UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

DEPARTMENT OF ARCHITECTURE

OFFICE AND TRAINING CENTRE FOR GHANA NATIONAL ASSOCIATION OF GARAGES (G.N.A.G) – KUMASI (SUAME MAGAZINE)

A Design Thesis Report Presented to
The Department of Architecture
University of Science and Technology
In Partial Fulfilment for the Post-graduate
Diploma in Architecture

BY

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B.Sc. DESIGN

JULY 1994

DEDICATED TO MY PARENTS,

MR. AND MRS. OTENG

AND MY BROTHERS AND SISTER

MORE ALSO TO MY DEAREST UNCLE PROFESSOR

DR. A. A. OTENG YEBOAH

ACKNOWLEDGEMENT

My greatest gratitude goes to the lecturers in the Faculty of Architecture who guided me in preparation of Material for the thesis Notable among the lot are:

Mr. W. Enningful Eghan

Dr. H. N. A. Wellington

Dr. Gilbert Nartey.

I am grateful to my friend who for their assistance in various forms for encouraging me and also proof-reading this report and offering invaluable suggestions to upgrade the style of presentation.

Special thanks to my friends:

Mr. Nii Sai Torto

Mr. Bernard Koko

Mr. Kwesi Ampofo

Mr. Abeku Panford

Uncle Apea-Korang

for their invaluable assistance and help both in prayers and financially. May God help them all and the Rest of the Class of '94.

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CHAPTER 1

INTRODUCTION The Ghana National Association of Garages comprises of all Auto–Mechanics, Spare Parts dealers and other related services who have Registered under the council of Indigenous Businessmen Association (CIBA) Law 1993.

There are members all over the country based on Registration and contributions to the Association and the entire Nation as well.

Ashanti Region has the highest number of members and this has been due to its contribution both human and metal resources. Kumasi being the National/Regional Headquarters.

HISTORICAL BACKGROUND (Kumasi Branch): Suame Magazine

This Association in 1935 by a Group of Mechanics at the now Suame Police Station. In 1960, it was registered as a **Mechanical Association of Suame.** Under the help of the then Asantehene, Nana Agyeman Prempeh (I) and the Town Planning Department allocated A Site to these "fitters" known as "Magazine" at Suame–Tafo light Industrial Area. This was a result of the growing nature of the Association and its members. In 1986 it became A member of the Ghana National Association of Garages (G.N.A.G.).

AIMS AND OBJECTIVES OF THE ASSOCIATION

1. To Mobilise Resources and Assistance to its Members.
2. To Raise Revenue to develop the infrastructure and its supporting facilities in the sector.
3. To help upgrade the level of technical skills by establishing a training centre brings students and its Registered Members.

Membership

There are 16 zones in Kumasi each comprising of 7 members each.

- Chairman
- Vice Chairman
- Secretary
- Potter
- Treasurer and
- Two other Members

As a profit making oriented – members are asked to pay their dues.

There are four main Meetings.

(a) Annual Meetings

(b) Board Meetings

(c) Committee Meetings

(d) Regional Meetings.

This has realized the Topic, Office/Training Centre for the Ghana National Association of Garages – Kumasi Suame.

THE NEED: As a Contribution of the informal sector to Industrialization in Africa, it has been realized that there is the need to promote an informal technical base for the generality of young school leavers (J.S.S & S.S.S.) and illiterates to find work in this sector as formal apprentices. This will form a linkage between the formal sector.

It has become a national outcry to reorganise the people of Suame Magazine under the National Association of Garages its Regional Branch.

There is no adequate facility in terms of Spatial Requirements to implement this development plans.

A well modulated architectural design is required to provide the necessary spring board for administrative, and technical managerial, meetings etc in this association.

Aims and objectives of the Scheme

- A strong technological base for growth
- Possibility of stimulating indigenous entrepreneurship
- Initial Capital easier to mobilise
- Resource intensive resulting in more job opportunities
- The use of the appropriate technology and adequate use of local Resources – Metal and human.
- Adequate opportunity for self employment of entrepreneurs.

OBJECTIVES

- To upgrade the technical and managerial competence of both the members and the Association.
- Exposing them to modern trends in the various disciplines.
- To ensure that the facility is used to its utmost for the benefit of G.N.A.G. and the nation as a whole.
- To ensure that the Association is self-funding

CONCEPT OF DEVELOPMENT:

It should be noted that, the various preparations, techniques, methods and targets netting are all based on the technology, concepts and tradition of the transport system in the country with Conceptional Perception that our present industry is 90% Maintenance and Servicing.

However, for future progress and aspirations, bearing in mind that Ghana is passing through a process, the preparations and delivery had some kind of in-built Mechanism of stimulating the target group to accept innovations.

(a) TARGET GROUP

Marster Mechanics, Assistant Mechanics, Apprentices, School Leaver, Semi-illiterate, Illiterates, Members.

(b) TRAINING METHODS TO BE USED

(i) Traditional teaching approach

(ii) Individualised leaening

(iii) The use of local languages apart from English Language.

(iv) The use of teaching aids and library facilities a Manual – Audio Visuals etc.

CHAPTER 2

SCOPE OF THE PROJECT

(a) SITE LOCATION: The site is located at Suame/Tafo light industrial Area. It covers an area of 3.3 Acres (13,200sq meters).

It is situated about 3km from Kejetia Centre. The site has been earmarked for industrial activities such as Auto Mechanics, Industrial Mechanics etc.

(b) DEVELOPMENT INTENSIONS.

This is intended to provide a physical facility to enable the office /training centre achieve its aim and objectives.

However, this was not to provide training for it's members only but to serve as a role model to help boost up the Environmental Conditions of the site (area) as a whole.

In the light of the existing problems of the Association, it has been further thought of phasing the project to meet the financial aspiration of the association.

As a G.E.S. policy on Deboardinisation programme. It has been considered as a day school running in 2 streams. Which will help

the users make the optimum utilization of the facility.

(c) CRITERIA FOR SITE SELECTION:

The Criteria upon which the site selection was made are:

(i) the site is on the outskirts of the city, away from the Central Business District which s more Suitable for Commerce.

(ii) there is a good transportation system linking the site to the centre of the city and various parts of the region and country.

(iii) Existing social facilities and infrastructural network is highly developed. Electrical power, water, telephone, banking services and the like is available to be tapped.

(iv) Raw Materials are available on site or very near

(v) There is a concentration of manpower with the relevant skills in the area.

(vi) There is a good housing/sanitary facilities in the area.

(vii) The area has been earmarked for the G.N.A.G. to develop it into an office/training centre.

Merit

(i) The largest Concentration of skilled technicians and artisans countrywide. They are highly innovative. This form the base of the target group.

(d) CLIENTS AND USERS: The client is the Ghana National Association of Garages Kumasi Branch. (Head Office and the Regional Office: The status of G.N.A.G. is therefore, that of a non-governmental organisation. It is also profit making organisation which registered members are liable to pay dues to finance the associations aims and objective. It is under the M.O.T.C. and forms a liaison between its members and the government:

(ii) CLIENTS BRIEF:

(a) Offices –

(i) Head Office

(ii) Administration for the Training Centre:

(b) Technical Workshops: –

(i) Auto Mechanics

(ii) Auto Body Works

(iii) Auto Electricals

(iv) Pump and Injection Workshop

(v) Industrial Mechanics

(c) Special Teaching Areas:

– Resource Centre

– Lecture Theatre

– Meeting Hall

(d) Supporting facilities

(i) First aid clinic

(ii) Canteen

(iii) Stores

(iv) Sanitary Areas.

(e) The expected number of students population was estimated by the client as 320. Based on duration of training on pilot programmes organised by G.N.A.G., M.O.T.C., M:O.E.C and sponsored by the World Bank.

SPECIAL PROGRAMMES:

Under the auspices of the G.N.A.G., the M.O.T.C. Special pilot programmes are organised to train Master Mechanics.

However, the main objective is to prepare every Master Mechanics in such a way that at the end of the training he or she would be able to understand and appreciate the need to know the basic principles and theories behind their practice.

SELECTION OF TRAINEES:

The trainees were selected upon Consultation with K.T.I. and based on the laid down Criteria such as Zonal, Interest, Experience, level of eduction, type of work etc.

-Auto Body straighters

-Auto Painters

-Auto Mechanics

-Auto Electricals

-Heavy Duty Diesel Mechanics:

METHODS AND TECHNIQUES:-

The use of Competency Based learning approach in modified manner suitable for our economy and environment. Our local languages together with English are used.

- Video; projectors, slides, information sheets, learning guides were also used in the programmes:

POST EVALUATION:

A post evaluation survey was conducted in order to assess the extent of the impact the training has had on the whole systems of their operation. This revealed the following:

(a) After returning to their workshops they found their old Methods of operation unsuitable and time consuming

(b) They however, realized that they were handicapped in terms of tools and equipment.

(c) Many realized that they had to rearrange their shops in order to allow proper flow of work to keep the shop tidy and clean and also create good environment for both the customers and themselves.

CONCLUSION:

In the light of this pilot programmes, the Association, however, felt if an office/training centre is realised, members of the association will benefit from its operation, aims and objectives so as to raise the standard of its members both technically and managerial. This however, formed the basis of having an office and a training centre thereby reducing the long run. Also to improve the existing environmental conditions as to handling of work, landscaping etc....

(d) FINANCE:- This scheme would be sponsored by the Ghana Government, World Bank and the Social Security and National Insurance Trust (S.S.N.I.T) and from other sources either in cash or kind.

- Money and equipment from other well established organisations.

- Moneys realised from the Association.

CHAPTER 3

Technical Studies

This was based on the clients brief and other technical considerations and requirements as to the establishment of the user function and the required spaces needed for the smooth running of the spaces in question.

- Tools and Equipments required in each area of works
- The type of vehicles – light and heavy duty establishment of tuning radius and spaces required.
- Work Benches, heights and spacing of working benches.

Technical Consideration

(a) <u>Day Lighting and Artificial Lighting:</u>

i. The provision of adequate illumination for tasks of Manufacturing and Inspection.

ii. The elimination of glare resulting from unduly bright sources, reflective surfaces and the juxtapositioning of bright and dark spaces.

iii. Consideration should be given to the stroboscopic effect on rotating/reciprocating machinery when choosing lamps for industrial applications.

iv. It may be necessary to provide spot lights for intricate tasks.

Lighting provided must meet requirements of task with highest illuminance value, lowest limiting glare index and best colour rendering.

(b) Ventilation:

Adequate ventilation is crucial for the thermal comfort of workers. A lot of energy is liberated into the work place by both machines and human beings.

i. The correct thermal balance must be maintained by the provision of large expanse of window area and an adequate volume by increasing room height.

ii. Extractor fans are employed in the welding, spraying furnaces and hearths.

iii. 1 to 1.5 air changes per hour is required in the workshops.

(c) Noise and Vibration

i. In all the workshops, generation of noise from various sources is inevitable.

ii. Again the vibrations produced as a result, if not properly handled, can cause serious structural cracks in walls and floors.

iii. Each piece of machinery to be installed on a separate mounting.

iv. Resilient pads and helical springs employed to dampen vibrations thus preventing structural cracks.

v. Screening off of workshops and noise sources by tree planting.

(d) Structure

Functional and spatial requirements dictate large uninterrupted spaces. These would ensure smooth unhindered work flow and would allow for easy re-fooling of the plant where when necessary.

Partitions should, therefore, be, as much as possible, freestanding and moveable.

(e) Fire Prevention and Control:

Fire protection, undertaken in order to safe-guard human life and property, includes preventing, detecting and extinguishing fires. It is also concerned with the improvement of fire prevention and suppression methods by research into the causes of fire, the study of engineering data leading to establishment of standards in building design and construction that will limit fire hazards:

i. Compartmentation - especially in the warehouse. Partitions or doors of a high Fire Resistance (FR) Provided to prevent fire moving across the floor.

ii. The choice of Materials

iii. Roof Ventilators:- These would reduce smoke and heat build up and prevent rapid spread of fire.

iv. Fire Escape Routes:- Large doors are provided, opening into the outdoor working spaces. A network of fire hydrants, hose reels fire extinguishers and the fire-fighting equipment is provided in the Workshops and other areas.

v. Water Tank:- This would amongst other things, provide water for fire fighting especially in times of water shortage.

