SHERE - HILL MILITARY BASE

FOR

MILITARY OPERATIONS AND BUSH CAMPING

BY

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DECLARATION

I, DUNG RAMES MARCUS of the Department of Architecture, Faculty of Environmental Design, A. B. U. Zaria hereby declare that this research documentation has been a personal academic undertaking executed under the supersion of my mentors at the Department of Architecture, Faculty of Environmental Design, A. B. U. Zaria and that all quotations and informations utilised and their sources have been duly aknowledged by means of references.

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APPROVAL

The undersigned have read and approved this Thesis and recommended it to the postgraduate school, Ahmadu Bello University, Zaria for the award of the MASTER OF SCIENCE DEGREE in Architecture.

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Sign:- External Examiner

DEDICATION

This document of my research work is dedicated to:-

My parents Capt. and Mrs Mckai Dung for all their assistance, advices and encouragements during all my trying periods.

My brother Jang, my sisters Zong and Nyam - for all they have represented to me and to the entire cosmic realm for it's infinite vestas.

(TO BE PREPARED FOR WAR IS ONE OF THE MOST EFFECTUAL MEANS OF PRESERVING PEACE)

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My deep and engulfing appreciation also goes to my mentor architect Csenouseki whose hardwork and co-operation saw me through the project

I am also highly indepted to the following people for their moral and financial support towards the success of this research work: My parents Capt. and Mrs. Mckai Dung (Rtd) for giving me life and teaching me, even from a very tender age, the need to struggle for my own independence in life; My brother Jang and my sisters Zong and Nyam. Others includes all my brothers and sisters, aunts and uncles especially Ali Aku, Edward, Lawrence and Ishaya for all their assistance and help during my research and documentation.

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- ABSTRACTS

SHERE - HILL MILITARY BASE. (CAMP DAMISA) JOS.

By

DUNG RAMES MARCUS. B. Sc (Hons) ARCHITECTURE

Military architecture which is itself a specialised branch of architecture has not been intensively investigated into and properly explored.

In view of the rapid technological development of global warfare and battle strategies, it would not be possible at any given time in the history of mankind to be able to evolve absolute principles as regards the design and construction of Military camps. This is so because the technology and structural requirements will continously change with the advancement in arms technology and sophistication. The Nigerian Army in this regards is not left out in this global defence strategies and sophistication with regards to military arms and battle readiness of it's troops. I therefore feel it necessary to boldly venture into this aspect of military housing with particular emphasies to real or mock war situations.

Military war camps are generally temporally as the war itself is expected to advance geographically and end at a certain time. At the moment, there is only one semi parmanent military camp in Nigeria located in Kuru near Jos.

The act of training a soldier especially of the infantry cadre is greatly influenced by the physical and social environment in which he is being trained. This two vital aspects of his training and military conciousness are completely lacking in the present site. This is because the site is located just at the fringe of the Bukuru metropolitan suburb where military/civilian friction cannot be avoided despite the tight

training schedule and disciplinary measures accord dodgers.

Conventional Battle fronts, lines or fields are commonly not found within armless civilian settlements ~~e~~xcept by a chance of error.

The physical and mental development of a soldier especially during training is of paramount importance but it should not be at the expense of his general state of health. Casualties in training and epidemic outbreaks should be kept at their bearest minimum.

The Nigerian Army right from pre - independence has been embarking on numerous compaigns, bush excercises, operations or regular maneourvers. These maneourvers are commonly referred to as 'rawan daji' in the Northern part of the country. Even after the civil war in 1970 heralding the down of a united Nigeria, troops were still being drafted to the shere hill camp for regular maneouvers, redeployment and demobilisation. Thus the bases for my choice of shere hills as a model site for this research. Other sites could be located at the various mountain savanah regions of this country taking advantage of the terrain type for the battle type emphasy.

The Shere - hills already has a long standing history of military engagements.

With the reorganisation process still going on within the Nigerian Army will within the near future realise or see the significant importance of mountain warfare within the context of our territorial defence strategy and attach to it some degree of priority. Like in other armies of advanced countries e.g. the United states, there are established special divisions as a whole to takle the problems of mountain warfare. This division is referred to as the mountain division in the United states. A mountain Brigade or Battalion in the Nigerian Army should be enough to handle the

problems of specialised training and military confrontation within the mountanous regions of this country.

In the United states, the mountain division is a specialised body of troops specially trained for the purpose of mountain warfare. Such special bodies of troops or units are not very unusual within the army as we also have the air born brigades and the amphibiouse marine commandos who are basically infantry or land combatants who have undergone special training for deployment through the air, sea or water bodies respectively.

It is no doubt that the major role of the Nigerian Army is to defend the territorial intergrity of this great nation. In line with this paramount role, I realised that the country could suffer a serious threat of war from our mountanouse borders of the east or West or even within the interior of the country through paratrooping or seccession as there are mountains scattered all over the country.

As Napoleon Bonarparte once said (I may loose a battle but I will never loose a minute.) Speed and accurate co-ordination are two essential principles to the success of any battle war. There cannot be good discipline and high moral if there is no proper co-ordination of the troops concerned.

In tackling this problem of military speed from an architectural point of view, I intend to look into the possibilities of errecting fast dwelling units within the sortest possible time to consolidate the capture, defence and sustained operational objectives, of an army . These units syould also be easily and rapidly dismantable, compact low volume cubage, light weight and missile impact resistant. They should be easily moved from one place to anotheras the war progresses or retrogresses.

The construction of this unit should also be such that minimal damage is done to the organic environment in form of substructutes. As that can

always give a clue to the enemies on advance.

I also intend to make this camp a prototype for either a divisional battalion or even a company maneuver. This means that in a small scale operation involving a platoon or even a section, the troop can simply construct it's own living units after defeating the enemy and forming an allround defence of the area.

In the past, trenches used to be dug out for living in and probably batchers or even the commendeering of civilian houses for this purpose depending on the size and strength of the fighting troops.

The aims and objectives of this research work can be summarised into the following points:-

1 - To design a hypothetical military operations camp for the Nigerian Army.

2 - To emphasize a specialised aspect of warfare which shall be known as mountain savanah warfare.

3. - To research into the feasibility of this emphasis with regards to the choice of site.

4. - To emphasize speed and strength as a military strategy in my choice of materials, details and construction techniques easily understood by any one.

5 - To develope the real tension and emotion of war in a naturally bold and imposing environment.

6 - To improve the battle readiness of our army through regular maneouvers.

7 - To revolutionarise the art of military architecture with particular reference to war times.

W A R N I N G:

For no reason whatwoever should the context of this desertation be turned

over to the press or any public information midia without the consent of the ministry of defence. This is so because of the tight security and sececy of the information here within.

1:1 INTRODUCTION

The context of this desertation has been divided into four basic sections:-

The first section i.e part one deals with the general objectives of research and methodology together with information on the Nigerian Army as an initial information on the base for study. It covers to an extend the military history of the Nigerian Army, right from it's inception during the slave trade. It also tauches on the military formations of the Nigerian Army together with it's organisational structure. Informations on tactical battle strategies and opperational procces is also given in this section. A few or the types of artillery weapons used in some world armies and their characteristics is also included in this section.

Part two which basically deals with the architectural bases for the research includes such informations on the militarisation of architecture with respect to military habitation and arsenals. In this section is also a few case studies of war camps and feasibility analyses of the type of warefare emphasised in the research i.e. mountain Savanah warefare.

Part three covers all aspects of the design analyses and evolution such as site selection criteria and geo-data together with the site analyses.

P rt four deals basically with the design brief and metamorphosies. It covers such aspects as the site concept, functional analyses and schedule of accomodation base on the kind of information gathered from part three.

Finally from the above information evolved the final design with respect to descision making. A bit of the structural analyses of the main design was also touched in this part together with the services.

The major architectural emphasy in this research is the evolution of compactly light weight dismantable structures that will fasilitate and suit the purpose for which it is intended for. That is mobility and speed in warfare. This also means that minimal interferance to the organic inviro-nment in form of substructure will also be incorporated.

1:2 - PROBLEM SYNOPSIES:

1:2:1 - Purpose of research:

The primary aim of the Nigerian Army is to defend the territorial integrity of this great country. This as stated in the aims and abjectives of the Nigerian Army is one of its' basic priorities in addition to other objectives. The act of defending a countries sovereignty brings to mind one major face of battle procedure. The six basic phases of battle procedure have been elaborately discused in chapter 4. These phases are:-

1 - Briefing

2 - Advance

3 - Attack

4 - Defence

5 - Withdrawal

Also, the aim and abjectives of the Nigerian are stated as follows:-

1 - To Defend the territorial integrity of Nigeria

2 - To defer attack by any nation and should deterance fail, to bring any war to a condusion favourable to Nigeria.

3 - To provide aid to civil power

4 - To aid OAU and UN and supoor any other arrangement or agreement which may be enter into from time to time by the federal government.

To militarily defend a region, state or country, a good and sound knowledge of the terrain cannot be over emphasised.

The Nigeria civil war and it's post consequances are still very fresh in our memories today. The Biafra Army despite its handicapness in military power were only able to sustain the war for such a long time maily because of it's better understanding of the Eastern terrains of this country. This also brings to mind the problem of internal cohession and unity of c the country. The Ibos attempted sessesion and they could have. Succeeded if the war had not bordered on their civilian population.

In view of these two major reasons (internal and National security) Military operations and regular maneuvers hsould be geared towards a better understanding of our own various terrain types in addition to arms handling and basic military tactices. A good understanding of our different terrian types will strengthen our Armies defence capabilities and strategies. Thus, regular military operations or trainings should better be undertaken within the vicinity of these terrains rather than in classrooms and isolated from the ntural battle field features.

The purpose of this thesis research is therefore

1 - To provide an architectural design proposal cheosing a mountanouse terrain within the savanah region. Thus emphasizing mountain savanah warfare.

2 - To architecturally aid in exposing the ~~ni~~ soldier to the significant importance of terrain understanding in battle tacticer

3 - To promote and encairrage the tactice of special waffare within the Nigerian Army

4 - To aid the Nigerian Army in maintaining a vigilant and battle ready Army thorugh regular trainings and operations.

5 - To expose the Ni erian troops to difficult terrain warfare , through natural obstacles

1:2:3 - GOALS

My goals here shall be:-

1 -

1 - To envolve forms that will increase the functionality of military campincamping units

2 - To research into building materials will enhance both rigidity and at the same time be of ~~a~~compact light weight.

3 - To emphasize dismantability and compactness resulting into low volume cunage

4 - To harmorise the forms envolve with different terrains landscapes and vegetation.

