

There is a primary sub-station e located at the Suame Magazine.

The capacities of the five transformers does not meet the need of the growing number of artisans the magazine.

A PICTURE OF PRIMARY SUB-STATION E LOCATED AT THE SUAME MAGAZINE. IT'S THE ONLY STATION DISTRIBUTING POWER TO THE FIVE TRANSFORMERS AT THE MAGAZINE.

4.17 WATER SUPPLY

Water for day to day activities at the workshop is fetched from taps being supplied by Ghana Water Company Limited (GWCL) and other fetch from river Bunkonfuom.

GWCL supplies water to 13,000 consumers at the Suame district.

There are fire hydrants located at the Suame Magazine but cannot be identified on the maps. Workshops have been constructed over some of them and are impossible to locate some of them. Food vendors cooking at the Suame magazine buy clean water outside the magazine and use it to cook their food.

Other artisans have dug wells where people fetch and bath with it at the end of the day's work before they go home.

95% of the workers at Suame don't use water directly in their line of work.

95% of retailers and workshops at Suame magazine don't have any fire extinguishers.

MAP SHOWING WATER DISTRIBUTION LINES IN KUMASI

4.18 PHYSICAL ENVIRONMENT

4.18.0 SITE BOUNDARIES

The Suame Magazine site is bounded by the following:

1. THE OFFINSO ROAD

2. THE TAFO ROAD

3. THE NEW TAFO ROAD

The Suame Magazine site covers an area of 2,371,899 m^2 (585.85acres).

The site slopes from the east towards the west at a drop of 2m at a distance of 10m and vice versa from west to east to form a valley at the middle of the site.

The Bunkonfuom River runs through the valleys on the site with marshy areas around it.

PICTURE OF TAFO NEW ROAD

PICTURE OF TAFO ROAD

PICTURE OF OFFINSO ROAD

PICTURE OF TAFO CEMETERY

Building conditions

Structures are classified based on their performance using the following criteria;

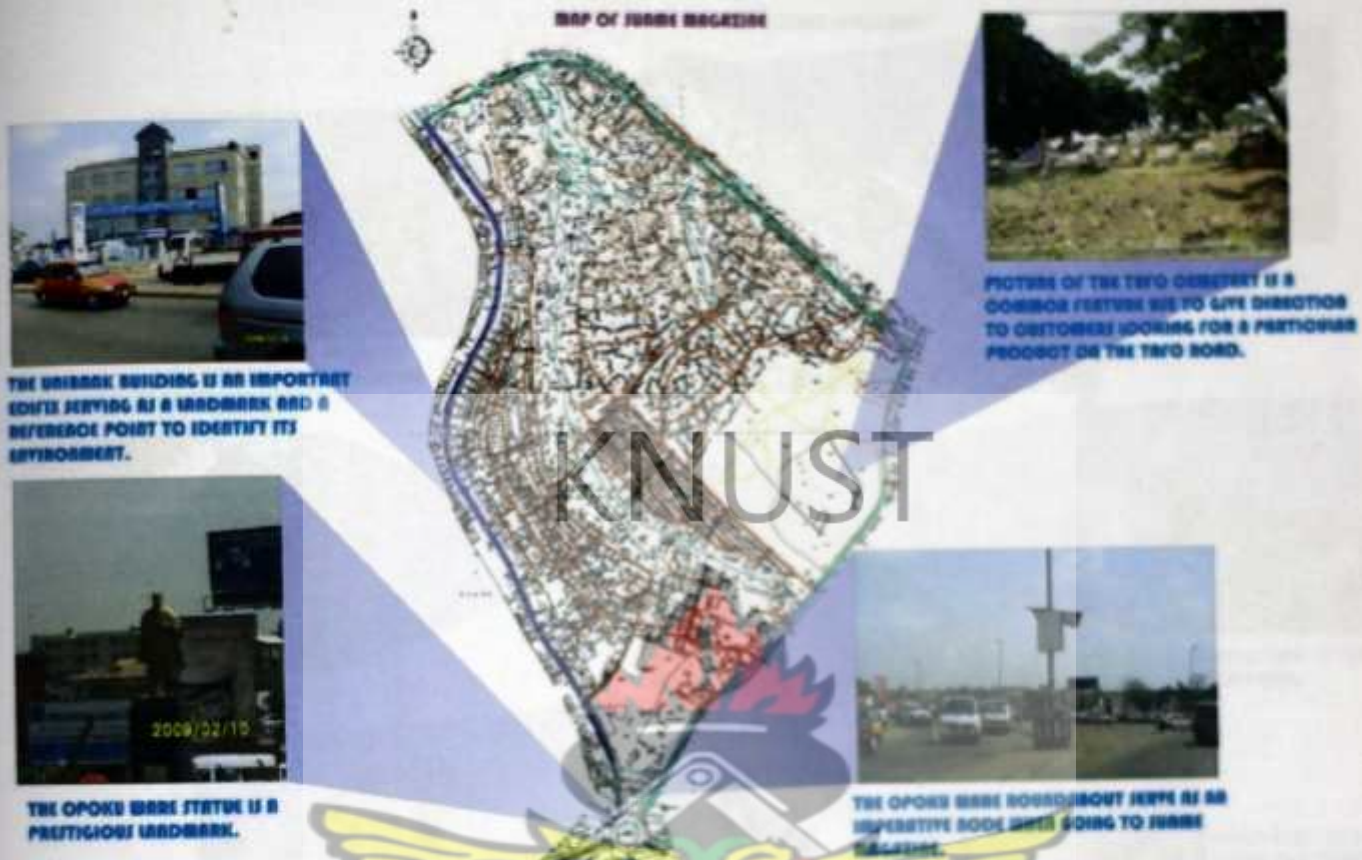
1. Super structure

2. Infrastructure &services

They are grouped into; good, fair or poor.

4.19 LANDMARKS, VISTAS, EDGES AND NODES

These features are used as reference points for orientation and direction, inter-woven with the zone's streetscape gives its character.