Dust/Fume Handling:

Extractor fans are positioned where necessary especially in the workshops. (spraying, industrial mechanics, welding or fabrication unit) to deal with these pollutants.

Workshops Services:

This depends solely on the function and kind of job or industrial activities held in the workshop in question. Generally, Services like, lights, water, compressors, oil etc. are supplied at various service points.

Trenches are essential, for easy cleaning of the area.

CHAPTER 4

The Environmental Context of the Site

(a) SOCIAL PATTERNS:

There is a heterogeneous mix of people from all over the country and the neighbouring countries:– Ewes, Northeners, etc. with the Akans forming the majority group of influx: Other foreigners from Burkina Faso, Togo, Niger etc.

- Most come to stay with their relatives or sleep in the workshops as watchmen. Majority of them live in Kumasi and the surrounding villages of about 10–30 km Radius from the City Centre.

DATA:

69% – influx of workers within the radius of 10.30 km from Kumasi.

15% – from within the Kumasi Metropolis.

9% – Influx of workers from the northern parts of the country

5% – Influx of workers form the southern parts of the country

2% – Workers from neighbouring countries.

Most of 30,000 skilled and semi–skilled workers live in Suame, Tafo, Makrom, Bremang, Kropo, Bantama, C.P.C. etc ... and surrounding areas and have a kinship born out of work association.

Social Interaction on site is mainly in workshops, chop bars, retail and spare parts shops. Outside the industrial area, the

interaction continues in drinking bars, video centres, banks, lorry parks etc and amongst others.

The influx of workers are of the age between 17–23 years.

Estimated number of apprentices employed annually to this sector 2,650. Out of which:

62% – School Leaving Group (1643)

20% – Semi–illiterate (530)

18% – Illiterates (477)

Design Implications:

1. Establishing the kind of training and teaching methods to used.
2. Forming the mainstead of spatial requirements to meet their social interaction aspiration: The use of open spaces courtyards, canteen, and other areas for privacy.
3. Establishing the basis for:
   i. The Catchment area for the facility
   ii. The Target Group for the training centre.

(b) **HOUSING:**

Most of the houses are typical Ashanti Courtyard units and are quite large, and of mixed quality.

They are arranged neatly along roads and are mainly of landcrete and sandcrete construction. Nearly all are located off the industrial area. The houses are densely populated which has led to unauthorized extensions and adapted spaces for both commercial and residential use.

PROPOSALS:

It has been proposed that G.N.A.G. have their own hostel to solve the problem of housing its students and members.

(c) INDUSTRIAL ACTIVITIES:

Apart from A. Lang and a couple of timber firms which are fairly large, the majority of business here are small holdings. These are engages in Auto Mechanics, Straightening & Welding, Latheing, blacksmithing, Agric Implements, trolley, etc...

Most of the activities are done in the open yard and this has its own problems of maintenance, waste handling and other environmental problems. The structures are temporal and it needs a proper lay-out to help in facilitating the smooth running of industrial activities.

An inadequate use of space and lack of managerial skills has established a lot of managerial and misuse of resources.

Design Implications:

(1) A well modulated Design that will serve as a model for the development of individual and entire workshops in the area.

(2) The use of outdoor spaces to keep them in balance as to their way of life and experience.

(3) More storage facilities to be provided for both incoming and outgoing jobs.

(4) Careful handling of waste.

(d) SERVICES:

(i) Electricity: Its the source of power used in most of the industries. However, demand is fairly high.

As an industrial estate the required standards for power supply is not adequate. There is also lack of knowledge & education on the type of cable and phases to be used.

There is a problem of blackouts and overloading of power.

Design Implications:

(a) The use of stand-by generators and transformers to boost the supply of power.

(ii) Water Supply: The area is provided with potable water from G.W.S.C. The water distribution network ensure supply of water effectively distributed.

(e) HEALTH: There are private hospitals as well as zonal clinics.

(i) Sanitary Facilities: In the site area there are 3 well placed sanitary areas which ensure that all are within 400 meters radius.

(ii) Solid waste disposal: There are three(3) main solid waster disposal.

i. SCRAP: Consist of metals and other waste associated with vehicle repair and other metal fabrication.

ii. Domestic type refuse.

III. WASTE OIL: Proposed on site interpreter drains leading to 1.0m^3 dump.

(f) OPERATIONAL AND MAINTENANCE:

The facilities are put under franchised management in line with K.M.A. policy on public facilities.

5. Land Use:

The site area is demarcated for industrial purposes with some mixed use.

CHAPTER 5

CASE STUDIES

Criteria for Selection

Based on the site for organising Pilot projects and the workshops needed to establish a training centre as well as its organisational structure to effect an effective supervision and other required services.

To establish the required needs for various workshops and its spatial and technical implications.

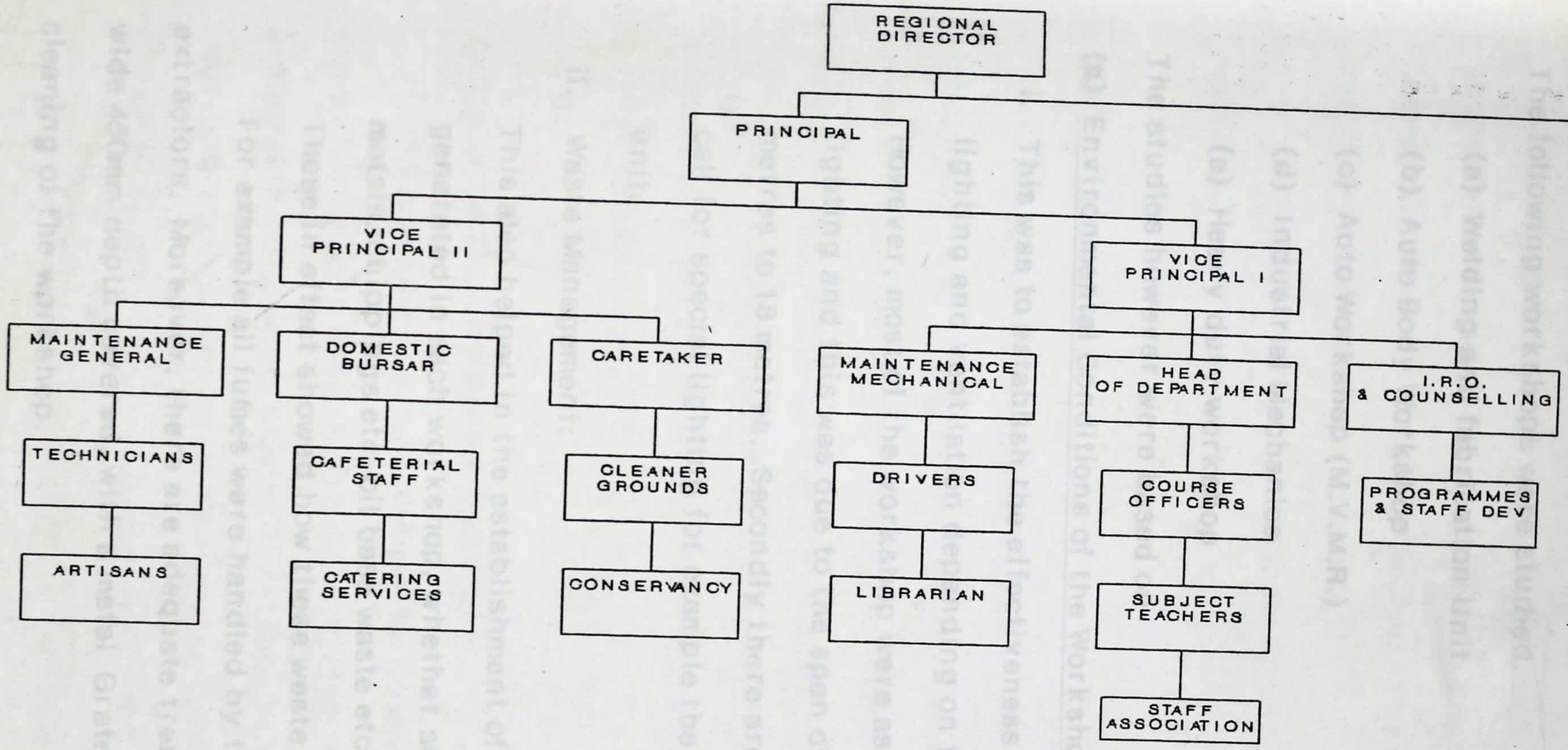
To form a clear basis between the formal and informal training skills and approach to work.

Level of technical base as to tools and equipments used in each workshop.

(a) *KUMASI TECHNICAL INSTITUTE (K.T.I.)*

In this formal workshop or institution, special workshops were taken as case studies. This was based on the clients brief to establish special workshops as a platform to its training centre. These were workshops which needed a "modern" trend to training skill to its high level of technological changes prior to its tool, machines and equipments.

i. Organisational Structure


REGIONAL DIRECTOR
PRINCIPAL
BOARD OF GOVERNORS
VICE PRINCIPAL II
VICE PRINCIPAL I
MAINTENANCE GENERAL
DOMESTIC BURSAR
CARETAKER
MAINTENANCE MECHANICAL
HEAD OF DEPARTMENT
I.R.O. & COUNSELLING
TECHNICIANS
CAFETERIAL STAFF
CLEANER GROUNDS
DRIVERS
COURSE OFFICERS
PROGRAMMES & STAFF DEV
ARTISANS
CATERING SERVICES
CONSERVANCY
LIBRARIAN
SUBJECT TEACHERS
STAFF ASSOCIATION

ii. Workshops:

The following workshops were studied.

(a) Welding and fabrication Unit

(b) Auto Body Workshop

(c) Auto Workshop (M.V.M.R.)

(d) Industrial Mechanics

(e) Heavy duty workshop

The studies however were based on

(a) Environmental Conditions of the Workshop:

i. This was to establish the effectiveness and adequacy of lighting and ventilation depending on the type of workshop. However, most of the workshop were assisted by artificial lighting and this was due to the span of the workshops – 12 metres to 18 metres. Secondly there are special areas which call for special lighting for example the fuel injection and pump unit.

ii. Waste Management:

This also helped in the establishment of the kind of waste generated in each workshop, whether solid waste – scrap – metals, chippings etc, oil base waste etc.

These in effect showed how these waste were handled.

For example all fumes were handled by the use of mechanical extractors. Moreover, there are adequate trenches with about 300mm wide 450mm depth covered, with a metal Grate which facilitates easy cleaning of the workshop.

(b) **SERVICES:**

Services like power (electricity), water, air supply are tapped at the various needed points. These are done by the use of connecting pipes on top of the ceiling. The service layout should be very flexible to effect any changes.

Secondly, there is an adequate spacing for easily servicing of machines

Safety Measures:

The use of large openings as emergency exit points and fire extinguishers as a means of fire control measure. For health and other medical treatments there are provision of first aid boxes in each workshop and a several first and clinic.

The kind of materials used in construction also prevents fire outbreaks and anti slippery (abrasive) furnishes to reduce the number of casualties.

Structure and Support System

The structure system is based on 6000mm column centres. This however has been used as a modular system, so that, multiples of this are used in various workshops to establish the right spatial require-meats taking into consideration the user function of the workshop in question.

The roof structure is supported by post and beam construction. The beam serves as a roof gutta spacing about 12–18 metres with its vault corrugated aluminium roofing sheet.

Materials and Furnishes

Materials used in construction of

i. Walls: Concrete and sandcrete construction with steel doors which are operated by compressure.

II. Floors: Granolithic floor furnishes with precast terrazzo slab beneath.

iii. Ceilings: These are left open that is the roofing materials are exposed as the ceiling.

iv Ceramic Tiles: are used at areas where water is predominantly used eg. washing bays, sink areas and lubricating bays for easy cleaning .

Fire Resistance materials are widely used.

Suame Magazine (Light Industrial Area)

This forms a pool of artisans and technicians located at Suame light industrial area. Most of the workshops are owned individually and a few by organisations.

Since they form the majority of the target group. It was necessary to have a closer look in their way of organising their workshop, social behaviour with regards to work, education, recreation etc, services, environmental conditions, safety measures,

tools and equipments, structure and support systems. Waste management of their workshops and the entire area.

