THE CONCEPT CANTONMENT AREA PLANNING IN THE NIGERIAN ARMY

M.sc. (U.R.P) THESIS

BY

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C E R T I F I C A T E

This is to certify that this thesis, 'The Concept of Cantonment Area Planning in the Nigerian Army' by Omotosho, E.S.O has been submitted in partial fulfilment of the requirement for the award of Master of Science in Urban and Regional Planning.

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JUNE 1981.

DEDICATION

Dedicated to the

memory of my Father

ACKNOWLEDGEMENT

It may be impossible to do justice to everybody who deserves commendation for the various roles played in making this work a success. In the light of this, I would love to express my profound gratitude to each and every one of you. God knows you all and will reward you immensely.

I can not but give special thanks to Dr Kulshrestha and Arc J.O. Popoola for the valuable guidance given me throughout the period of work on this study.

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1.00 THE INTRODUCTORY BACKGROUND

The need for defence is as old as the history of man. Even the palaeolithic man who had no permanent dwelling place, engaged in very simple system of defence by utilising his local materials as a weapon of defence in case of attack by any wild life.

When man started to live in organised communities, he intensified this defence function. In building a house he puts doors to ensure his safety and that of his property.

In England the first attempt at creating effective communal defence system was made by Edward and Ethelfleda, the children of Alfred the Great.[1] The Danes had subjected the defenceless Anglo Saxons living in quite unprotected farms toseries of attacks burning and killing in the process. When finally Alfred the Great managed to put a stop to one of the worst raids, his children built a few camps called 'borough' in the heart of England. They surrounded these boroughs with earth work in the old style so that the people could gather behind them when there was a bad raid.

The Romans in their days of adventure, had invented and maintained an elaborate camp systems for their troops. These camps, usually roughly square with a gate in each of the four sides except where the site was on top of a cliff or beside

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[1] Braun, H. (1956) A Short History of English Architecture London, Faber and Faber Ltd.

a stream, are usually surrounded with earth work defences. Inside are huts arranged in rows with lanes between them and crossing each other in squares. The general's headquarters was usually located in the middle.

In the present day world, the need for defence is assuming increasing importance among the various nations. Substantial amounts are yearly allocated, and sophisticated devices are daily employed to secure effective defence system. The developing countries still struggling to get out of the grips of poverty and the numerous problems of under development, are not left behind in the race.

A stable, and peaceful political environment is a pre-requisite condition for sound economic development of any nation. The stability of any nation is to a large extent a function of its ability to mobilise enough force for its defence against external aggression or internal uprising. It is not surprising therefore, that ~~any~~ any developing countries including Nigeria give high priority to its defence.

However, if the huge amount invested in this sector, (and much of which goes into provision of working, training and living facilities for the troops) is to achieve desireable results, a more rational planning for those uses should be undertaken immediately.

1.10 Justification for the Study

A recently undertaken survey I carried out among the personnel of the Nigerian Army confirmed the widely held view that the Nigerian Army operates under a sub-optimum working environment. There was a unanimous 100% agreement among the respondents that the Cantonments, the permanent residental and working area for the Army Personnel are far from the ideal.

Among the numerous short comings of the cantonment enumerated ranges from overcrowding, inadequate provision of facilities, poor maintenance, lack of effective command and control, lack of provision for expansion and poor standard of accomodation (see fig 2f).

The enomous yearly expenditure on the military, of which the army takes a substantial amounts (see Defence expenditure and National income 1961 - 75) requires judicious spending to justify the prupose for which it is meant.

A country that has just recently emerged from energy sapping civil war, a war that took its toil of the human and material resources, needs not be reminded of the necessity for a well organised and functional army. This no doubts has a lot of influence on the numerous construction programmes for the military going on in the different parts of the country.

With the decision to move the Federal Capital to Abuja, there will no doubts be a need for a well planned Army establishment in the town. It will not only be wasteful, but unprogressive to carry to the New Federal Capital the bundle of confussion which characterises the many Cantonments in this

country. For efficiency, a well planned system of cantonment layout is essential for a place like the New Federal Capital. It is hoped that this work will provide information that could be integrated with a proposal for Abuja.

Finally, a documented information to assist the planning of our Army Establishments is long overdue.
It is ridiculous that over twenty years after independence, the Nigerian Army can not boast of any documented information regarding the principles and standards employed for the planning of the Army settlements in this country. While this work is no doubt, not the first of its kind in the world, but surely it is, to the best of my knowledge the first conscious effort made to identify and document the problems of, the planning principles and standards of Military Cantonments in this country.

1.20 AIMS AND OBJECTIVES

1.20 Aims: The main aim of this work is an attempt to investigate into cantonment area planning and develop a conceptual model for efficient cantonment area planning for the Nigerian Army.

1.21 Objectives: Within the frame work of this goal the following objectives have been evolved.

1. To investigate into types of cantonment and their Area Planning.
2. To identify the elements and principles of cantonment area planning in Nigeria, with particular reference to selected studied cases.

3. To identify the deficiencies in the existing Cantonments.

4. To define standards of Cantonment Area Planning that would achieve

a. Desireable link with nearby urban centre.

b. Comfortable living environment.

c. Desirable working and Training environment.

d. Efficient management of the Cantonment area.

5. To develop a conceptual model for cantonment area planning.

6. To demonstrate the conceptual model with a hypothetical case.

1.30 Limitations:

I am extremely handicapped by the dearth of relevant literature and document on this topic, which has, may be, inevitably been 'neglected' by the Planning Profession. Things couldn't have been much better, in that even in the present day nuclear warfare, when war is increasingly becoming computarized, no nation will expose the details of its defence strategy on the pages of public papers. Such information is often classified as secret document and entrusted to the care of dedicated citizens. It is no wonder therefore, that while a lot has been written on the concept of industrial Estate Planning, Housing layout for Residential areas, university planning, Hospital Planning etc; little has been documented as to the strategy of Military space Planning. Base maps, aerial photographs are non existent in many cases for the analysis of many cantonments.

It is therefore my intention that while trying to work towards the development of a better working environment for the personnel of the Nigerian Army, the National security will be in no way jeopardised by way of information given out in this publication. To this end, the cantonments studied and analysed for this study, while taken from different areas of the country, will simply be referred to as cantonments A, B and C. The specific names and the locations will not be given. It is in the light of this too, that a hypothetical proposal is made, rather than plan for a specific one in a specific location.

1.40 Methodology: The methodology employed consists of the following

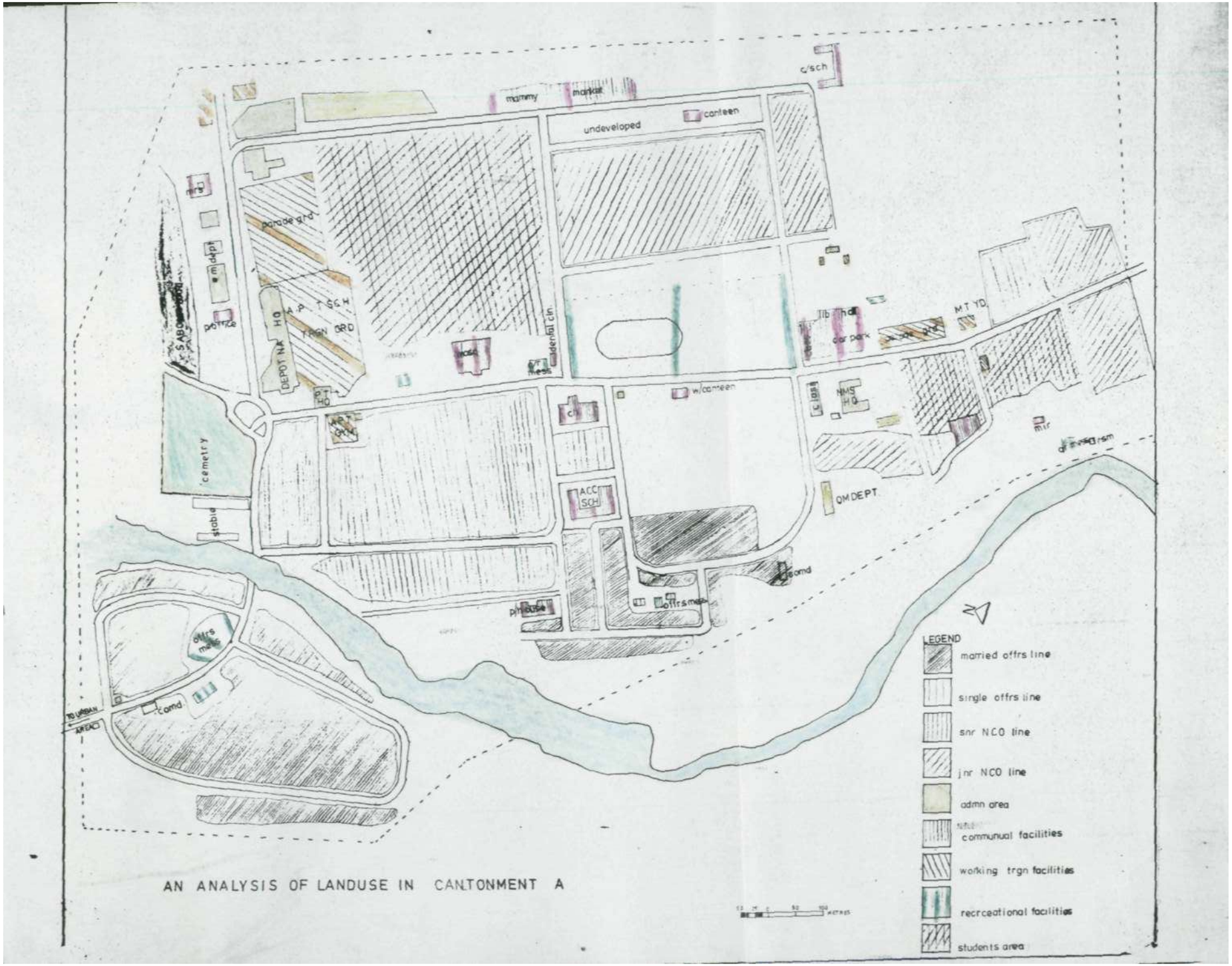
a. Definition of the functions expected of a cantonment.

b. Examination of the existing cantonments to identify the elements and highlight the concepts and planning principles and existing short comings and major problems.

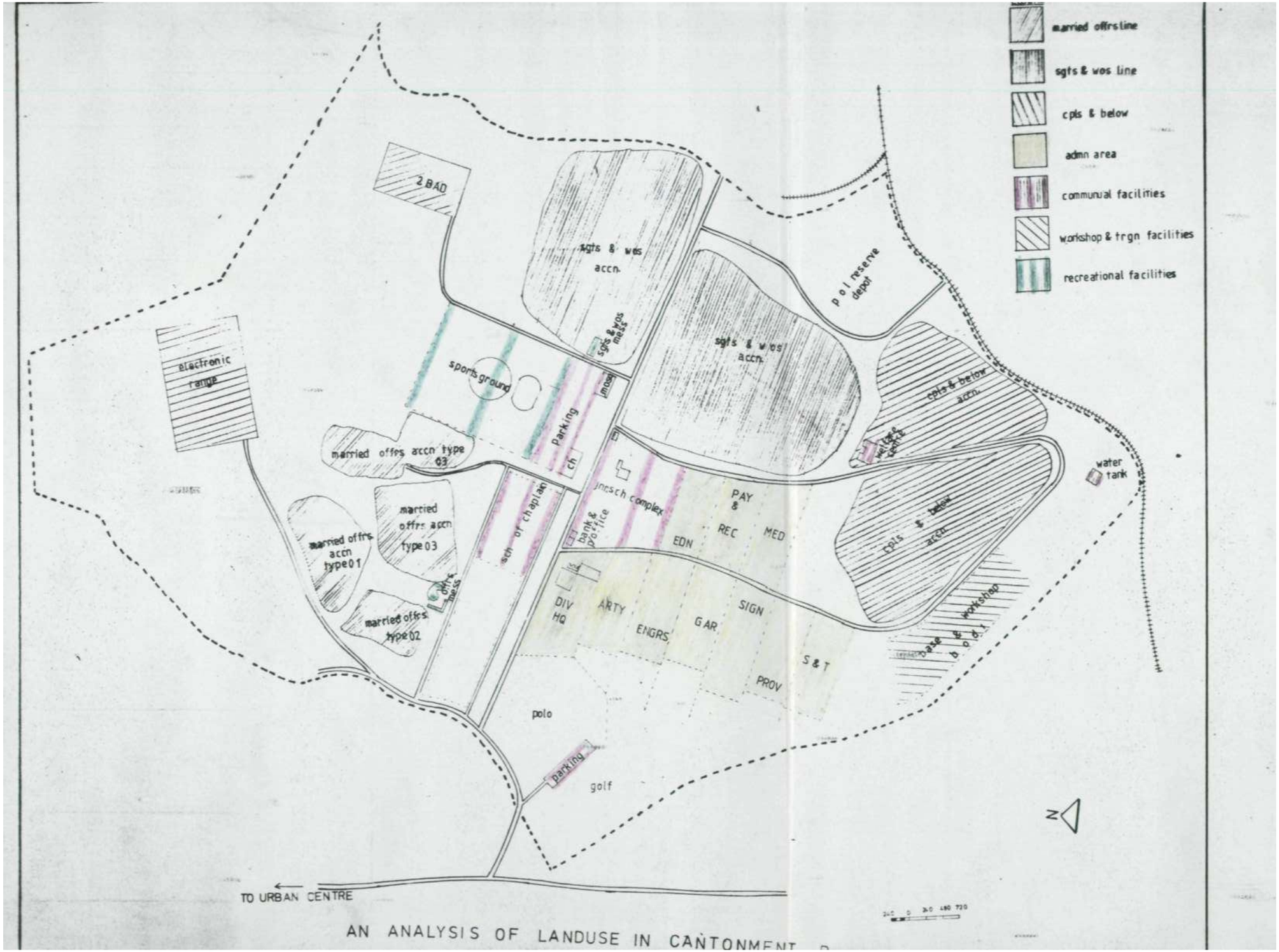
c. Proposals for future layouts in the light of identified existing short comings.

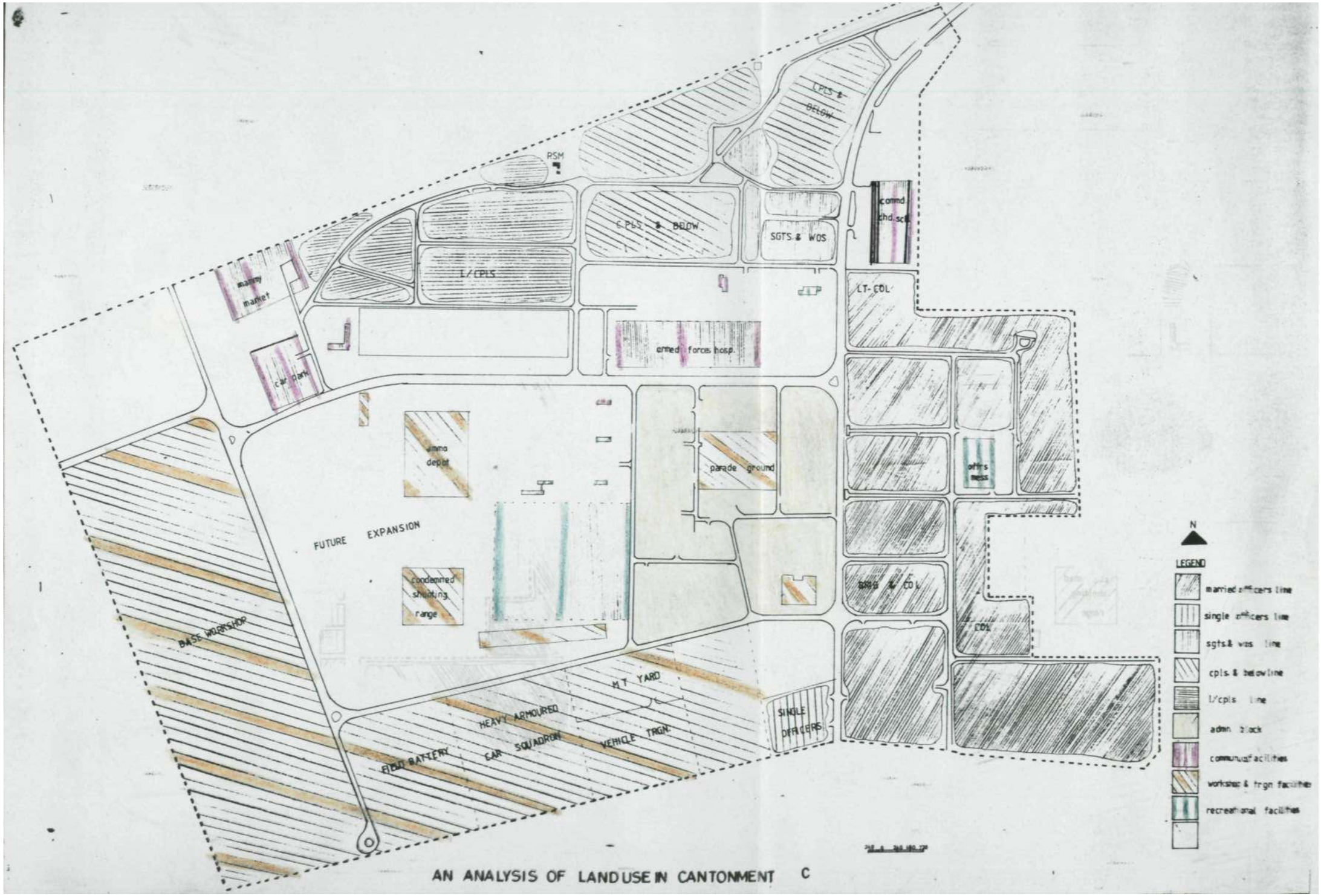
The style of Data Collection consists of interviews conducted with the aid of questionnaires, and face to face formal and informal interviews. The interviewee consists of army personnel randomly chosen, but cutting across the ranks and files of the army. Particular attention was paid to officers and men who have either lived or are still living in a cantonment and those that are knowledgeable about cantonments and their functions.