5 - To c ause minimal damage to the organic environment (organic architectural approach)

6 - To harmonise the froms so envolve with the terain type for better cormounflage.

1:2:4 - Aims and Objectives of Thesis

The aims and objectives of this research shall be:-

1 - To envolve a model military camp for the purpose of training and operations that could be used on different terrains.

2 - To improve the combatants aprociation of all the theories of battle strategies aquired in the classrooms by exprasing him to the trrain types he will eventually battle on rather than restricting him to only the classrooms.

3 - To emphasize mountain ~~w~~avanahwarfare as a booter to ~~o~~ur territorial defence strategh.

4 - To deemphasize military civilian friction as it is found in advance countries. This is manifested in the choice of my model site.

5 - To harmonise the architectural froms with the terrains for batter comounflage.

6 - To

6 - To open up the architectural challenges of military warfare in addition to barrack architecture.

1: 2: 5 - Scope and Limitations

The scope of this research work shall be limited to a maximum of battalion operation. It will also encouporate the annual bushcamping excercise undertaken by "boys" from the Nigerian Military School and cadets from the Nigerian Defence Accademy or even from the command and Staff College Jaji. I t will also be limited by the possibility of materials that could enhance an organic concept of architecture with easy construction techniques. The special planning of the camp should be attaned with the rythm of the terrain. This will include other auxilliary fascilities such as mess. wireless communication (centre sighal HQ) medical inspection room (MIR), Armory (arms store), admin block motor transport yard (MTYD), quater masters store (QM), and laundred. All these fascilities are collectively refered to as logistic services.

1:2:6 - Research Methodology

Military science and architecture together form a very expensive field of research area. Military architecture could be divided into two major branches.

1 - Barrack architecture

2 - War and architecture

My work is based on the second branch which deals with housing the troops in the warfront, In the past the use of batches and trenches have always dominated the architecture of battle field in addition to membrance and cables in limited usage.

Research into military science and architecture is pratically oriented, in the final analyses towards descision making for military strategies and physical planning of military policies in terms of military facilities to be provided.

The research may sometimes be concerned with basic comcepts and by hypothesis testing, but only as a preliminary to specific policy oriented research. The aims of a military science research are varied, the main requirments are to establish criteria relating to the type and number of military fascilities to be provided to create maximum coordination of military activities.

It may also be possible to establish the cost and benefits of different options to evaluate existing or experimental provision and to measure the effects on and relationship with others.

1:2:6:1 - Methods of Research into Military Camps

From what I have mentioned so far, it is abvious that military camp research depends greatly on studying the existing camp fascilities to determine how successfull; it's deficiency and merits, and to draw therefore a conclusion on the camp need and preferences of the troops concerned.

Where there are no such exising camps available, to act as a base for the research, the people concerned i,e. the soldiers could be studied with the aim of determining their battle needs and preferences. This could be done in many ways viz through interviews, observations, use of questionaries e.t.c.

The use of these methods are also very vital in the study of an existing military camp facilities. The troops themselves have an impression about the fascilities provided in war fronts. These impressions could be very useful to a military science researcher.

1:2:6:2½ - Methods Used For Data Collection

The methods of research use for this thesis are:-

1 - Published Data: The background knowledge of the building types and some general informations on military science and architecture was gathered from periodical, magaxines, test books and other published infromation sources.

Case studies on building types were taken both from books and personal experience in bush camps. The theoretical background of knowledge on the building types was however gather from military oriented text books.

2 - Field Data: Existing military facilities in army barracks were visited and their merits and demerits were noted. Also my personal experiences in the Army and participation in bush camping exercises were also enhance. Hence organised, observation was one of the important tools used in the study of the existing camp facilities.

1:2:6:3 Methods of Data Collection

The analyses of the data were based on:-

1 - Architectural principles and techniques

2 - Activity system

Every data was subjected to analysis bearing in mind it's architectural implications. "Activity system" was the basis for the analysis of the types of activities chosen after the analysis of field data.

In this study, activity system means either

1 - a situation where an entity certigorically exhibits a regularity in the cohevent and ordering of it's activities in time and space or

2 - a concept used to determine the activity types and level of participation desired especially in military operational activities which involves a real or mock war situation.

1:2:6:4 - Conslusion

In this project the data analysed eill be used in architectural design of the military operations base for mountain savanah warfare. It is hoped that the special warefare policy of the Nigerian Army and it's battle readiness will be improved.

CHAPTER 2

2.1

NIGERIAN ARMY - BRIEF HISTORY

The history of the Nigerian army started from the Lagos constabulary of 40 men in June 1863 to it's present size of four divisions. Throughout this period, their has been a series of reorganisation which is still going on today. The history of the Nigerian army is so vast but I will only make mention of some important events and dates.

The history of the Nigerian army cannot be said to be unconnected with the early exploration of West Africa by the Europeans.

The Europeans were first trading in gold, Ivory, spices and grains. With the discovery of the west Indies in 1492 and the subsequent discovery of America, slave trade dominated other trades along the West African coast. In 1771, chief justice Mansfield ruled against slave trade as an illegal trade. In 1807, the British Government passed a law that as from 1st March 1808 slave trade is illegal. In place of slave trade, legitrinate trade was introduced in commodities like pepper, tusks and palm oil.

In order to check the illegal slave dealers, the use of force was neccessary. A force was thefefore raised to check the illegal slave dealers; maintain law and order and to promote the legitiniate trade. This force was mainly white men. Meanwhile the legitimte trade was going on in Nigeria eventhough some chiefs were against it in preference to slave trade. Typical among these chiefs was king Kosoko of Lagos. The legitimate trade was centered along the coast and rivers Niger and Benue.

Situation in the country and and also activities engaged by the colorial masters necessitated the creation of a local constabular for Lagos in June 1863. This date could be said to bethe birth date of the Nigerian army. The constabularies later increased to three according to the areas of trade. Each of these constabularies was independent of the other. The other two were the Niger coast constabulary and the Royal Niger constabulary. These three constabularies latter developed to form what [illegible] is today known as the Nigerian Army

THE LAGOS CONSTABULARY:

The Lagos constabulary was formed in June 1863. It was the first of the three constabularies. It was made up of 40 men. Later in the year a militia of Hausa men from the North numbering about 600 men was merged with the force. In 1865, the force was renamed the Lagos Hausa constabulary, and this was based in Lagos.

THE NIGER COAST CONSTABULARY:

The Niger coast constabulary was formed in 1892 after the declaration of protectorate over the cameroon oil river and the Niger mouths. This force was gun boat to patrol the coast against diffiant local rulers who preter slave trade to the legitimate trade. The force was first known as the "oil river irregulars"; later itcame to be Niger coast protectorate force.

THE ROYAL NIGER CONSTABULARY:

The Royal Niger constabulary was formed in 1886 after the united African company was given a Royal chatter. This force was used to present a common force against competitors other than the British and to maintain Law and order in the Local areas. In 1890 the military

base was set up at Lokoja.

ACHIEVEMENTS OF THE CONSTABULARIES:

The constabularies carried many operational campaigns both national and international. These campaigns include .

a - ASHANT: CAMPAIGNS 1873 - 74.

It was during this campaign that they got their first battle honour.

b - BENIN CITY EXPEDITIA, 1887.

This operation was carried out by the Niger coast constabulary against the king of Benin city who had earlier killed the British Acting consul General Mr. Philip who went to negotiate with him. Benin city was captured and theking fled away.

C - BIDA AND ILLORIN EXPEDITION OF 1897

This operation was against the chief of Bida and Ilorin. The chief of Bida was trying to colaborate with thechief of Ilorin and Bussa to revolt against the colonial masters. The chief of Bussa didn't agree and he leaked out theplan to the white men who inturn organised an operation to capture both Bida and Ilorin,

d - Other Campaigns

Otherc campaigns

THE WEST AFRICAN FRONTIER FORCE (WAFF)

The WAFF was formed in 1898 by Lord Lugard. They included west African colonies of Nigeria, Gold coast (Now Ghana), Sierra Laone and the Gambia. Its headquaters was at Jebba in Nigeria. The WAFF was a product of the metamorphosis and expansion that occured from the former constabularies. The formation of WAFF was necessitated by the threates of the French and Germans within the British colonies. WAFF was a regular military force.

By 1901 WAFF was re-organised into fire Regiments. In Nigeria alone, there were three of such regiments. They included the Lagos Regiment, the Northern Nigerian Regiment and the Southern Nigerian Regiment. They were based at Lagos, Lokoja and Calabar respectively. The WAFF had arms and service supports like military engineers, signals (mainly whites), Artillery and field hospitals.

The Nigerian Army remain as part of WAFF untill 1958. However, in 1928, the force became the Royal West African Frontier force (RWAFF) when king George V became the commander in chief (C in C).

Achievements of WAFF and RWAFF:

Between 1898 and 1958, the WAFF carried out a series of operational campaigns which includes:

a - The Ashanti Campaigns of 1900

This campaign was carried out in Gold coast against the Ashantis, a war like tribe which caused constant trauble and recend the British Legitimate trade.

b - Borno Campaign of 1902

This campaign was carried out against the Franch in Nigerian boarder area of Borno. The French troop: Killed the chief of Borno who was very friendly with the British WAFF troops were sent out to Borno and the French were Flusled out and nomalcy was restored under the command of col Morland.

friendly with the British WAFF troops were sent out to Borno and the French were flushed out and normalcy was restored under the command of col Morland.

C - WWI 1914 - 18

During the first world war, WAFF fought against the Germans in Cameroons ~~of~~ between 1914 - 16. Also between 1916 - 18, the WAFF fought the Germans in East Africa. WAFF lost over 528 men during the battles. Battle honour won included "Duala"; Garna" and 'Banyo'

d - WWII 1939 - 1945

During the second world war RWAFF fought in Abyssinia (now Ethiopia) against the Italian Duke of Aosfa. They brought back lake emperor Sallasie who was in exile at Sudan. Infact a Nigerian Regiment mounted a guard of honour on his arrival back to Addis ababa. RWAFF also fought against the Japanese in Burma 1943 - 45. The operations in Burma included the chandit and Arakan campaigns which later led to the capture of Myohoung colite and Tamandu. Battle honours won during the WW II indide "Marda Pass", "Babile Pass", "Colit", Tamandu, "Abyssinia", "Burma"; "Kaladan" etc.

RWAFF AFTER WW II

Because of the world war, two Rwaff expanded to 14 battalions with other service units. After the war, the str~~g~~ was reduced to 4 battalions and later increased to five battalions again which was maintained till independence in 1960.