Organisation of workshops are left to the individual managerial skills and this had led to the collapse of many workshops due to lack of managerial skills.

Due to their level of education, most workshops do not conform to the basic requirements for their workshops in question. And that most of timber structures and sandcrete materials for walls and aluminium roofing sheets. However, most of these workshops are small, measuring about 2.5m x 3m. These are meant for keeping the tools and other machines and equipments and the rest of the jobs are done in the open yard.

Waste management, for instance needs an attention to help keep the place clean and welcoming. Scrap, waste oil, and other Domestic refuse. Sanitary facilities have also been taken care of.

Moreover, safety Measures are not extensively used however, it needs to be addressed to reduce the level of fire outbreaks and casualties.

Chopbars, drinking bars etc are designed to have an open air to facilitate ventilation.

Looking at the structure and morphology of the site one experiences a rustic nature of architecture and the juxtapositioning of structures(buildings) explains the use of opening spaces and buildings used to enclose spaces as courtyards as working areas. The building scale or massing has an even nature with few building projecting out.

These factors and observations needed to be emphasised such that the scheme will meet this requirement. So that the users don't really fall out of place based on their background with regards to the settlements structure and Morphology.

Lessons from Case Studies

- Spatial organisation must be sound to ensure proper circulation and efficiency in work.
- Building width must be wide enough to cater adequately for the spatial requirements of machines and vehicles.
- Large windows (wall openings to allow for increases natural ventilation).
- Large uninterrupted spaces but should be of inexpensive construction.
- Adequate storage facilities for raw materials, finished products, equipments etc.
- Special mounting/pads for machines.

CHAPTER 6

DESIGN BRIEF DEVELOPMENT

i. CLIENTS BRIEF:

This emphasised on the development of the scheme, with special interest in the training centre and the head office. However, it was necessary to define two (2) offices to undertake the clerical duties of the Association and the training centre.

The development intensions was to have an office to undertake both clerical and administrative duties, a training centre with special workshops which adhere to the countries G.E.S. policy on deboardinisation and the new education reform policies. However, the development intensions was to have a twenty years program of phasing depending on the financial assistance given to the Association by the Government of Ghana and other financial institutions.

Outline of Client's brief:

(a) **OFFICES**

Head office – Association

Administration – Training Centre

(b) **TRAINING CENTRE**

Special Workshops (Technical)

i. Auto Mechanics

ii. Auto Electrical

iii. Auto Bodyworks

iv. Straightening and Welding

v. Lathe turning/Blacksmithing

vi. Heavy duty workshops

SUPPORTING FACILITIES

i. Canteen

ii. Resource Centre

iii. Lecture Theatre

iv. Meeting

v. Supporting services

The expected number of students population was three hundred and twenty (320). This was based on duration of training on pilot programmes organised by Kumasi Technical Institute, Ministry of Transport and Communication etc sponsored by the World Bank.

ii. BRIEF DEVELOPMENT:

The aim of the training centre is to upgrade the level of technical skills in this sector. So that each student attains the full competency level of NATIONAL CRAFTMANS CERTIFICATE at the end of the training.

Admission is based on:

(a) Basic education level certificate

(b) By interviews

(c) Membership

Duration of training is four (4) years:

- In the first year (1st), students take on core subjects and special workshop practice.

- In the second year (2nd), students take on core subjects and special workshop practice.
- Third year (3rd), – workshops practice (elective)
- Fourth year (4th) – final project work.

Course structure is based on core subjects such as Mathematics, English, General Science and basic handling of tools and equipment.

– Course stream – 2 stream ie. Hundred (100) students in a stream with 25 pupils in a class per each stream.
This however, gives the total students population.

– Looking at the educational issues, the main aim is to bridge the informal and formal sector by blending the traditional methods of teaching and formal methods of teaching. This however, affects the general layout and spatial requirements and the teaching methods and technics to be used.

However, the Resource Centre needs to be of an audio–visual centre where special programmes are organised with respect to each discipline in the various workshops. This will render its high percentage of usage ie bring its utilisation factor above 85%.

There is also the need to have a meeting hall for both the members and the students. This was necessary due to the kind of meetings organised by the association and more also for special programmes to its members to upgrade their managerial and entrepreneur skills.

Moreover, there is the need to provide a counselling section for its members and trainees. This will help also to advise both parties

on the aspirations of the Association as well as what one is willing pursue as his/her career in the future.

(i) HEAD OFFICE (Design Brief)

- Meeting Room
- Board Room
- Office
- National and vice chairman Sanitary facilities
- Regional Chairman
- Stores
- Treasure
- Secretary
- Potter/Receptionist
- Personnel Department
- Accounts Department
- Legal Department
- Counselling section
- Administration
- Principal office
- Vice Principal office
- Staff Common Room
- Programs and staff development office
- Industrial Relation Office (I.R.O)
- Reception
- First aid clinic
- Changing/Toilet facilities

Teaching Areas

Lecture Theatre

Resource Centre

Workshops

Changing/Locker Rooms

Rest Areas (outdoors)

Supporting facilities

Canteen

General stores

Security

Parking facilities

Waiting area

Sanitary facilities

ACCOMMODATION SCHEDULE

HEAD OFFICE	SIZE (m)	AREA (m^2)
NATIONAL CHAIRMAN	8 x 5	40
NATIONAL VICE CHAIRMAN	6 x 5	30
REGIONAL CHAIRMAN	6 x 5	30
SECRETARY'S OFFICE	2 x 5	10
TREASURER	4 x 5	20
POTTER	4 x 5	20
RECEPTION	10 x 5	50
LEGAL OFFICE	6 x 5	30
PERSONNEL OFFICE	6 x 5	30
ACCOUNTS OFFICE	8 x 5	40
ADMINISTRATIONS OFFICE	2 x 5	10
SALES DEPARTMENT	8 x 5	40
PURCHASING DEPARTMENT	8 x 5	40
STORES	12 x 12	144
COMPUTER ROOM	8 x 5	40
SANITARY AREAS (5 x 6)	30 x 3	900
GENERAL STORES	6 x 5	30
		1504 m^2
GENERAL AREAS		
BOARD ROOM	12 x 5	60
MEETING HALL	18 x 28	504
RESOURCE CENTRE	8 x 12	96
CANTEEN	-	566
PARKING AREAS (22)	12.5 x 22	275
		1501 m^2
ACADEMIC SECTION		
PRINCIPAL'S OFFICE	6 x 5	30
VICE PRINCIPALS' OFFICE	6 x 5	30
SECRETARY	2 x 5	10
COUNSELLOR'S SECTION	10 x 5	50
PROGRAMS & STAFF DEVELOPMENT OFFICE	6 x 5	30

OFFICE	2 x 5	10
INDUSTRIAL RELATION OFFICE	4 x 3	12
GENERAL OFFICE	5 x 3	15
STAFF COMMON ROOM	8 x 5	40
CHANGING ROOM	16 x 12	192
LECTURE THEATRE	12 x 7	84
FIRST AID CLINIC	7 x 4	28
		531m ^{2}
WORKSHOPS		
INDUSTRIAL MECHANICS	12 x 24	288
AUTO MECHANICS (Heavy Duty)	9 x 22	198
AUTO MECHANICS (Light Duty)	12 x 24	288
HYDRAULIC & PUMP SECTION	9 x 12	108
AUTO ELECTRICALS	12 x 30	360
AUTO BODY WORKS	12 x 24	288
AUTO SPRAYING UNIT	12 x 36	432
WORKSHOP YARD	60 x 25	1500
SUPPORTING SERVICES AREA	6 x 25	150
WORKING COURT YARD	12 x 18	216
VEHICLE COMPOUND	20 x 30	600
GATE HOUSE x (3)	2 x 3	18
		4,446m ^{2}
TOTAL FLOOR AREA		7,982m ^{2}

CHAPTER 7

Component Spatial Requirements

This is to explain the functional relationship, the intensity of interaction and the circulation pattern which establishes the effectiveness of dispositioning of various spaces.

However, this was established from a critical look at the accommodation schedule which has the following spatial components:

(a) **Administration**

i. Head Office

ii. Education office (training centre)

(b) **Teaching Areas**

i. Lecture Rooms

ii. Workshops

iii. Changing area

iv. Rest Areas

v. Staff

(c) **Cafeteria**

i. Kitchen

ii. Eating Area

iii. Offices/Changing Room

iv. Outdoor Cooking Area

v. Service yard

(d) **Workshop**

i. <u>Light duty</u>: Mechanical, Electrical, Bodyworks and Auto Spray

ii. Heavy duty: Mechanical, Electrical, Injection & Pump workshops

iii. Industrial Mechanics

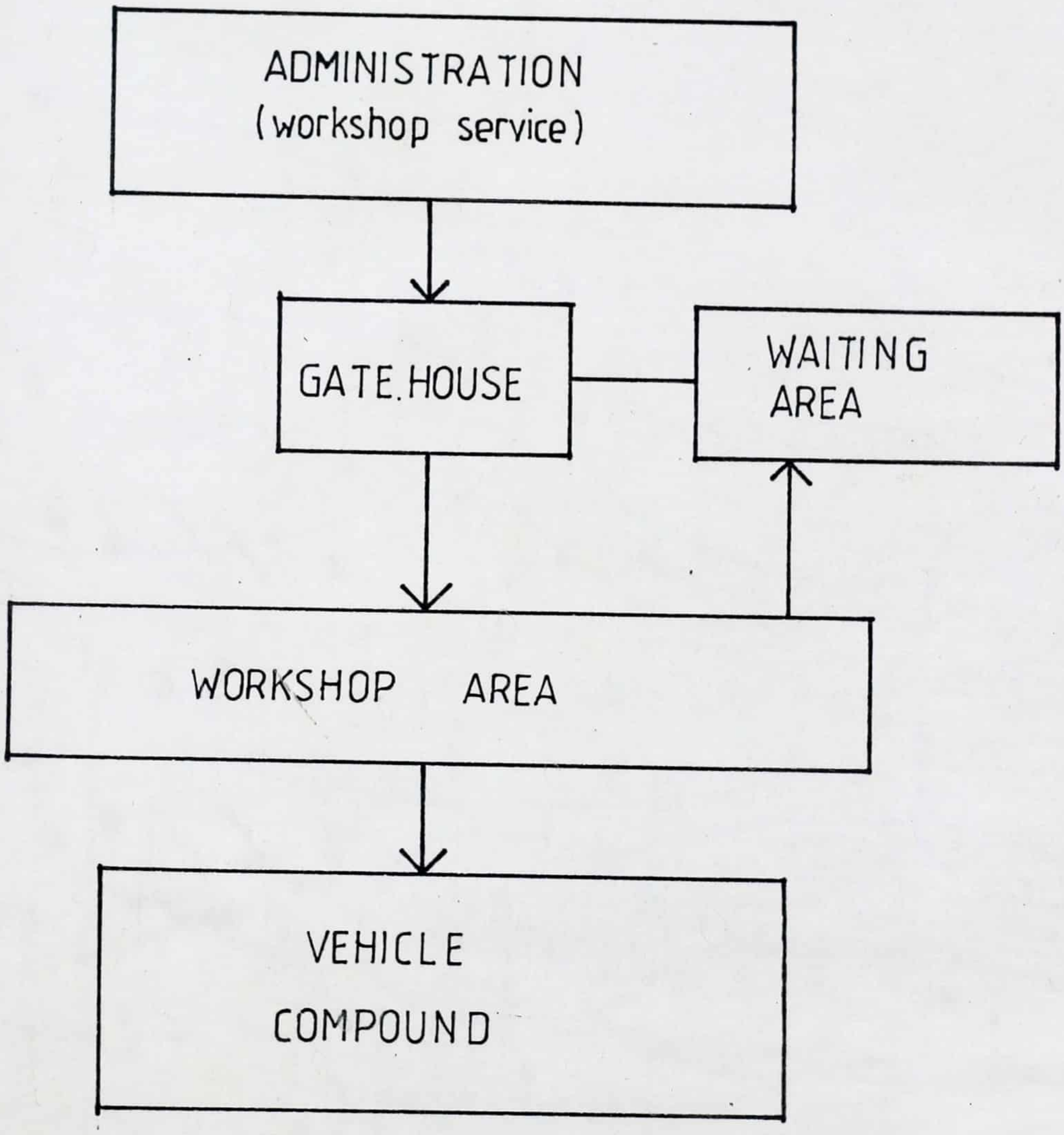
(e) **Supporting facilities:**

This was necessary to provide services to the main components of the design.