Other groups included in the interview are Army project



AN ANALYSIS OF LANDUSE IN CANTONMENT A


married offrs line
sgts & wos line
cpls & below
admn area
communal facilities
workshop & trgn facilities
recreational facilities
2 BAD
sgts & wos accn.
sgts & wos mess
p o l reserve depot
sgts & wos accn.
electronic range
sports ground
parking
ch
married offrs accn type 03
cpls & below accn.
water tank
water tank
married offrs accn type 03
married offrs accn type 01
married offrs accn type 02
offrs mess
sch of chaplain
bank & post office
PAY & REC
MED
EDN
DIV HQ
ARTY
ENGRS
GAR
SIGN
S & T
PROV
polo
parking
golf
cpls & below accn.
base wksp
workshop
N
TO URBAN CENTRE
AN ANALYSIS OF LANDUSE IN CANTONMENT



AN ANALYSIS OF LANDUSE IN CANTONMENT C

designers and directors. A direct observation was made of existing situation in the field to cross examine the information collected both from interviews and literature review.

Another technique employed consists of detailed study of the layout of existing cantonments, to identify the component elements indicated and highlight the short comings.

Efforts have been made to keep technical terms to a minimum and explains those whose inclusion was felt to be mandatory.

FACTORS INFLUENCING THE SITING OF MILITARY AREAS
[respondents' priority]

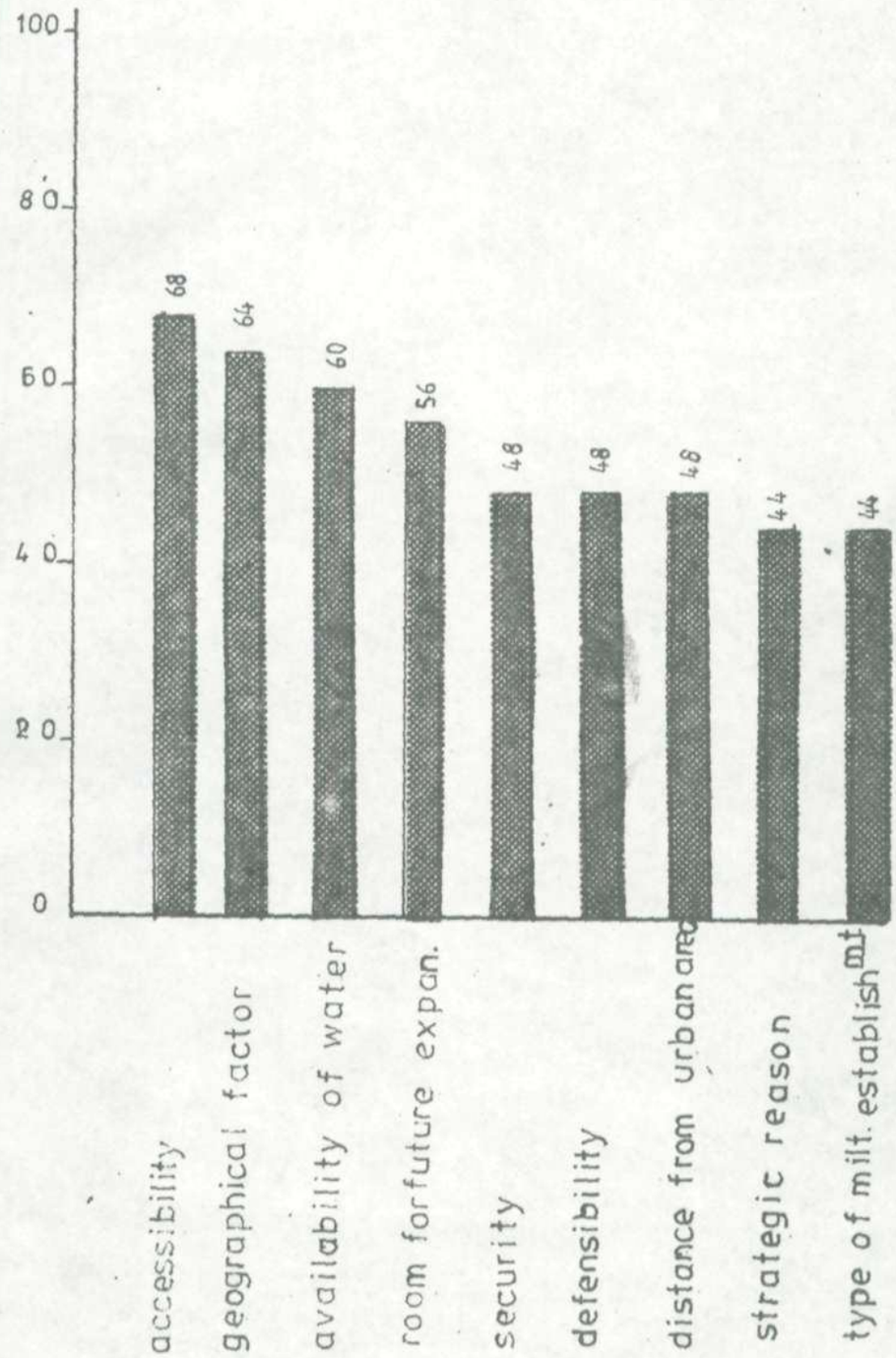


fig 1

CHAPTER 2

2.00 The Structure of the Nigerian Army and the place of Cantonment

2.10 Pre Colonial Era: In the Pre-colonial Era, Nigeria as we know it today was non-existence and the defence requirement in the three major areas (the North, East and West) forming the present day Nigeria differed tremendously from the current situation.

To the Eastern side of the Niger, the dominant group were the Igbos. In Pre-colonial days according to Elizabeth Isicheis history of the Igbos, the Igbo communities were constantly at war. The wars were fought either as a result of land dispute or as a revenge for an injury suffered by one of the village group member in the hands of another village group.

Although various strategies which involved the use of the land were employed there was never a need to maintain a standing army of any size that would necessitate physical spatial organisation of space.

In their account of the Yoruba warfare in the 19th century J. Ade Ajayi and Robert S. Smith also confirmed that there was no standing Yoruba army.

The need to repulse the slave raiders, the Jihadists and to supress internal uprising within the Oyo Kingdom led to many wars in the 19th century. Defence strategies to suit each occasion were devised.

The system of defence evolved suited the then situation but since it did not involve the raising of a standing army that needed to be kept permanently together and catered for, it was not manifesed in any notable spatial organisation of space.

The situation in Hausa land was not any different. The Fulani dynasty with its accompanying slave raiding, waged ceaseless wars until it was brought to an end by the British rule. Here too a standing army was not maintained.

The pre-colonial era, therefore witnessed unco-ordinated defence plans for the different areas making up the present day Nigeria.

2.20 The Colonial Era:

The era of colonial rule brought a change in the political situation. The component parts hitherto, enjoying autonomous political power were with the amalgamation of the North and South in 1914 brought under one umbrella of administration. Immediately the task of defence became enourmous.

The colonial masters needed to consolidate their hold by protecting the acquired territory against ambitious rival colonial powers, and at the same time seek means of suppressing

internal uprising any place there was one.

For this to be effective the British developed what Anthony King (1976) in his colonial urban development described as 'The dominance - dependence relationship'[2] This is the relationship between the colonised society and the colonial society. It entails the subjugation of one group by the other.

"In the dependence society, the sanction used by the colonisers to maintain their authority over the colonised population was the armed forces"[2]. As would be expected a great bulk of this military force would be provided by the colonised society under the command of the officers of the Metropolitan society.

In the Nigerian experience, the military under the colonial rule served more than mantaining the dominance - dependence relationship. It was the primary tool for sustaining the hold on the colony, and where there was need for it, served the interest of the colonial master outside the colonised society. Thus they fought in Ashanti. Burma, Ethiopia, India, East Africa and German Kamerum. With this situation, it thus became necessary to maintain a standing army kept together in a state of preparedness for call up. So for the first time, planning consideration for the location of such troops became necessary.

It all started when in 1863 'Glovers Hausas' as they were called, consisting of slaves freed by Lt. Glover, later Sir John Glover, governor of Lagos became the first batch of troops that constituted the Lagos constabulary[3]. They were just 40 in number. They joined the West Indian Regiment to form a force for defence of Lagos. By June permission was granted to increase

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3 Clarke, F.A.S (Brig) and Haywood A. (Col) (1964) The History of the Royal West African Frontier Force(Wellington Press, Aldershot)

2 King, D.A. (1976) Colonial Urban Development Henley and Boston, London.

the size to 100, and later to 600 in October of the same year.

In 1865 the British Government Authorised its constitution as a regular force to be named 'Hausa Constabulary'. It was liable to police as well as military duties. Later the title was altered to 'Lagos' Constabulary, a name it retained until its incorporation into the West African Frontier Force as the Lagos Battalion in 1901. Later on in 1914 with the amalgamation of the North and South the Nigerian Regiment of the West African Frontier Force made up of all other forces was founded. This was renamed the Queen's Own Nigeria Regiment in January 1956.[4] The Army was known by his name until after independence, when at the Durbar ground at SOKOTO in November, 1960 the ceremony marking the changed status gave birth to the Present day Nigerian Army.

2.30 The structure of the Nigerian Army.

The structure of the Nigerian Army as shown in fig 2a indicates that at the seat of the Army Headquarters (usually in the Federal Capital) or at the Divisional headquarters, the Brigade headquarters or in any given place chosen for co-locating more than one unit a cantonment is usually established. The term cantonment is used to describe the permanent area for the military serving mainly for residential and training pruposes. The term is constantly used in India and so little used else where that it has become almost appropriated as Anglo-India. (Voyle 1876) describes it as "the permanent military station in India..... In that country a cantonment contains barracks for European troops and native huts termed lines for the Sepogs.

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[4] Miner, N.J. (1971) The Nigerian Army 1956 - 1966 (Methuen, London)

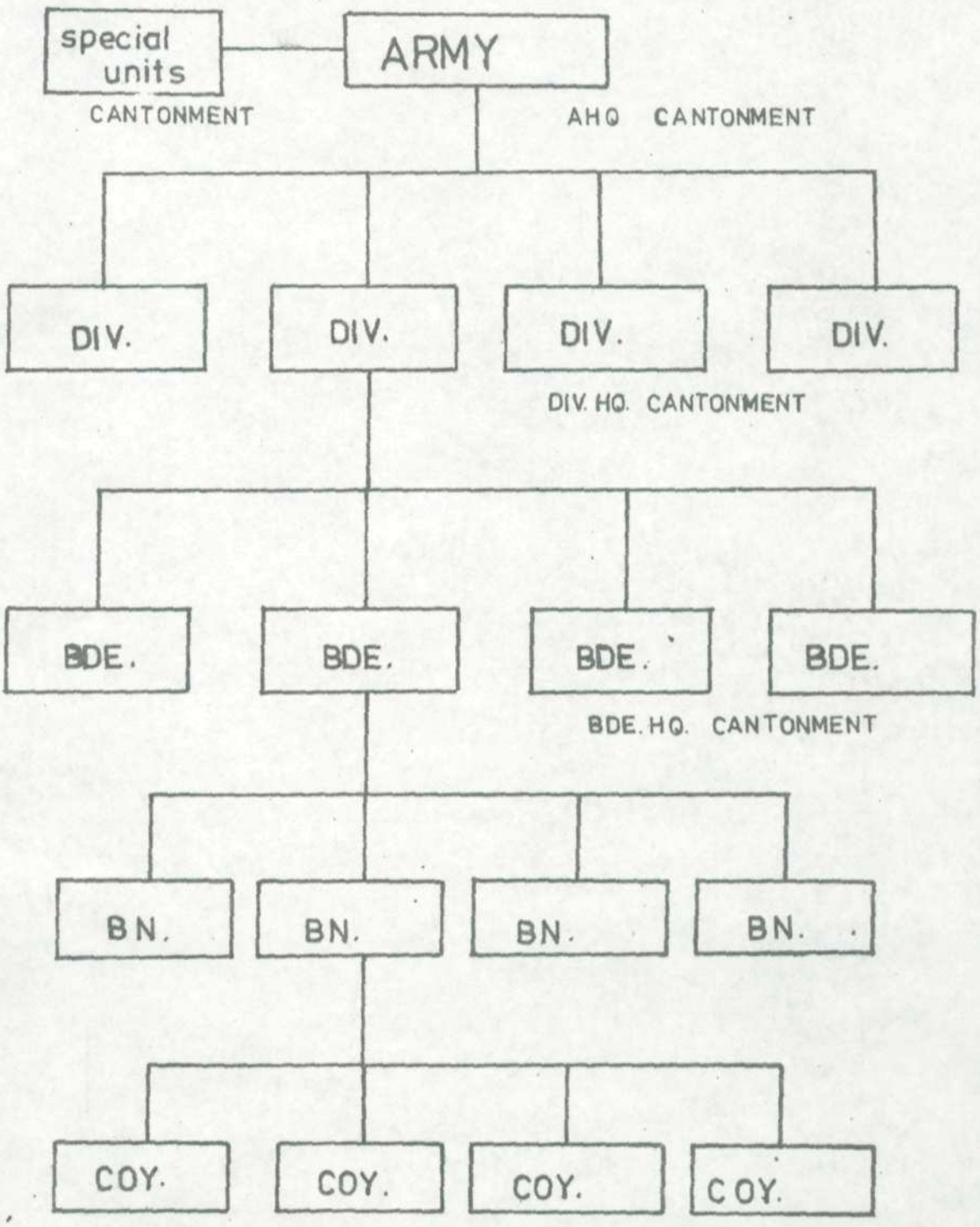


fig 2a

THE STRUCTURE OF THE NIGERIAN ARMY AND THE PLACE OF CANTONMENT

The European officers live for the most part in bungalows or thatched houses. Regimental bazaars also form part of the adjuncts of the cantonments" [4]

In another definition (Smith 1883) Suggests that it is "Permanent station where troops of various arms are massed together away from the native inhabitants"

The etymology of cantonment gives an insight into both the physical spatial organisation as well as its location in relation to other sectors of the colonial Urban System.

The term has its origin in the French word 'Canton' "meaning to quarter, divide land into portions, to share to separate or sever by division" (Murray 1888)
"The word presupposes an authority structure which permits the division of spatial areas and their allocation to various functions and social groups. The separation concept implicit in the word cantonment is two fold. Separation or division of spatial area within the coundaries of the military Camp and the separation of the Camp from the indigenous city".

In the Nigerian context, the term is usually applied to permanent military complex with high concentration of troops from at least more than two units of the army. The two-fold separation concept identified with the Indian situation is also present.

2.40 Cantonment types.

In the study undertaken two kinds of cantonments were identified (see fig 3e)

a. A cantonment of training units

b. A cantonment for mixed uses.

King D.A. (1976) Colonial Urban Development London, Henley and Boston.

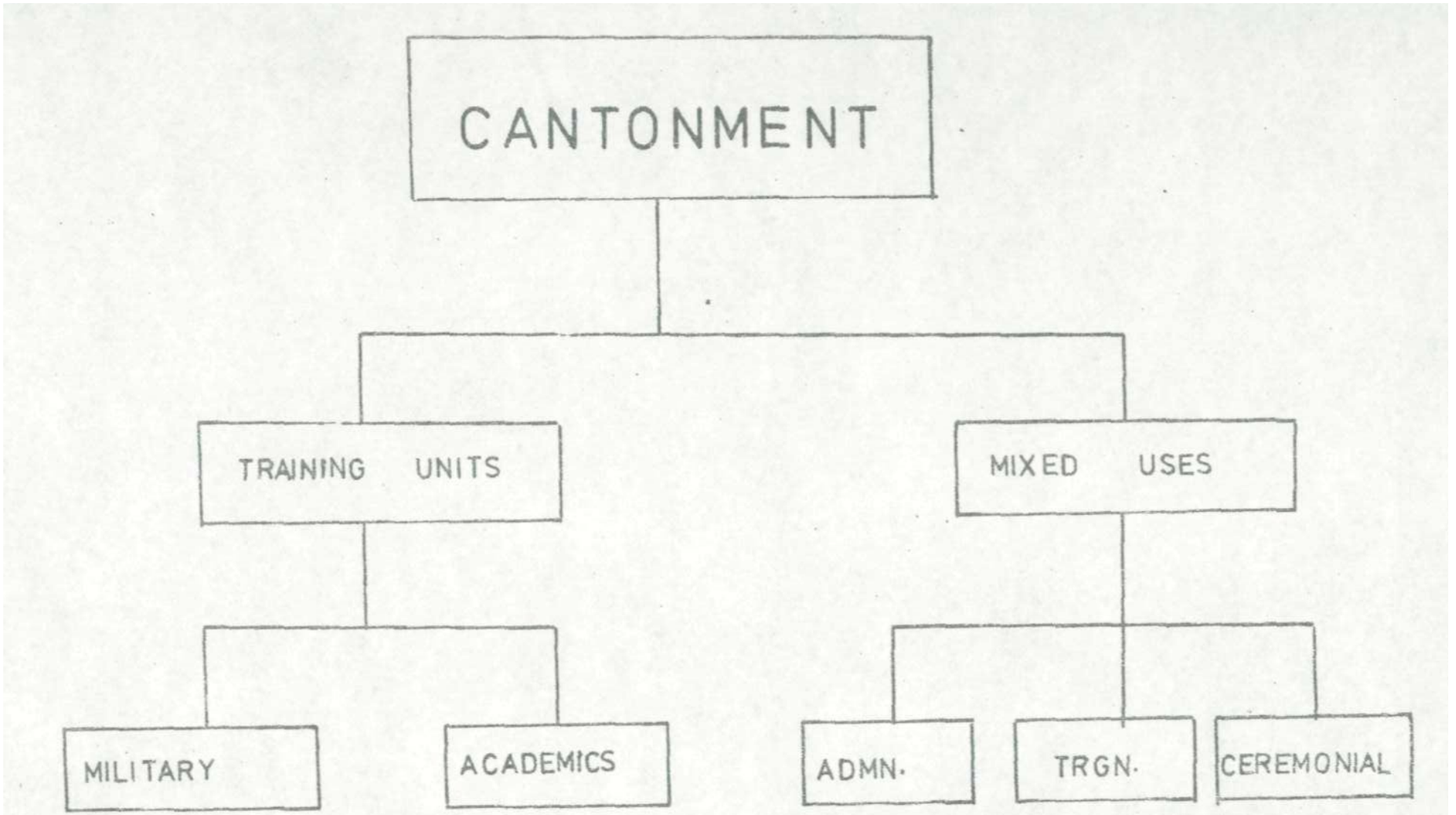


fig 2e

TYPES OF CANTONMENT

Since the cantonments vary in function, it is expected that spatial organisation of space, and land utilisation within the cantonments will also differ. Planning consideration emphasis will also differ.