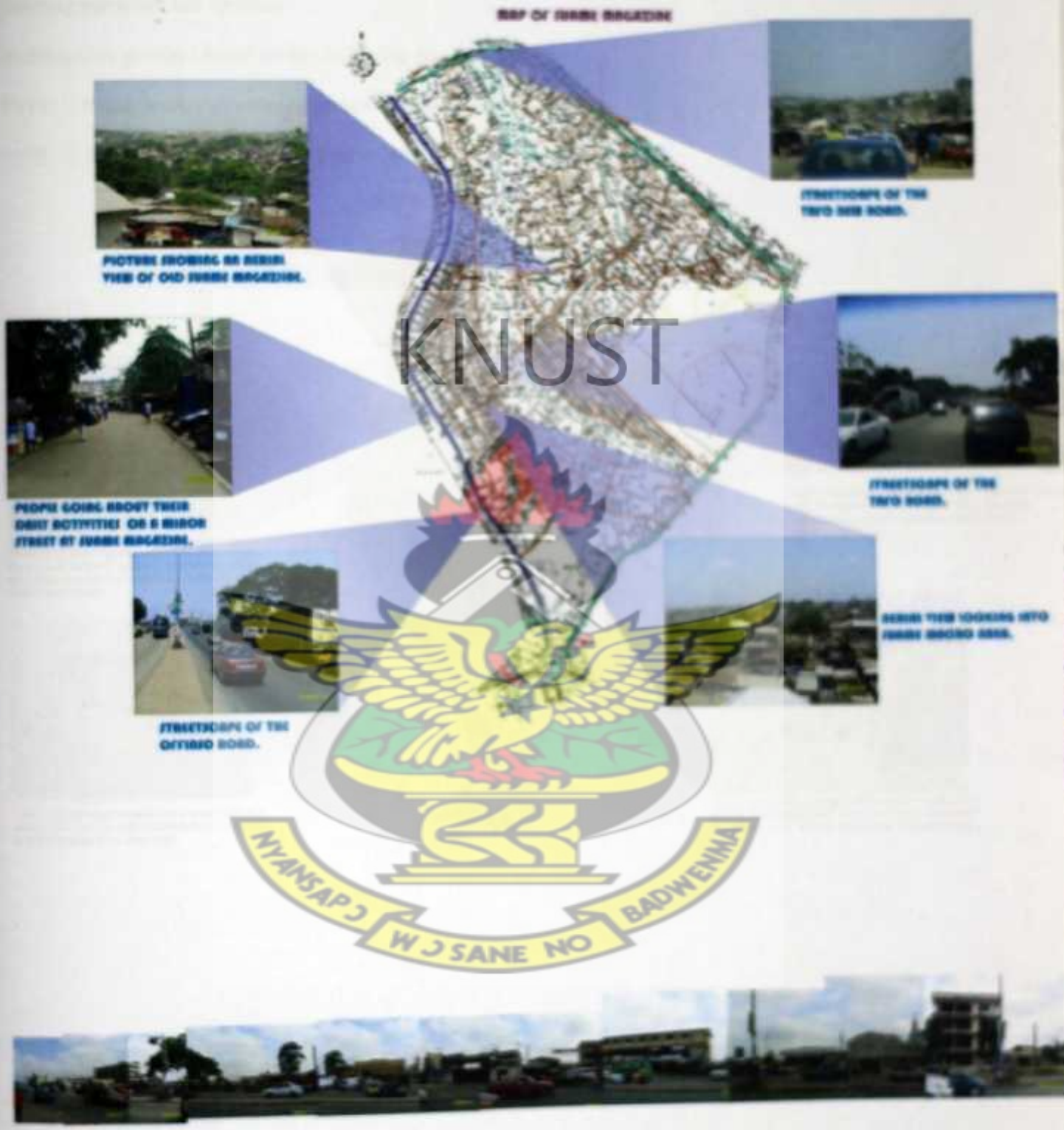


Streetscape and Skyline

90% of the buildings along the main roads were residential structures which were later renovated and used for shops, banks and other commercials purposes.

There are different architectural styles seen at Suame including international and modern style.

Building height ranges from 5 storeys to single storey. This creates an inter-play of heights in the streetscape show the massing.



STREET FACDE OF THE OFFINSO ROAD

Building materials and finishes

Buildings are grouped based on the following classification;

TYPE 1; Block work/concrete and windows with steel doors.

TYPE 2; Wooden structure/steel container with aluminium roofing sheet.

PROPOSALS

INTRODUCTION

OBJECTIVES

TO CONTRIBUTE TO THT INDUSTRIAL GROWTH OF SUAME MAGAZINE

TO ATTEMPT FOR ORDERLY,APPROPRIATE AND BALANCED ARRANGEMENT OF LAND USE

TO PROVIDE FOR THE SHORT AND LONG TERM MEASURES THAT CAN HELP DEVELOP SUAME MAGAZINE

ISSUES TO BE CONSIDERED

FORMAL AND VISUAL PERFORMANCE OF THE BUILT ENVIRONMENT

SOCIO-ECONOMIC PERFORMANCE

TECHNICAL PERFORMANCE

MANAGEMENT PERFORMANCE

PROGRAMME OUTLINE

EXISTING LAND USE

DETERMINING AREAS OF REGENERATION
THE MASSING OF SOME SPECIFIC AREAS

PROPOSED LAND USE

LAND USE OPTIONS
JUSTIFICATIONS
PROPOSED MASSING OF SOME SECTORS

EXISTING ROAD LAYOUT

DETERMINING ARE TYPES OF ROADS AVAILABLE

PROPOSED ROAD LAYOUT

ROAD LAYOUT OPTIONS
JUSTIFICATIONS

PROPOSALS

ROAD NETWORK AND SUAME ROUNDABOUT INTERCHANGE(GHANA HIGHWAY PROPOSAL)

LIGHT INDUSTRY

TECHNICAL EDUCATION

TRADE AND COMMERCE

HEALTH CARE

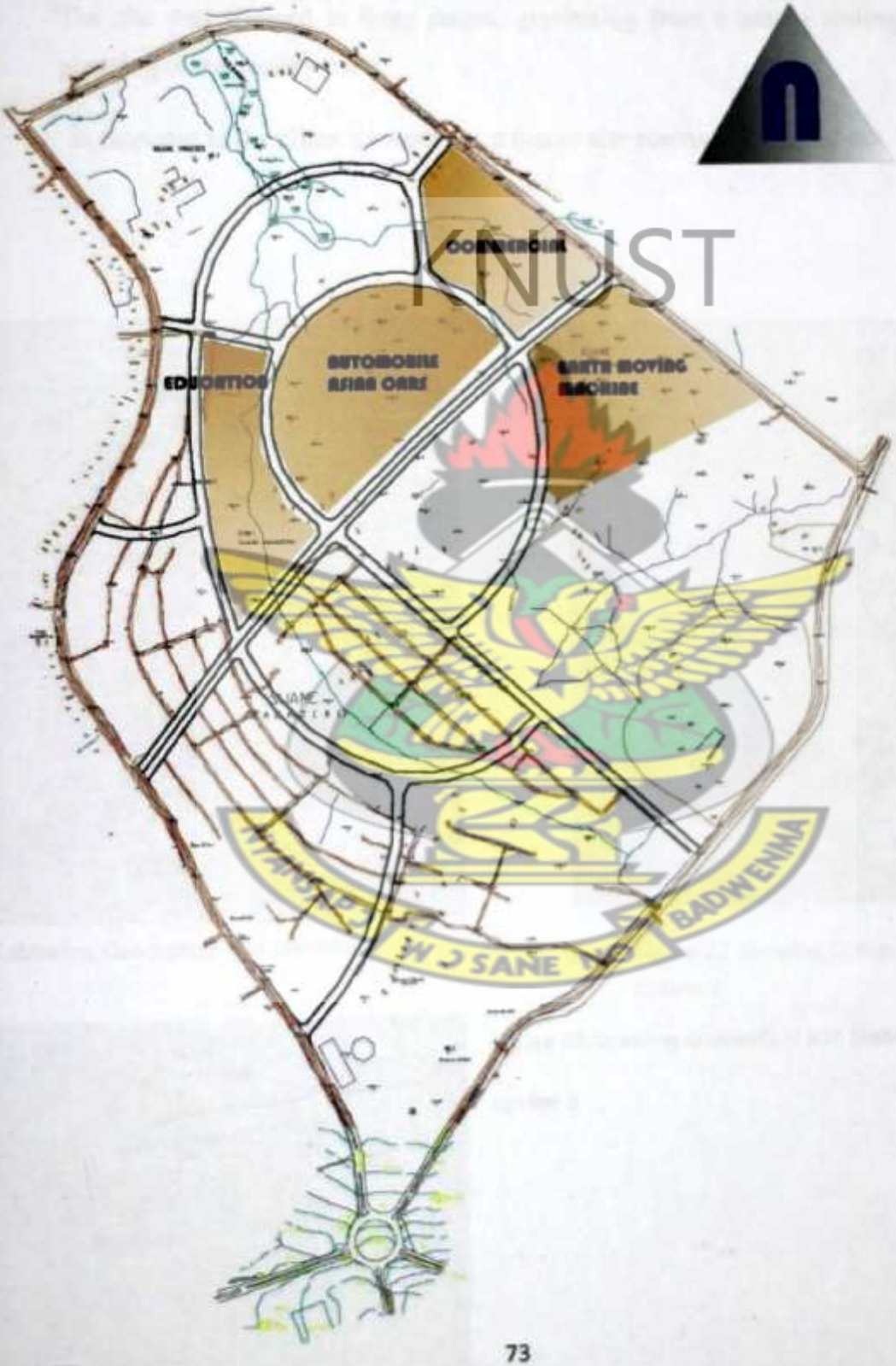
LANDSCAPE

EXISTING ROAD NETWORK

AREA OF REGENERATION

PROPOSED LANDUSE MAP WITH ROAD NETWORK

AREA UNDER PHASE ONE



4.32. CONCEPTUAL DEVELOPMENTS AND PLANNING

4.33. Conceptual Site Planning

The site was planned in three stages, gravitating from a macro zoning level to the planning of the facility itself.

In response to the client's intentions, a macro site zoning was carved out.