FUNCTIONAL RELATIONSHIP (WORKSHOP)

(a) Service Process

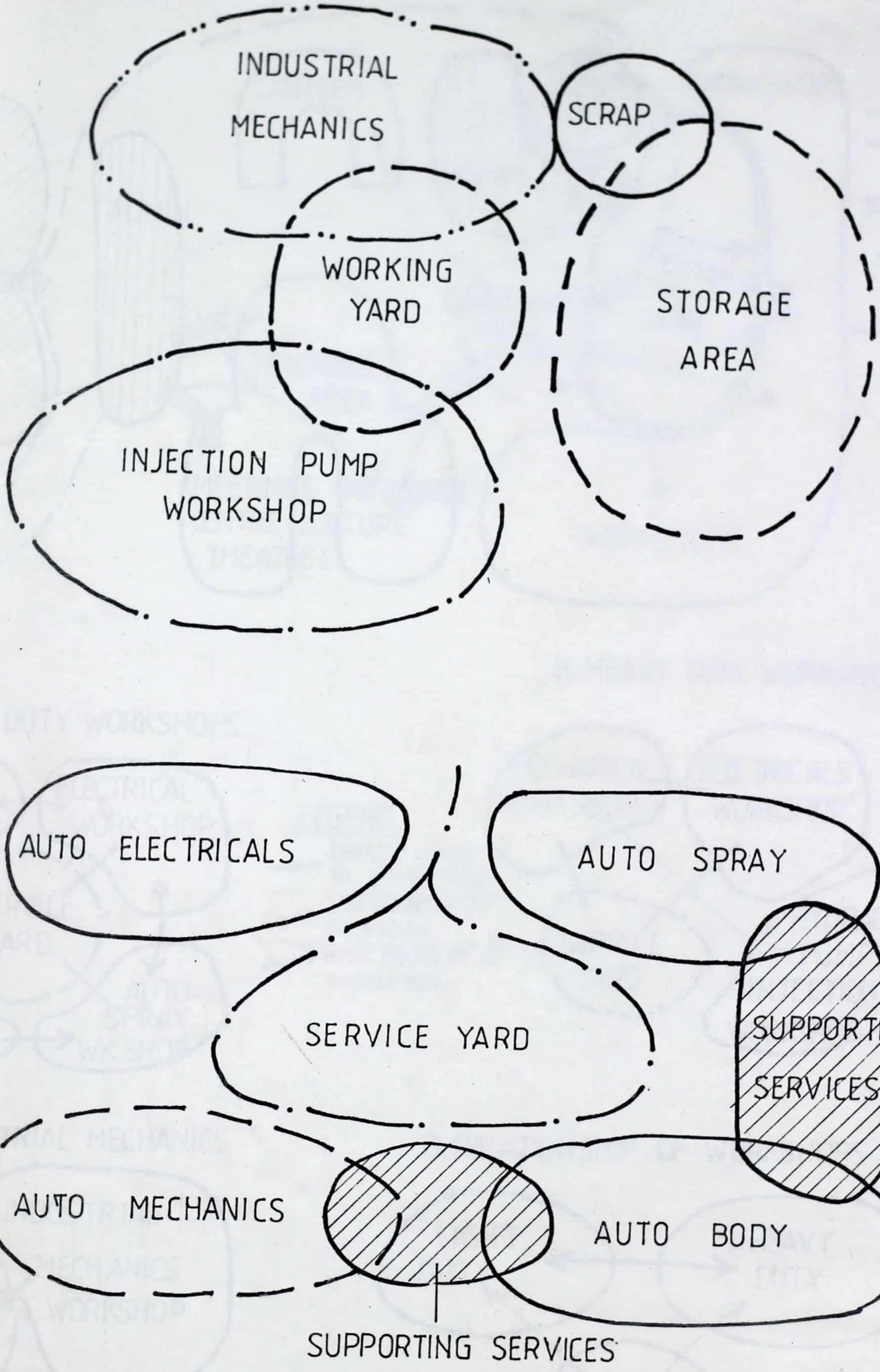
This was to establish the kind of jobs or services to be rendered. In that sense of if any job should be inspected, and if it is a very good example of a teaching material to train the students. This helps to regulate the Number of Servicing jobs into the facility.



(b) Flow chart

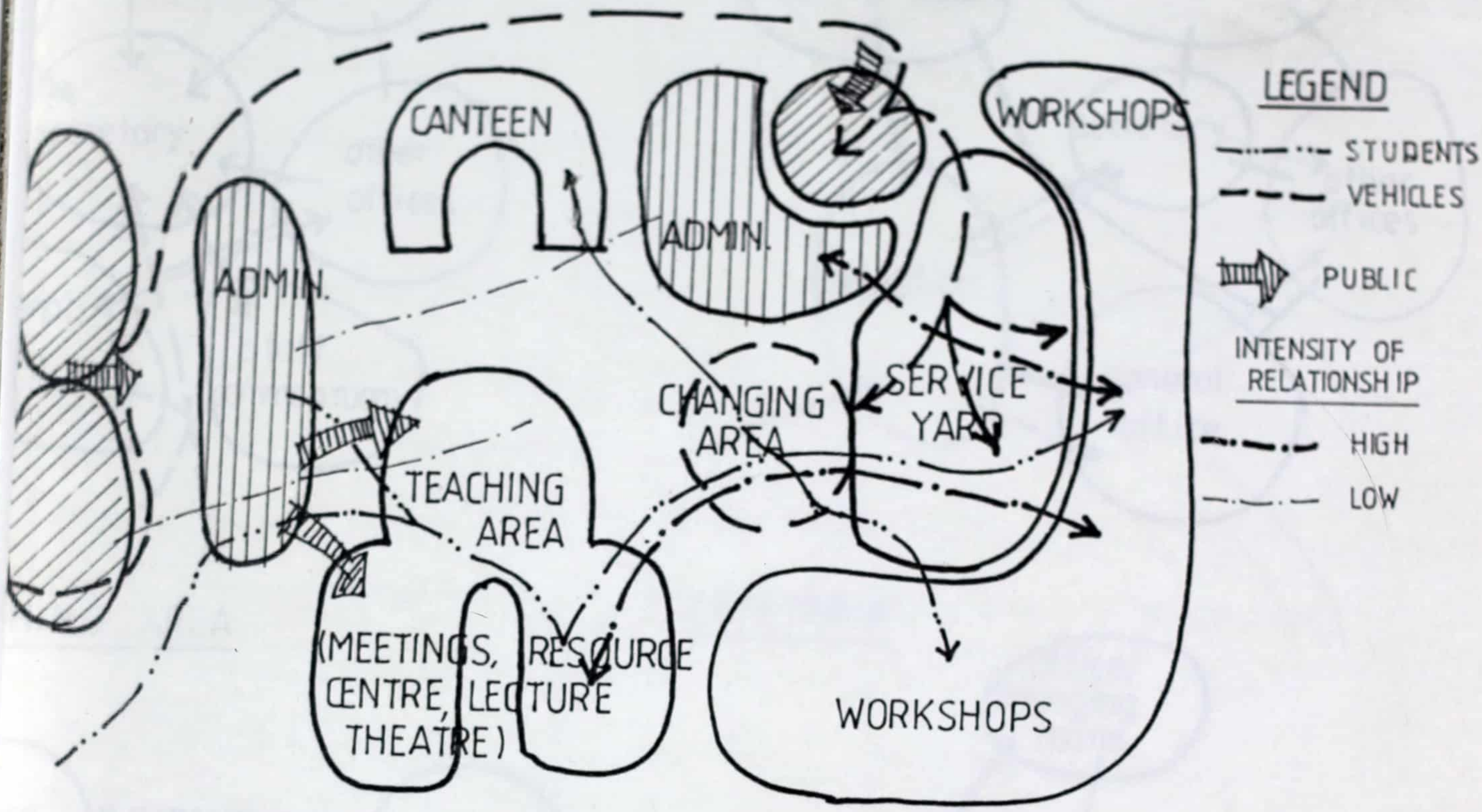
(i) Workshops

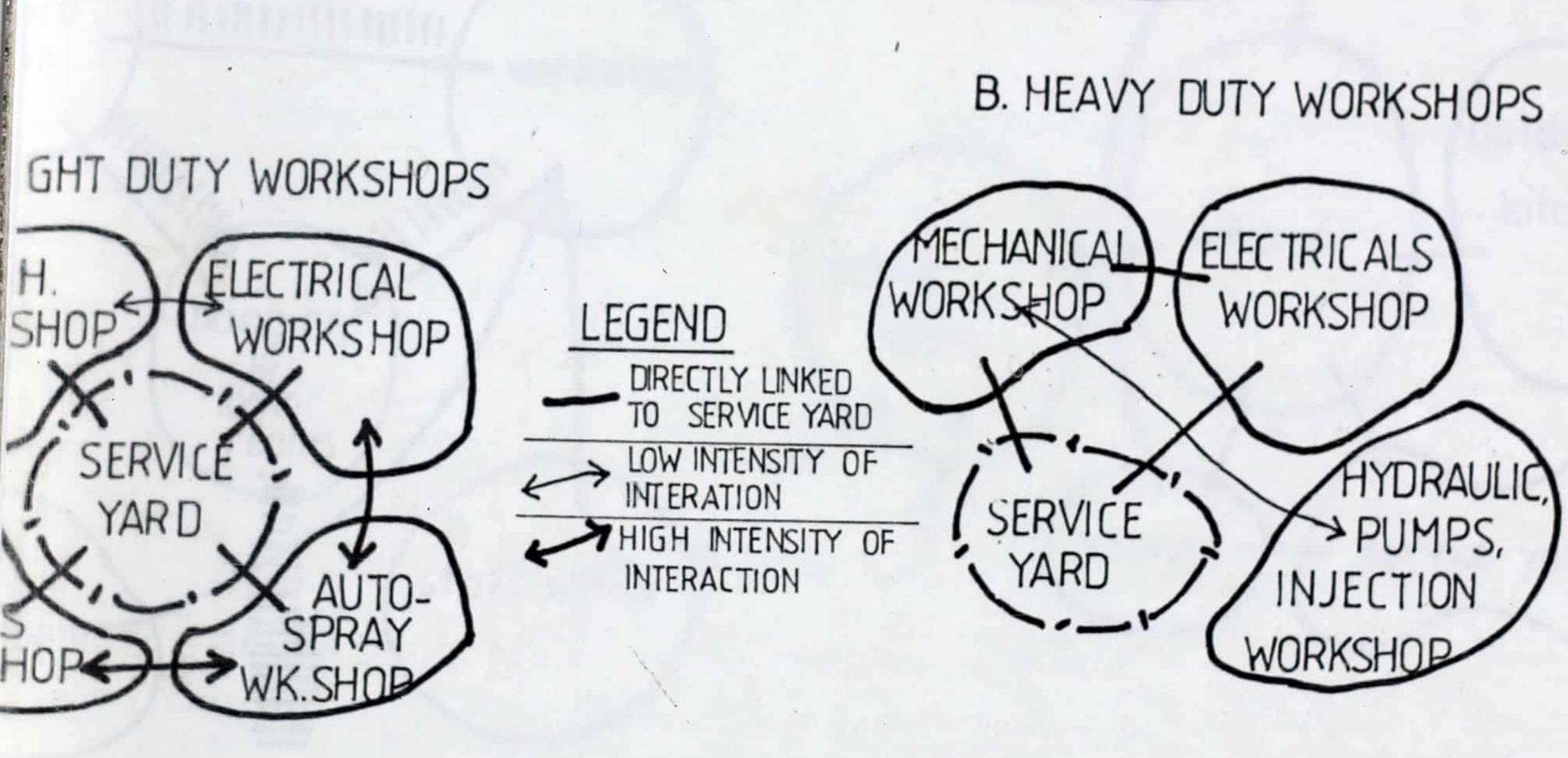
(functional Relationship Diagram)