2.40 a. Characteristics of Cantonment of Training Units.

This type of cantonment is made up of units that specialise in training activities. The training could be academic training or military training such as drills and physical Education training. The institution could be for training of other ranks or officers to be or officers re-training. The requirements for such a cantonment will include special facilities for the components elements of a cantonment.

(i) Residential Component: With the students population, in addition to the officers and men of the training units, the residential area in this type of cantonment takes a substantial proportion of the land area, - about 33.6% (see table 1).

Residential segregation is another feature of significance. The student are, quite separated from the instructors lines but should be close to training areas.

(ii) The Training Area: The type of facilities to be provided will depend on the type of training undertaken. However sufficient ground with adequate facilities is essential. Training area, although shows a low percentage of the total land area 4.53%, but in reality the figure is higher. Most of the

LAND USE TYPE	CANTONMENT TYPE & % USE			
	trgn.inst.	recommended	mixed use	recmd.
	%	%	%	%
RESIDENTIAL	33.6	35	25.09	30
RECREATIONAL	4.75	5.5	3.02	3.5
COMMUNITY FACILITY	1.90	3.5	3.43	3.5
COMMERCIAL	0.54	1.0	0.59	1.0
ADMINISTRATIVE	2.2	2.0	7 63	7.5
WORKING TRAINING	4.5	14.5	14:5	10
OPEN SPACES	35.01	24	31.44	30
ROADS	17.50	14.5	14.3	14.5
TOTAL	100	100	100	100

CURRENT AND RECOMMENDED % LAND USE OF CANTONMEN

table1

out door training takes place in the undeveloped open spaces. A recommendation of 10% of total land area is regarded as reasonable. To ensure safety, special care must be taken in the location of training facilities. Special care in the location of the magazine, armoury, and range must be taken. An essential aspect of the training area landscape is camouflaging device to shield it from easy identification and attack in case of out break of war.

(iii) Road: The Road pattern developed requires special attention in training areas that will make use of heavy vehicles.

(iv) Administrative Area: The land area for administrative use is usually lower in this type of cantonment than in others. 2.2% as against 7.63% in cantonment for mixed use. (see table 1)

(v) Recreation Area: This again requires extensive area to provide for sports ground for students as well as instructors, in addition to other recreation facilities.

Other component elements of cantonment of training units are commercial area and community facilities. A location close to the civilian area and preferably close to the entrance will be ideal for the location of a mammy market. This activity that is likely to generate some noise must be remote from the class room area.

Community facilities are best scattered around the core area, to bring them close to both the students and instructors.

The location of the cantonment vis-a-vis the urban area will depend on the type of training programme. A cantonment of training units with bias towards academic will best locate close to an urban area. A distance of ½ - 2 kilometers away from the urban area will be an ideal location. If the training is a special type ~~of~~ that requires the use of heavy weapons or demands a high degree of secrecy the location could be as far away as 40 kilometers.

The location in either case must be easily accessible by Road and by rail if possible.

The design concept for this type of cantonment must ensure the separation of training areas from areas frequented by the public.

2.40 b. <u>Characteristics of Cantonment for Mixed uses.</u>

This category of cantonment found in such places as Divisional Headquarter, Brigade Headquarter or the location of the Army Headquarter, accomodates units that perform administrative, military or even ceremonial duties.

Such cantonments can locate quite close to the urban area too. For this category a distance of same range as of cantonment of training units will be ideal. However if the military training involves the use of heavy weapons and requires high degree of secrecy, or wide expanse of land then a range of between 5 - 40 kilometers

from the urban area will be quite appropriate.

Basically it contains all the components elements of a cantonment of training units. However, residential and administrative areas deserve some attention. Administrative area requirement is lower than that of cantonment of training units 25.09% as against 33.6%. However, this is inadequate as the cantonments generally experience over crowding. A proposal of 30% of the land area has been suggested. (see table 1) for proposals.

This category of cantonment devotes a greater area for administrative use than in the case of cantonment of training units. (see table 1)
Concept case3 - is viewed as an appropriate design concept for this type of cantonment.

2.50 Cantonment and its Relationship with the Neighbouring Urban Area.

Cantonment in British Colonial territories were originally established as "invigilator and protector" of the neighbouring Administrative Headquarters of the Colonial Masters. This therefore calls for a location that is close enough to enable easy execution of this functions. While it is desirable that such military bases should be separated from the civilian population, it is not however, possible for the military centre to live in complete isolation from the urban area, no matter how ideal the site of the location. Such a large group of people that do not earn a living directly by engaging in productive occupation, and, kept away from the source that

engages in this sector has to be well planned for. Lewis Keebles in his book Principles of Town and Country Planning wrote[5] "It must also be remembered that people will not permanently live in places where public services and social facilities are defective, where the general habits of life prevailing are displeasing to them". And I hasten to add, that not even the military.

There is a lot of necessary social and economic interactions between the cantonment area and neighbouring urban centres, that constantly bring the occupants off the two areas together.

Fig 2g indicates the major needs of the cantonment that are provided by the urban areas. In addition to these, the cantonment depends almost entirely on the main town for its consumer goods such as vegetables, fresh milk, meat and other food items.

However, contrary to the expressed view that the "Cantonment towns are parasite", there is a form of symbiotic interaction between the cantonment Towns and the neighbouring urban areas. While the cantonment obtains most of its perishable commodities and food items from the main town, the economy of the Main town is boosted by the income generated as a result of purchases by the occupants of the cantonment. The civilian population of the neighbouring town often takes advantage of the non-commercialising attitudes of certain facilities provided in the cantonment and obtain certain goods at a fairly cheaper rate than in the urban area. Drinks in the messes and various other items in the AFIN shops are quite attractive in terms of price

[5] Keeble, L. (1969) Principles and Practice of Town and country planning London: The Estates Gazette Limited.

NEEDS THAT CAN BE PROVIDED BY
THE CANTONMENT
[respondents' priority]
100
80
60
40
20
0
60
56
56
52
48
48
48
48
44
44
medical services
educational facilities
markets
electricity
social facilities
water
shopping centres
sports facilities
messes
banks

fig3i

to civilians who have access to them. It has however, been observed that the price index of certain commodities such as food items often go up ("K.M. Kulkarni - Cantonment towns of India - Ekistics 277 Jul/Aug 1979). Those days in the month that troops receive their pay.

Officers and men often take advantage of other facilities existing in town to obtain the needed variety in life. Cinema houses, clubs and recreational and sport centres are sources of attraction to inhabitants of cantonment Towns.

Specialised services such as tailoring, motor machanics, services of lawyers are offered by the main Towns to the Cantonment Towns.

A very important implication of this relationship between the cantonments and the urban areas is the need for effective link between the two areas. The distance of the cantonment from the urban area not withstanding, efficient link by road and if possible by rail must be provided. Those facilities which can be provided by the cantonment should by all means be provided to minimise the dependence of the cantonment on urban areas. No doubt the establishment of a civilian area on the cantonment will help to reduce this dependency.

CHAPER 3

3.00 Physical Planning Characteristics of Cantonment.

All cantonments generally display certain common characteristics. They are all made up of certain component elements that are highly interelated (see fig 3b) and require proper organisation to function well. How well a cantonment will fulfil its role of maintaining military regimentality and discipline, as well as serving as a training place for the troops largely depends on the organisation of the internal structure. One way of achieving this end is the grouping of related activities and setting aside special areas suited for their operation.

Thus zoning, is a major tool required in the layout of cantonment area. Activities that have high degree of affinity with each other are grouped together and linked with efficient communication network. Activities that generate noise, such as corp of drums, the workshop should locate well away from the class rooms, residential areas and offices.

Five major land use types have been identified in the cantonment area. The proportional area devoted to different land uses varies depending on the type of Cantonment. (see fig 3) Generally in the cantonment of training units, greater area is devoted to residential use (about 33.6%) (see table 1) while Cantonments of mixed uses, devote about 27.92% to residential use. Students residential accomodation added to the instructors, both officers and other ranks and the men to render other essential services account for the increased

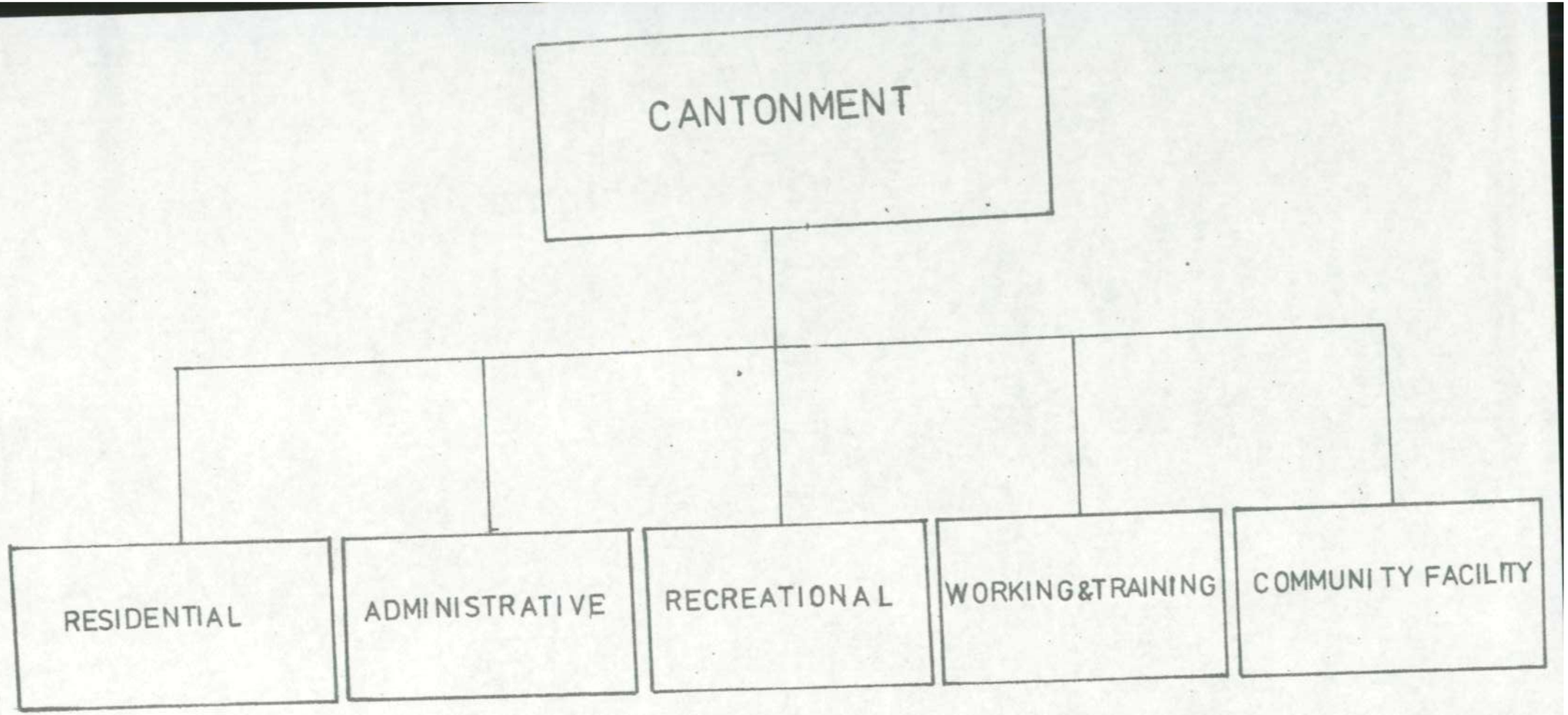


fig 3a THE ELEMENTS OF A CANTONMENT

use of residential land. Based on the existing situation, recommended increase to 35% of the land area is recommended for the residential use in cantonments of training units, while for mixed uses, a total area of about 30% of cantonment area is recommended.

After a careful study, and considering the congestion in the existing cantonments, recommendations for proportional use of the total land area for the different uses have also been proposed. (see Table 1)

3.10 Residential Area Land Use.

This is the highest land consuming sector of the cantonment. It takes about 25 - 35% of the total land area of the cantonment. The proper organisation will largely determine personal relationship between the different ranks and files in the cantonment. As this has direct bearing on the level of discipline this should be given serious consideration in the allocation of residential areas.

The officer is to be friendly but not familiar with the other ranks, hence the places of residence should be well separated.

In order to maintain the hierarchy in the army, the other ranks residence is also grouped into two categories of the senior Non commissioned officers lines and the Junior Non-commissioned officers line.

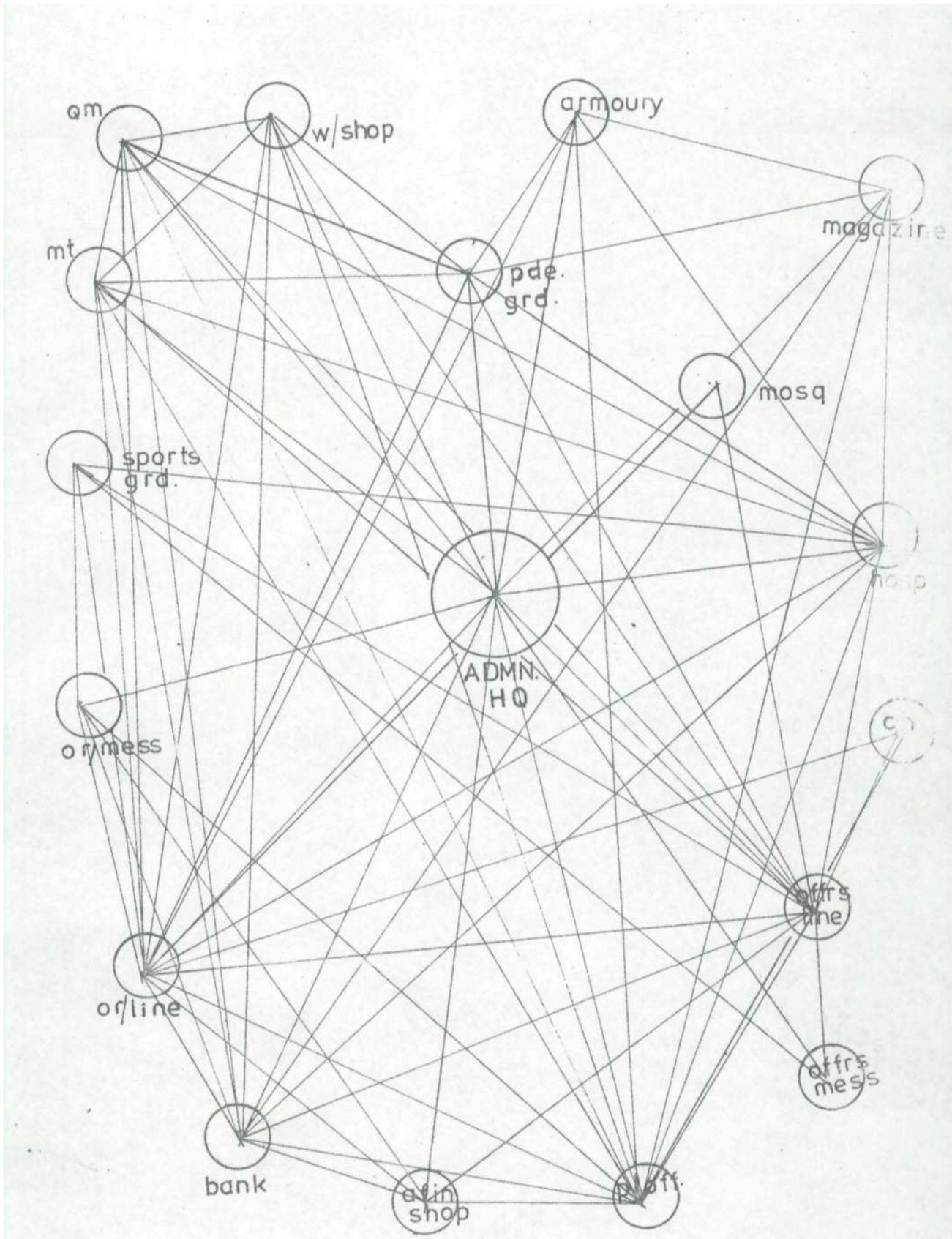


fig. 36.1

INTERACTION WITHIN THE CANTONMENT

There is also among the officers a form of residential segregation, although this is most often along marital status line rather than rank wise. Although this rank wise segregation occurs in some cantonments, as it might facilitate administrative procedure, married officers should generally live together irrespective of rank.