Figure 26 showing Conceptual site planning option 1

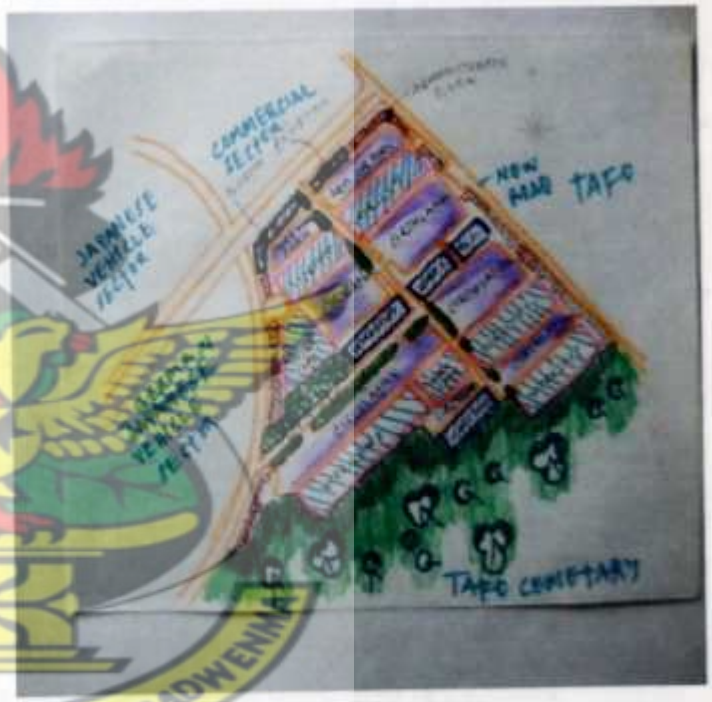


Figure 27 showing Conceptual site planning option 2

Figure 28 showing conceptual site planning option 3

4.34. DESCRIPTION OF DESIGN CONSIDERATIONS

Success of earth moving repair centre depends on the whims of its customers, mostly building, and mining company. This is because, 70 percent of private company trip, and purchase decisions are made by company. It is therefore important to meet the company's needs at workshops destinations. This means also meeting the needs of company or the industry when they accompany their staffs on the workshop trip. Then design consequently considers strategies and design solutions for customer of company staffs and other progressive works-targeted experiences to attract the essential spare part for their customers to their facilities. The following design solutions are employed:

4.35. Column spacing

A 15m x 15m bay column grid is employed. Because of it huge structure and functionality of the facility, column placement should be grid uniformly.

4.36. Tenant Mix

The earth moving repair centre's utilize spaces with two section garages delivery areas. They occupy double sectors and. They are designed to take advantage of dominant locations with good display. Openings to the outside are therefore used as advertising boards and display windows. For convenience, they are located at the same level as the car parks. The idea is to expose the workshop to varying sequence of differing merchandise as much as possible. Consequently, each work area is designed and properly located in relation to each and every exhibition type. The auto mechanic repair centre incorporates warehouse to house spare parts, specialty display-only machine and other destination-oriented uses.

CHAPTER FIVE

RECOMMENDATION AND CONCLUSION

5.0 SERVICES, CONSTRUCTION TECHNOLOGY AND LANDSCAPING

5.1 SERVICES

5.1.0 Electricity

A generator plant would be located on the individual sector on the site to supply to the facility with the adequate electrical energy needed. Underground cable supply to the unit from the generator shall be along access roads and shall terminate in the switch rooms from which point power will be distributed throughout the facility.

5.1.1 Lighting and ventilation

- **Ventilation**

As a measure of prudence in a developing country, the facility has been primarily designed around architectural principles which will enable a full operation on natural ventilation. Principles employed include; stack ventilation (low air inlet and high air outlets, high roof volumes, etc), solids and courtyard system planning concept (strategic cavities on windward sides). However, central air conditioning systems are used for the large space light spare parts warehouse and covered part of workshop. Some offices and specialty changing room require the central system. Other administration will use the split air conditioning system. The facades are designed to conceal all ac systems. Zonal system is suitable for auto mechanic repairing centre, and large variety store where there are a number of rooms or floors to be served. The building is divided into zones with similar conditions as possible. Units receive an air supply condition to an average temperature and humidity from central plant. Each zone is supplied with its own local refrigeration fan and booster cooler system in such a system each floor may form an independent zone. Other modes of mechanical ventilation are employed in areas which do not necessary need air conditioning. Extractor systems are installed at the wash rooms to extract foul scents as well as

introduce fresh air into the space. The same system has been applied in combination with the natural stack effect within the oil pump laboratory to enhance ventilation.

- Lighting

Natural lighting is used during the day for open-air areas. The courtyard introduce at the core of the facility as well as the use of transparent glass at strategic aspects of the facility admits light into the facility. Nevertheless, some levels of artificial lighting will be required to supplement day lighting in some specific areas like the offices, warehouses and exhibition areas.

For overall artificial lighting, fluorescent lights will be used. Intensity of lights will be graded increasing towards the entrances and exits and courtyards. General lighting is design with a flexible switching system controlled from various points. Some of the lights will have automatic control system. There will be duplicate control buttons at the security control department. Lighting intensities will be graded as follows:

- car parking areas 100lux
- workshop and pedestrian walkways- varied between 40 and 200lux
- exhibition and warehouse – 500lux
- other circulation spaces- 200lux

Special effects lighting will be used for advertising and signage. It will be also used for interior decor and interactive multimedia purposes. Security lighting will be designed by arranging the switching of the light such that certain patterns of light can be left on during non working hours and be operated by separate and automatic time switches and circuit breakers.

Emergency lights within the workshop will be provided by separate battery operated system and positioned at specific locations in accordance with fire regulations. The battery room is located on the external wall and provided with natural ventilation as well as extractor to take out fumes. Lighting here is surface mounted galvanized conduit with fluorescent fittings.

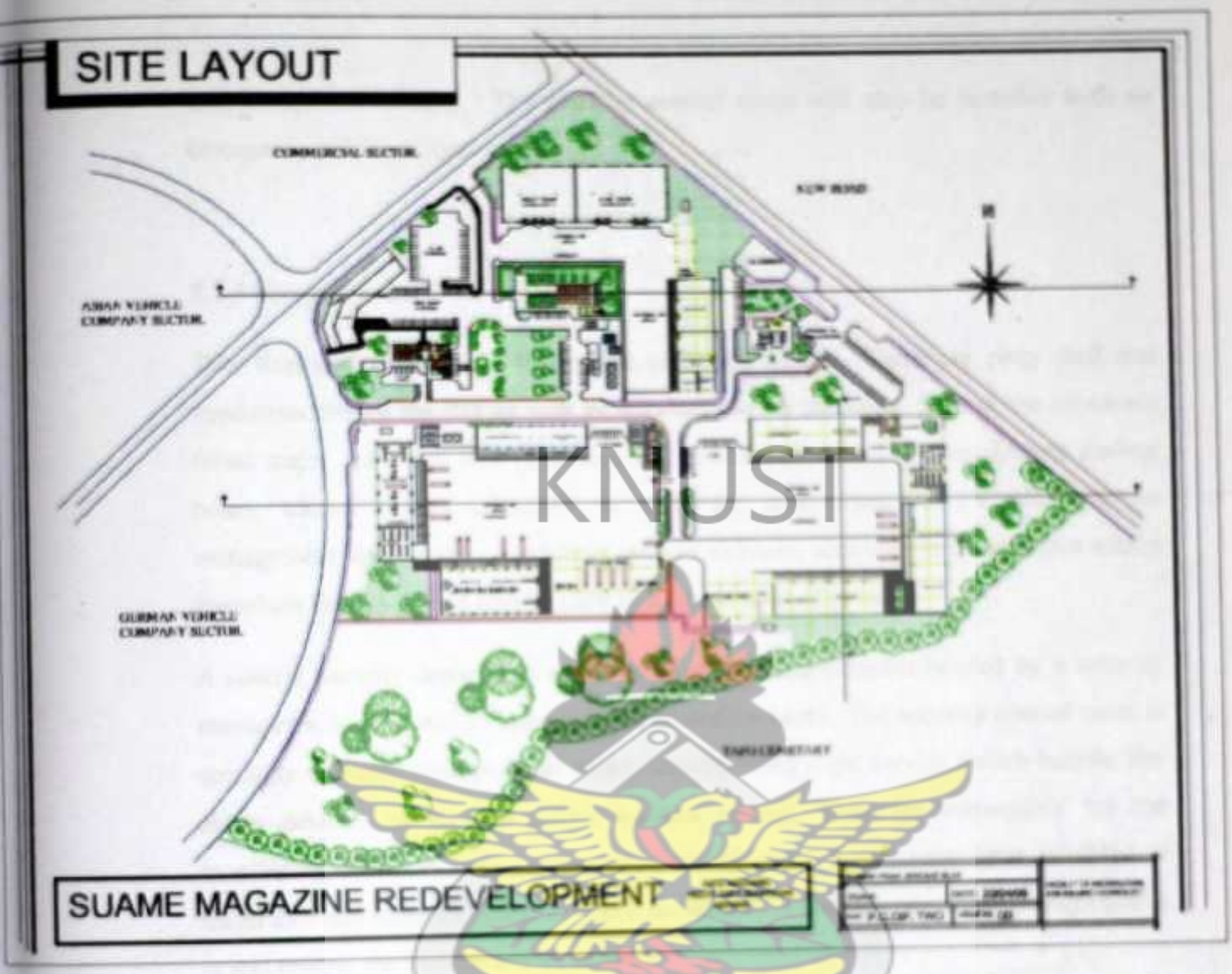


Figure 29 shows site layout

5.1.2 Information systems

A central information centre is located within the circulation area for customer service and general information. The information centre will operate audio and visual information system. The audio system provides facility for amplification selection and distribution other sources like Motorola radio. Microphone imputes and alarm signaling will be incorporated in the systems. Loudspeakers will be installed at vantage points in order to reach all artisans. The system will be used as a public

address and advertising. The security control room will also be installed with an emergency public address system.