The WW II had three major effects on RWAFF

1 - Units were mixed up

2 - New ones were introduced

3 - Indigenes were promoted.

NIGERIANISATION OF THE ARMY:

All along these periods of changes of the Nigerian army, the officers and senior none commisioned officers (SNCOS) were all whites. With the eminence of independence oto some countries, after the WW II, a regular officers school of training was established in Teshi Ghana in 1953. Nigerian officers were drafted there for training, though they proceeded to other European countries for further training after ROST.

By 1st April 1960,The administration was handed over to indigenes hitherto the name was changed to Queens own Nigerian Regiment in 1956 when Queen Elezabeth II visited Nigeria with the handing over of the Nigerian Army administration. The namewas changd to Roayal Nigerian Army. By 1st Oct 1963 when Nigeria gained republican status, the name was changed to Nigerian Army which still holds till date.

NIGERIAN ARMY DURING AND AFTER THE CIVIL WAR

On 15th January 1966, there was a military take over in Nigeria which led to seccession of the Eastern Region of Nigeria under the command of colonel Odumegu Ojukwu. In order to maintain unity and sovereignty, the Nigerian Army had to fight. Ac civil war subsequently broke out on 6th July 1967. It lasted for about two and a half years. the civil war ended on 12th Jan. 1970 when the seccessionist surrendered.

The civil war led to the increase in strength of the Nigerian Army from five units to over 67 units in 1970. Most of these units were then located in the war zones. After war therefore, there was the need for reorganisation and demobilisation which is still going on till date.

CHAPTER 3

3:1- MILITARY FORMATIONS AND ORGANISATIONAL STRUCTURE

3.1:1 - SECTION

A section in military usage refers to the smallest pocket of soldiers or troops of an army with the smallest organisational structure. It is a submit of a platoon and its the smallest fairly independent combat organisation. The personel strength of a section varies from 8 - 15 but the most ideal and that used by the Nigerian Army is 11 soldiers. It is usually commanded by a junior NCO of the rank of coporal though sometimes a sergent is detailed to command a section as the case may be.

In every military formation, the sections contain over 70% of the other Ranks (OR) especially the junior NCO_S. For example in a fifle platoon, out of a total other Ranks strength of 130 soldiers, over 90 are found within the sections. A section does not have any eletachment attached to it such as signals, cooks, drivers tec. but enjoys all facilities accorded the platoon under which it is assigned. In real war situations, troops under sections seldom use any other form of shelter or housing apart from the trenches which they have dug up for themselves in the defensive post.

3: 1: 2 - Platoon

This usually refers to the principal subdivision of a military company, battery or troop. It is costomarily commanded by a lieutemamt and it consists of abont 25 - 50 soldiers organised into two or more sections or squads commanded by a none commissioned officer (coporal) as earlier mentioned.

In the 17th century, the term was used to refer to a body of masketeers who fire together in a volley atternately with another platoon and it has always maintained some sense of systematic alternate employment Hence "platoon fire" meant a regulated fire of alternating platoon volleys and a platoon sometimes refered to the volley itself. In the 18th century battalions were often organised for tactical purposes into 4 platoons of grenadiers or light infantry.

The term platoon has been in use in the U. S. Military mannals since 1979 and throughout the 19th century meant half a company. The platoon was reintroduced into the British Army in 1913.

A typical infantry company for example consists of a company H.Q., three rifle platoons and a motarp platoon. The rifle platoon has a platoon H.Q. comprising of the platoon commander, usually a lieutenant, a platoon sergent and few junior NCOS as aids. The rifle platoon also has 3 or 4 rifle sqnads or sections made up of 10 or 11 or less soldeirs (Junior NCOS) and commanded by a coporal whose Zic is a lance coporal. There is also a machin gun squad or section in a rifle platoon with a simillar organisation and command to any of the rifle sections.

This brings to all a total of 4 sections and a platoon headquaters in a conventional platoon.

The organisational structure of a military platoon is simillar to any of the platoons discribed in the organisation and equipments of an infantry battalion. This reference is necessary in order to avoid elublucation of text.

Also, in a platoon battle drill, mention must be made of the way and manner of desposition of the troops in the field according to sections in a platoon advance and attack. The principles and techniques used here are simillar tothoe employed in a companyadvance formation before any contact is made with the enemy in the sustained fire rloe system.

The platoon headquaters is usually located in the centre of the whole advance set ups in all the three different formations.

Typical of the Nigerian Army, a platoon is usually composed of four sections plus a platoon headquaters as earlier mentioned. But peculier to the Nigerian Army is the total absence of an absolute machin gun (M.G.) section. In the atternative, in each section there are usually five M. G. men including his Zic. This still brings us to a total personel strenght of eleven soldiers in a typical section.

3: 1: 3 - Company

Here a military company refers to a subdivision of an infantry battalion normally comprising 100 - 130men. Some other Armies have independent companies which may have a strenghh of about 200 or more men. A company is usually commanded by a major. It is usually subdivided into platoon which are again subdivided into sections as earlier mentioned.

The company is the lowest administrative unit in most branches of mordern Army. As afformentioned, the strength and organisation of an irfantry company varies considrably from nation to nation. Sometimes a company is even commanded by a captain depending on its strength. In the U. S. Army after the second world war, an infantry company consisted of a headquaters (H.Q.), three rifle platoons, each with a light machin gun section or squad and a weapons platoon to provide motar and anti tank fire. I comprised of about 200 men. It's armaments however changes rapidly with th the introduction of new weapons as a product of technological and economic advancement but of social and spiritual refrogression. This is because war in itself is a babaric act that kills mans spiritual enlightenment and provides the solution to the creation fo more problems.

Typical of the Nigerian Army, a company is usually made up of four platoons with a company headquaters for administrative proposes. Thus bringing us to a total fo for platoons in a company.

As a battle strategy involving a company advance and attack, the company headquaters is always located in the centre. The company headquaters combines both the function of administrative coordination and combat engagements in the sustained five role system.

Withen the limits of military vocabulary and language connotations, the formations of an ingantry company in the battle field is most commonly refered to as two up and one downor one up and two down with the headquater platoon always in the centre of this formation.

For more information on the organisational structure of a company, refere to the organisation and equipment of an infantry battalion.

3:1:4 - Battalion

A battalion refers to a unit of organisation of troops consisting of several companies usually 4 and 50 called for being originally a body of men arranged for battle. A battalion of ingantry is generally divided into an even number of companies, each company being equall. The interval between companies in line is usually about 7 - 7.5m. In what ever direction the battalion faces, the companies sesignated numerically from the ritht to the left in line and from the head to the rear when in column, first company second company and so on. In what ever direction the battlion faces, the companies to the right of the centre of the battlion in line constitute the ritht wing. If there be an odd number of companies in line, the center company belongs to the right wing. A battalion of artillery consist of any number of batteries or companies from two to five. The intervals between companies (batteries) in line is usually about 25 - 25.5m. In what ever direction the battlion faces, the companies or batteries are designated in the same manner as the companies of an ingantry battlion and are also assigned to wings just as the infantry companies too.

Battalion training the means whereby the smallest number of independent units may be orgarised for the purpose of maneovers and for combat ingagements, should be intensive and directed primarillyat the instructions of the company officers in the handling of the units and sub units in their natural relationship. It should also be mainly concerned with the tachical employement of the fighting power of companies in mutual support. The battalion commander should apply in practice, the principles of command and tactical leadship, a knowledge of which he has gained by study and experience and should atimes direct and not command his battalion in excercises designed to involve specific features of the minor phases of

training, the elements of which have previousely been the object of drill ground training. A concrete case should be stated calling for the actual employment of the troops concerned. The strength and character of the opposition to be expected will be determined by the battalion commander. Besides the application of appropriate tactical principles adopted to the ground in use, opportunity should be [illegible] afforded of making incidental and appropriate use of previousely acquired knowledge of signalling, construction of field for fifications or pioneer works of the passage of abstacles screening from the observation of aircrafts e.t.c. The greater the variety of incidents introduced, the more instructive will this excercise be.

As a result of trench warfare and intensive training, the tactice of a battalion has changed as drastically as in attack. If the enemy now assaults a position, he must first pass through a curtain of fire of artillery. If the range becomes shorter be meets rifle fire and the machin guns each firing 500 shots per minute. The at 150 yards (135m) from the trench, he is met bya secon barage of fire bombs fromthe rifle granades. If there are any survivors, they are met at 36m (40yds) by bombs throwm by hand, close rifle fire and machin guns that spray bullet. If any reach their objectives, they are faced by bayonets. The whole attack is under a dense white smoke of hundreds of explosives and exploding bombs. Each man has his specific work and his specific weapon in the use of which he has been found to display a special aptitude. Each man has a responsibility which never fell to the share of the individual infantry man in the old fashioned attack.

Typical of the Nigeria Army, A battalion us usually commanded by a lieutenant colonel. His Zic is a major and his adjatant is usually a captain.

Organisation and equipment of an Infantry Battalion

It is much a mater of necessity that I make extra emphasies on the infantry battalion as this is the scope of the research work. This thesis work takes into consideration a battalion scale opperation which is the maximum capacity to which the capm is designed.

In order to fully understand the organisational structure of an infantry battalion, knowledge of its role and function must be know.

The role of an infantry battalion is basically to defeat the ememy by stillful use of fire power and maneuver by day or by night in any weather or tarrain and to secure the battle field.

Althought, the infantry is the basic fighting arm of an Army, no successfull military operation can be carried out withou the use of the infantry which is even self supporting and designed to carry out sustained opperations on its own. It's role in limitted or generla warfare will require it to operate in clse cooperation with other fighting arms as earlier indicated. These arms includes both the combat and service arms that will be explained in 3:2.

The infantry battalion is there for designed to be air portable and capable of opperations in limited war against enemy regular forces equiped with mordern concentional weapons in counter revolutionary warfare and internal security operation.

Organisation

In keepint with it's altimate role and task of closing up with the enemy and distroying him in totallity, the infantry battalion comprises of:-

1 - Battalion H.Q (headquaterr)

2 - 3 Rifle companies each of 3 rifle platoons

3 - Support company of 4 platoons and a signal

4 - An administrative company.

Battalion H.Q. - This consist of the Head Quaters and training wing. It is made up of C.O. (commanding officer), zic (second in command), I. O. (Infantry instructions officer), W.T.O (weapons training officer) and 63 O.R. (other Ranks).