The single officers who invariably are young officers have much more to gain by living together"in their own world"rather than living a lonesome life in the midst of married officers. The way of life of this group of officers also calls for separation from the married officers to ~~allow~~ give room for "free living". Generally an area adjacent to the officers' mess is the most ideal location for the single officers. An integral part of the residential area which is often lacking in most if not all cantonments in this country is organised children play ground. A properly organised play ground, well located in a central position between the other ranks and officers lines will provide another avenue for mixing by children of all ranks. This I believe will help to reduce whatever negative impact that residential segregation might have on the offspring of the various ranks.

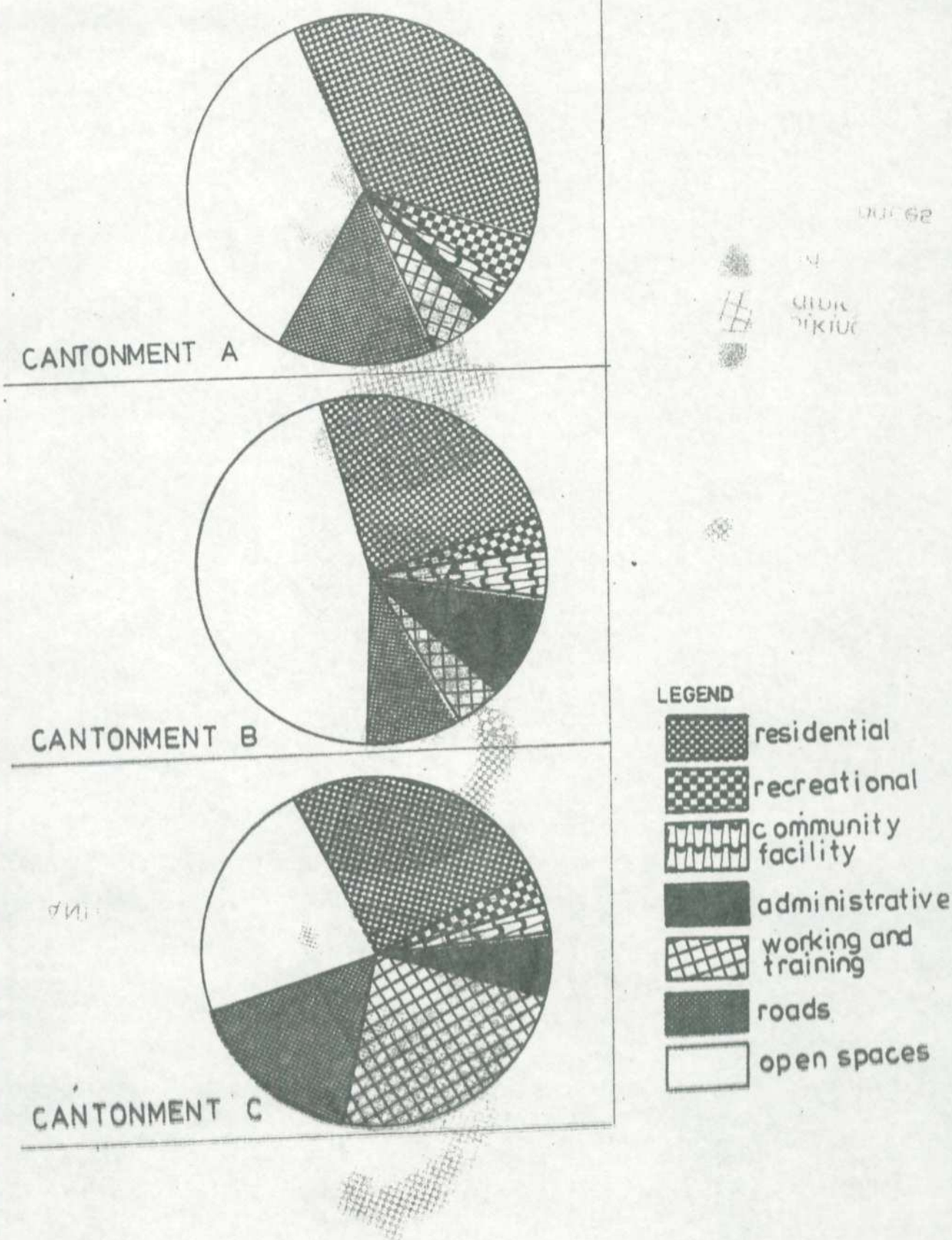
Residential area road net work, should be designed to provide the necessary variation from the rigid gridiron pattern characteristic of military cantonments.

Trees form good camouflage for buildings and structures on the ground when viewed from the air. They should be used very well for this purpose as well as for providing shade.

Another innovation sought for, is the integration into the residential areas of accomodation for the civilian population working in the cantonments which are far from the urban areas. It has the advantage of making such civilians to be easily accessible if there is need for it even after official working hours. It in addition relieves him of the accomodation problem and daily journey to and from the urban area. Such establishments should be administered by a body set up by the Cantonment Authority with the representatives of the civilian population as members.

3.20 Administrative Area:

Perhaps one of the greatest shortcomings of the cantonment in this country is lack of effective command and control. Although this has been ranked 3rd priority problem of the Cantonment, It nevertheless, affects other things that makes its ranking order doubtful. Many Cantonments in this country are made up of units that established one after the other, each with its commanding officer and administrative headquarters. Cantonment 'A' in the studied cases with three commandants, having three Administrative blocks situated in scattered locations all over the place is a common feature of our Cantonment.



CANTONMENT AREA LANDUSE

fig 3c

There is no single over all commander responsible for the day to day administration of the cantonment.

This invariably leads to duplication of facilities and tremendous waste of fund. How does one justify the existence of three Administrative blocks, three Quartermaster Departments, two medical centres (MRS and MIR), two officers' messes and two for the other ranks, and three welfare canteens in a single location!!

Training units cantonments require less space for administration than a Cantonment that has as one of its units, the Headquarters of a formation. This varies from 2.2% of the total land area in a training institution cantonment to about 7% of the cantonment land area in a cantonment for mixed uses. (see table 1)

The location of the administrative block is a function of the nature of the cantonment. For a training institution and a cantonment for administrative purpose a location close to the entrance or core area is ideal. A situation that will locate the administrative block side by side or colse to the major training areas, that are considered out of bounds should be avoided.

3.3 Recreational Facilities:

This has been used in this study to include officers and other ranks messes that provide relaxation and sporting facilities for officers and men. Since the mess facilities could be extended to non-military personnel, the location vis-a-vis this role and the users within the Cantonment is

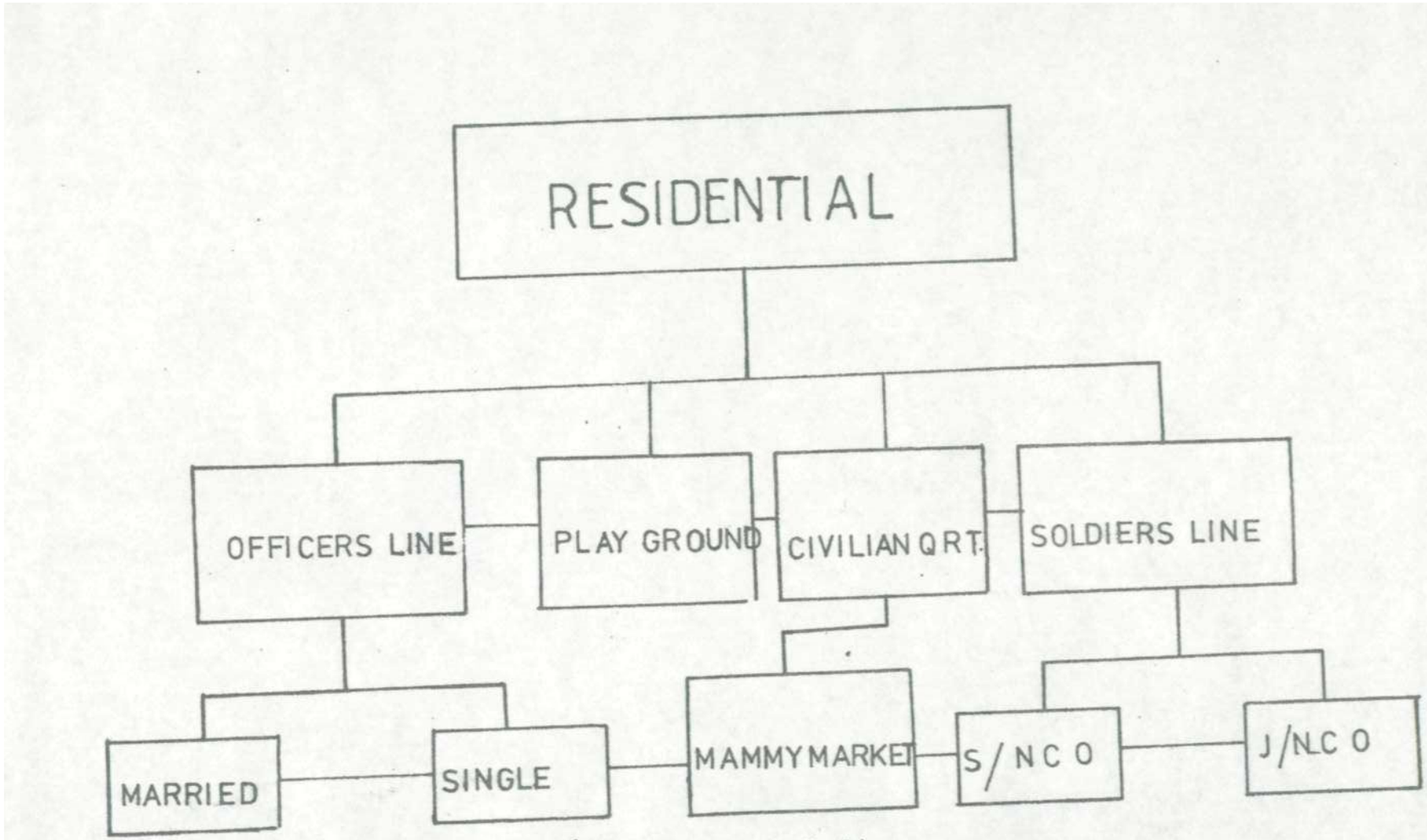

RESIDENTIAL
OFFICERS LINE
PLAY GROUND
CIVILIAN QRT.
SOLDIERS LINE
MARRIED
SINGLE
MAMMY MARKET
S/NCO
J/NCO

fig 3d

very crucial. Usually a location close to the officers lines is the most ideal. Similarly the other ranks mess should be located within a short distance from the residential area. An integral part of the mess facility is facility for both indoor and out door game. Since officers are usually encouraged to make full use of the mess and avoid as much as possible spending too much time in civilian social clubs, it is desireable that sports facilities are also provided. A gymnasium equipped with indoor games should be located next to the main mess building. The surrounding area should be utilised for out door sports such as Lawn Tennis, Basket - Volley ball.

It is desireable that in a Cantonment for mixed uses, a central sports ground for various games be set up for use by both officers and men.

In a Training institution Cantonment a central sports ground serving the needs of officers, men and students should be provided in addition to those in the officers mess.

Swimming is an important, training that every serving personnel should master. It is therefore imperative that a swimming pool be located for the use of all ranks. This should form part of the training ground and removed from the residential areas.

Organised children play ground which had earlier been suggested to be integrated with residential area planning is another recreational facility to note when planning any cantonment.

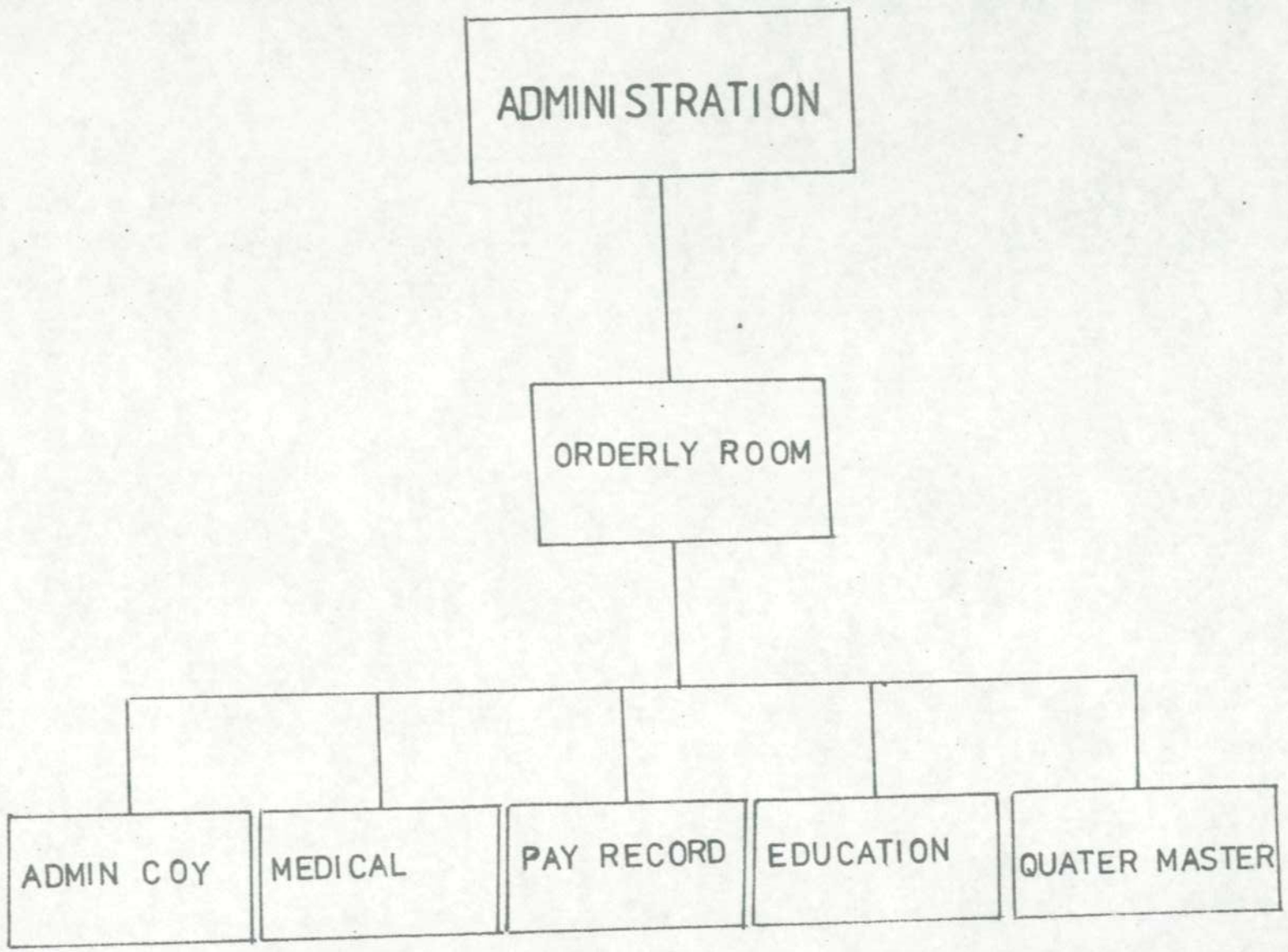

ADMINISTRATION
ORDERLY ROOM
ADMIN COY
MEDICAL
PAY RECORD
EDUCATION
QUATER MASTER

fig 3e

3.4 Community Facilities:

This is defined in this study as those public facilities commonly shared by cantonment dwellers. These include school churches, mosques, medical facilities, libraries, post office, banks and a central shopping complex.

Most of the existing cantonments are without some of these essential facilities. The most lacking facilities are public libraries, banks and a central shopping complex The cantonment may not possess the necessary economic population threshold to operate a bank, since by its nature, unlike other facilities, it is a special public service provided, for which the army will still have to rely on the civilian population for; it is nevertheless a necessity for cantonments that are remote from urban areas. The recent policy of paying the soldiers salaries directly through the bank and no more by officers and men makes it inevitable that a small branch be established for such units.

A public reading library, located in the vicinity of the command children school is another vitale necessity of the cantonment.

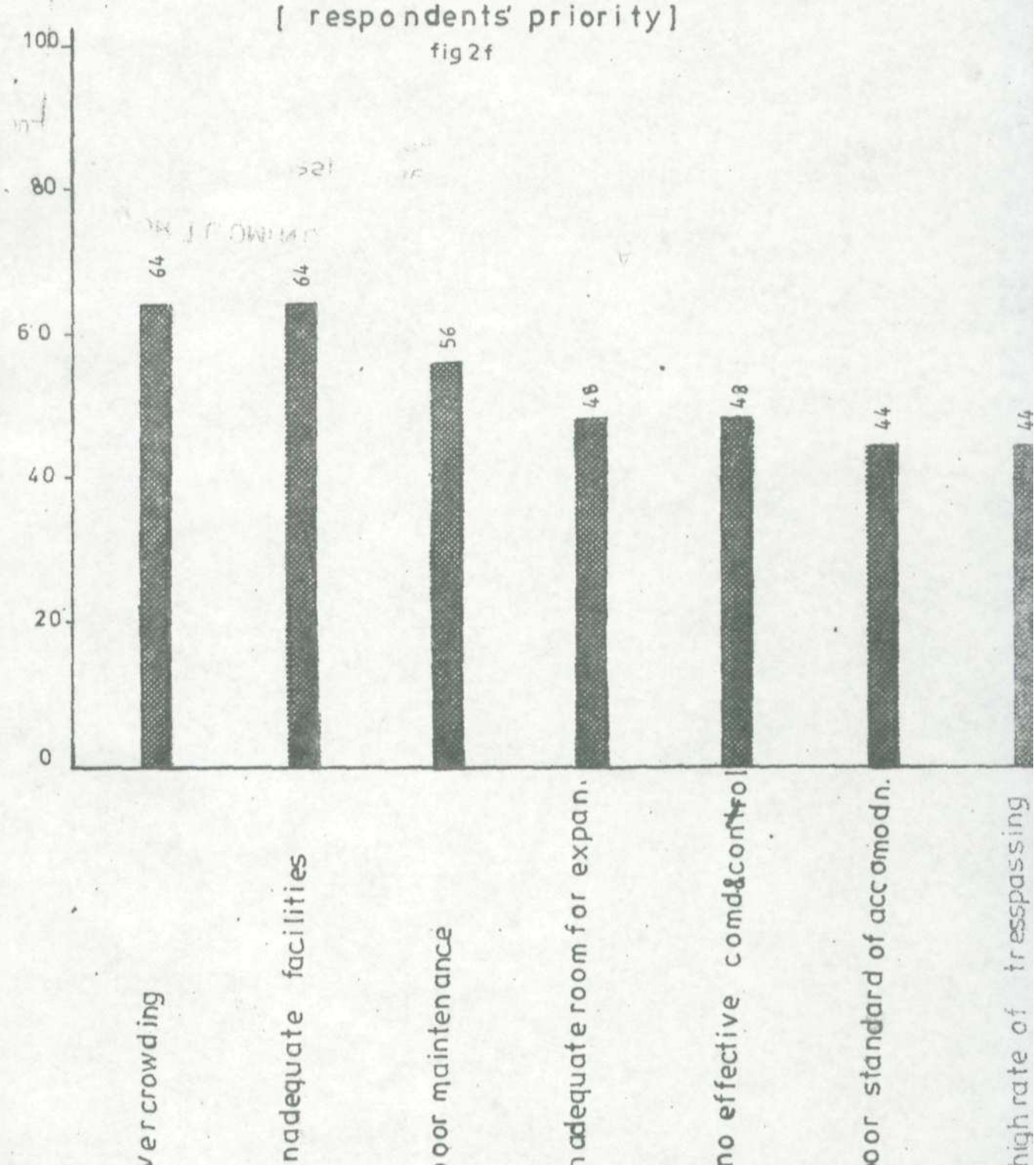
A well equipped and well manned Medical Centre must be located within easy reach of cantonment residents. The status of this Medical centre will depend on the size of the cantonment, the distance from the nearby urban centre.