5.1.3 Security control

Two forms of security are taken care of in the facility. These are petty theft and vandalism during the day as well as burglary during the night. During the shutdown times major entrances will be locked and wired with alarm system. During trading hours, closed circuit television is used for monitoring. CCTV also enables management to be aware of incidents such as sickness, accidents and vandalism within the whole facility. It can also be used as a crowd control device.

A central security department comprising of an administration headed by a security manager is located within the main administration block. The security control room is specially designed with pedestal desks, incorporating night service switch boards, fire alarm detector panels and public address system. They are responsible for the monitoring of the security equipment. Security check points have been provided at major exit and entrance points to check movement of people and vehicles. Night patrol in and around the facility will be in place.

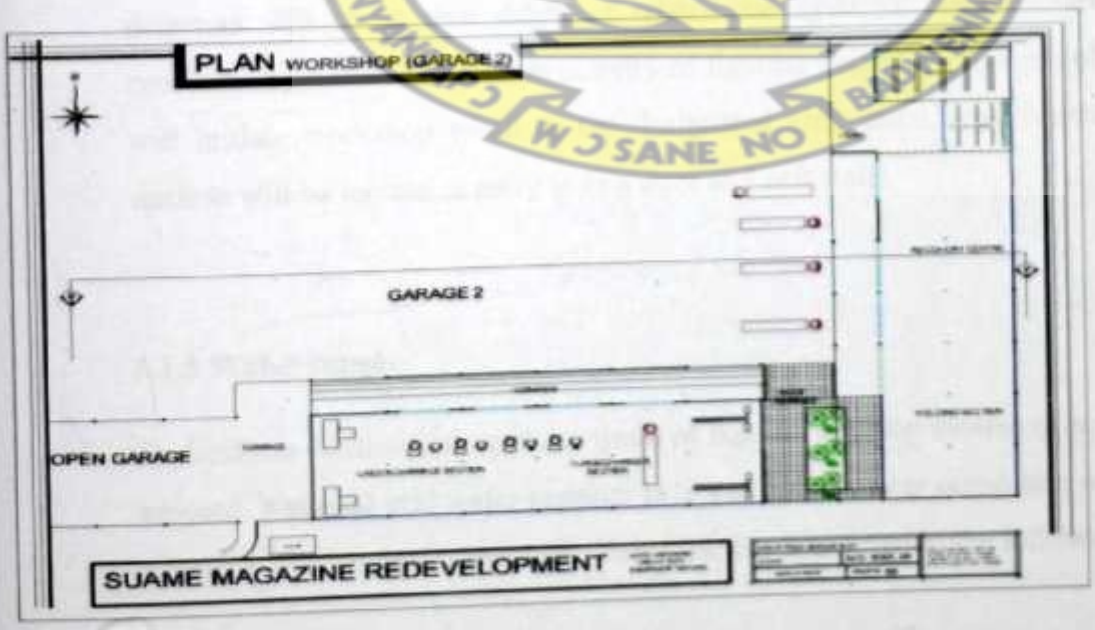


Figure 30 shows workshop 2.

5.1.4 Fire

- Protection and Prevention

Fire controls systems such as smoke detectors and fire alarms systems are controlled from a central control board. The electrical system where the building has been sectioned into independent load centers act as fire protection. Here, electrically induced fire outbreak can be prevented from one area to other.

Sprinkler heads and Hose reels supplied by mains are placed at strategic location within the circulation area and behind the workshops as a fire fighting measure. Automatic fire alarm systems are installed. These operate on the principle of heat sensing and smoke detection. It consists of fire alarm initiators, indication panels and bells. Smoke detectors are located at vantage points. Fire extinguishers also located at strategic intervals within the facility is an additional source of fire control.

- Fire and smoke detection

Automatic sprinkler and standpipe water flow indicators. Area smoke detectors will be provided in all electrical and telecommunication equipment rooms and elevator machine rooms. Duct smoke detectors will be provided in recirculation air systems as required by code. In addition to activating alarm signals, activation of the smoke detectors will cause shut down of related fan systems. Smoke detectors will be provided in all workshops were activity of lighting occurs. Activation of this detector will initiate workshop recall to the designated circulation area. Manual fire alarm stations will be located at entry to exit door and exit stairs.

5.1.5 Water supply

To facilitate continuous supply in times of repairs, the loop system of supply has been adopted. National grid water supplier is linked by a booster pump into overhead water storage at the free stand reservoir. The objective is to provide the following:

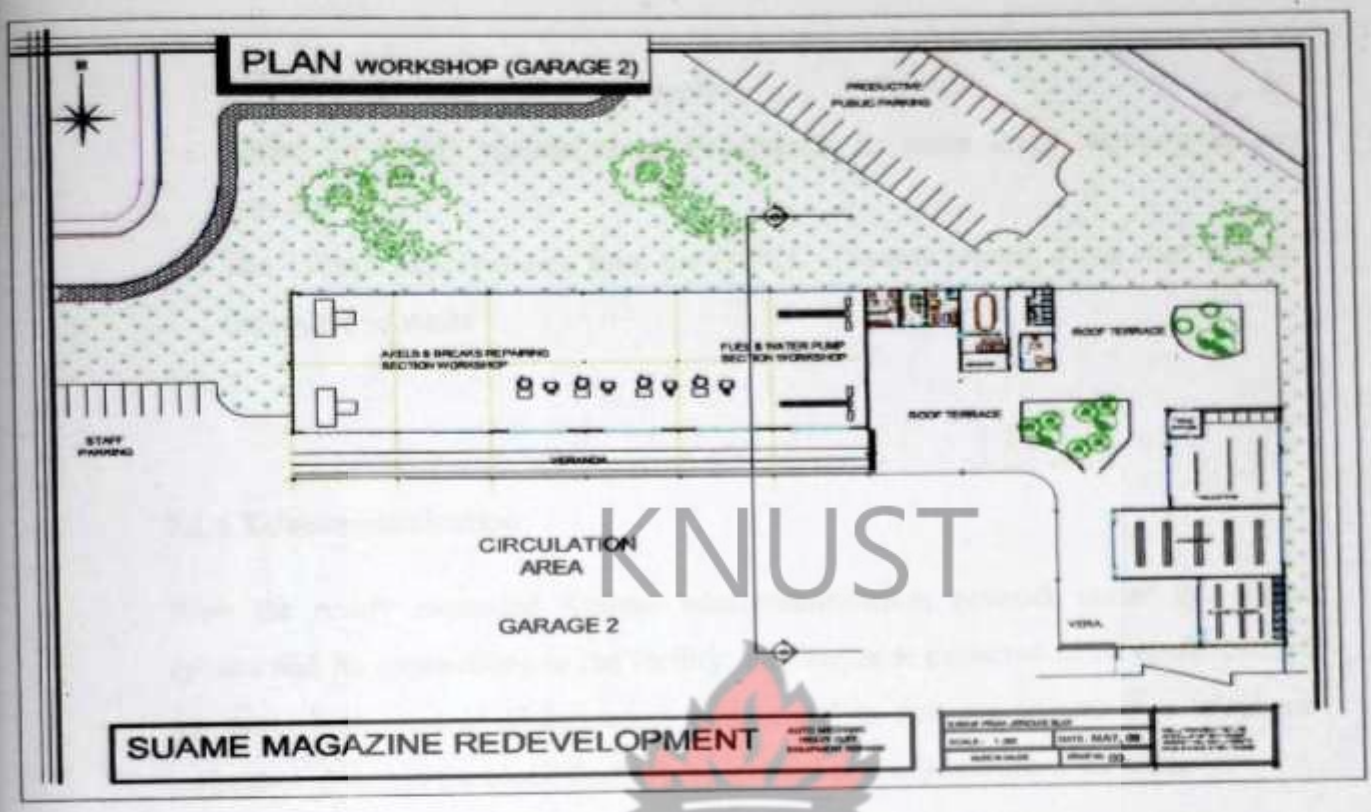


Figure 31 shows workshop 2 continuous. The administration, spare parts shop, tool room and the changing room.