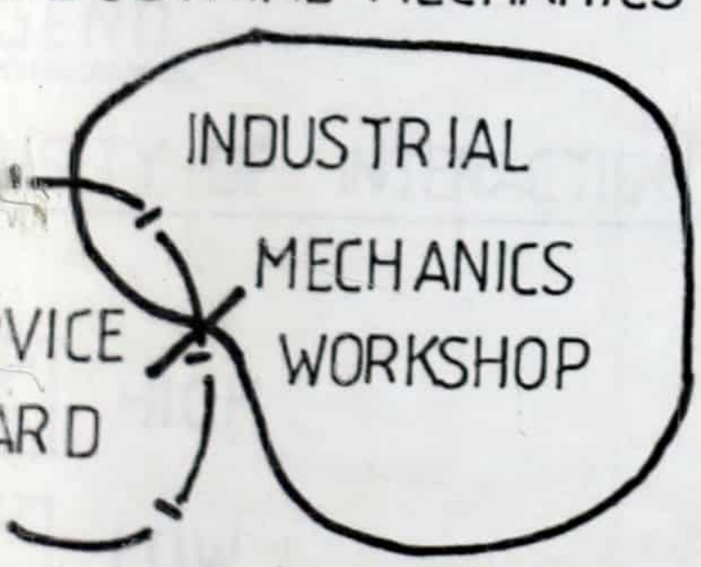


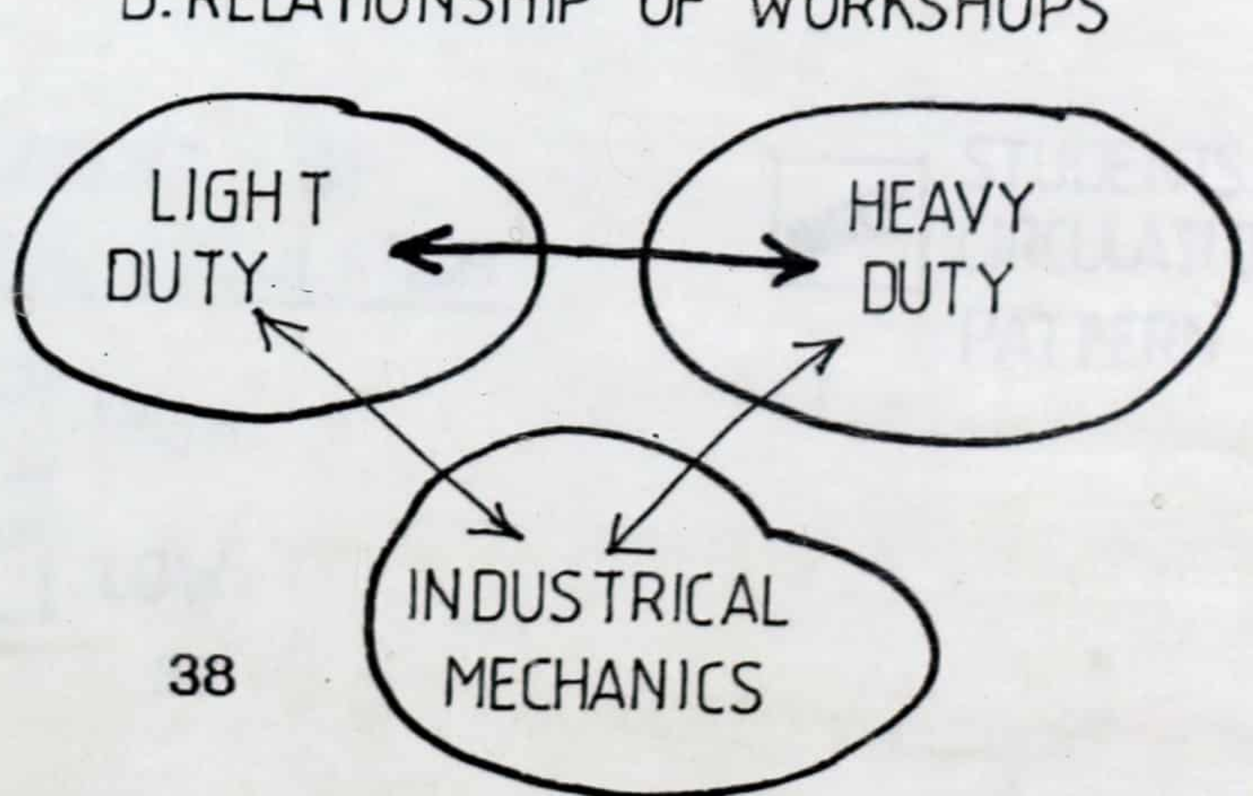
(ii) Conceptual Development

(functional Relationship – main components)