Rifle Companies - These are three in number and are all identical in structure. They consist of a company headquaters of two officers and seventeen other ranks. Each riflt companing is made up of three identical platoons of one officer and thirty nine other ranks (39 O.R) The brings the total personel strength of a rifle company to five officers and 134 other ranks.

See detaile at table 3:1:30. The rifle companies but NAMC, NAPC and cooks are sometimes attached when necessary.

Rifle Platoon - Each rifle platoonconsists of one officer and 39 other ranks(O.R). There are 3 identical sections of 10 other ranks each and a H.Q. of one officer and 9 O.R.

Rifle Section:- This is based on a section of 10 men (O.R.) which is considered ideal number for a junior NCO. of the rank of coporal or sergant as the cass may be to command.

Communications at company level are based on VHF manpack radio and a H.F. radio on the battalion net guard. The company H.Q. requires 2x¾ ton vehicles, one FFR and one 4 ton vehicle for the company.

Support Company:- These consists of a headquaters of one officer and 14 other ranks. It is made up on a motar platoon, antitank (AT/TK) platoon, signals platoons, M.G. (machim gun) platoon and servelance platoon.

The company commander is the company's adviser on the employment of support weapons and will co-opdinate the fire support of the company weapons with that provided by the supporting arms e.g. artillery and air force. He requires an aditional VHF manpack radio set to enable him to run a company net when dismounted. There is no company Zic as there is no operational task for him.

For administrative porposes in the barracks, the senior platoon commander will normally assist the company commander . Support platoon commanders are expected to have commanded a rifle platoon and require specialist training before assuming their appointment.

See detail at - Tables 4:1 41 and 4:1:42

Motar Platoon:- The motar platoon consit of one officer and fourty two (42) other ranks (O.R). The platoon commander is responsible for the co-ordination of motar fire support within the battlion. The platoon is subdivided into a platoon headquaters of one officer and nine other ranks (9 O.R.) and four identical motor sections.

- 3 Motar Sections:- Each section has eleven other ranks and can provide 2 motar fire comtrollers (MFC). The section has 2x¾ ton G5 LR and trailers. Each vehicle carries one 81mm motar detachment (refere chapter 5). The section commander here is usually a sergent (SGT) and the motar five controller (MFC) a coporal (cpl).The drivers must be trained as motar number or radio operators.

The 81mm motar has a rang of 3000m and may be fired by sections/ or even on a linked section of one or more sections which make it essentially a battlion weapon. It is therefore essential that it should b be grouped in one company. Communications withen is provided by a VHF raido The platoon commander has a vehichle mounted bet on the battlion communicatio net and a bet on the motar platoon net. The motar fire controllers (MFC) have manpack sets to enable them to communicate to the mota base plate .o position of motar fires.

.3 Antitank Sections:- Eacher section comprises of nine soldiers and is commanded by a sergent (sgt). There are two antitank detachments manted on

position of the situation and position of motar fires.

3 Antitank Sections:- Each section comprises of nine soldiers and is commanded by a sergent (sgt). There are two antitank detachments mounted on ¾ ton landrovers, each towing one 107mm antitank gun (refere to chapter 5).

See detail at table 3:1:43

MMG Platon:- The MMG platoon is equiped with machin guns (M.G.) in the sustained fire (SF) role. It consists of one officer and twenty nine (29) other ranks (OR). There are three identical sections of eight other ranks each. Each section is mounted on one ¾ ton GS landrover and has two machin guns equiped for the sustain fire (SF) role. The section is commanded by a coporal (pl).

see detaile at 3:1:44

Surveillance Platoon:- This platoon consists of one officer and twenty one other ranks. It has three identical sections of five (5) other ranks (OR) commanded by a sergent (SGT). The surveillance platoon in the Nigerian Army is presently based on the french rader system; RASIT 3190

See detail at 3:1:45

The section of five (5) other ranks (OR) each has RASIT 3190 capable of high definition surveillance of up to 2.5km for men and up to 14km and 18km for men and vehicles respectively for long range detection. The rader is carried on a ¾ ton FFR landrover which enables batteries to be charged.

Signal Platoon:- The platoon consists of one officer and fourty two other ranks (42 OR). It provides signallers and mix driver operators to operate the battalion command net and the controle and rover stations of the rifle company nets. It establishes a signal centre at the battalion headquaters (H.Q.) and will lay line communications as required by the commanding officer (CO).

There is a Nigerian Army Signal detachment usually of 12 soldiers that man the battalison rear link communications and give technical advice to the battalion signals officer

See detaile at 3:1:46

Administrative Company:- This is usually the largest company in the battalion and it includes attachments from other corps of the Nigerian Army. It consists of:-

1 - A company headquater (HQ) made up of the officer commanding (OC) and ten other ranks (10 OR)

2 - Drums platoon which is usually under the command of the drum major (S/SGT) and are established for two purposes.

a - To provide musick for battalion parades, cerimonial and routines withen the barracks

b - To defend the battalion headquaters (HQ) in the field.

The drum platoon has a total strength of thirty eight other ranks (38 OR)

See detaile at 3:1:47

Quater masters (QM) Platoon:- The quater masters platoon which consists of one officer and sixty three other ranks (63 OR) under the command of the quater master officer(QMO) who is resopnsible for the detailed administration of the battalion quater master's stores,

See detaile at 3:1:48

Motar Transport (M.T.) Platoon:- The motar transport platoon consists of one officer i.e the motor transport officer (M.T.O) and ninety seven other ranks(97 OR). It is resopnsible for the administration and maintanance of the vehicles on charge to the battalion. In the fields, these vehicles come under company controle as part of the "F" echelon. The remainder of the battalion transport will be controlled by the M.T.O. (Motor Transport Officer).

in "A" echelon

See detail at 3:1:49

Attached Personel:-

Medical Platoon:- This consists of two officers and twenty four other ranks (24 OR) from the Nigerian Army Medical corps (NAMC). One officer is a medical doctor and the other is a nursing officer. The Regimental Th medical officer (RMO) advices the commanding officer (CO) on all medical matters. The task of the medical platoon includes the following on a battalion scale.

a - To provide medical care for the battalion in barracks by meanning the medical inspection room (MIR).

b - To set up a small medical reception station (MRS) to deal with minor hospital cases in the barracks

c - To provide regimental aid posts in the field and traine medical orderlies for the rifle companies.

d - To supervice hygiene.

Education Section:- This consists of one officer and six education instructors from the Nigerian Army education corps (NAEC) They will concentrate on ACE 3 classes. In war, they may be employed on other duties such as company and battalion inteligence tasks. The battalion education officer advices the commanding officer (C.O.) on all educational matters.

Pay Section:- This section is made up o one officer and eight other ranks (8 O.R) from the Nigerian Army pay corps (NAPC) which will enable one pay clerk to be alloted to each company in the battalion. The battalion pay officer officer advices the commanding officer (CO) on all pay matters.

Chaplain and Battalion Imam:- Three Nigerian Army Chaplain Department (NACHD) warrant officers class 1 are and give technical advice to the battalion signals officer

See detaile at 3:1:46

Administrative company: This is usually the largest company in the battalion and it includes attachments from other corps of the Nigerian Army. It consists of:-

1 - A company headquater (HQ) made up of the officer commanding (OC) and ten other ranks (10 OR).

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Engineers Maintance Troop:- There will normally be an engineers maintanance troop from the Nigerian Army electrical and mechanical enginerres corps (NAEMEC) attached to each battalion. They are not part of the battalion establishement but will be responsible for all works and services required in the battalion barracks short of jobs needing proffessional building contractor.

3:1:5 - BRIGADE

A brigade in military conotation and terms refers to an indeterminate number of reginents or squadrons or battalions or battries. It is a unit of military or ganisation commanded by a Major general, Brigadier or Colonel.

In the United States Army, three regiments or battalions of ingantry or calvary usually consitute a brigade which was commanded by a brigadier general.

During the second world war (WWI), the squar division consisted of two brigades each commanded by a brigadier general and including two infantry regiments or battalions with their componets of artillery and other supporting arms. During the post war period when the "triangular" division with it's three infantry battalions c came into being, the infantry brigade was abolished as a standard administrative or tactical unit in the British and U.S armed forces. The term remained in use during the second world war (WWII) and the Korean war to designate a task force raised for some specific mission. In the summer of 1950, for instance, the U.S. first provisional marine brigade in Korea included a marin infantry regiment or battalion, four aircraft squadrons and a battalion of artillery plus smaller units of tanks, engineers and other supporting arms. This brigade was in effect a self sufficient small army of about 6,500 men who were employed effectively as a mobile reserve at a time when the United Nations forces out mumbered.

Although the brigade as a standered administrative and tactical unit was abolished in 1939 the rank of brigadier general was still r t i retained by the U. S. Army.

In the British Army, a brigade of infantry comprises three battalions while a brigade of artillery contains four batteries. As earlier mentioned, the u.S. Army could have a calvary brigade but the British Army has none. Before 1920 in Britain, a brigade was also commanded by a brigadier general as it is the case with the U.S. Army. But as from 1920 onwards, the rank of brigadier general was droped from the British Army.and the rank of brigadier was adopted as the commanding officer of a brigade of infantry. The commanding officer of a brigade (brigadier) is often assisted by a brigade major in the barracks and by other officers in the war front. This latter made of brigade organisation by the British is what the Nigerian Army has asopted with slight medification in certain instances. A lieutenant clonel is sometimes seen to command an artillery brigade in the British Army.

The British commonwealth division in Korea was composed of four brigades each consisting of three infantry battalions, Headquaters (HQ) group and appropriate components of artillery, tanks and engineers.

In 1961, the U.S. Army tevived the brigade as a tactical unit consisting of a headquaters (HQ) to which will be attached administrative and combat support element and two to fire combat maneuver battalions.

In the French Army, in the, in the gendarmerie, as formally in the calvary, a brigade is a small fraction of an army under

The command of a subaltern officer. In the regular, army, a brigade containes two regiments of infantry or of calvary or a mixed body of both.

The brigade combination was introduced by Gustavus Adolphus of Swe Sweden, whose examples was copied by various European Armies.

In the Nigerian Army, a brigade has the same set up as found in the British Army but to the continous proccess of reorganisation within the Nigerian Army, there has been just but a slight variation between the two. A brigade is today being commanded by a colonel in Nigeria and not by a brigadier as it is the case in the British system. The brigade commander (Colonel) is usually assisted by a brigade major in the barracks and by other officers in the war front.

With respect to the Nigerian Army, a brigade is made up of about four battalions and a brigade headquaters (HQ). The brigade headquaters (HQ) in this regards is primarily for administrative purposes and not apperational or combat oriented.as it is the case with other lesser units of the Nigerian Army namely platoon company and battalion.