A shopping centre that will supply basic occasional requirements of the troops is a necessity. This, supplemented by the Mammy market will provide the troops with requirem

SHORTCOMINGS OF EXISTING CANTONMENTS

[respondents' priority]

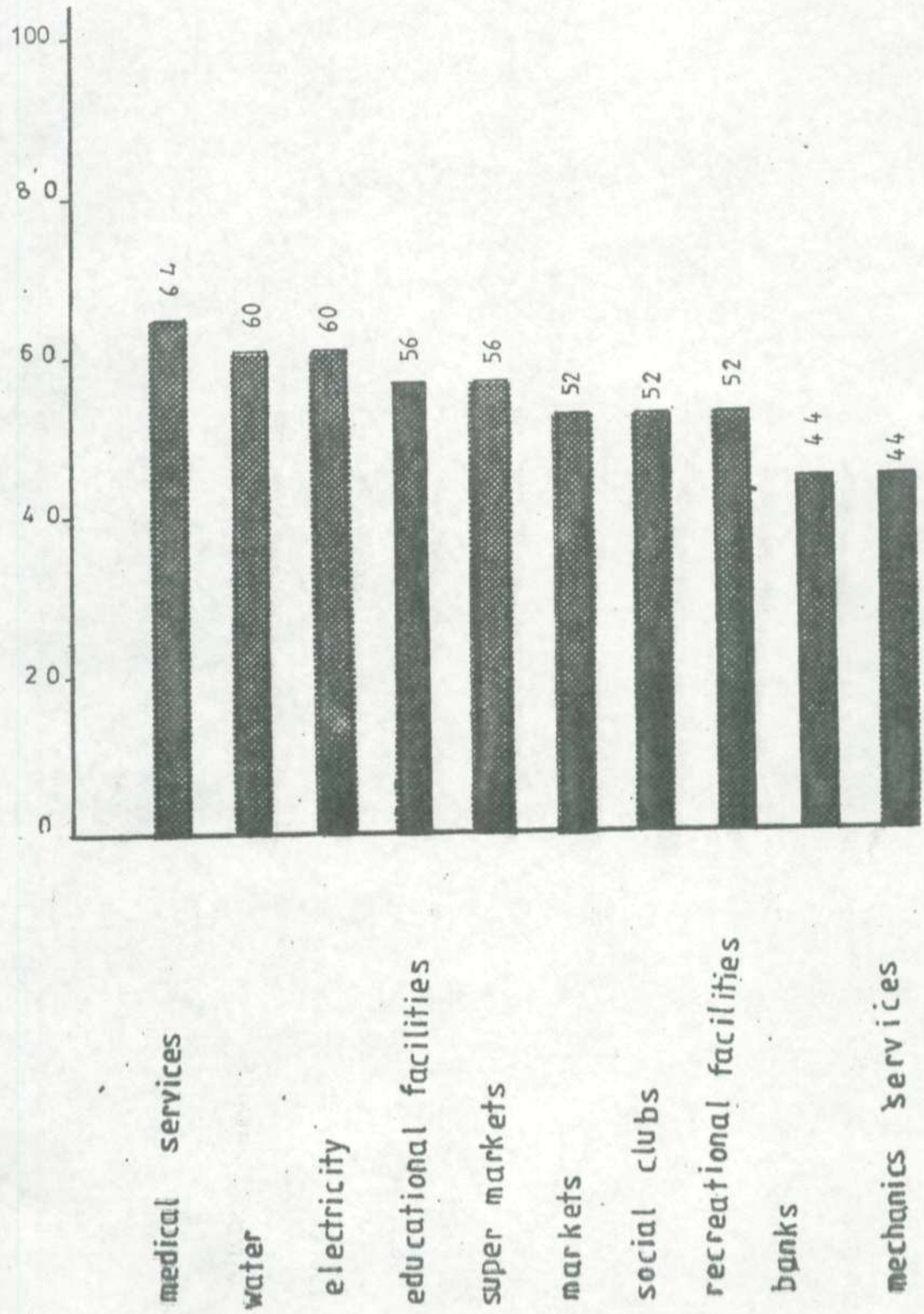
fig 2f



CANTONMENT NEEDS PROVIDED BY URBANAREAS

[respondents' priority]

fig 2g



that would otherwise have taken them to the urban area. A prominent position near the administrative headquarters or at the entrance of the cantonment, and quite close to the Quarter guard will be an ideal location. A canteen that provides food should form part of this complex especially in cantonments that are very far away from urban area.

It is imperative that essential community facilities are well provided to avoid constant moving away from duty post by both officers and men. Such facilities formed a basic link between the urban population and the cantonment in the colonial army, when a good number of foreign goods were usually brought from the colonial society for the benefit of colonial army officers. This usually attracted the civilian population who had taste for such goods. Community facilities takes 1.90% of cantonments of training institutions as against 3.43% of cantonments of mixed uses.

3.5 Working and Training Areas:

The working and training area comprises of those areas used for both indoor and out door training.

These areas require special location in relation to the other component elements of the cantonment and the urban area. The indoor training, which are held in class rooms provide the basic theoretical background for the out door training. Although some of these could take place outdoor. The location of the class room, must take into consideration noise generating areas like a stand bye generator or mammy market and avoid them.

Out door training could be gymnsatic training or drill and this could be easily incorporated in areas around areas

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[1] Field Survey Jan 1981

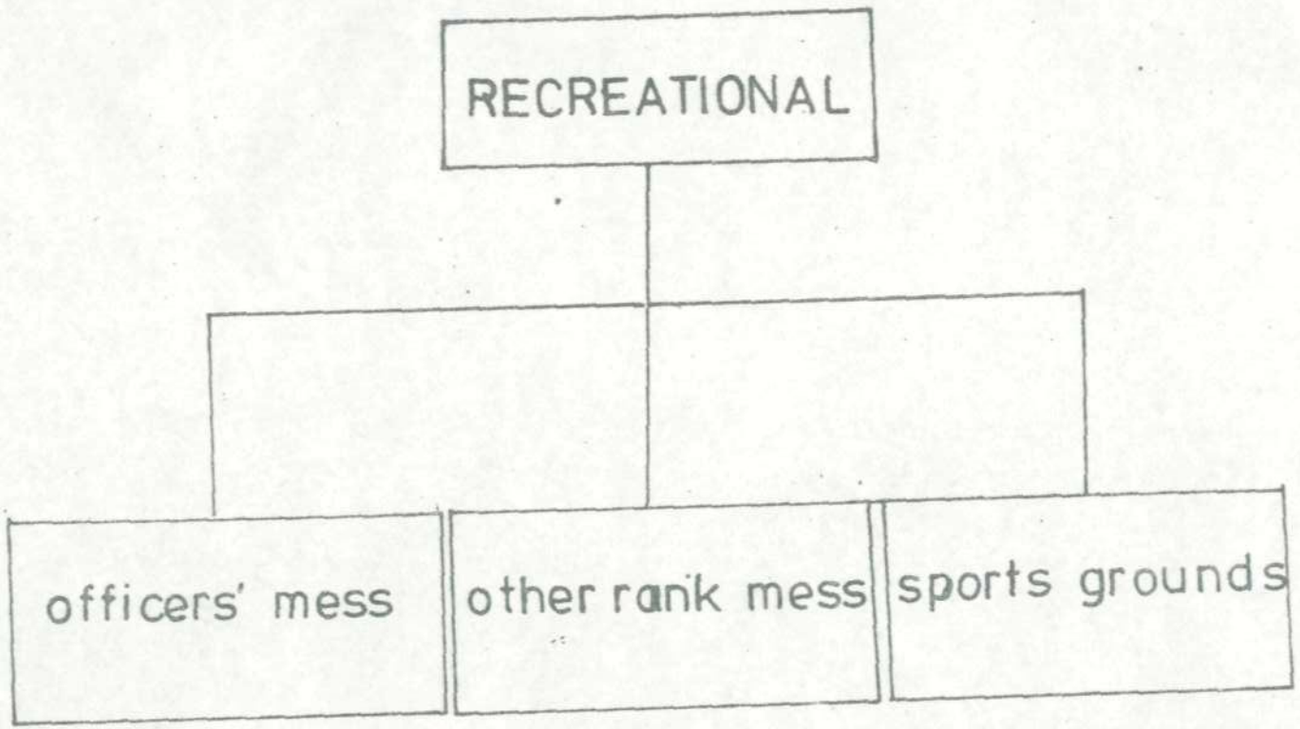

RECREATIONAL
officers' mess
other rank mess
sports grounds

fig 3f

utilised for community facilities. The parade ground which forms the training ground for drills and also serves for parades, require special location. Ceremonial parades usually attract large number of outsiders and prominent location that is easily accessible should be set aside for it. Preferably a central location. This gives it accessibility to all ranks from all departments.

If there is need to locate a light weapon range within the Cantonment near urban areas, appropriate direction away from the urban area and residential, and administrative areas of the Cantonment is required. Peripheral location is ideal. However, there is a need to have a shooting range located away from the cantonment in a case like this to serve for training of personnel in the use of heavy arms. This could be located some 3 - 5 kilometers away and made to face direction away from the urban and cantonment direction. Where the land can not be acquired and fenced to prevent trespassers during shooting exercises a public message to nearby inhabitants will serve to warn them to keep off for the duration of the shooting exercise. Land areas adjacent to the training area could be used for light training facilities and sufficient area should be left for such purpose. Since most of the intensive training will take place away from the cantonment area, where such land is not available, does not adversely affect training.

All military locations become key targets during any war, so special efforts to protect the training areas by means of sufficient camouflaging devise, in construction material and with trees is essential.

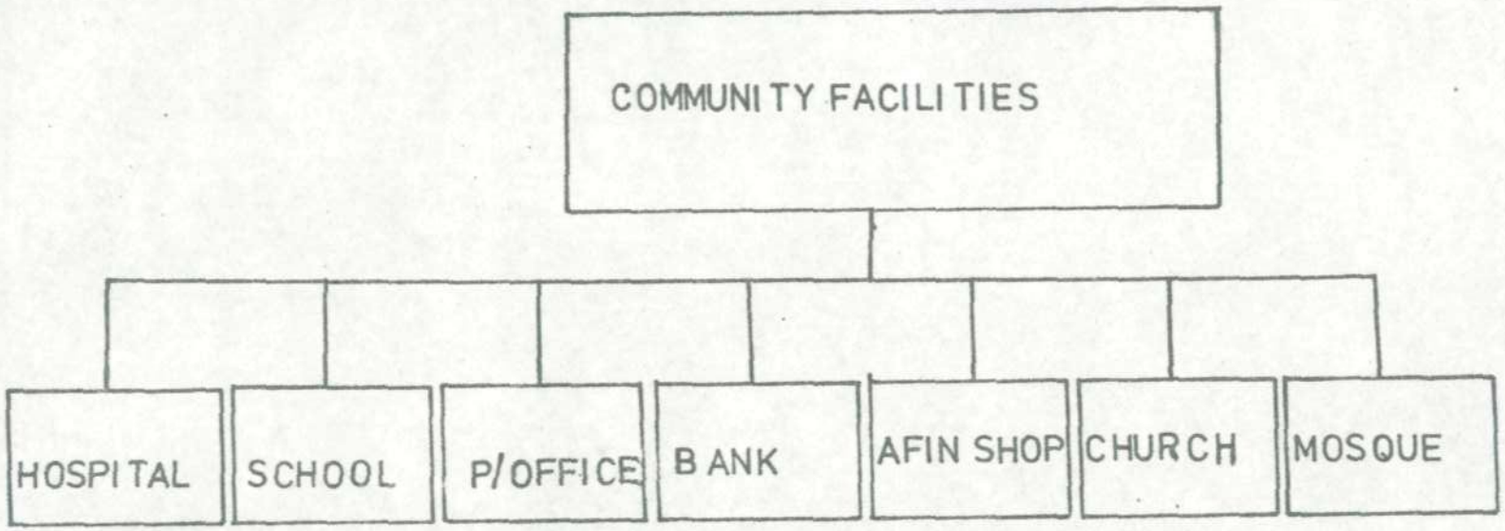

COMMUNITY FACILITIES
HOSPITAL
SCHOOL
P/OFFICE
BANK
AFIN SHOP
CHURCH
MOSQUE

fig 3g

The road network around the training area should where necessary be strong enough to accomodate heavy vehicles that will ply them frequently. Area devoted to training in the cantonment of training units indicates a very low figure, because from investigation a greater proportion of the area formerly devoted to training has been converted to residential use. A higher percentage is required for effective training programme. The recommended area use are 14.5% and 10% for cantonment of training units and for mixed uses respectively.[2]

Modern techniques and innovations in military science will necessitate changes in training method and programme, training areas should be flexible enough to accomodate such innovations.

3.60 Concept of Zoning and Traffic Circulation:

With these various land uses, that are highly interelated there is a need for effective linking of the different areas. This has been achieved in two ways

a. Zoning. This brings together land uses that are highly related.

b. Traffic Circulation Pattern. To achieve dispatch and a high degree of efficiency an efficient traffic net work is essential.

The cantonment area requires a direct link with the regional road. Direct accesses from the different areas to a peripheral road surrounding the cantonment and linking it with the main highway is necessary. The main entrance will

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2. Field Survey Jan 1981


WORKING&TRGN.
PARADE GRD.
RANGE
W/SHOP
QM STORE
SIGNAL
ASSAULT PNR.
TRGN. GRD.

fig 3h

remain the only public avenue for access into the cantonment, while the other gates will remain closed, to be used as private roads, and for use in case of an emergency. The internal circulation ensures direct links by roads and foot paths beyween the different zones. Three categories of roads have been developed. This consists of the main road which is a first order road linking the cantonment with the Regional road. The second category is the link between these main roads and the different component areas, ~~of~~ the third category consists ~~of~~ ~~cantonment~~ of series of foot paths linking the different elements of the component parts.