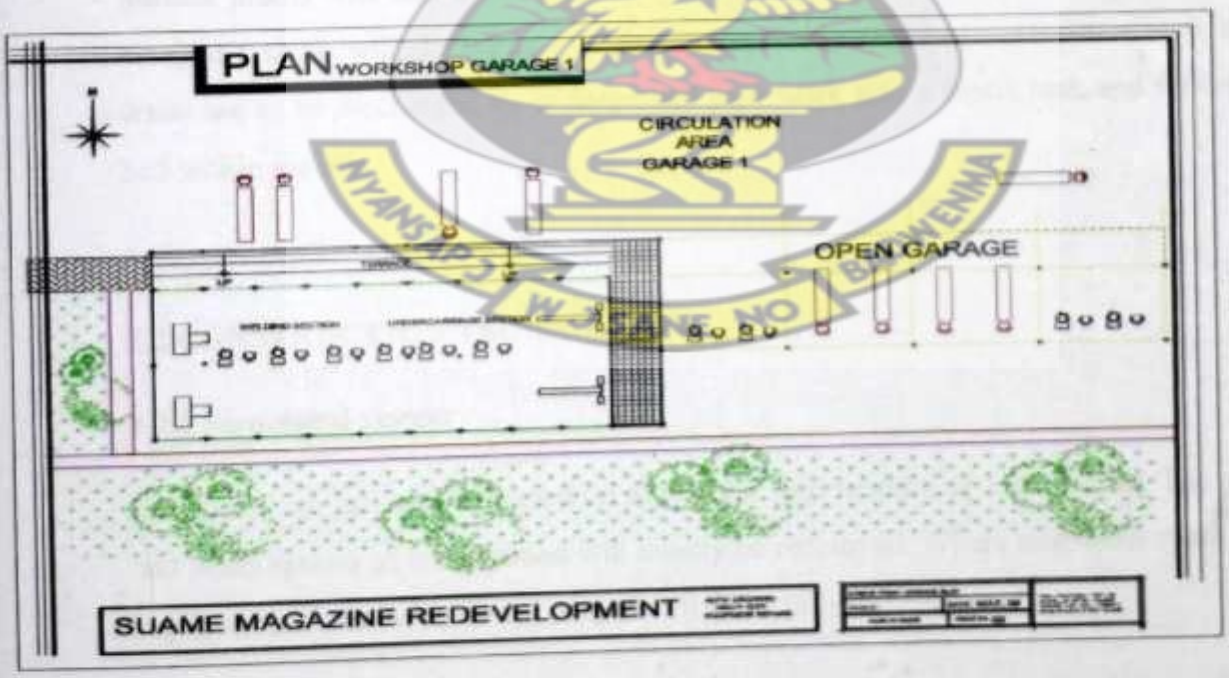


Figure 32 shows workshop 1 of recovery centre and open garage.

- Over 48 hours reserve of water supply
- Buffer for mains against excessive demand in some areas resulting in low pressure.
- The 100mm supply mains from the GWCL – Suame around about road is to be the source of water

5.1.6 Telecommunication

With the newly expanded Kumasi telecommunication network under the digital system and its connections to the facility, the former is expected to be easily catered for through the use of underground cable supplies that are to end in a telephone switchboard within the block from where internal connections are to be made.

5.1.7 Sewerage

Surface drains will take care of storm water. A network of covered and open drains along the slope will discharge into the appropriately required destination. Soil and waste are to be discharged by underground pipe work into a septic tank and filtration bed within the site.

5.2 CONSTRUCTION TECHNOLOGY

5.2.0 Structural system

Generally, the facility is planned on a modular grid module of 15m × 15m. The post and beam system of construction will mostly be employed. Where ambitious spans are required, steel lattice/roofs and trusses will be employed.

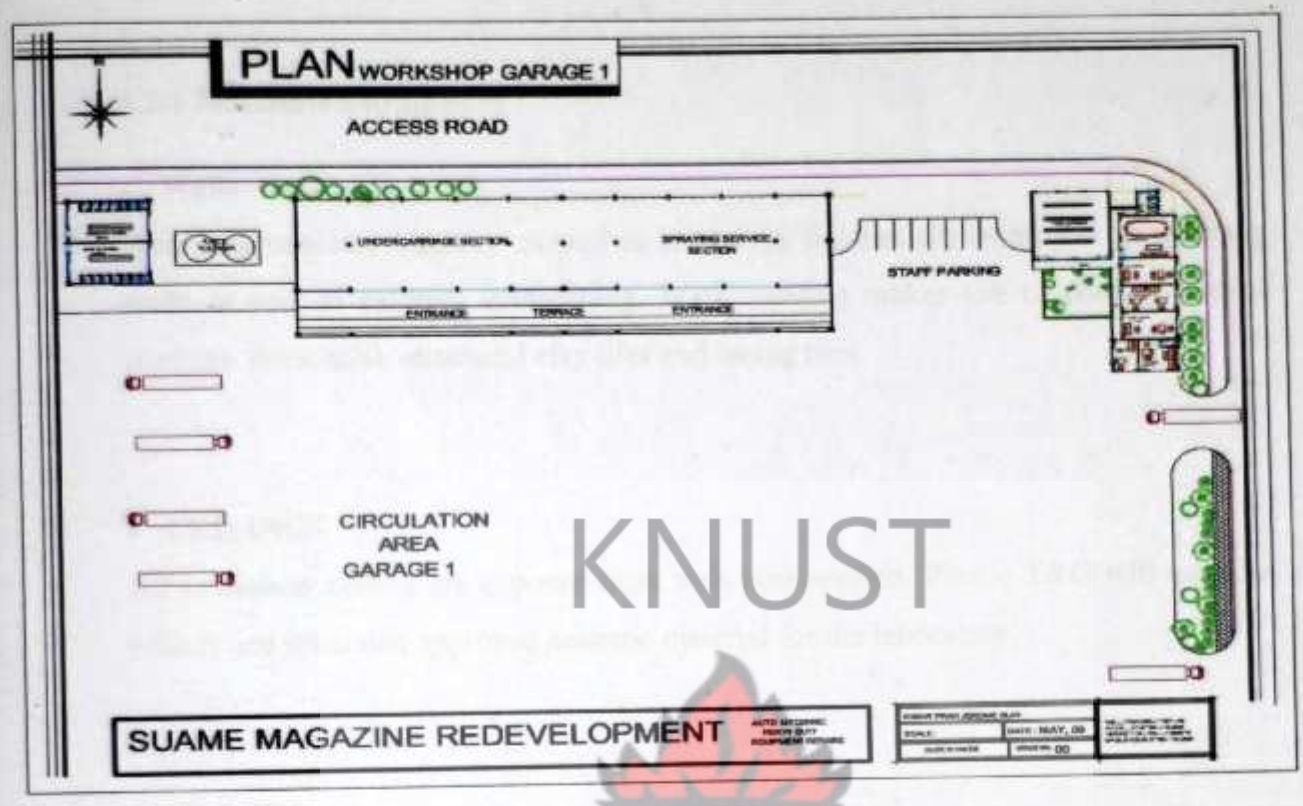


Figure 33 shows workshop 1 the administration ,entrance to the garage, undercarriage section and spraying section.