As a matter of national security and military inteligence, it shall not be possible for me to give a full break down of the arms and equipments. of an infantry brigade.

It should be noted here that the brigade itself is a submit of a military division.

3:1:5 - DIVISION

In mordern Armies, a military division refers to the smallest military formation that comprises a balanced team of all the arms and services for the independent conduct of operations. It usually numbers about 1,300 to 20,000 men and it's usually commanded by a

major general. The standard types of divisions are infantry, and armoured divisions. There are also specialised types of divisions such as:

1 - Air borne division

2 - Motorised division

3 - Mountain division

The personel strength of a military division depends on such factors such as

1 - The type of division

2 - Nationality or country concerned

3 - The tactical demands of the time

For example in world war one (WWI), static french warfare made desireble the so called square division of four regiments organised into two brigades. This arrangement fascilitated relief in the line, brigade for brigade.

Mobile warfare brought the dewellopement of mordern traingular organisation of three subdivisions (Generally called combat teams or combat commands) two for operations and one for ready reserve. All armies all over the world are now conductiing experiments to determine that most suitable internal organisation of the division to meet the requirments of modern day atomic and nuclear waffare. Nigeria as a country cannot afford to be left out of this vice.

A division is the smallest military unit that contains a ...general staff. In is not an integral component of army corps but it's assigned to opetate under contrôle of these higher headquaters as the plan of operation and circumstance dicates.

The military strenth of an army for the conduct of war may be roughly measured by the number and quality of the divisions it can bring to bear against an enmy. Divisions together with additional supporting combat and service troops are formed into corps and field armies for the conduct of military operations.

To meet specialised requirements in warfare, divisions have evolve into serveral types falling within two general classification:

1 - Infantry division

2 - Armoured division

Infantry divisions known as fifle divisions in the soviet Army are organised and equiped for combat under all conditions of teraim and weather. They comprise the principal portion of the fighting force of an army. An infantry division consists chiefly of foot soldiers equiped with light weapons but also including supporting artillery, armour and engineering units. It also it's own coomunication, supply maintanance and evacuation services. Bivisions of this type are modified by the introduction of light equipments and given special training may perform specilised roles. Examples are the air borne paratroopers and mountain alpin divisions. The Nigerian Army at the moment already has an air born brigade department and a mountain war department at the command and staff college in Jaji. Some Armies in the world have what is called motorised divisions by adding truck tansport and light armoured vehicles sufficient to mount all troops the troops of an infantry division. In Nigeria and the United States Armies, these are called mechanised divisions. The armoured or mechanised divisions also contain dements of all arms and services but it is comparatively much stronger in tank force than the infantry division.

It makes extensive use of armourdd vehicles to increase the mobility and protection from small arms fire of infantry engineers and other troops operating in close support of tanks. During the second world war the Soviet Army Organised a large number of artillery divisions each consisting of from 18 - 20 artillery battalions.

Armoured division operations are characterised by great speed of movement over a favourable terrain, heavy fire power and shock effect. Higher commanders often employe them as a mobile reserve ad as a stricking force against objectives deep in enemy territories when the progress of the battle creats an upportunity for bold maneuvers.

Infantry divisions have a greater capability for sustained action and their movement is less hindered by terrain obstacles.

Air borne division usually pose a strategic threat since the may be moved by air to any part of a considerable area - to upset their lightness in weapons and austere support, they depend greatly on suprise and rapid execution for success of an air born assault mission. They are ordinarily commited to battle obly for brief periods unless reinforced with additional troops.

Retracting back a little bit into the history of military science, it could be seen that the divisional system in mordern armies originated from the long periods of French world leadership in military science during the 18th century and 19th century General Lazare Niclas Carnot organised the force of the armies of the revolution into parmanent divisions. Napoleon Banarpart altered the divisional organisation by providing supporting corps of artillery and eventually formed seperate calvary divisions.

In 1957 the United States began tests on a "pentomic" divisional structure to meet the demands of atomic war but was latter discarded in 1961.

The term division was one used in the united states to denote a tactical subdivision of any army corps and latter for a geographical area of military command. This is simillar to Nigeria as can be seen from the map bellow:

As earlier mentioned, the Nigerian Army has been organised into four divisions namely

- One mechanised division - Kaduna
- Two mechanised division - Ibdan
- Three armeured division - Jos
- 82 composit division - Enugu

Each of these divisions has three organis brigades giving rise to the "triangular" concept of divisional organisation adapted in 1939 by the United States Army.

NIGERIAN ARMY - ORGANISATIONAL STRUCTURE

After an extensive and intensive discourse on military formations generally, in the preceeding chapter, it is paramount to make mention of the military formations and organisational structure with specific reference to the Nigerian Army.

The Nigerian Army re-organisation is still going on and since this reorganisation is not yet complet or near completion, it will not be possible for me in this research work to give an absolutely accurate information of the present day organisation of the army or statistically project it. This is with respect o to it's combat arms and logistic organisation. In this research work, I will obly attempt to make mention of the present day organisation and what the feature trends are most likely going to be.

3:2:1:- COMPOSITION OF THE NIGERIAN ARMY

a.- Combat Arms: These are the fighting and supporting consisting of the:-

- Infantry
- Armoured corps (NAAC)
- Artillery corps (NACA)
- Engineers corps (NACE)
- Signals corps (NASC)

The general characteristics and founctions /organisations of these combat arms of the Nigerian Army has been extensively discoursed in the previouse chapter. Thus reference to it may be of importance it necessary.

b - Administrative and Logistic Services:- These are designed to provide the material, physical, imental and spiritual needs of the combat arms include:-

- Nigerian Army medical corps (NAMC)
- Nigerian Army corps of military police (NACMP)
- Nigeria Army ordance corps (NAOC)
- Nigerian Army chaplain department (NACHD)
- Nigerian Army corps of supply and transport (NACST)
- Nigerian Army Electrical and mechanical engineers (NAEME)
- Nigerian Army Education corps (NAEC)

  e.t.c.

c - The Staff:- These provides the machinery to coordinate the effect of the whole e.g. clerks e.t.c.

3:2:2 - Organisational Concept

Considering the organisational concept of the Nigerian Army, emphasis is laid on special organs that can meat with speed accuracy and power when ever the need arrises. Such organisations must be strong flexible and capable of reacting constantly and rapidly to changes in political, economic social and technological circumatances of defence especially in the traumatic transition from peace to war. As a follow up to this comcept, the Nigerian Army is organised into two mechanised division, one armoured division and a composit division.

Detailes as shown of 3:1:40

3:2:3 - Deployement

The deployement of the various military units of the Nigerian Army is governed by the following factors:-

a - Terrain

b - Threat

c - Availability of good communication net work

d - The need to use existing military barracks

e - Effective command and contrôle

Based on the above five factor, the organisation of the Nigerian Army into four divisions is as follows.

a - 1st Mechanised Division - comprising Kaduna (HQ) Kano, Niger and Sokoto Statew all as Brigades under the division.

b - 2nd Mechanised Division - Comprisisng Ibadan (HQ) Lagos, Ogun, Oyo, Ondo, Kwara and parts of Bendel State (excluding Warri) as brigade headquaters.

c - 3rd Armoured Division - Comprising plateau (Jos (HQ), Borno, Bauchi and Gongola States as Brigade headquaters.

d - 82nd Division - Comprising Imo (Enugu - HQ), Benue, Rivers Cross Rivers ans dome parts of Bendel States (including Warri) as Brigade headquators. This divisionais also refered to as 82nd Composit Division.

Each division has three organic Brigades or more as the case necessitates.

See fig. - 3:1:60

3:2:4 - Nigerian Army Training Institutions

The Nigerian Army has training institutions for the training of their personels - officers, recruits, and other ranks (NCOS). This institutions includes:-

a - Depot Nigerian Army (NA) Zaria:- Established in 1917, It is respo responsible for the training of reruits. However during the last Nigerian civil war, other training centres for recruits were being operated.

b - Nigerian Military School (NMS) Zaria:- This school was started in 19 in 1954 mainly for the purpose of training young Nigerians who will be capable of filling the gap left by the European NCOS. Now it trains "boy soldiers" up to the secondary school level after which they join the army of for futher training (NDA) or studies (higher institution).

c - Nigerian Defence Academy (NDA) Kaduna This institution is responsible for producing combatent officers for the Nigerian Army established in 1964, it trains regular combatant officers for the Army, Navy and Air force. In 1967 as a result of the evil war, it under took the training of short service combatant officers. The training continued untill q977 when it was stoped from 1977 to institution also undertook the training of direct short service (DSSC) officers who have had no prio military training before joining the officers corps on the Nigerian Army. This has always been in addition to her normal duty of training the regular cadets. The training of Direct short service officers was stoped again in 1981 while that of short service (SS) combatants was started again in 1985.

d - Command and Staff College - Jaji. Established in 1976 for the training of army officers from within the Nigerian armed forces and Africa. The training is centred on command and staff duties as well as geo - politics. Before 1978 the college only undertakes the training of senior officers from all arms of the

Armed forces. But as from 1978 onwards, a junior division of the college (CSC) was established to train officers of the rank of captains, staff duties (Grad III Staff).

The Nigerian Army has seen a lot of devellopments and changes right from it's inception. The changes are likely to continue as the re-organisation excercise is a contineouse proccess to meet the prevailling circumstance of global socio political and technological changes.

3:2 5: - Contemprory International Operations and Campaigns

The history of military operations in the Nigerian Army as earlier stated in 3:1, dates as far back as the pre 1863 era before the birth of what is today known as the Nigerian Army. This could be seen in the operations by the British to check slave trade as an illegal trade and the subsequent operations at Ashanti, Congo, Benin, Bida, Illorin, Busa, Kotangora e.t.c.

Today, the Nigerian Army has on its merits served and it(s still serving on international operations to help bring peace and total independence in Africa and the world at large. Notable among these operations are:-

a - Congo Operations of 1961 - 63 Nigerian Army served as part of the United Nations (UN) forces in Congo.

b - Tanzanian Peace Mission of 1964 The Nigerian Army troops where sent to Tanzania in 1964 to help maintain peace in the country.

c - Middle East UNIFIL 1978:- Since 1978, the Nigerian Army has been contributing with troops and materials to the United

Nations Interim force in Lebanon. The troops are still being sent their till date and are most likely going to be contineausly sent untill that region sees peace

c - Chad Republic Peace Keeping Mission of 1979 The Nigerian Army sent troops to Chad to help maintain peace in the country. The two opposing forces were so hostile that the Nigerian forces had to be with drawn after a temporary peace had been brought to the country.