PRIORITY REASONS FOR SEPARATING MILITARY AREAS FROM URBAN AREAS

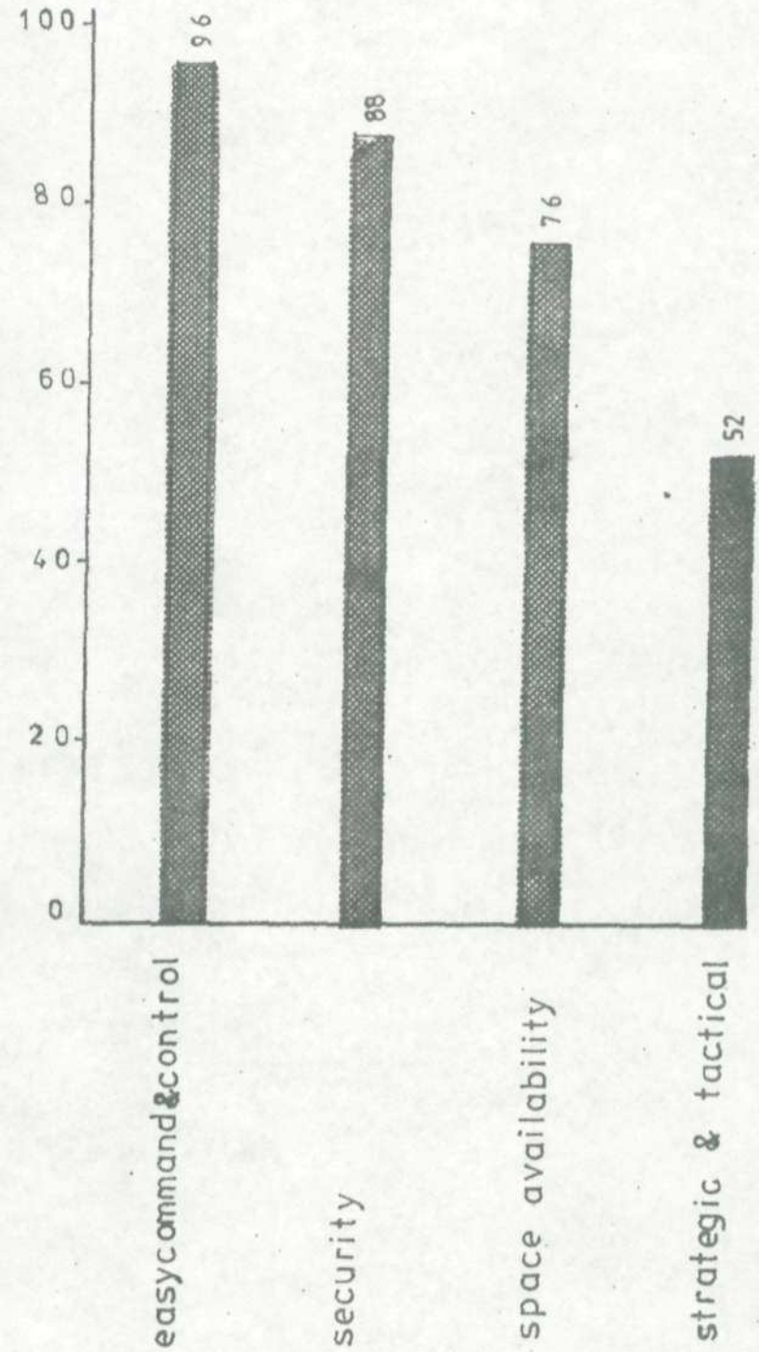
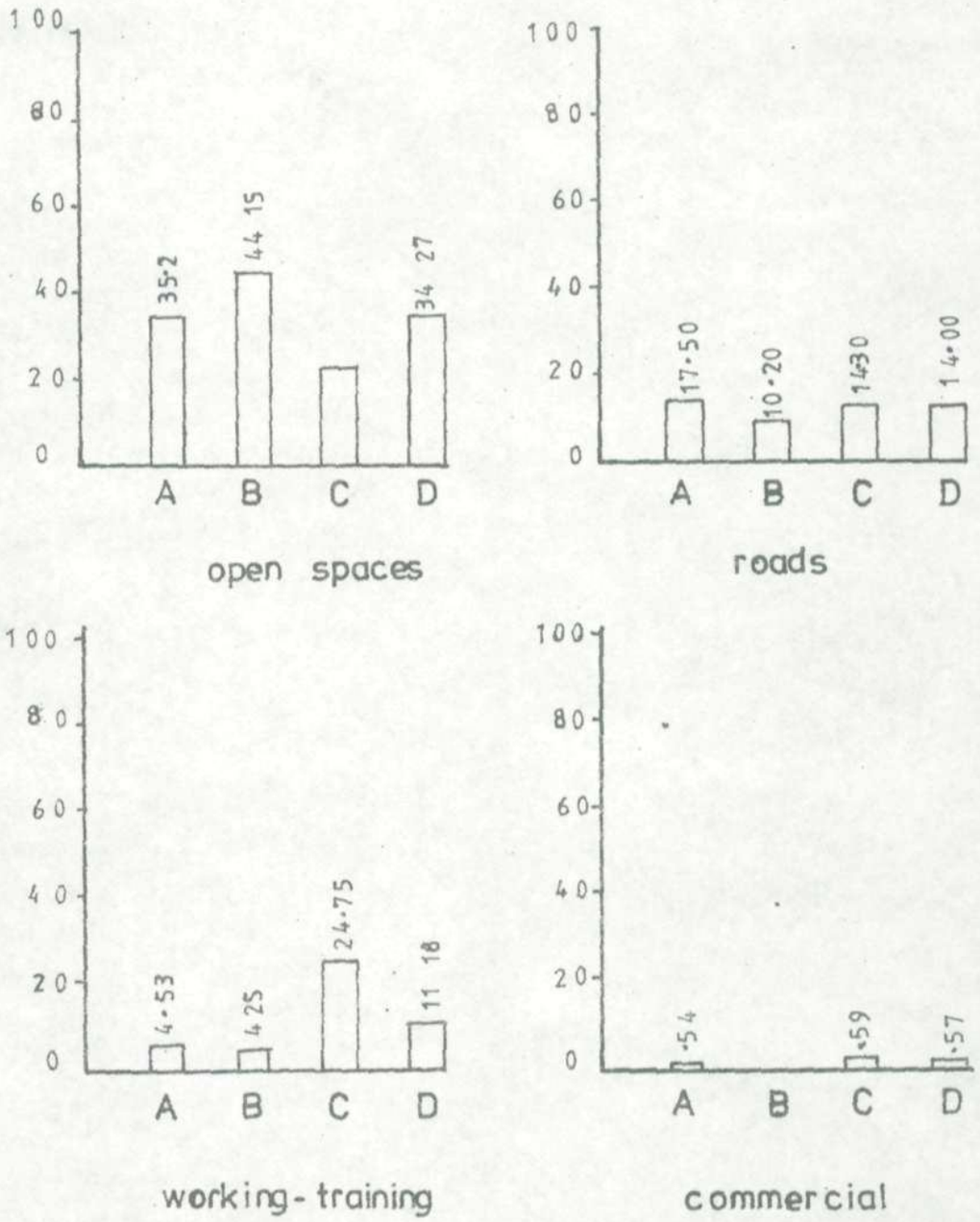
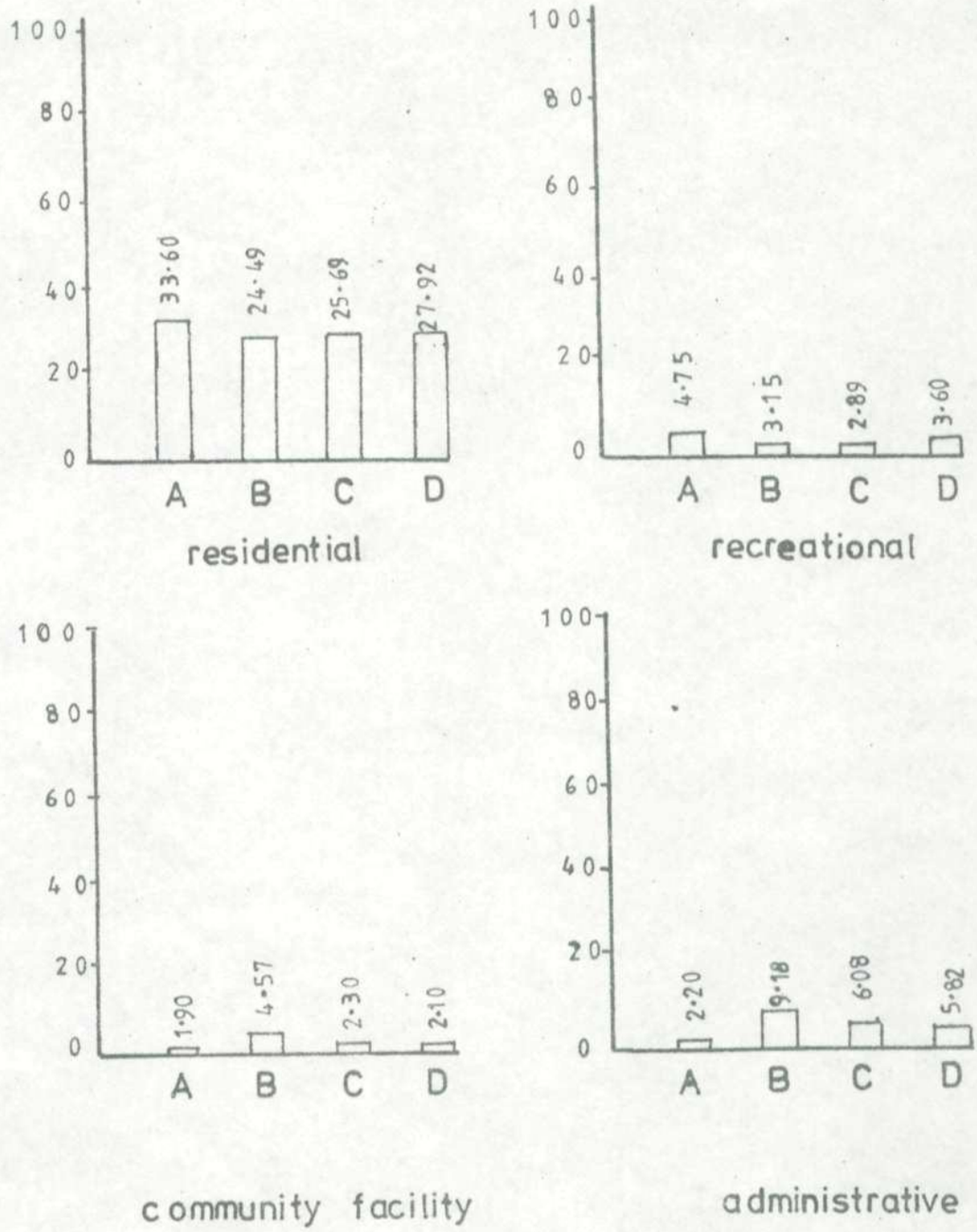


fig 3j



CANTONMENT AREA LAND USE

fig 31



CANTONMENT AREA LAND USE fig 3m

CHAPTER 4

STANDARDS PRINCIPLES AND CONCEPTS OF CANTONMENT PLANNING

4.10 The earliest known efforts in planning of military areas were made by the Romans. The Roman invented and maintained an elaborate camp systems for their troops. Those camps, usually roughly square with a gate in each of the four sides except where the site was on top of a cliff or beside a stream, are usually surrounded with earth work defences. Inside, are huts arranged in rows with lanes between and crossing each other in squares. The general's headquarters was usually located in the middle.

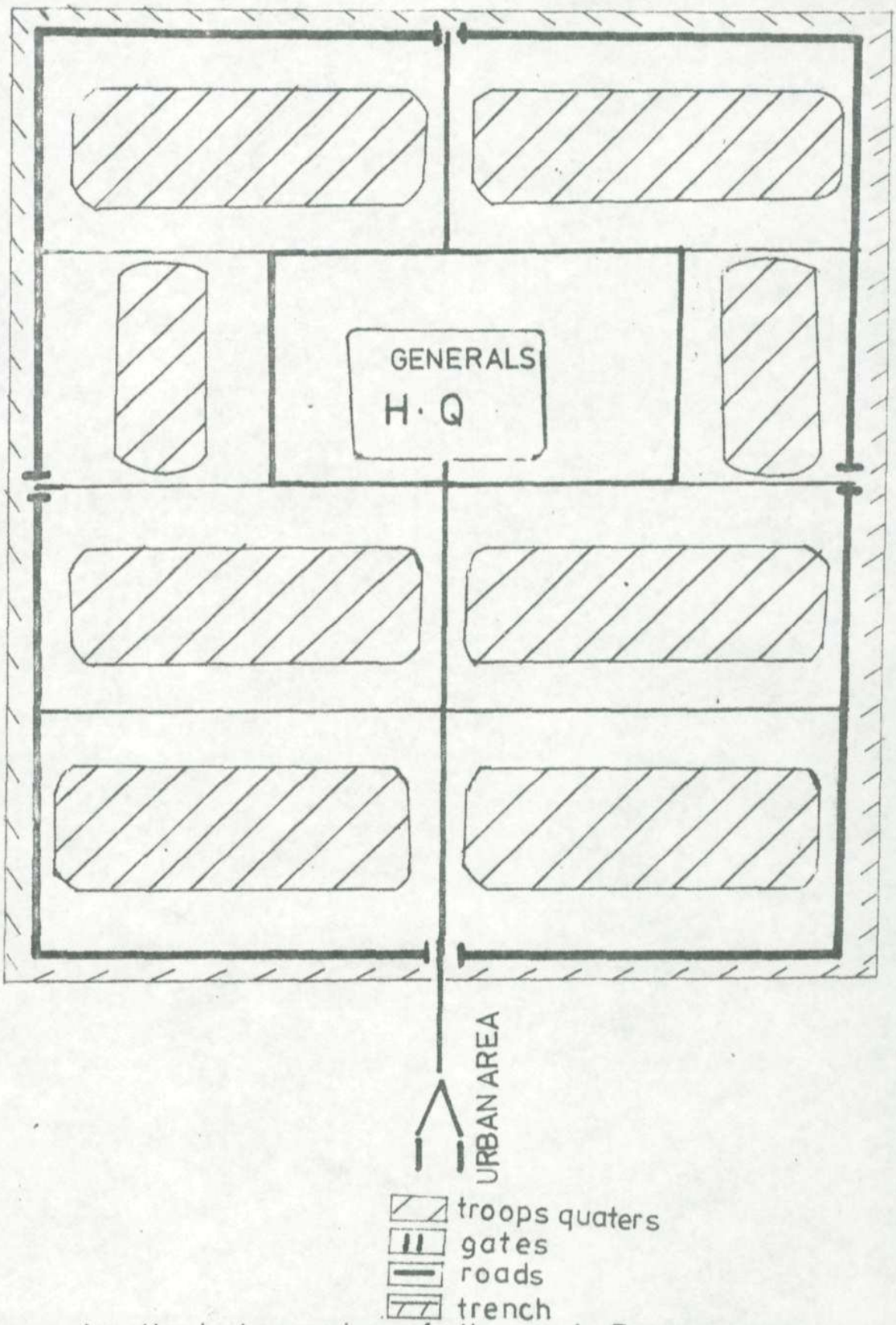
Although there are no documented principles, standards, and concepts used for the planning of Cantonments in this country, the early Army establishments set up by the colonial masters show that some factors were considered.

The existing cantonments show the gridiron pattern developed by the Romans. Whatever the criticism of rigidity associated with this by planners, it nevertheless, forms the most efficient method of evacuating troops and materials in time of emergency.

Another concept employed by the Romans is that of easy exit from the camp. This is achieved with the number of gates serving as outlets from the camps.

4.20 Existing and Proposed concepts, Principles and Standards for Cantonment Area Planning.

Undocumented traditional army values, custom tradition together with the need for safety and efficiency are the



a visualised impression of the early Roman camp

deciding factors for the planning principles used for Cantonment layout.

4.21 Standard for Cantonment Location:

Existing cantonments do not show any uniform standard for location in relation to urban areas.[1] The location varies from cantonment found within the urban area, those located within a distance of ½ - 1 kilometer away to those located over 40 kilometers away from urban areas. Ideal location will vary between these given distances depending on the nature and function of the cantonment.
A Cantonment of training units could located within a distance of ½ - 2 kilometers away from the urban centre. So, also is a Cantonment with mixed use but heavily weighed on Administration. While Cantonments that perform military functions that require the use of heavy weapons, high degree of secrecy and extensive area of land for training will best locate within a range of 5 - 40 kilometers from the urban area.

4.22 Standards for Land use.

The analysis of existing situation shows variation in cantonment area propotional land use standard from one type of cantonment to the other. (Table1) shows the identified standard and the recommended ones for the different types of cantonment.

4.23 Standards for Road Development: There are two categories of roads within the existing cantonments.

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1. Field Survey Jan 1981

a. Major Roads with a carriage way of about 7.32 meters and a ~~right of way~~ reservation of about 1.52 meters.

b. Minor Roads. These have a carriage way of 5.5 meters and a ~~right of way~~ reservation of about 1.52 meters.[2]

There are no given standards for special roads to be used by heavy vehicles like armoured cars and tanks. Such roads will however, have to be specially reinforced to be able cope with the heavy weight to be carried frequently.

4.24 Standards for Parade Ground:

The number and size of parade ground varies with units and function to be performed. In a cantonment with many units there might be the need for every unit to have a such a space for taking daily parade state of the personnel. However, large scale parade ground for official parades varies in length from 120 - 150 meters by 90m.[3]

4.25 Standards for Recreational Areas:

Standards for mess provision

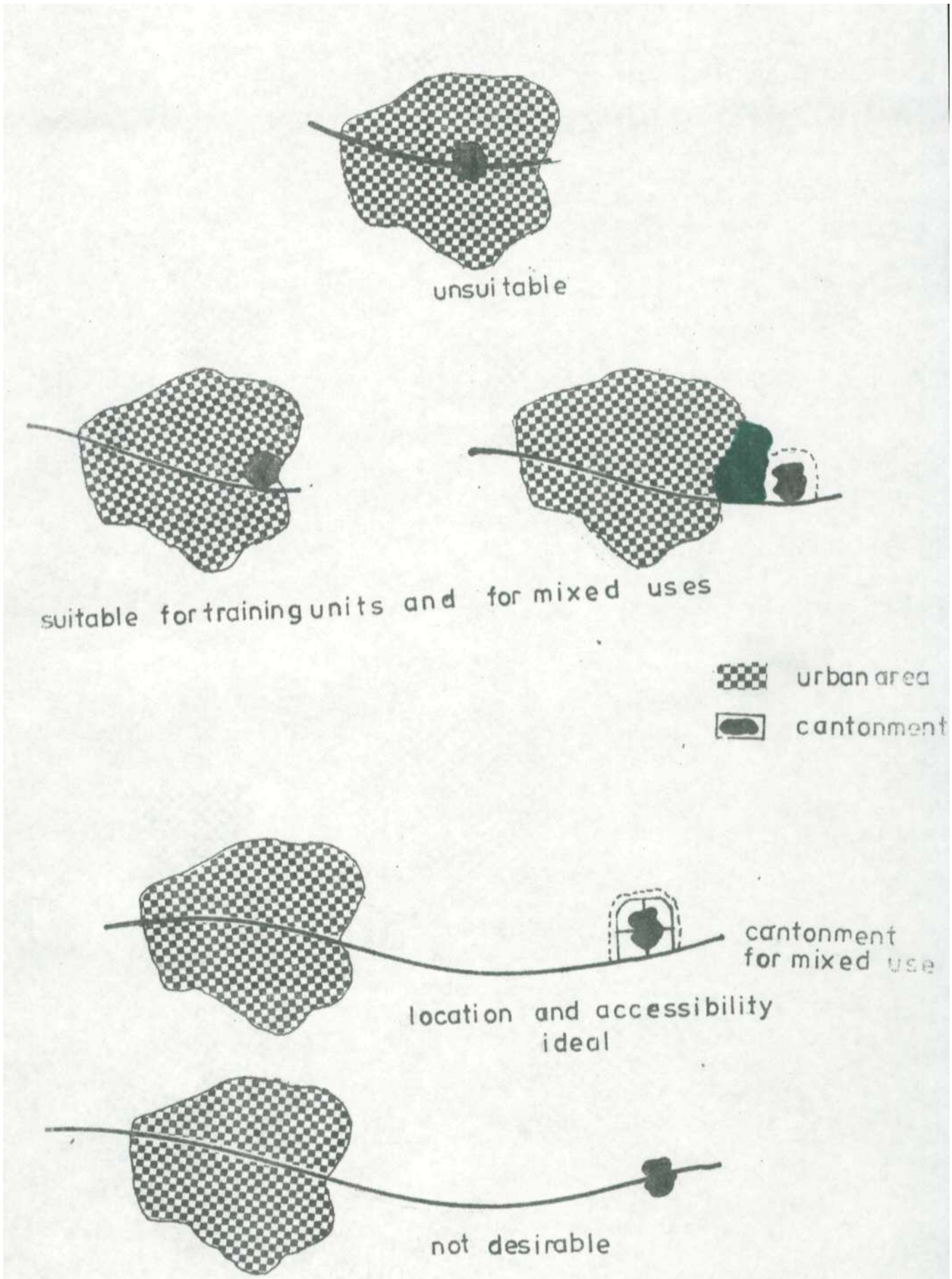
Every Cantonment must possess an officers mess, a Warrant and Sergeants mess and one for corporals and below.