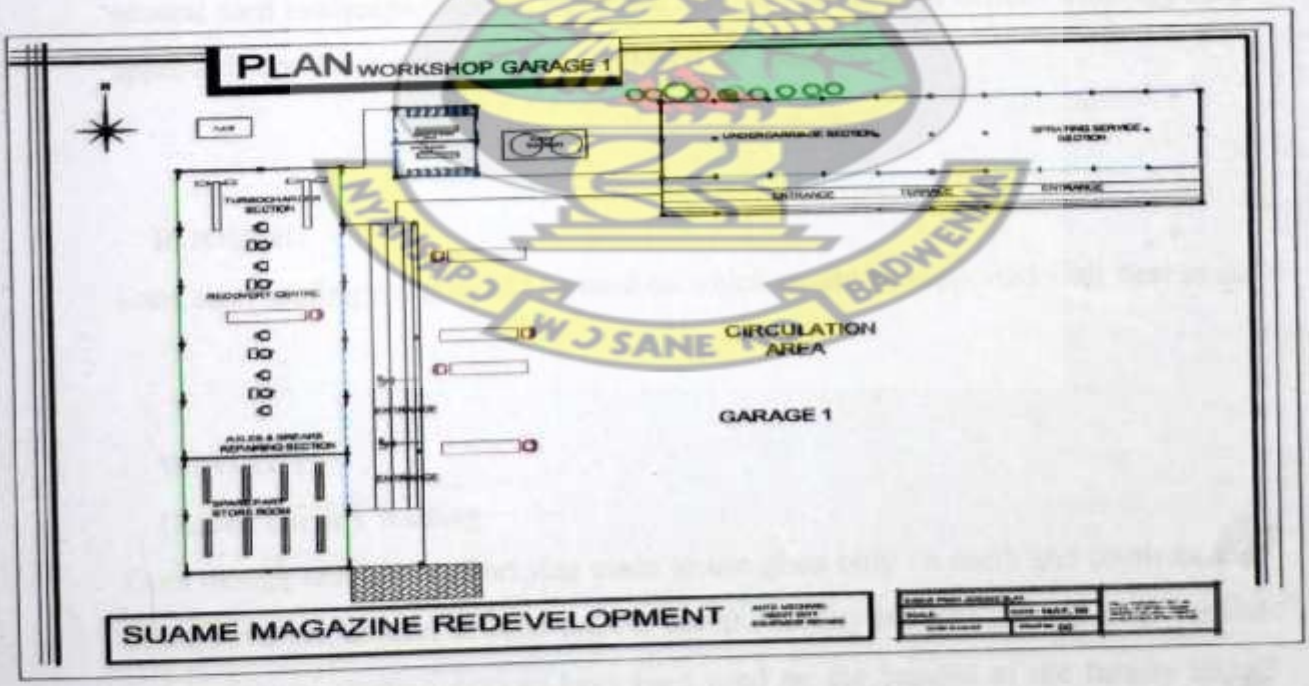


Figure 34 shows other part of the workshop 1 with the changing area, the plant and water

5.2.1 Materials and finishes

- **Walls**

Stone and concrete masonry as well as brickwork finishes are employed on retaining walls as part of external landscaping. Wall cladding makes use of combination of concrete sheet units, structural clay tiles and facing tiles.

- **CEILINGS**

All workshop ceiling are exposed truss with post-applied. Plastic T&G will used for offices and specialist approved acoustic material for the laboratory.

- **FLOORS**

Asphalt finishes and pavement blocks are used in varied ways for driveways and car parks. Pavement materials such as concrete blocks, stone finishes are employed. Materials used for steps, ramps and retaining wall definition are consistent with general hard landscape finishes. Porcelain tiles will be used for offices while specialist approved acoustic material will be employed for laboratory.

- **ROOFING**

Long span roofing cover would be used on which would be supported with steel truss.

- **WINDOWS**

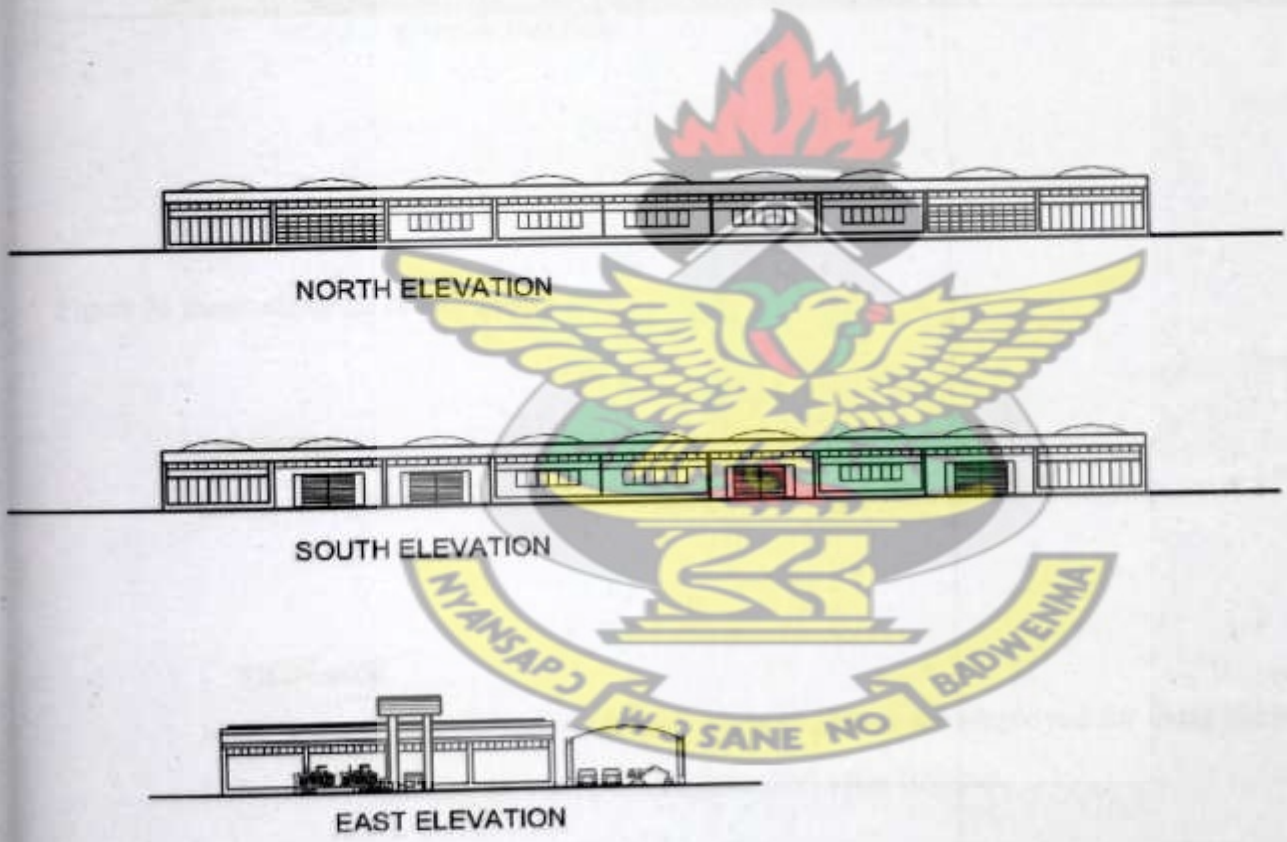
Glazed curtain walling

Even though conscious effort was made to use glass only on north and south facades of the structure, control of solar ingress into the facility remains critical. Both vertical and horizontal shading devices have been used on the facades of the facility taking into consideration the calculated shadow angles of these facades. The red bias light is very good for computer fitted rooms since it does not create glare. The glass panels are

supported using planer bolts on a four-node connector. The cast-steel brackets resist horizontal wind loads.

Additionally, awning windows has been dominantly used within the curtain walls, to open when need be, to allow for effective ventilation.

Figure35 shows elevation of the warehouse.