3:2:6 - Nigerian Army - Aims and Objectives

As I have earlier indicated in my discourse, that that entire, organisational structure and concept of the Nigerian Army counts down to the archievements of certain airms and objectives which includes the following.

1 - To defend the territorial integrity of Nigeria

2 - To defer attacks by any nation and should deterance fail, to bring any war to a conclusion favourable to Nigeria

3 - To provide aid to civil power

4 - To aid the OAU and UN and support any other arrangement or agreement which may be entered into from time to time by the Federal Government of Nigeria.

In accordance with the above goals especially the first, a sound knowledge of the different terrain types within the country cannot be over emphasised. In this research work, I have attampted to architecturally deal with the problems eminent in mountain savanah terrain to better the Nigerian troops for an effective mountain saranah warfare anywhere on this earth. Emphases are being laid here on combat operations and regular maneovers.

Lack of a good knowledge of the terrains must have been a major responsibility for the prolonged Nigerian Civil war (1966 - 1970) and the vietnamese experience of the vietcong.

Table [illegible]

ORG OF RIFLE COY - INF BN - NA

COY HQ

OC	-Maj	-1
2i/c	-Capt	-1
Batmen	-Ptes	-2
CSM	-WO II	-1
CQMS	-SSgt	-1
Admin & Int Sgt	-Sgt	-1
Dvr/Op	-Cpl	-1
Clks GD	-Cpl	-1
"	-LCpl	-1
"	-Pte	-1
Stmn GD	-Cpl	-1
"	-LCpl	-1
Tailor	-LCpl	-1*
MG Nos	-Ptes	-2
Cooks	-Cpl	-1
"	-Pte	-1
	Total -	2 x 17

NO. 1 PL
(1 x 39)

NO. 2 PL

Pl Comd	-Lt	-1
Batman	-Pte	-1
Pl Sgt	-Sgt	-1
A/Tk Team	-LCpl	-1
"	Ptes	-2**
Radio Op	-Pte	-1
60mm Mor Team	-LCpl	-1
"	-Ptes	-2
	Total -	1 x 9

NO. 3 PL
(1 x 39)

Also i/c of MG.
One also acts as Runner.

NO. 1 SEC

Sec Comd	-Cpl	-1
Sec 2i/c	-LCpl	-1
Rifleman	-Ptes	-6
MG man	-Ptes	-2

NO. 2 SEC
(10 OR)

NO. 3 SEC
(10 OR)

SUMMARY

Table 3:1:40

OGR OF INF BN - NA

BN HQ

CO	- Lt Col	-	1
Pers Staff	- LCpls	-	3
2i/c	- Maj	-	1
Adjt	- Capt	-	1
IO	- Lt	-	1
Batmen	- Ptes	-	3
Int Staff	- SSgt	-	1
"	- Sgt	-	1
"	- Cpls	-	2
RSM	- WO1	-	1
RP	- Sgt	-	1
"	- Cpls	-	4
"	- LCpls	-	15
	Total	-	4 x 31

ORDERLY ROOM

CC	- WOII	-	1
O/Room Sgt	- SSgt	-	1
Docus NCO	- Sgt	-	1
Clks GD	- Cpls	-	2
"	- LCpls	-	3
"	- Ptes	-	6
	Total	-	14 OR

TRG WING

WTO	- Capt	-	1
Batman	- Pte	-	1
WT CSM	- WOII	-	1
Instrs	- SSgt	-	1
"	- Sgts	-	2
"	- Cpls	-	8
Instrs Aids	- LCpls	-	4
Stmn GD	- LCpl	-	1
	Total	-	
		-	1 x 18

RIFLE COY (5 x 134)

RIFLE COY (5 x 134)

RIFLE COY (5 x 134)

SUPPORT COY (6 x 178)

ADMIN COY (3 x 208

SUMMARY MANPOWER

Lt Col	Maj	Capt	Lt	WO1	WO II	SSgt	Sgt	Cpl	LCpl	Pte	TOTAL Offrs	OR	Grand
1	6	8	14	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	1	[illegible]

Table 3 1 (cont)

ORG OF OM IL - ADMIN COY - INF BN

IL HQ

OM	- Capt	-1
Batman	- Pte	-1
WMS	- WOII	-1
Cks GD	- LCpl	-1
"	- Pte	-1
	Total -	1 x 5

WATCHES

	-1
	-1
	-1
D -	3

T/REFITTERS

Cpl	-1
LCpl	-1
Ptes	-2
Total -	4

ARMS STMN

Cpl	-1
LCpl	-1
Pte	-1
Total -	3

CLO STMN

Sgt	-1
LCpl	-1
Ptes	-2
Total -	4

LOCN STMN

Sgt	-1
Cpl	-1
LCpl	-1
Ptes	-2
Total -	5

COY COOKS

Sgt	-1
LCpl	-1
Pte	-1
Total	3

G. 1098 & AMMO STMN

Sgt	-1
Cpls	-2
LCpls	-2
Ptes	-3
Total -	8

OFFRS MESS

Mess NCO	-Sgt	-1
Stmn GD	-Cpl	-1
Cooks	-Cpl	-1
"	-LCpl	-1
"	-Ptes	-2
Barmen	-Cpl	-1
"	-LCpls	-2
"	-Ptes	-2
Waiters	-Ptes	-6
Total -		17

WOs & SGTs MESS

Mess NCO	-Cpl	-1
Stmn GD	-LCpl	-1
Barmen	-LCpl	-1
"	-Pte	-1
Waiters	-Ptes	-2
Total -		6

ORs CANTN

Cpl	
LCpl	
Ptes	
Total	

SUMMARY

Capt	Lt	WOI	WOII	SSgt	Sgt	Cpl	LCpl	Pte	TOTAL Offr	TOTAL OR	TOTAL Grand
1	-	-	1	-	5	11	15	31	1	63	64

Table 3:1:47

ORG OF ADMIN COY - INF BN

COY HQ

OC	-Maj	-1
Batman	-Pte	-1
CSM	-WOII	-1
COMS	-SSgt	-1
Clks GD	-Cpl	-1
"	-LCpl	-1
"	-Pte	-1
Stmn GD	-Cpl	-1
"	-Pte	-1
Arms Stmn	-LCpl	-1
"	-Pte	-1
	Total -	1 x 10

QM PL
(1 x 63)

MT PL
(1 x 97)

DRUM PL

Drum Major	-SSgt	-1
Drummers	-Sgt	-1
"	-Cpls	-7
"	-Lcpls	-9
"	-Ftes	-20
	Total -	130 CR

ATT PERS

S U M M A R Y

Maj	Capt	Lt	WO1	WOII	SSgt	Sgt	Cpl	LCpl	Pte	T O T A L Offrs	OR	Grand
1	2	-	-	3	4	9	28	38	126	3	208	211

Table 3/1/45

ORG OF SURVEILLANCE PL - SUPPORT COY - INF BN

ANNEX B TO
ORGANISATION 2

PL HQ

Pl Comd	-Lt	-1
Batman	-Pte	-1
Pl Sgt	-SSgt	-1
Dvr/Op	-Cpl	-1
Radio Op	-LCpl	-1
Stmn GD	-LCpl	-1
"	-Pte	-1
Total -		1 x 6

SEC

Sec Comd	-Sgt	-1
Radar Ops	-Cpls	-2
"	-LCpl	-1
Dvr/Op	-Pte	-1
Total -		5 OR

SEC (5 OR)

SEC (5 OR)

S U M M A R Y

Lt	WO1	WOII	SSgt	Sgt	Cpl	LCpl	Pte	T O T A L		
								Offr	OR	Grand
1	-	-	1	3	7	5	5	1	21	22

Table 3:1:44

ANNEX C PG
ORGANISATION 2

ORG OF MMG PL - SUPPORT COY - INF BN

PL HQ

Pl Comd	- Lt	-	1
Batman	- Pte	-	1
Pl Sgt	- Sgt	-	1
Stmn GD	- LCpl	-	1
"	- Pte	-	1
Radio Op	- Pte	-	1

SEC (8 OR)

SEC

Sec Comd	- Cpl	-	1
Range Taker	- Pte	-	1
	Total	-	2

SEC (8 OR)

DET

Det Comd	- LCpl	-	1
Gun Crew	- Ptes	-	2
	Total	-	3

DET (3 OR)

S U M M A R Y

Lt	WO1	WOII	SSgt	Sgt	Cpls	LCpl	Pte	T O T A L Offr	OR	Grand
1	-	-	-	1	3	7	18	1	29	30

Table 3:1:43

ANNEX 2 TO
CHANGE NO 2

ORG OF MOR PL - SUPPORT COY - INF BN

PL HQ

Pl Comd	-It	-1
Batman	-Pte	-1
Pl Sgt	-SSgt	-1
Dvr/Op	-Cpl	-1
Radio Ops	-LCpl	-1
" "	-Pte	-1
Stmn GD	-Cpl	-1
" "	-Pte	-1
Runners/Mor Nos	-Ptes	-2
Total-		1 x 9

SEC (11 OR)

SEC

Sec Comd	-Sgt	-1
Det Comds/MFC	-Cpls	-2
Total		3

SEC (11 OR)

DET

Det 2i/c	-LCpl	-1
Mor Nos.	-Ptes	-2
Radio Op	-Pte	-1
Total	-	4 OR

DET

SUMMARY

LT	WO1	WOII	SSgt	Sgt	Cpl	LCpl	Pte	TOTAL		
								Offr	OR	Grand
1	-	-	1	3	8	7	23	1	42	43

Table 3.1.46

ORG OF SIG PL - SUPPORT COY - INF BN

PL HQ

RSO	-Capt	-1
Batman	-Pte	-1
Pl Sgt	-SSgt	-1
Admin NCO	-Sgt	-1
Dvrs	-LCpl	-1
"	-Ptes	-3
Clk GD	-LCpl	-1
Stmn GD	-LCpl	-1
"	-Pte	-1
	Total -	1 x 10

RADIO SEC

Sec Comd	-Sgt	-1
Bn Con Ops	-Cpls	-2
"	-Pte	-1
Rfl Coy Ops	-Cpls	-3
" " "	-LCpls	-3
CO & 2i/c Ops	-LCpls	-2
OC Sp & Admin Coy Ops	-LCpls	-2
Pool Ops	-Ptes	-6
	Total -	20 OR