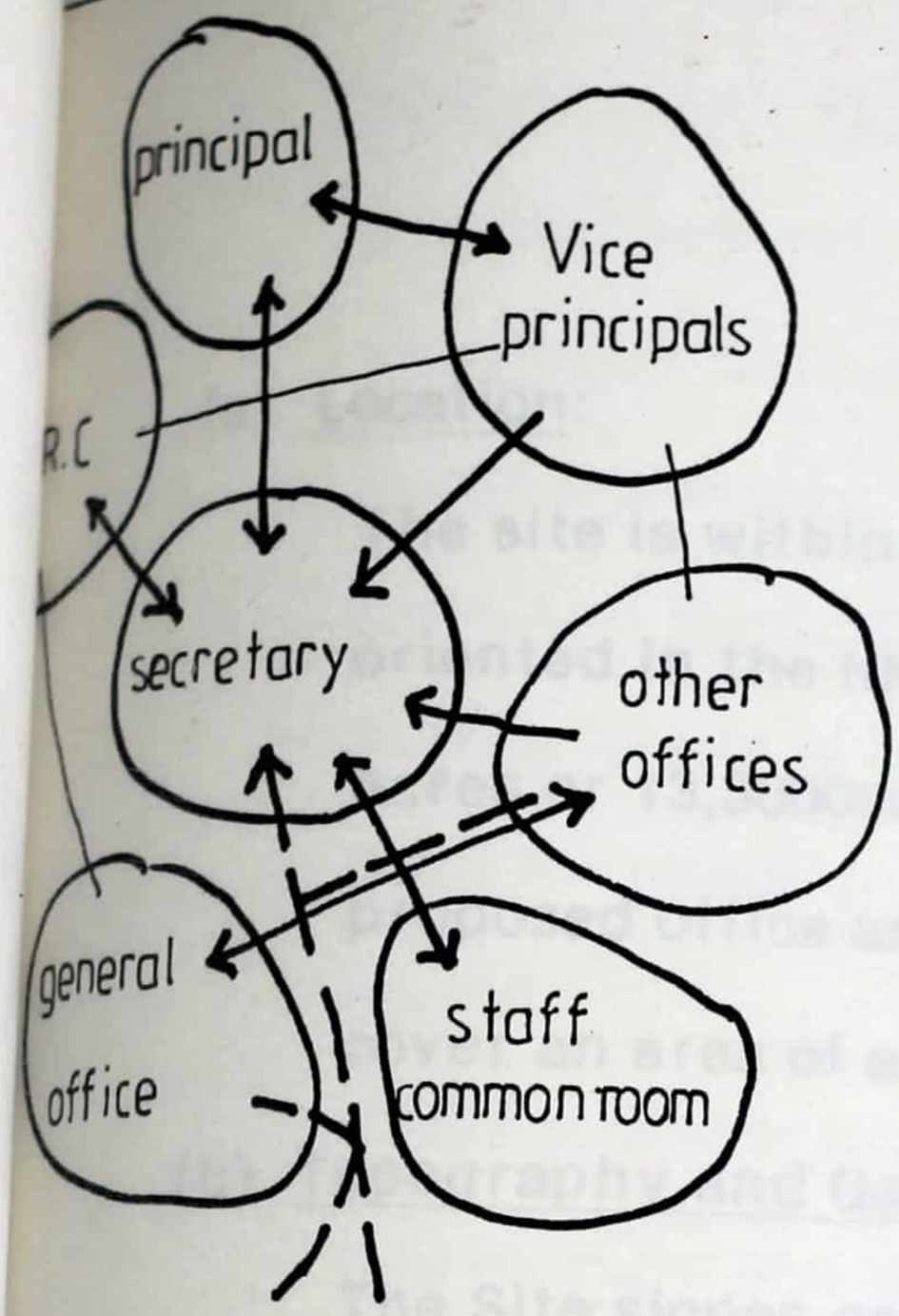




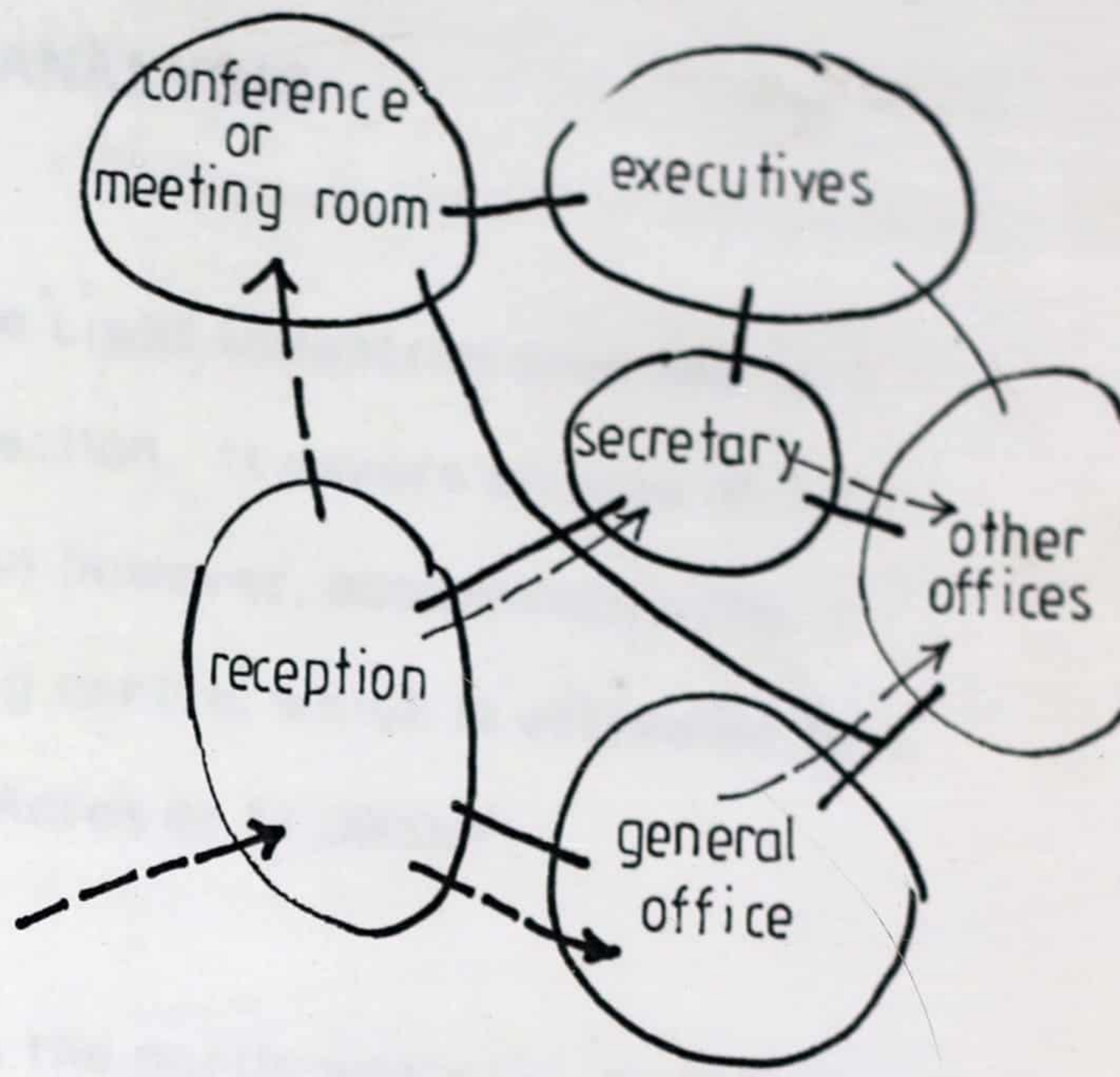




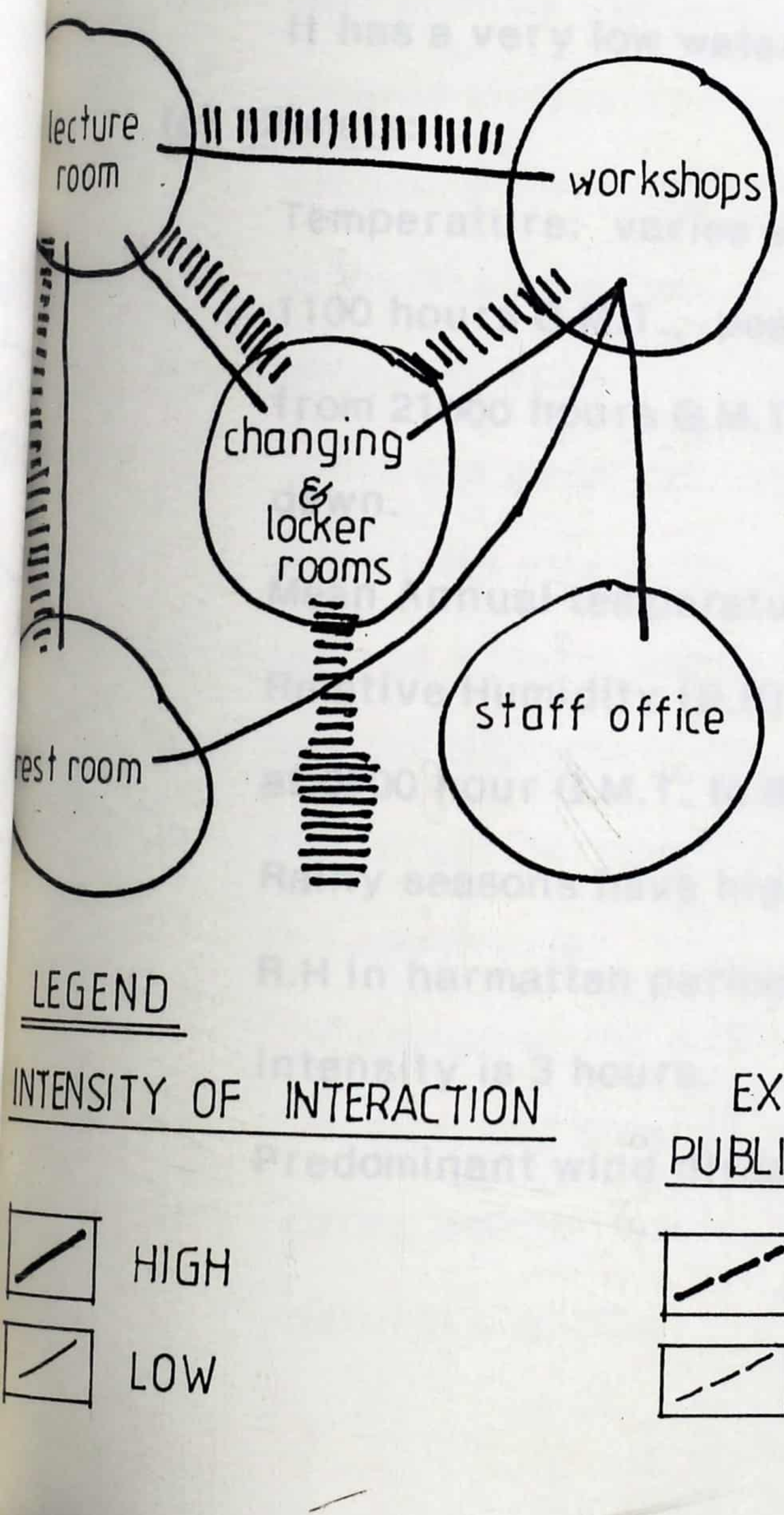
EDUCATIONAL



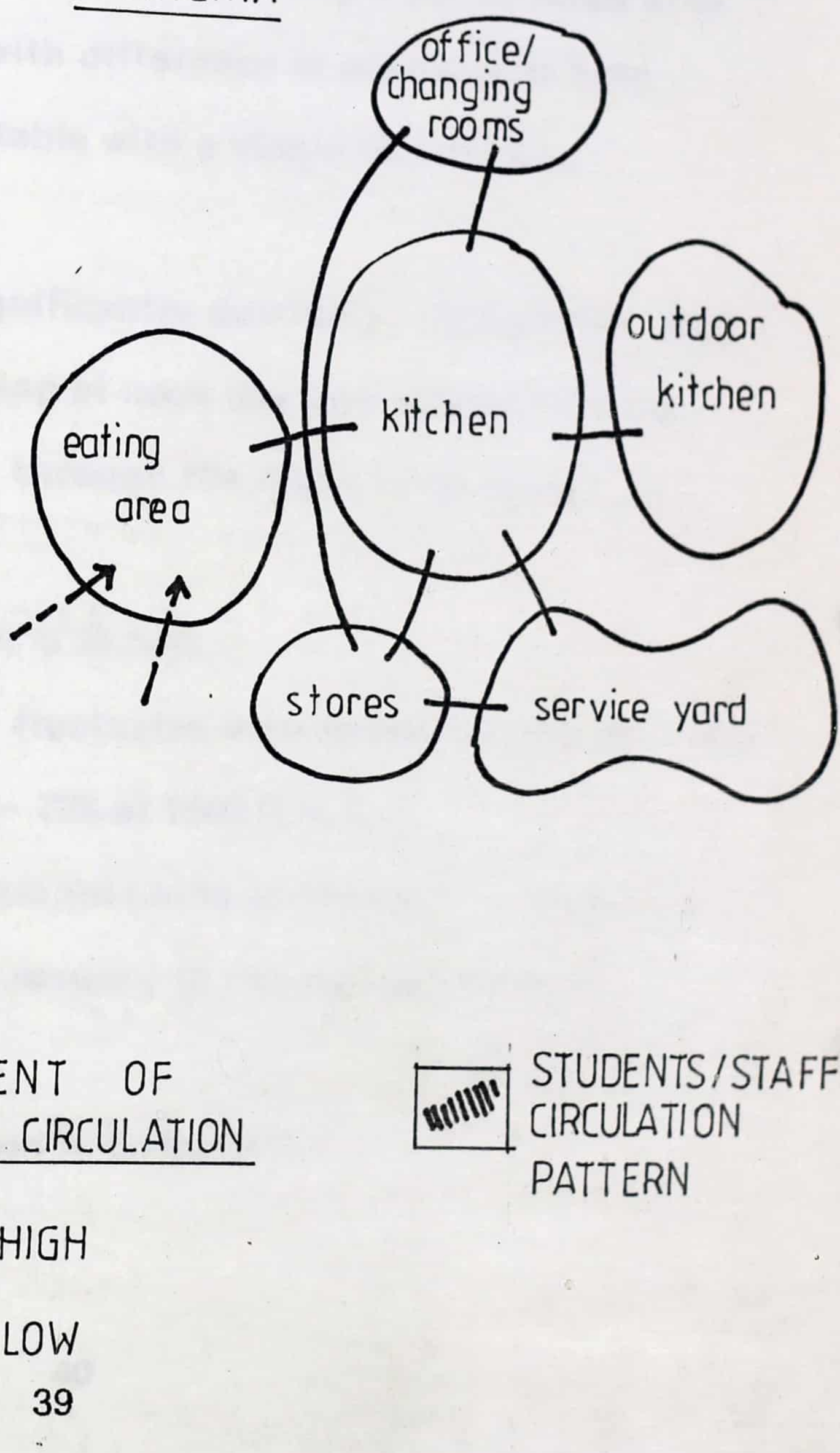
ADMINISTRATION



TEACHING AREA



CAFETERIA



LEGEND

INTENSITY OF INTERACTION

HIGH

LOW

EXTENT OF PUBLIC CIRCULATION

HIGH

LOW

STUDENTS/STAFF CIRCULATION PATTERN

CHAPTER 8

SITE ANALYSIS

(a) Location:

The site is within the Suame Light Industrial area and is oriented in the NNW – S direction. It covers an area of 3.3 Acres or 13,3000m². This can however, accommodate the proposed office and training centre, which is estimated to cover an area of about 2.8 Acres or 11,3000m².

(b) Topography and Geology:

The Site slopes generally in the north–westerly direction.

It slopes from 830 feet – 815 feet depicting a gentle slope area with a gradient of 1:40 with difference in contours of 1.5m.

It has a very low water table with a stable laterite soil.

(c) Climate:

Temperature: varies significantly duirually, rising from 0800 – 1100 hours G.M.T., peaking at noon day and falling steadily from 21ooo hours G.M.T. through the night to its lowest, at dawn.

Mean Annual temperature is 25.5°C.

Relative Humidity (R.H) – fluctuates with temperatures. 85 – 90% at 0900 hour G.M.T. to 65 – 70% at 1500 G.M.T.

Rainy seasons have highest RH (June to October), with lowest R.H in harmattan period (January to February) rainfall intensity is 3 hours.

Predominant wind direction is S.Westerly.

(d) Vegetation and Landuse:

Original vegetation is rainforest. Site is virtually devoid of vegetation due to nature of work and density of development (built-up area).

(e) Access and Roadways:

Access to site is by a major dual courage which has a diverted Road to reduce traffic: - East bound, West bound and the South bound.

There is a lane proposed for pedestrian in the North-northwest bound: - Access is a 6m - 8m carriageway with a 2m footpath.

(f) Existing Structures:

Site is very densely populated by workshops. These are mainly permanently "temporary" structures of wood. The site is already encroached with various activities. There is a proposed filling station to serve both the area and the office/training centre.

(g) Service Utilities:

There are proposal underground cables to the site to supply electricity and water supply.

(h) Drainage & Waste Disposal:

DESIGN IMPLICATIONS:

The larger portion of the site (design) should be on the north and south axis.

The design of the scheme should take advantage with regards to design and position of buildings to achieve

- Cross Ventilation

- Natural Lighting

- Reducing the level of pollution
- Appreciable roof over hangs
- Appreciable drainage systems are required
- Effective landscaping to provide shading a reducing glare.

CHAPTER 9

DESIGN

(a) CONCEPT OF DESIGN:

The concept of the design was influenced by various factors such as technical considerations, environmental conditions such as lighting and ventilation, peripheral studies both on the target group and the structure and morphology in the area of study.

However, inspiration was taken from the traditional Akan usage of space where it renders itself in

1. Courtyards
2. Sheltered areas
3. Open areas

This in effect aided ventilation which was the prime factor of considerations. Secondly it also helped to keep the users of the facility at home. In that with this setting of layout, the user(s) does not seem to be out of placed.

However, simple pitch and gable roof forms were considered to create harmony with the existing massing of the area.

Furthermore, the scheme was considered to serve as a model to help upgrade the existing workshops in the light industrial area. However, simple materials which can be acquired locally are used and simple post and beam construction was considered to help in future phasing and expansion programmes. Landscaping which formed an integral part of the design was considered. This was geared towards

the creation of comfortable conditions by providing shade, barriers, seating light etc.

(b) Planning Concept:

(i) Sprawling Development:

This was to achieve the effective natural ventilation for the scheme. Apart from its having an Akan traditional setting the total floor area of the built environment encouraged such development.

(ii) Environmental Improvement:

- Planting of trees and grass on site to provide better aesthetic qualities, colour and shade.
- Retaining walls to accommodate change in levels and to stabilise soil.
- Channels and Industrial drains – different systems for rain and waste water and for toxic chemical effluent.
- Litter bins, scrap yards and skips in convenient places to keep compound litter-free.
- Materials like brick and stone used for kerbs, walkway concrete pavers etc.
- Street lights and security lights along streets, walkway perimeter fence and built up area.

(iii) MASSING:

- This considered the sloping direction and gradients of the site – 1:40 and it slopes from south to north direction.
- This however, made it very easy to place the workshops on the south and a band of 3-Storey building in the North serving as

the head office. It also had a staggered buildings on the West and East bound to help conform to the site layout.