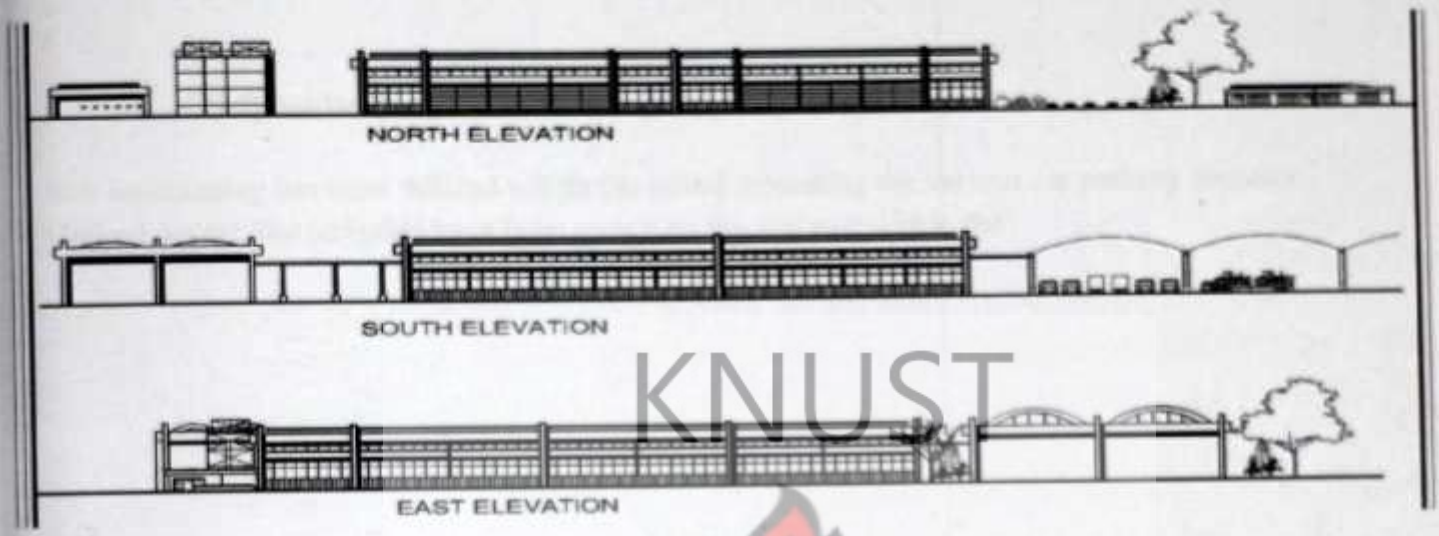


Figure 36 shows elevation of workshop 1

- **DOORS**

Laminated glass in aluminium frames and rolling grilles for all workshop.

- **SIGNAGE**

Multi colored diverse materials from glass to plastic are employed for these elements. Directional signs are all made of stainless steel satin finishes.

5.3 LANDSCAPING

Landscaping which also forms an integral part of the design has been considered and effectively used in the design to raise comfort levels as well as the overall functionality of the facility.

It can be categorized into soft landscaping and hard landscaping.

- **Soft landscaping**

Soft landscaping has been utilized within the island separating the various car parking sections. Ground covers like turfgrass have been grown on the soil part within the

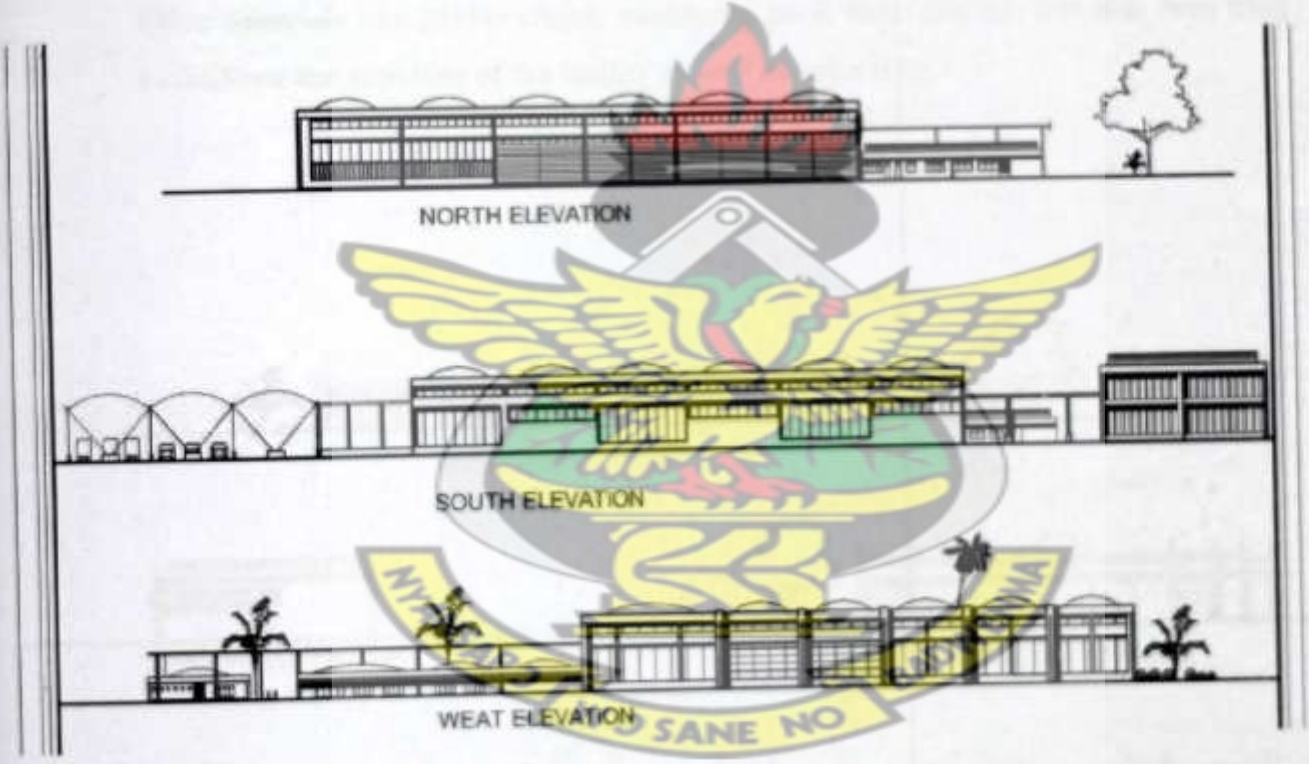


Figure 37 shows elevation of the workshop 2.

Island, and spotted systematically and with flowery shrubs like hibiscus esculentum. This does not only give good visual effect but also improves its immediate environ and beyond. Weeping willows and Regstonia regia have also adapted along the borders of the drive routes to give the prospective customers a royal welcome as they visit the facility.

Lawns have also been covered with grass, to break away from the monotony of the pavement blocks as well as provide a more suitable ground where children can interact and play safely.

- Hard landscaping

Materials like pavement blocks have been used within the parking area, and asphalt, for the minor access road. Sandcrete blocks have been used for the peripheries of the pedstrianized walkways, curbs etc.

Other materials like garden chairs, swimming pool, fountains etc. has also been used to facilitate the activities of the facility as well as spice it up.