COMCEN SEC

Sig Clk & Indoor Linesmen	-Cpls	-2
Exchange Ops	-Ptes	-2
Exchange Orderlies	-Ptes	-2
	Total -	6 OR

LINES SEC

Sec Comd	-Cpl	-1
Linesmen	-LCpls	-2
"	-Ptes	-3
	Total -	6 OR

SUMMARY

Capt	Lt	WOI	WOII	SSgt	Sgt	Cpl	LCpl	Pte	TOTAL Offr	TOTAL OR	TOTAL Grand
1	-	-	-	1	2	8	12	19	1	42	43

ANNEX B 1-
PROFILES

ORG OF A/TK PL - SUPPORT COY - INF BN

PL HQ

Pl Comd - Lt - 1
Batman - Pte - 1
Pl Sgt - SSgt - 1
Stmn GD - LCpl - 1
Total - 1 x 3

SEC

Sec Comdt - Sgt - 1

DET

Det Comd - Cpl - 1
Gun Crew - LCpl - 1
" - Pte - 1
Dvr - Pte - 1
Total -. 4 OR

SEC (9 OR)

SEC (9 OR)

DET (4 OR)

SUMMARY

LT	WOI	WOII	SSgt	Sgt	Cpl	LCpl	Pte	TOTAL		
								Offr	OR	Grand
1	-	-	1	3	6	7	13	1	30	31

Table 5:1:41

ORG OF SUPPORT COY - INF BN

COY HQ

OC	-Maj	-1
Batman	-Pte	-1
CSM	-WOII	-1
CQMS	-SSgt	-1
Dvr/Op	-Cpl	-1
Clk GD	-Cpl	-1
"	-LCpl	-1
"	-Pte	-1
Tailor	-LCpl	-1*
Atmn GD	-LCpls	-4
Cooks	-Cpl	-1
"	-Pte	-1
Total -		1 x 14

MOR PL (1 x 42) | A/TK PL (1 x 30) | SIG PL (1 x 48) | MMG PL (1 x 29) | SURV PL (1 x 21)

SUMMARY

Maj	Capt	Lt	WO1	WOII	SSgt	Sgt	Cpl	LCpl	Pte	TOTAL Offrs	TOTAL OR	TOTAL Grand
1	1	4	-	1	5	12	35	44	81	6	178	184

*Also i/c of GPMG.

CHAPTER FOUR

MILITARY OPERATIONAL AND WAR STRATEGIES

"I may louse a battle but I will never loose a minute" (Napoleon)

The efficient use of time is an essential ingriedient to the important tactical principles of the need to sieze and maintain the initiative. Limited amount of time available must be put to the best possible use by all concerned in the preparetion and execution of operations: The whole affair is commonly refered to as "battle procedure.

Battle procedure therefore involves all the drills necessary to launch soldiers properly into battle and as quickly and efficiently as possible. The battle procadure consists of two essential stages.

1. The issue of warning orders
2. The issue of detailed operational orders

The basic principles behind the above battle procedure and orders are

1. Anticipation at all levels of likely future task

2. A thorough knowledge of the grouning system

3. An efficient drill for reconnaissance and the issue of orders

4. Concurrent activity in all groups

In anticipation of future tasks, the more commanders and their staff anticipate future tastks moves etc , the more time will be available to prepare for battle thus breeding confidence and avoiding panic and confussion.

The grouping system is where the battalion group is divided into the functional groupings neccessary for the operation. These groups include the following

1. <u>Reconnaisance Group (R.Group)</u> The task of this group involves all aspect of battle palnning strategies and reconnaisance. Military inteligence report shall give every detaile information concerning the enemy with regards to personel strength and fire power. Every

location and battle readyness or strategy including all other related information that will be to the advantage of the fighting troops will be suplied the R group. They undertake all aspects of patrols raids and recce.

2. T The Orders Group (O.Group) The task of this group is the issue and reciept of orders to the fighting troops and from the command headquaters respectively. The handle the issue of operational orders.

3. The Main Body This body is the force required for the entire battle operation. Usually after the R an O groups have carried out their task fully and properly.

The 'R' 'O' groups are formed at battalion group, company group and Plateau levels. The R group is designed to give the commanders all neccessary advice as regards the proper execution of the operation

The 'O' group on the other hand consist of the R group and all other subordinates who must receive and execute the commanders orders.

CHAPTER 4

"I may loose a battle but I will never loose a minute"

MILITARY OPERATIONAL AND WAR STRATEGIES:

"I may loose a battle but I will never loose a minute"

The size and composition of the 'R' and 'O' groups will vary in accordance with the commanding officers wishes, the type of operation, and the time available.

The main body consists of the rest of the troops not includ in either the R or O groups above. Their commander is often the second in command (zic) in the unit. He prepares the men for battle when the commander is involved in recce and planning. This system enables the commander to have full time for planning the battle and to concentrate. The main body consists of the three echelons which are:-

1 - The Fighting echdon ("F"echelon). This is made up of the men, equipments and vehicles required to fight the battle.

2. - "A" echelon: This consists of men, equipments and vehicles which must be readily available to support the "F" echelon. It is usually a reserve force, and could be required to strike with all speed and force when needed.

3. - "B" echelon: This consists of men, equipments and vehicles which are not needed in the "F" and A" echelons. It consists of basically the administrative elements such as cooks, clerks etc. They are sometimes refered to as attatche.

AN EXAMPLE OF A BATTLE OPERATIONAL ORDERS:- CONTENTS.

WARNING ORDER (.) ATTACK (¥) 1 (Platoon) PL TO CAPTURE HILL IN SQ4828 BY (") NMB 171000A RV O GP PT 2038 BY 171200A. RV MAIN BODY

PT 2364 BY 171500A (.) ADMIN (,) SE.LF CONTAINED FOR 24 HRS (.) ACK.

4:1:1 Briefing

After the commanders have recieved the operational orders, they then go ahead and call their men for briefing. The points expected in this briefing will be:-

1 - Ground

2 - Situation

3 - Mission

4 - Execution

5 - Administration and Logistics

6 - Command and signals

A general discription of the ground to show vital feature aproaches and obstacles should suffice. It is quite important to discribe in place where all men can see the ground that the commander is refering to. If this is not possible, rough models should be used for this purpose e.g. sand models.

The situation will involve enemy forces; strength and position Friendly forces at platoon, battalion and company levels should be located identified and explained. Mission should be stated, such as to destroy, capture or distabilise. Oetailes of the neighbouring platoons companies and support weapons should be also be included.

The mission of the operation is the most vital aspect of the briefing as it's the task to be given. It must be given as a statement and order using the word "will" before the mission is stated. e.g. We will distroy and capture shere hill at 1800 hrs tomorow.

In the execution, a clear and brief discription of how the task will be carried out must be properly explained by the commander and well undefstood by the toops. This will usually include an outlin, detailes alloted to each sub-unit and co-ordinating instructions.

If there is any changes in the normal equipments of the unit as laid down in the unit's standing orders, it must be stated. Instructions on ammunitions, feeding, water and medical arrangements will be given.

Under command and signal, the opdrations commander will include the following;".

1. - Position of operational HQ
2. - Position of other friendly operational (HQ)
3. - Pre-arranged signals
4. - Radio instructions

4:1:2 - Advance:

The operational commander will always be influenced by the ground, visibility and task given to him in the choice of a formation for his advance.

The basic formations for a section operation are:-

1 - Single file
2 - File
3 - Arrow head
4 - Spear head
5 - Diamon head
6 - Extended line or file

There basic formations are variable to suit the ground and the tactical situation. It should be borne in mine that controle and the ability to produce effective and accurate fire are of vital importance.

4:1:3 - ATTACK

When troops are closing up with the enemy, the ground and distance may make it impracticable for fire to be produced effectively to neutralise the enemy position. In this case the attacking troops move closer to the enemy by fire and movement which requires part of the

troops to advance foward while the remaining covers their movement by fire. This is sometimes refered to as keeping one leg on the ground.

The importance of fire and movement forms the bases of all infantry tactics giving the following as advantages.

1 - It develhopes an aggressive spirit in the soldier

2 - It saves unnecessary casualities and time

3 - It exercises most of the basic infantry skills for battle craft e.g. field craft, weapons handling team work fire controle and leadership

4 - It helps the attacking troops to overcome minor oppositions without any additional resources being made available.

There are four basic principles for fire and movement when their is contact with the enemy.

1 - Controle

2 - Speed

3 - The angle of covering fire should be as wide as possible

4 - Movements must be covered by fire at all times especially in the open.

There are two basic types of fire and movement

1 - Cater pillaring
2 - Leap frogging

} These movements are carried out in the manner and way which the names imply.

In another form of attack, the commander may be faced with the problem of ground appreciation depending on the type of country and terrain. For example a commanders main problem in the open country terrain could be finding cover while in closed

country terrain, he may be faced with the problem of finding positions with good observation and fields of fire.

Skillfull use of ground will help to gain surprise and save lives in both the attack and defence. Troops should be t trained to devellope an eye for ground. It is advisable that ground should always be condidered from the enemys point of view and should be appreciated under the following:-

1 - Fire positions
2 - Observation positions
3 - Cover from enemy fire
4 - Cover from enemy view
5 - Obstacles

The selection of fire positions requires through knowledge of the characteristics of weapons and the use of ground. The requirments of a fire position vary with the task but ideally a fire position should provide:-

1 - Cover from fire
2 - Cover from view
3 - Afford a good observation of the target to be engaged.
4 - Room for free usage of weapons
5 - Covered approach
6 - Easy routes of advance

When the commander realises that he is winning the attack by his own personal intuition and reduced fire power from the enemy positions, he then goes on assault. This is usually undertaken by left flanking or right flanking. Under covering fire from friendly positions. Once the assault has been completed, the operation commander will embark on the following drills:-

1 - The rear party joins the assault group at a double

2 - The commander will organise a search of the area of the obective for any enemy hiding or wounded.

3 - The commander will check possition of troops and allot area of observations and detail reference points

4 - He will also check for

a - Casualities withen his men

b - Ammunition expenditure

c - Supply of necessary ammunitions

A:1:A DEFENCE:

Once the troops have completed the assault and all preceeding drills, they will take up a defensive position which may be foward of the captured postion forming an all round (360°) defensive field of fire. This re-organisation will usually be carried out as a drill and as follows:-

1 - The point group in the flanking order of march will take the centre on the original axis of advance

2 - The second assault group will go straight on accross the objective to the far flank

3 - The third assault group will cover the remaining exposed flank

4 - The fire group will cover the rear

5 - The command H.Q will then rally in the center

6 - The operation commander will go round the positions at once to check area of observation and fire.