Standards for Sports Ground

The number and types of sports ground will depend on size and interest shown by the personnel of the cantonment. However, an all round interest should be catered for by providing sports ground for the major popular games in the country.

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2. Field Survey Jan 1981
3. " " " "



CANTONMENT:-SUITABILITY FOR LOCATION AND ACCESSIBILITY

fig4a

Standards for open spaces

There are no organised open spaces or children play ground in most cantonments in this country. For every cantonment there must be provided at least a central organised open space for children of both officers and other ranks to play together, and for relaxation by all ranks. However if there is sufficient room, one play ground each should be developed in the residential areas of officers and other ranks. Such playground will help to eliminate any negative impact of segregation on off spring.

4.26 Standards for Medical Facilities

Irrespective of the size of the cantonment, there must be at least a medical centre for providing health care. For a fairly small cantonment of two or three units an MRS will suffice, while a fulfledge hospital is needed for a cantonment with larger number of units.

4.27 Standards for Educational Facilities

Every cantonment area must have at least a primary school and a nursery school.

Hardly is there a Cantonment in this country with a public reading library. At least, one must be provided for every cantonment to help improve the personnel education, and that of their children.

4.30 Planning Principles of Cantonment Areas.

The guiding principles for Cantonment area planning consists of the following.

a. To achieve immediate reaction to attack with a massive retaliatory force, and to foster cohesion and brotherhood. To achieve this the army has delibrately concentrated on a single site many related activities, and fused together military and personal life through the mess and the barrack.

b. To maintain regimentality and military discipline, the traditional respect for the rank hierarchy must be maintained. This has led to the development of residential segregation. "The officer is to be friendly but not familiar with the soldier" goes the saying.

c. To ensure efficiency.

d. To ensure the safety of military personnel and the populace.

e. To ensure land use compatibility.

The establishment and internal structural arrangement of the cantonment area should thus seek to satisfy these principles.

4.40 Concepts for the Design of Cantonment areas

The existing cantonments in the country display the following concepts.

a. Zoning

b. Residential segregation

A few others utilised mixed land use concept with peripherial location of residential areas and concentration of administrative and community facilities in the core area.

This study has developed these concepts and used them for proposals which could be utilised to plan the type of

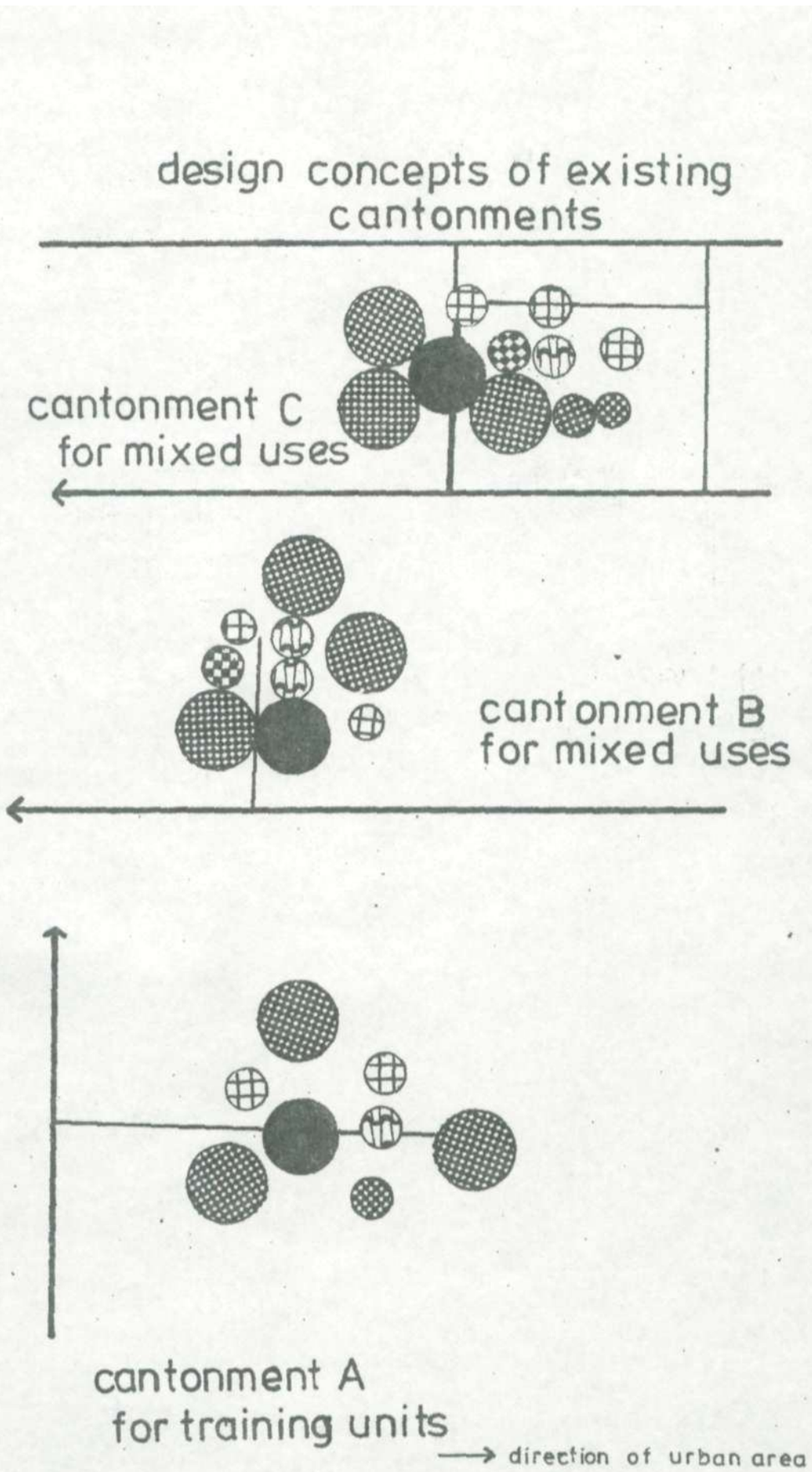

design concepts of existing cantonments
cantonment C for mixed uses
cantonment B for mixed uses
cantonment A for training units
direction of urban area

fig4b

cantonment it is most appropriate for. The proposal takes into consideration the need for restriction of movement of unauthorised persons to certain departments where security is highly essential, and admission is strictly on special invitation. Entrance to such departments should therefore be as private as possible.

(Fig 4c case 1)is a proposal for use in the planning of Cantonment of training units. This concept proposes residential area at the entrance of the Cantonment and concentrates recreational and administrative activities in the core, removing the training area away from the public area.

The Recreational area separates the residential areas.

Residential segregation of officers and the men is maintained, while students are removed from the instructors but close to the training grounds.

For mixed uses Cantonment(figures 4c case 2) are proposed.

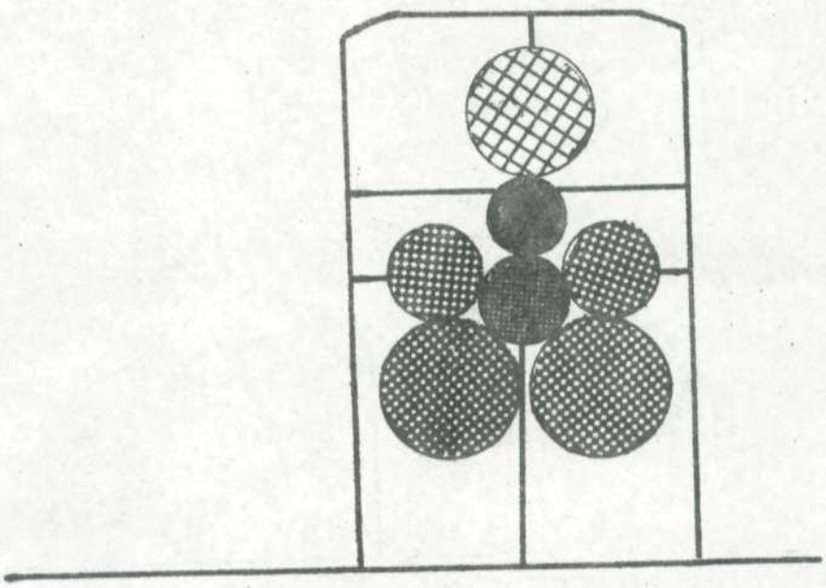
Here again the same concept of movement restriction is employed, that is removing the training area away from administrative and residential areas. In this case community facilities and recreational activities occupy the core area and could overlapse with other uses where they are compatible. Case 3 concentrates Administrative, recreational area and community facilities in the core and brings residential area to the entrance, and surrounding the core area.

A variation of this is case 4 which could be used for a cantonment of units whose functions involve some degree of secrecy. Here administrative and residential areas are

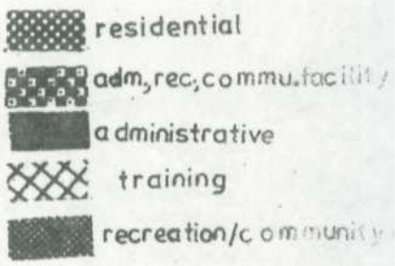
at the peripherial area of entrance while recreational area is the core and the training area in the outskirt of the other end.

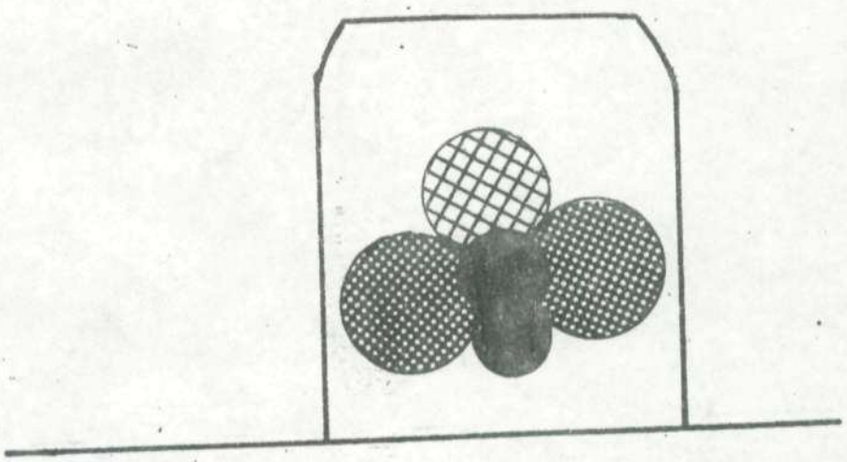
These concepts give room for slight modification to be able to meet the changes in the science of modern warfare.

propoposed concepts of cantonment area planning



case 1 for training units

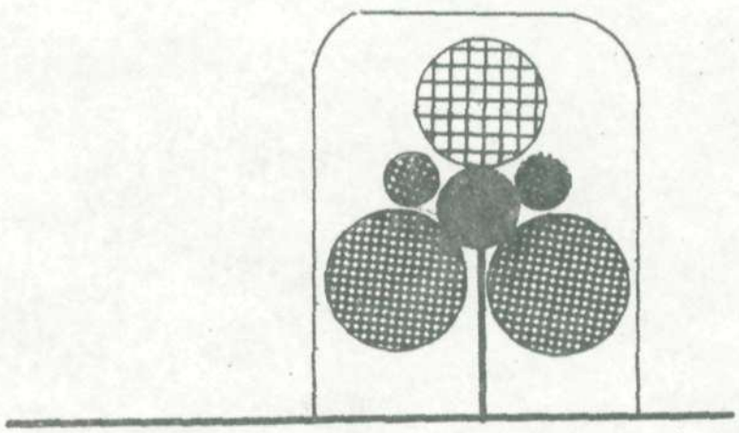




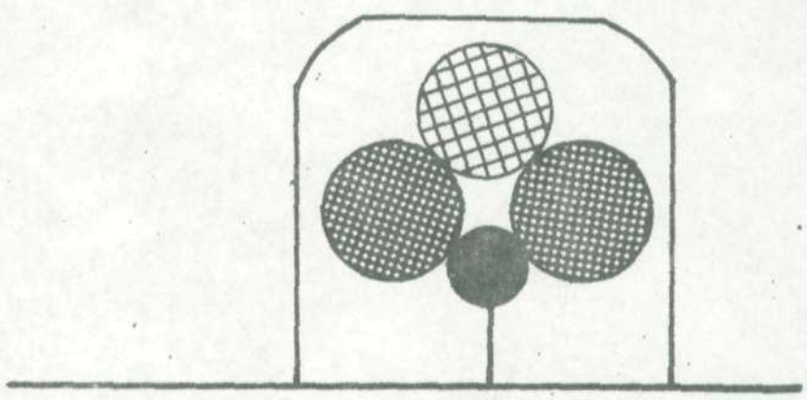
case 2 for mixed use

fig 4c

proposed conceptsof cantonment area planning



case 3 for mixed use



case 4 for use requiring secrecy

fig4c

CHAPTER 5

FINDINGS, PROPOSALS AND IMPLEMENTATION

5.00 Findings: The analysis of the survey data collected for this study presents some outstanding findings that will go a long way to help to achieve the aim and objectives of the study.

The highlights of the findings are

1. The existing cantonments in the country fall into two broad categories.

a. Those cantonments that are made up essentially of training units.

b. Those that perform functions (that for lack of better terminology) can be described as mixed uses. This includes cantonments at Divisional or Brigade headquarters that house the personnel serving in the Headquarters, as well as personnel of any other army unit considered for the particular location.

Thus the function could be administrative, military or even ceremonial in nature.

2. The distance from the town and location of a cantonment depends on the function it performs. Thus a cantonment that is essentially biased towards academic and any other military training, that does not require the use of potentially dangerous weapons, or involved in any functions regarded as too secret or that require wide expanse of land could be located in close proximity to the urban area.

Cantonments with functions involving the use of sophisticated and dangerous weapons, or which by the nature of

training undertaken by the occupants requires wide expanse of land and needed to be widely separated from the civilian population are located very far away.

3. For a number of reasons which include the following, the Cantonments must be separated from the civilian population

i. Ease of command and control
ii. Security
iii. Space availability
iv. Strategic and Tactical Reasons.

4. The Cantonment area is made up of elements performing functions that are highly interelated. The main identified component elements of the Cantonment are

i. Residential area
ii. Recreational areas
iii. Community Facilities
iv. Administrative areas
v. Training and working areas.

5. There is zoning of functional areas within the Cantonment.

6. There is Residential segregation within the Cantonment.

7. There is duplication of certain facilities such as can be seen in Cantonment 'A' where there are three Quartermaster departments, two Medical Inspection Room, three administrative headquarters, two parade grounds, two mechnical transport yards, two officers' messes and three other ranks messes.

Also officers of one unit live side by side with the other ranks of the other unit, thus defeating residential segregation principle. All these are products of unco-ordinated planning resulting from lack of a central command for the three units making up the cantonment.

8. That a good number of existing cantonments were not planned. Many started as single army barrack and grew up with additional other barracks depending on the thinking of the men at the helm of affairs at the material time. The result is congestion, lack of co-ordinated development and inadequate provision of facilities.

9. Within the cantonment there is inadequate provision of or lack of certain basic facilities which are essential for the smooth functioning of the cantonment. Such facilities include Library services, banks, post offices, children play ground, adequate water supply and regular power supply, facilities for maintaining private vehicles and social clubs.

10. That irrespective of the size and number of occupants of a cantonment certain basic facilities must be provided. These include the following.

a. A Medical centre

b. A Mechanical transport yard

c. A Quarter master department

11. That there is a delibrate policy by the Army to concentrate on a single site as many units as possible within a given location, so as to achieve a high degree of mobility and dispatch.

5.10 Proposals

It is observed that spatial separation of military areas from civilian areas is not only desireable, but should be strictly kept to. However, this has a lot of implication for physical planning.

1. A location that is easily accessible by road and where possible by rail is strongly advocated. A direct access to the highway from the cantonment through peripherial roads should be provided in addition to the main entrance. This would perform important function in case of emergency.

2. If there is need to locate a military Cantonment close to an urban area, then sufficient buffer zone of green area should be maintained. This will serve as well for light training while providing room for future expansion.

It is desireable that peripherial fencing of the Cantonment should be undertaken to act as additional physical barrier and to check incidence of tress passing.