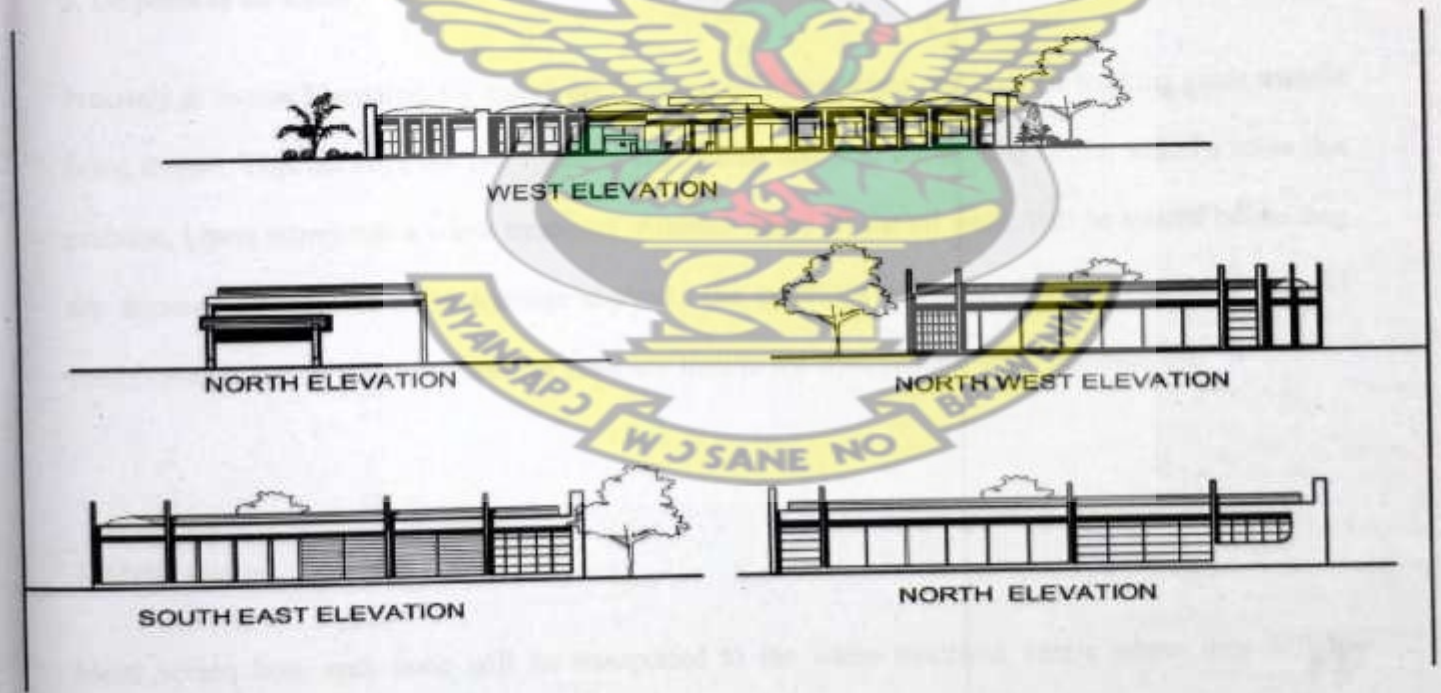


Figure 38 shows elevation of exhibition block and workshop 3.

5.4. ENVIRONMENTAL IMPACT ASSESSMENT

The Automobile repairs centre raises the following major environmental problems and these are their proposed solutions.

1. **Carbon Emission**

About 20% of the site has been allocated to greenery. This is to help absorb a considerable amount of the carbon emissions from the waste products of the burning fuel from the automobiles. This is also assist in the combat of global warming and provides a cleaner environment for the workers at Suame Magazine.

2. **Disposal of oil waste**

Presently at Suame Magazine, oil wastes are disposed off into streams and on their working yards without being treated. This destroys the few existing vegetations and also the fertility of the soil. To solve this problem, I have introduces a waste treatment collector where all the oil waste will be treated before they are disposed off into the main drainage channel. The treatment collector will neutralized the harmful components in the oil waste and will not pose any treat to the environment when disposed off.

3. **Metal scraps**

Metal scraps from each zone will be transported to the waste treatment centre where they will be compressed into modules. These will then be transported to factories in Tema which deal in metal products to use in their production.

5.5. COSTING AND CONCLUSION

5.5.0. COSTING

This chapter aims at giving the client an overview estimation of the cost of the project. The cost per square meter of construction of a industrial entity is estimated to be about $ 650, which is GH¢ 625.5

Therefore,

Administration .....4800m² x GH¢ 625.5

= GH¢ 30,002,400

Exhibition.....27000 m² x GH¢ 625.5

= GH¢ 16,888,500

Warehouse.....60000 m² x GH¢ 625.5

= GH¢ 37,530,000

Canteen.....4500 m² x GH¢ 625.5

= GH¢ 2,814,750

Workshops.....60000 m² per one block x GH¢ 625.5

= GH¢ 37,530,000

Grand total..... = GH¢ 90,988,650

5.5.1. CONCLUSION

In conclusion, since the prospective technician are invariably the consistent users of the facility, all the appropriate measures necessary to ensure a serene, comfortable, secured and stress free congenial environment has been provided, so that they enjoy the use of the space, while the client and prospective stakeholders, recoup the benefits of their investments within the shortest possible time. Under these conditions, it can be stated emphatically that this project is economically viable – all things being equal. It is therefore believed that the client and all the stakeholders involved would accept and make this proposal a reality.

APPENDIX I

THESIS QUESTIONNAIRE

TOPIC: REDEVELOPMENT OF SUAME MAGAZINE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

POST-GRADUATE DIPLOMA IN ARCHITECTURE

JUNE 09

Name:

Sex: male [ ] female [ ]

Age: **Date:**

1. What is the area of your expertise? Do you have any other profession?
Ans:

2. Master or Apprentice? If Master, how many workers?
Ans:

3. How long have you been working here?
Ans:

4. What time do you come to work and from which area? What is the means of transport?
Ans:

5. What systems do you work in this area? Clusters (Precinct) or Disperse
Ans:

6. Which one do you prefer and why?

Ans:

7. How do you acquire space/land here to operate?

Ans:

8. How do customers come in, park and how are they attended to? How many customers do you normally service in a day?

Ans.

9. If cars are not service the same day, how are they secured to be operated on the following day.

Ans:

10. What are your major sources of market? Inter regional, international or both?

Ans

11. How do you dispose of waste; dirty oil, scraps, etc?

Ans:

12. How do you bring in and store your products?

Ans:

13. Do you have any health facility at Suame magazine and if not, how far do you have to travel to get to the nearest one?

Ans:

14. Have you experienced fire outbreak in Suame Magazine before? How did it happen? Do you have safety measures to prevent fire?

Ans:

15. How often have you heard of theft cases in and around the Suame Magazine?

What security systems do you have in place? Individuals or collective security system?

Ans:

16. What material do you use for building your work station and why? Cost of the material?

Ans:

17. Do you have adequate sanitary facilities? Did you build it or is being provided by the KMA or a private owner? How much does it cost to access one if you don't have it?

Ans:

18. What is the traffic situation in and around Suame Magazine? How do people maneuver their way through?

Ans:

19. Are you comfortable (noise, traffic, space) with your current workstation? If yes or no, why?

Ans:

20. What is the coordination between KMA and the workers of the Magazine? Do you pay any form of taxes and do you receive the necessary services and support of the KMA?

Ans:

21. Will you accept to have some form of formal training?

Ans:

24. Do you bring your children to work place?

Ans:

25. Do you have schools in and around Suame Magazine? If yes, do you send your children there and why?

Ans:

26. Where do you get food during break time (breakfast, lunch of super)?

Ans:

27. Do you have banks in the area and do you save your money there? If yes or no, why?

Ans:

28. Do you have any workers associations and which one do you join? What kind of support to you receive from these associations?

Ans:

29. What is the accommodation situation for apprentices and master? Do they sleep in the workshops or rent places in and around the suburbs?

Ans:

30. Is there any coordination between the workers of Suame and the Engineering Department of KNUST? If yes, what are the arrangements and if no why not?

31. How do you want the magazine to look like in the next 10 years? (Planning, technology and machinery)

Ans:

32. What happens when it rains? (Drainage, shelters for customers and workers, etc.)

32. Do you know the history of Suame? How is started and the various stages and transitions it has been through over the years?

Ans:

BIBLIOGRAPHY

1. Trewhitt, Philip (1999). Armoured Fighting *Vehicles*. Dempsey-Parr.
2. History of the Bulldozer". http://inventors.about.com/od/bstartinventions/a/bulldozer.htm.
3. "World's First Bulldozer". http://www.kansasphototour.com/bulldoze.htm
4. Mario Theriault, *Great* Maritme *Inventions 1833-1950*, Goose Lane Editions, 2001, p. 71
5. http://www.volvo.com/constructionequipment/global/en-gb/AboutUs/history/products/articulated+haulers/Introduction.htm
6. http://www.bcmuseumofmining.org/pdfs/The_Super_Haul_Truck_Resource.pdf
7. http://www.wipo.int/pctdb/en/wo.jsp?IA=WO2003001950&DISPLAY=DESC
8. The Victorian Web
9. Coulton, Lifting in Early Greek Architecture, p.7
10. Coulton, Lifting in Early Greek Architecture, p. 147
11. Coulton, Lifting in Early Greek Architecture, p. 19
12. All data from: Hans-Liudger Dienel, Wolfgang Meighörner, p.13
13. *Lancaster, Lynne (July 1999). "Building Trajan's Column". American Journal of Archaeology 103 (3): 419-36*
14. *Brindley, James*. "The History of The Fork Lift" *(in English). Warehouse & Logistic News December 2005*. http://www.warehousenews.co.uk/News/December_2005/F-History.html. Retrieved on 2008-01-25.
15. "Forklift- The Backbone of The Industry" *(in English). MHEDA Journal Online*. http://www.datakey.org/mhedajournal/3q04/lifttrucks_a.php3. Retrieved on 2008-01-25.