- Moreover, in between buildings, there are open courts serving as working yards, parking lots, seating area for resting and Meeting.

DISPOSITION OF ACTIVITIES:

This is influenced to some measure of the following:

i. Activity groups

ii. Contours and Slopes

iii. Wind direction

iv. Noise generation

v. Accessibility

(i) ACTIVITY GROUPS:

Normally, there are different activities that are related to one another. Sometimes they may even share a similar space or facility . The workshop users the same working yard with its supporting facilities like the standby generator and compressor. This facility helps to tie them together in an "activity group".

(II) CONTOURS AND SLOPE:

The upper portion of the site ie. the southern part had the workshops to achieve more ventilation and also design.

In the mid section we have the teaching and Welfare facilities all oriented in a way that the noise level will not affect the teaching areas, but the welfare facilities serving as a buffer to the head office which is a 3–Storey building and located at the lowest level of the site.

(iii) WIND DIRECTION:

All the buildings have their longest axis in the north-south direction helping an effective natural ventilation.

(iv) NOISE GENERATION:

Noise is generated in certain areas. There are therefore grouped together or segregated. This provides us with 3-2 ones - Noisy Buffer and Quiet areas.

- The Noisy areas are the workshops.

- Buffer areas are the welfare area, parking lots and courtyards.

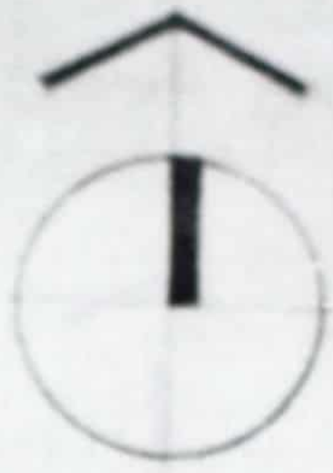
- Quiet areas are the teaching area and the offices of the Head office.

(v) ACCESSIBILITY:

The public areas are therefore near the entrance with provision of public parking and pedestrian access.

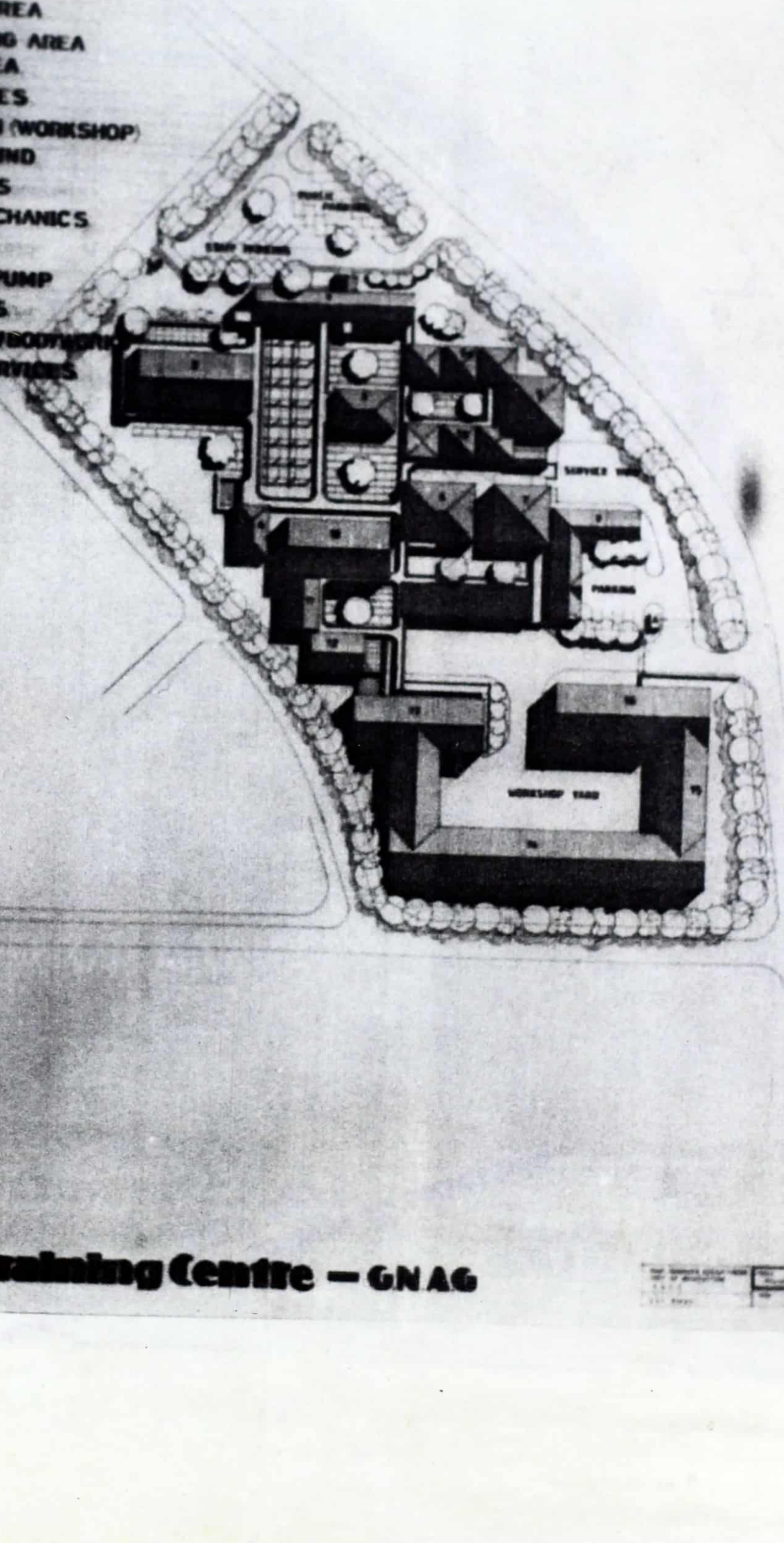
- Private areas by design restrict the movement of the public by use of short walls etc.

BLOCK PLAN



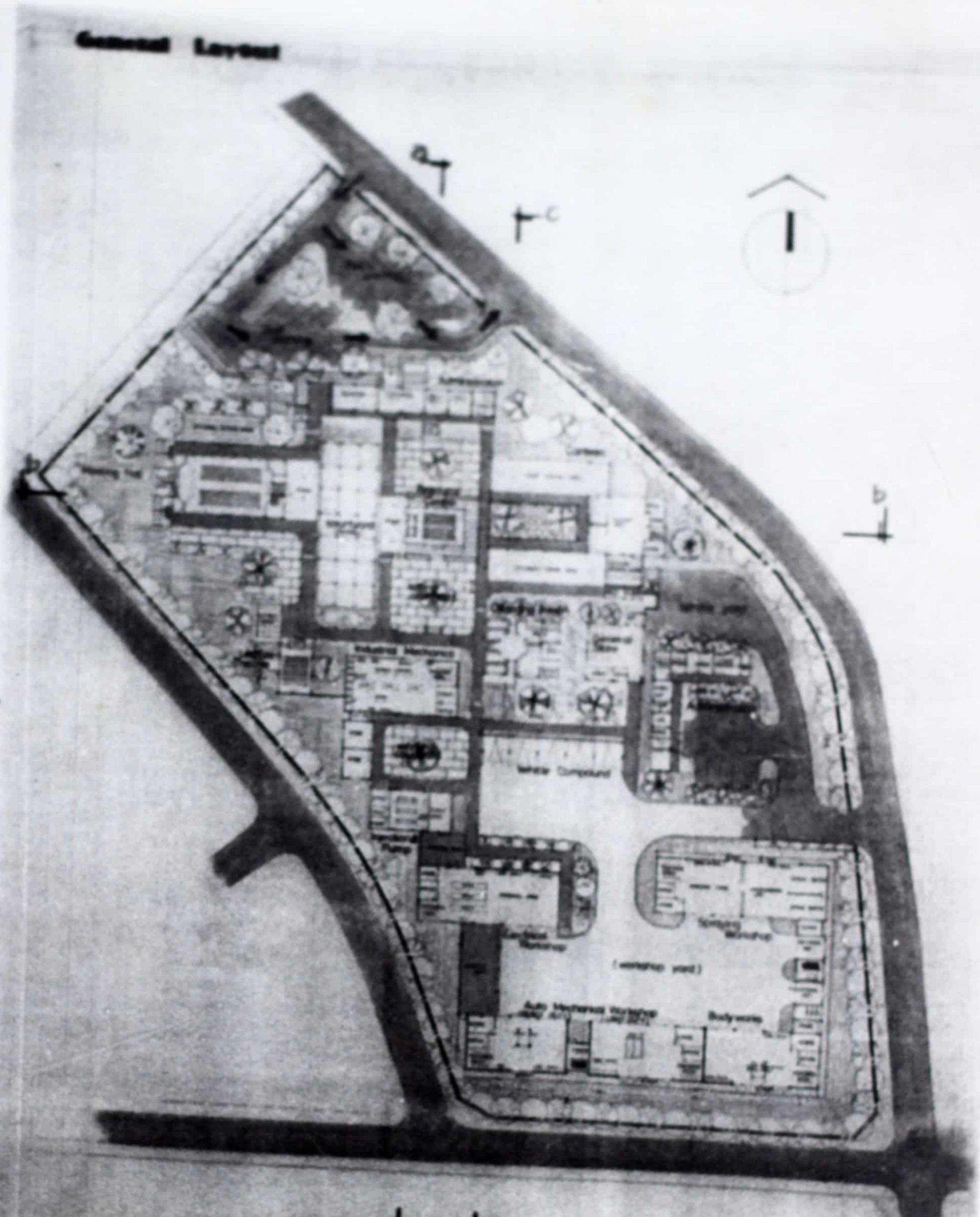
LEGEND

1 ADMINISTRATION
2 MEETING HALL
3 RESOURCE CENTRE
4 LECTURE THEATRE
5 CANTEEN COOKING AREA
5 STAFF EATING AREA
5 STUDENTS EATING AREA
6 CHANGING AREA
7 GENERAL STORES
8 ADMINISTRATION (WORKSHOP)
9 VEHICLE COMPOUND
WORKSHOPS
10 INDUSTRIAL MECHANICS
11 STORAGE AREA
12 INJECTION AND PUMP
13 AUTO ELCTRICALS
14 AUTO MECHANICS / BODYWORKS
15 SUPPORTING SERVICES
16 AUTO SPRAYING