3. The Cantonment should be near self sufficiency in the provision of basic facilities that could constantly attract the officers and men to the urban area.

i. Stand bye generator should be provided

ii. Where possible separate source of water must be provided or sufficient water storage be secured at all times.

iii. Health, Education, recreational, religious, shopping and other essential facilities must be provided.

4. For efficiency, function specialisation should from the basis of grouping the units comprising a cantonment.

5. It is desireable, that for each cantonment there should be a central command responsible for day to day administration of the cantonment. This will eliminate waste, enhance development of greater efficiency, and reduce incidence of hapharzard development.

6. A civilian area should be created and well integrated into the cantonments that are particularly far from the urban centres and should be directly administered by the cantonment commander. This will serve as a source of provision of day to day needs of the soldiers as well as provide accomodation for civilians who work in the cantonments.

7. A delibrate policy of planning ahead for Cantonment locations and the expected component units should be undertaken for future developments. This will reduce the incidence of duplication of functions, and avoid hapharzard developments within the cantonment. There is thus a need for the Army to re-evaluate the present role played by the Army Engineers, and the Architects in the army who currently together combines the task of planning, designing and construction without the aid of any known planning principles, design concepts or standards. Planning is a specialised function of the planners.

8. Finally, appropriate design concept for appropriate cantonment type should be employed. In this connection 4 design concepts that will ensure the necessary zoning of function areas, limit unnecessary

movements by unauthorised persons into training and other restricted areas, ensure the separation of the different ranks and bring occupants close enough to facilities commonly shared, have been evolved.

5.20 Implimentation:

There is a need to re-evaluate the distribution pattern of the major military concentrations in the country vis-a-vis our relationship with neighbouring countries and the political set up within the country.

Within established cantonments, the development should be in stages. For efficient and economic utilisation of facilities provided, students population must bear a proportional relationship to available facilities. As the need to increase students intake arises, the residential, training and other facilities should be expanded to meet the demand. This will also afford the opportunity of meeting up with changes in military science and incorporating in the training of men. When the Cantonment area is fully developed, a new cantonment can be provided if need be elsewhere.

In all countries, uncertainties as to the strength and development of forces have led to modernizing existing barracks rather than building new ones. This should be the guiding principle as cantonment layout are developed.

530 Conculsion:

Officials of the US Airforce and the North American Air Defence Command have warned that a leak-proof defence

is not now attainable.[1] That, in fact, today or next year or within ten years, any one of the several nuclear powers can unilaterally destroy the major cities of others, and the latter if they are prepared and respond quickly can make destruction mutual. In these circumstances, they concluded, problems which once dominated our thinking about defence becomes unimportant.

This necessary preparation, with the limited materials at our disposal rather than the acquisition of the knowledge to inflict any appreciable large scale destruction (which will continue to elude us for sometime to come) is the priority requirement of our defence, and as the 2nd National Development Plan noted "one of the ways of ensuing a happy and well disciplined Armed forces is the provision of good accomodation with all its attendant physical, health and educational facilities ". To achieve these, a thorough understanding of the cantonment set up, and a proper planning of the system is necessary.

This study has succeded in identifying the two categories of cantonment in this country, viz

a. Cantonment of training institutions.

b. Cantonments for mixed uses.

The major component elements of these cantonments can be grouped into five categories as follows

i. Residential area

ii. Recreational area

[1] Hitch & Mc Kean (1960) The Economies of Defence in the Nuclear Age (Cambridge, Havard u.p

iii. Administrative area

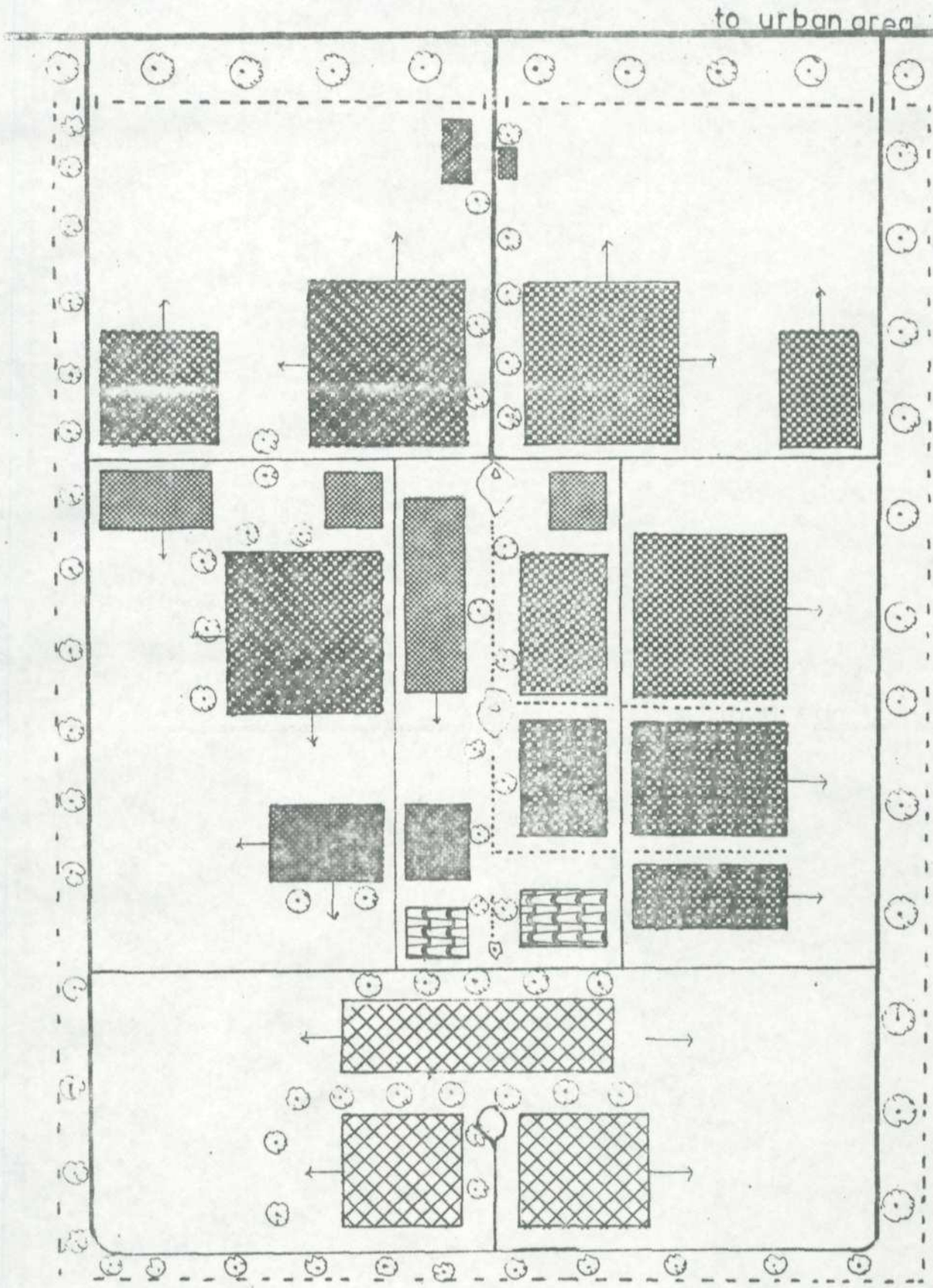
iv. Community facilities

v. Working and Training areas.

These various components perform functions that are highly interelated. For the smooth functioning of the system, these sub-systems have to be well linked.

The problems of our cantonments today emanate from the failure of the Cantonment planners to develop these elements well to meet the varying needs of the different cantonments. Whatever concept is evolved to achieve this, to be relevant, must take cognisance of the principles of zoning of function areas, Residential segregation, minimum exposure of training areas and the need for safety of material and men. There is no one single way of solving this, probably the best approach is the examination of the different situation and adopting a relevant design concept, that will be flexible enough to accomodate changes in military science.

Four design concepts that will satisfy the needs of the identified cantonment types have been proposed, and carefully articulated will provide the necessary tool for the planning of Cantonments in this country.



a hypothetical plan for a cantonment of training units

fig5a

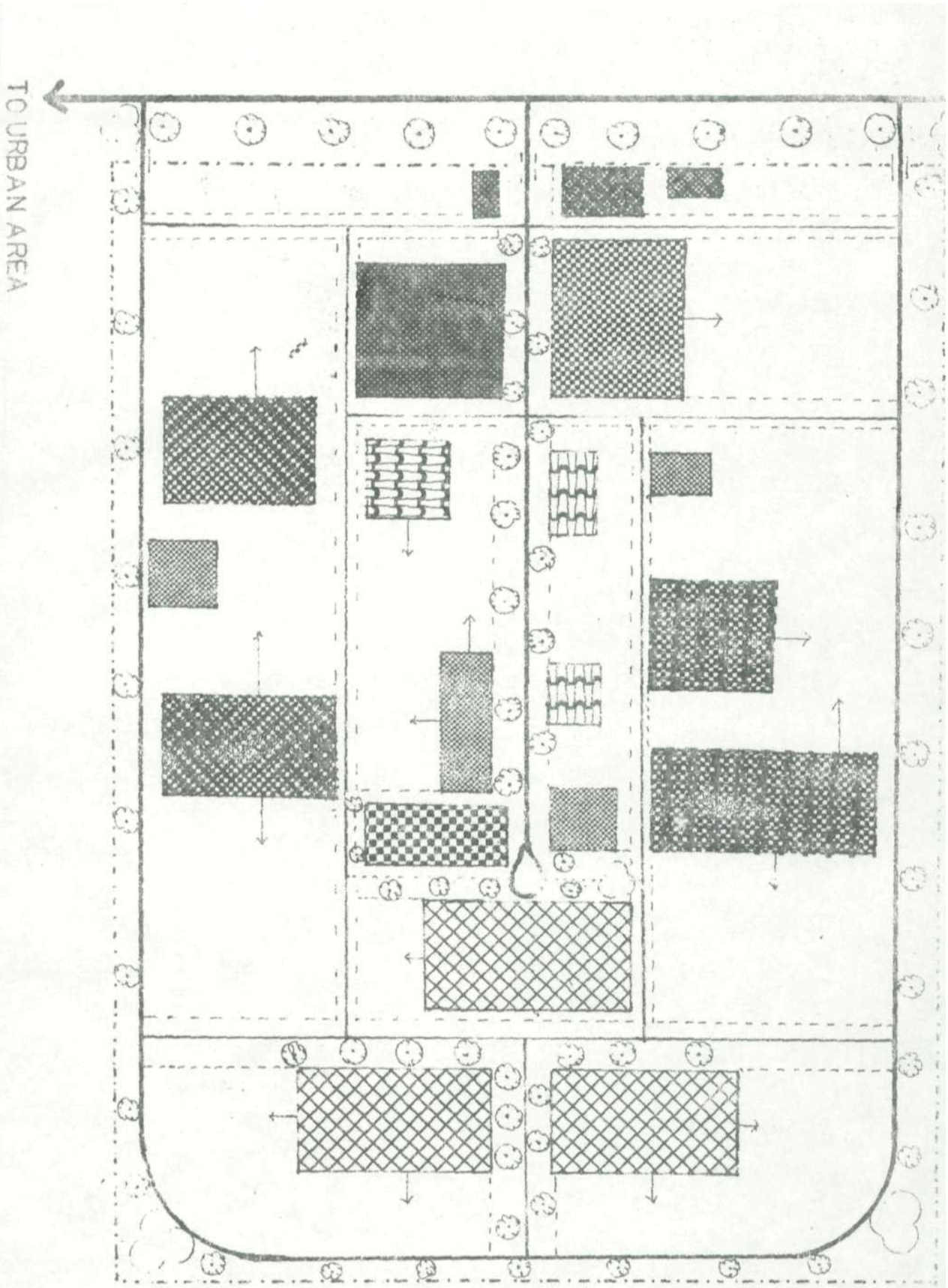


fig 5b a hypothetical plan for a cantonment with mixed uses

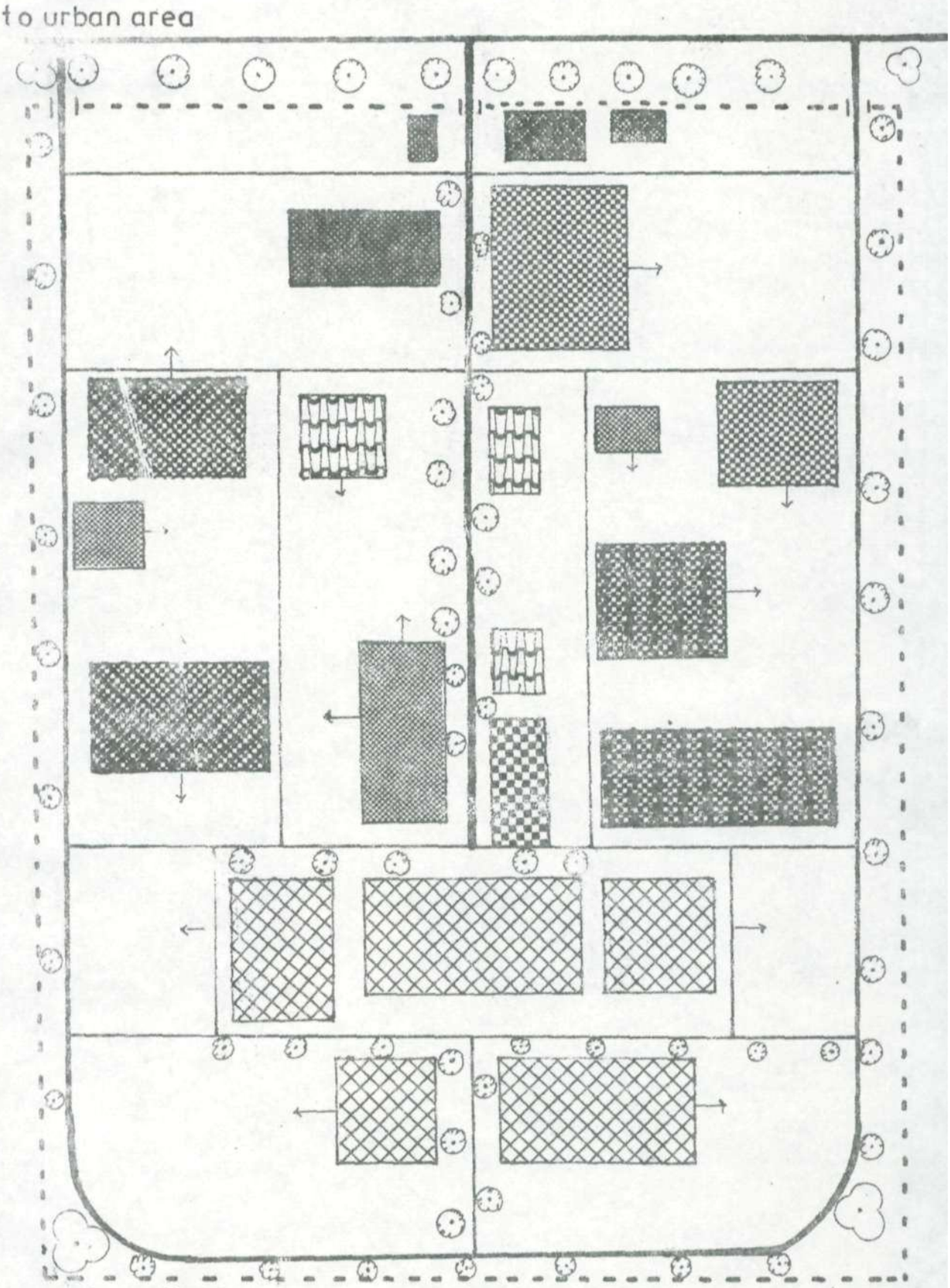


fig 5c a hypothetical plan for a cantonment of trainining units

APPENDIX

ABBREVIATIONS AND DEFINITION OF TERMS

Accn	-	Accomodation
AFIN SHOP	-	Armed Forces Institute of Nigeria shop
Admin	-	Administration
Arty	-	Artillery
Comdt	-	Commandant
Cpls	-	Corporals
Div HQ	-	Divisional Headquarters
Edn	-	Education
Engrs	-	Nigerian Army Engineers
Gar	-	Garrison
HQ	-	Headquarters
Line	-	Residential place for serving personnel
Med	-	Medical
Mess	-	Officers Club
MIR	-	Medical Inspection Room
MRS	-	Medical Reception Station
MT Yard	-	Mechanical Transport Yard
OR	-	Other Ranks
Prov	-	Provost
NCO	-	Non commissioned officer
QM	-	Quarter master
Trg	-	Training
Sgt	-	Sergeant
S&T	-	Supply and Transport

BIBLIOGRAPHY

1. Ajayi and Smith, (1964) Yoruba Warefare in the 19th (University Press, Ibadan)

2. Braun, H (1956) A Short history of English Architecture (Faber and Faber Ltd, London)

3. Clarke, F.A.S (Brig) and Haywood A. (Col) (1964) The history of the Royal West African Frontier Force (Wellington Press, Aldershort)

4. Hitch & Mc Kean (1960) The Economies of Defence in the Nuclear Age (Cambridge, Havard u.p)

5. I Sichei, E (1976) A history of the Igbo people (Macmillian Press Ltd, London.)

6. Johnson, History of the Yorubas (Routledge, London)

7. Keeble, L. (1968) Principles and Practice of Town and country Planning (The Estate Gazette, London)

8. King, D.A. (1976) Colonial Urban Development (Henley and Boston, London.)

9. MacKsey, K. (1976) The Guiness History of Land Warfare

10. Mahans, D.H. (1968) Field Fortification (Greenwood Press, New York.)

11. Miner, N.J. (1971) The Nigerian Army 1956 - 1966 (Methuen, London).

12. New Bury British Policy towards West Africa.

13. New Man, O. Defensible Space (Architectural Press, London).

14. Encyclopaedia Britanica

15. W.A.F.F. General SWP15/1 - Military (National Archieves Kaduna).