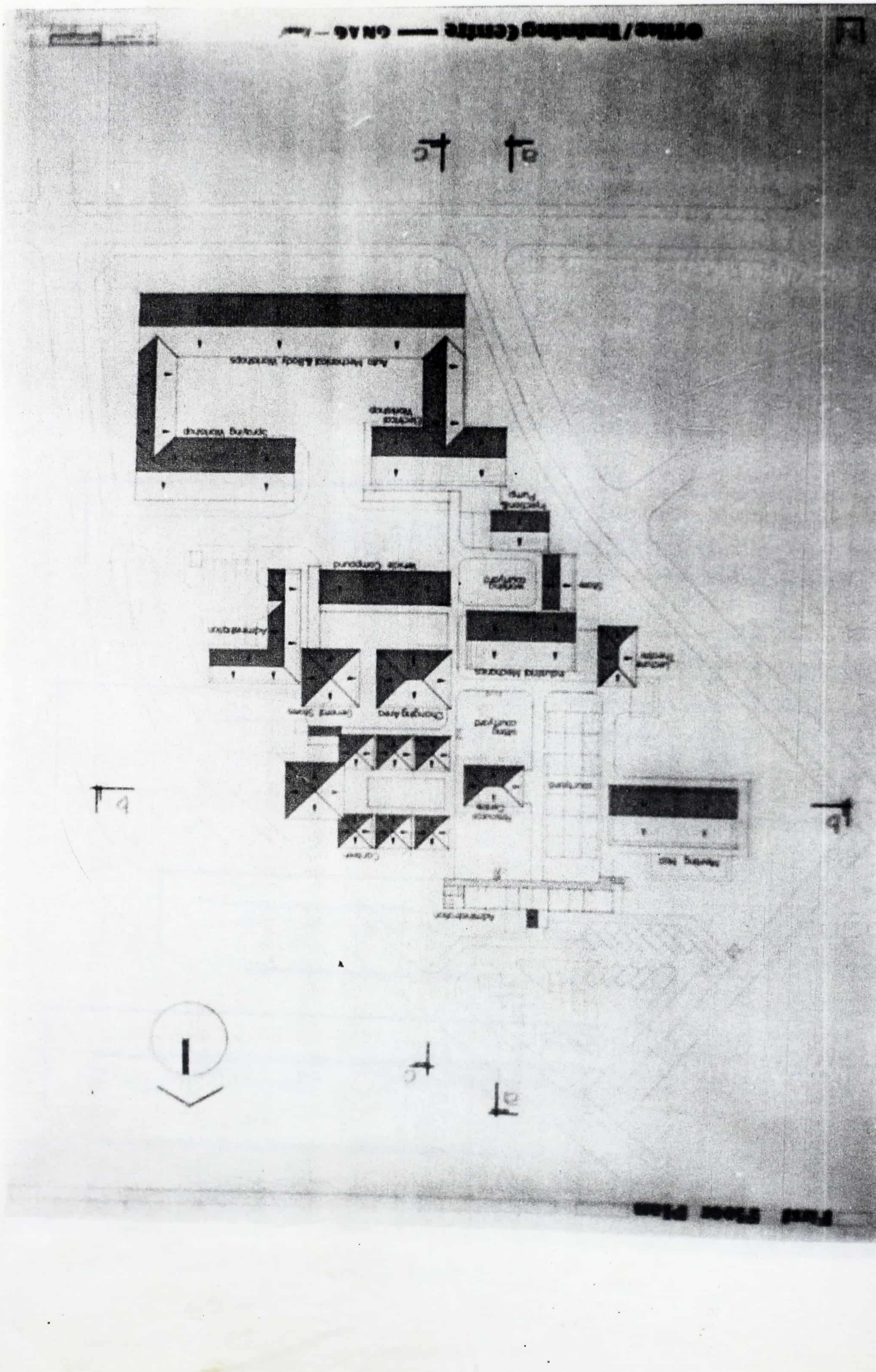
H Office / Training Centre — GNAG

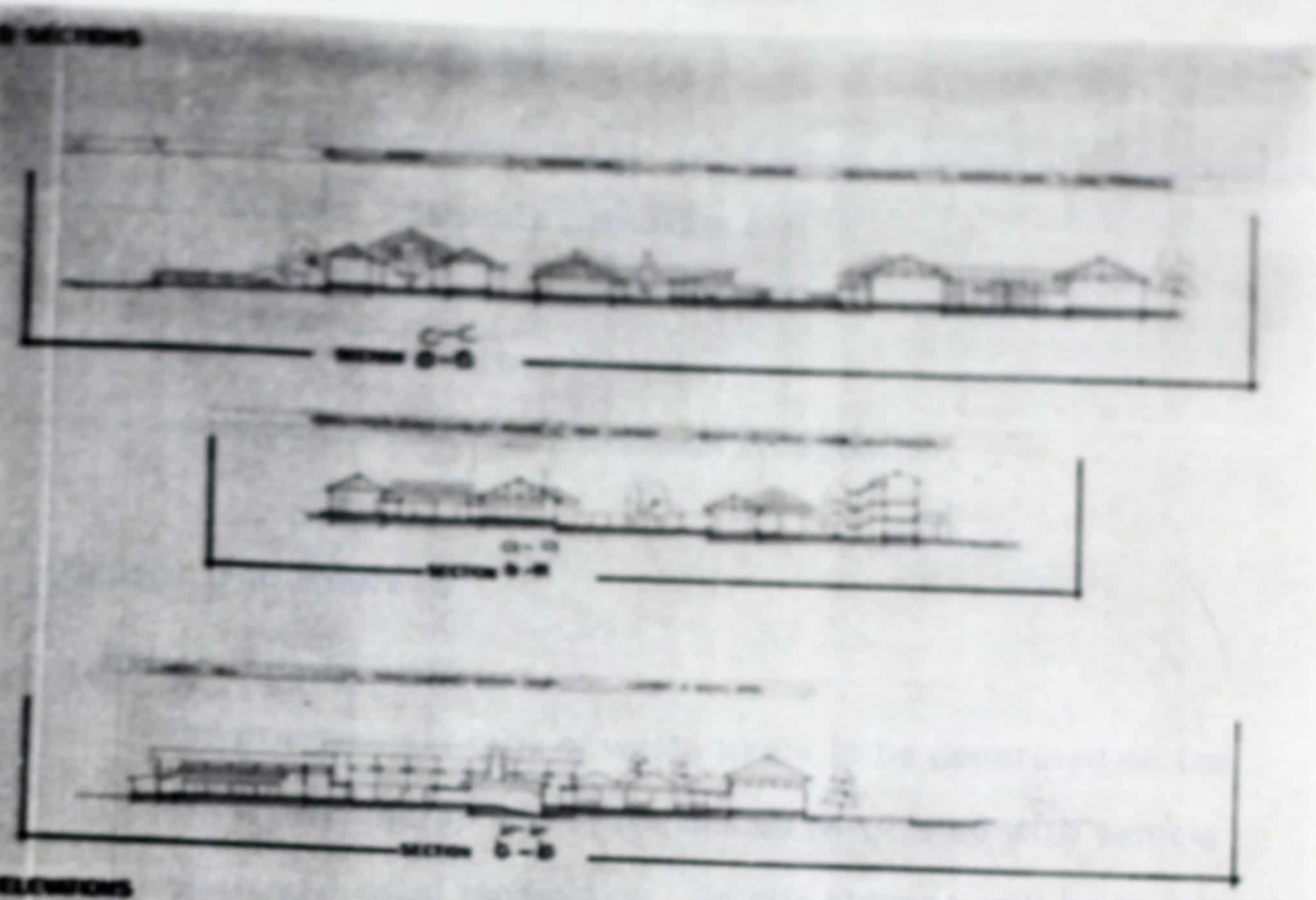
General Layout



a-d b-c

Office / Training Centre — GNAG —





CHAPTER 10

(a) *WASTE MANAGEMENT*

Three types of facilities for solid waste disposal are proposed into the scheme. These are provision for:

(i) Scrap Collection

(ii) Domestic – type refuse

(iii) Waste oil Collection and disposal troughs.

Design Parameters

i. SCRAP COLLECTION:

The predominate type of waste likely to be generated on the site is metal scrap and other wastes associated with vehicle repair and metal fabrication. On site storage will be permitted within and around workshop space but in controlled quantities. Additionally skip containers on hard stading concrete pads will be provided on site for the storage of scrap that would be transported to local furnaces or metal works in Accra and Tema by the scrap dealers.

ii. DOMESTIC TYPE REFUSE:

Since the Mechanics will stay on the site for about 12 hours its is assured that significant food waste, paper and other domestic type refuse will generated. However, dust bins and refuse boxes are provided at the necessary collection points.

iii. WASTE OIL COLLECTION TROUGHS:

The Construction of on-site interceptor drains leading to 1.0m³ dump (1 metre deep) at the corner of repair bays will encouraged within each workshop space. This is designed to collect and hold waste oils which will be transfer to the land fill site and flared periodically. And more also with the help of oil extractor machines.

iv. OPERATION AND MAINTENANCE:

Management of the solid waste facilities described above will be integrated into the activities of the waste Management Department of Kumasi Metropolitan Assembly (KMA). Skips will be picked every week for disposal at the land fill site.

(b) ***SERVICES***

The principal objective of the project is to provide potable water to the site for the Association to help in the use for drinking, cooking, also in need areas in the workshops.

As an industrial set-up hydrants are necessary to help control fire.

EXISTING SYSTEM: A 9" A.C. main (Dm 225) which runs along the Kumasi-Mampong Road is proposed to feed the new site where the scheme has been proposed.

PROPOSED SCHEME: A 6" A.C take off is proposed to serve the distribution system with a network of 4" A.C mains within the site.

Electricity Supply: The exact demand is not yet known. However, considering Kumasi Metropolitan Authority's decision to move all satellite garages to the area and the activities of the Mechanics some of whom have already started moving to the place, the demand can be assured as high. However, a separate transformer has been proposed in the scheme to help boost the supply of power to the various workshops and other facilities in both the training centre and the head office.

(c) *FIRE CONTROL MEASURES:*

Fire protection, undertaken in order to safe-guard human life property includes preventing, detecting and extinguishing fires. It si also concerned with the improvement of fire prevention and suppression methods. Where there is fire potential measures has been taken to limit the spread both externally and internally.

However, such measures to control fire such as compartmentation, the choice of materials and finishes, Roof ventilations, fire escape routes – large doors are provided – the use of fire hydrants, hose reels fire extinguishers and other fire fighting equipments are provided in the workshops and other areas.

(d) ***LANDSCAPING:***

As an industrial set-up landscaping plays a vital role. However, there were two landscape elements used.

- hard landscaping elements
- soft landscaping elements.

HARD LANDSCAPING ELEMENTS:

This is involves the use of concrete pavers, in-site concrete slabs, flag stones and concrete seating under trees and in the sitting areas. This was to help in easy cleaning and more also to satisfy their needs and wants as to the use of the facility.

PARKING:

The use od asphalt with reflective markers to show parking places for vehicles.

WORKSHOP YARD:

The use od concrete slabs, cast in-site with terazzo precast beneath. This however, facilitate easy washing and cleaning.

SOFT LANDSCAPING:

This was introduced as a measure to reduce glare, provide shade where necessary and also used to form boundary along the main plot line.

However, the use of shrubs, grass, tress with larger canopies etc were used in sitting and working courtyards.

Other Element:

There are security lights positioned at various vantage points. Since life in the facility does not take 24 hours. The main objective to lit the place in based on its security conscious. This is a vital

situation, so alarm and other crime detective equipments are installed.

Sign post are used to aid direction of movement (vehicualr or pedestrian).

CHAPTER 11

IMPLEMENTATION

PHASING:

Economic considerations have been given preference in developing the impletation program of the project.

A low initial cost and fast income generation are factors which primarily determined the phasing of the implementation.

The workshops which also various disciplines like auto mechanics, industrial mechanics, body works etc... have high income genrerating sectors like auto spray, injection and pump section. So that when this done first the rest will be self funding.

The teaching facilities such as the Lecture Theatre, Meeting Hall and the Resource Centre can be of the next stage of development. Since they are relatively income generating areas, especially the meeting hall.

The series of activities leading to the total realisation of the complex will be death with in four (4) phases as outlined.

Phase 1: Construction of the Workshops

Phase 2: Construction of Meeting Hall, Lecture Theatre and Resource Centre.

– Changing Area, General Stores

Phase 3: Canteen and administration

Phase 4: Contruction of Head Office and other facilities like parking, landscaping etc.

FINANCING

Financing this project has been a hot cake in the eyes of various financial institutions both internationally and internally. However, the Associations intensions is to have a local sponsorship or the World Bank loan. This will however, facilitate employment and more also cheap labour as presumed.

Financial institutions like, World Bank, International Monetary Fund, I.D.O. etc. And also locally we have the Social Security and National Insurance Trust (SSNIT), Bank for Housing and Construction etc.

However, the Government is also prepared to assist in the implementation of the project. Which fall under its economic recovery programmes as a boost or diversification in the industrial sector of the economy.

BIBLIOGRAPHY

BOOKS

1. Strategies for Development – Nag Chaudhun.
2. Systems, Tools and Project Planning – Delp, thesen, Motiwalla and Seshadri.
3. Effect of Industries on Nearby Settlement – Peter Asare.
4. Ghana World Bank Report 1992 – World Bank.
5. Appropriate or Under–developed Technology – A. Emppmanuel.

PUBLICATIONS

1. T.C.C. Annual Reviews – T.C.C. University of Science and Technology.
2. Tools for Progress – Intermediate Technology Develpment Group Limited.
3. Hand Book on International Trade Development – United Nations
4. Ghana Priority Works Project (Tafo Suame Light Industrial Complex) – Kumasi Metropolitan Assembly (K.M.A.)
5. World Bank Rehabilitation Programme (Report of Training of Ghana National Association of Garages by Kumasi Technical Inistitute By A. L. Osei.