7 - The zic will check casualities and ammunitions; redistributing holdings as neccessary

8 - The operation commander will report by wire less communication to his superior head quaters (HQ)

4:1:5 - WITHDRAWAL:

Widrawal from battle fronts when being defeated is not usually a matter for military tactics procedure. Thus it is not always taught to the troops as a drill. Widrawals are always very discouraged but sometimes they become inevitable as a result of perharps poor reconnaisance.

In the advent of any operational widrawal from the fire front, the artillery is often extensively engaged to shell deep into enemy territory and cause as much distruction as possible which will result into confusing the enemy thus delaying his fire co-ordination and advance. This strategy often gives the fighting and widrawing troops enough covering fire and ample time to evidraw both troops and equipments.

However there is no established military drill or procedure for widrawal. It is usually left to the descreation of the commander to use his own tactical initiatives.

In certain military operations, it is not only the infantry artillery or armoured corps that are involved individually. They usually compliment each other in the overall proccess of the operation.

Futher more, some operations may involve a combination of other arms of the armed forces such as the navy and Airforce.

4:1:6 COMBINED OPERATIONS:

A combined operation could be defined as that in which two or more of the fighting services are engaged in pursuit of a common objective. They comprise all kind of offensive actions from raids to larg scale assault landings and particullarly those which are classed as amphibious warfare. They afford an upportunity of exploiting the advantages gained from the command of the sea

Others could include

- Mountain Savanah warfare
- Airborn brigade para troopers
- Marin commandos

etc.

Drake in the west Indies in 1885 and Howard and Essex at cadiz in 1 596 showed how a combination of sea and land forces could inflict much damage on the enemy. Some conjunct expeditions" to give them their 18th century name, archieved parmanent results e.g. the capture of Gibralta by Rook and Eying ((1704), of Quebec by wolfe (1759) and of cape Tin (1795). Onthers like the 1809 expeditions to walcheren and the 1915 campaigns in Galtipoli were failures. Yet others like the distruction of 80fr ships in st malo in 1758 were raids designed to inflict loss in men, ships and stores. It is in this last category that all combine operations against the Germans failed untill nearly the end of 1942 when an Anglo American Army supported by numerouse ships and air craffs landed in France, North Africa 1942 and by so doing altered the course of the war.

This was a very typical case of troops brought together to fight a war in terrains they've never been trained on. That was why much material and strategic planning was put in befor the Germans could be brought to their knees.

Thanks to the distructive might of the atomic bomb at Hiroshima and Nagasaki.

CHAPTER 5

5:0 - TYPES OF ARTILLERY WAPONS IN SERVICE WITH MOST ARMIES IN THE WORLD.

In this chapter, I will only list the names and characteristics of some of the artillery weapon in service with most world armies. This is not to say that those are all or specifically the types of artillery arms in service with the Nigerian Army. Though some may in service with the Nigerian Army but I can't be specific due to military security reasons.

5:1 - Field Guns

1 - 75 mm field gun type M1897 produced by France.

Characteristics:-

Calibre _____ 75mm

Barrel length ..... 36 Calibres

Muzzle brake ..... Nil

Trail type ..... Pale

Weight ..... 1139 kg

Ammunition type ..... . Fixed

Charges ..... One

Ammunition options .....H E (7.24kg) shrapnel

Rate of fire 12.rds/min

Muzzle velocity ..... 529 m/s

Range ..... 855 Om

Elevation limits ..... . T18° - ii

Traverse limits ..... 6°

Detachment 6

2 .....75 mm maintain gun - Type 94. Produced by Japan.

Characteristics:-

Calibre 75mm

Barrel length .....20.8 Calibres

Muzzle brake .....Nil

Trail type .....Split

Weight 544kg

Ammunition type.....Semi - fixed

Charges .....One

Ammunition options .....H E (5.7kg)

.....Smoke WP

.....APHE

.....HEAT

.....Shrapnel

.....Incendiary

.....Illuminat ing

Rate of fire ..... 10 - 12 rds/min

Muzzle velocity 385M/S

Elevation limits .....- 9^0 T 45^0

Traverse limits ..... 6^0

Detachment 4

3 .....75mm Pack howwitzer, type M116 produced by the united states

Characteristics:-

Calibre 75mm

Barrel length ..... 15.93 calibres

Muzzle brake .....Nil

Trail type .....split

Weight 653kg

Ammunition type .....Semi fixed

charges 4

Ammunition options .....H E (6.25kg)

.....HEAT

.....smoke

.....Chemical

Rate of fire .....22 rds/min

Muzzle velocity .....381 m/s

Range 85 00m

Elevation limits ..... - 50 T 45^0

Traverse limits ..... 6^o

Detachment 4

4 - 76mm divisional gun, type M1942 (Z I S3) produced by USSR

Characteristics:-

Calibre 76.2mm

Barrel length .....42.6 calibres

Muzzle brake .....Double baffle

Trail type .....split

Weight .....1,116 kg

Ammunition type .....Fixed

Charges .....One

Ammunition options .....HVAP (3.1kg)

.....APHE (6.5kg

.....HEAT (4kg

.....H E (6.2kg

Rate of fire 20rds/min

Muzzle velocity .....965M/S HVAP

.....680 M/S(H E)

.....655 M/S (APHE)

.....325 M/S(HEAT)

Range 13300M

Elevation limits .....5^0 T 37^0

Traverse limits .....54^0

Detachement 6

5 - 105mm gun, type m35. Produced by Switzerland.

Characteristics:--

Calibre 105mm

Barrele length .....42 calibre

Muzzle brake .....Single baffle

Trail type .....split

weight .....3,840 kg

Ammunition type .....Unknow

Charges .....Not known

Ammunition options .....H E (15.3kg)

Rate of fire 5rds/min

Muzzle velocity 300M/S

Maximum range 21,000m

Elevation limits ..... - 3^0 T 45^0

Traverse limits ..... 60^0

Detachment 6

6 - 105mm Howitzer, type M101 AI. Produced by U.S.

Characteristics:

Calibre 105mm

Barrel length.....22.5 Calibres

Muzzle brake .....Nil

Trail type .....Split

Weight 2,220kg

Ammunition type .....Semi fixed

Charges 7

Ammunition options .....H E (14.9kg)

....HEAT

.....Smoke WP

.....Chemical

.....Illuminating

.....Carrier

.....Blank

Rate of fire 8rds/min

Muzzle velocity .....473 M/S

Maximum range 11,200mm

Elevation limits .....- 5° T 66°

Traverse limits ..... 45°

Detachment 8

7 - 105mm howitzer, type M102. Produced by U. S.

Characteristics:-

Calibre 105mm

Barrel length 133cms

Muzzle brake .....Nil

Trail type .....Box

Weight 1,470kg

Ammunition type .....semi fixed

charges 7

Ammunition options .....H E M (14,9kg)

.....H E M 482 (12.7kg

.....HEAT

.....Smoke WP

.....Chemical

.....Illuminating

.....Fletchettes

Rate of fire 3rds/min

Muzzle velocity .....Unknown

Maximum range 14,000m

Elevation limits .....5^0 T 75^o

Travers limits .....360?.....

Detachments..... 8

8 - 155mm howitzer, type FH 70. Produced by Germany, Italy and the United Kingdom.

Characteristics:-

Calibre 155mm

Barrel length .....39 calibres

Trail type .....split

Weigth 3800kg

Ammunition type .....Seperate

charges 8

Ammunition options .....H E (43.5kg)

.....Smoke BE

.....Illuminating

Rate of fire .....6 rds/min

Maximum velocity 827M/s

Range 24,000mm

Elevation limits .....5^0 T 70^o

Traverse limits .....56^o T

Detachments.....10

5.2 Self Propeled Field Guns

1 - 105mm sp gun, "Abbot", type FV433. Produced by U.K.

Characteristics:-

Calibre 105mm

Barrel length .....325 cm

Muzzle brake .....Double baffle

Ammunition types ..... Semi fized

Charges 8

Ammunition options .....H E

.....HESH

.....Smoke

.....Illuminating

.....Practice

Rate pf fire 12rds/min

Muzzle velocity 780m/s

Maximum range 17,000m

Elevation limits .....- 5° T 70°

Traverse limits .....360°

Detachments .....4 (including driver)

Chassis type .....FV 430

Engine .....Rolls Royce K 60

Power.....240 bhp

speed 48KM/h

Endurance ..... 480 km

Ammunition carried 40

Height X length X width 2.5x5.8x2.6m

Weight 16,556kg

2 - 155mm gun type SP 70. Produced by Germany, Italy and the United Kingdom.

Characteristics:-

Calibre 155m

Barrel length .....39 Calibres

Muzzle brake .....Double baffle

Ammunition types .....separate

charges 8

Ammunition options .....H E (43.5kg)

.....Smoke BE

.....Illuminating

Rate of.fire .....Unknown

Muzzle velocity 827M/S

Maximum range 24,000m

Elevation limits .....Unknown

Travers limits .....360°

Detachment 6

Chassis type - .....Individual

engine ..... ---------

power ..... - - - - -

speed ..... - - - -

endurance..... - - - -

Ammunition carried ..... -- - -

Height x length x breath..... - - - -

Weight .....- - - -

3 - 175mm SP gun, type M107. Produced by the United States of America

Characteristics;-

Calibre 175mm

Barrel length .....60 calibres

Muzzle brake .....Nil

Ammunition types .....separate

Charges 3

Ammunition options .....H E (66.6kg)

.....Chemical

Rate of fire .....1 rd/min

Muzzle velocity 914M/S

Maximum range 32,700m

Elevation limits .....2° T 65°

Travers on carriage ..... 60°

Detachment 32

Chassis - type ----------Individual

- engine ----------GM8V 71T

- Power ----------420 bhp

- speed ----------54 km/h

- endurance ------- 720km

Ammunition carried 1

Height x length x bredth --------3.47x11.3x3.14m

Weight 28,165kg

4 - 8inch SP howitzer, type M110. Produced by the United States of America

<u>Characteristics:-</u>

Calibre 203mm

Barrel length .....25 calibres

Muzzle brake .....

Ammunition type .....separate

Charges 7

Ammunition options .....Nuclear

.....H E (90.7kg)

.....H E spotting

.....Chemical

Rate of fire ..... ~~1~~rds/min

Muzzle velocity ..... 594 M/S

Elevation limits ..... - 2° T 65°

Travers carriage .....60°

Detachment 13

Chassis - type .....Individual

- engine ----------GM,8V 71T

- power .....420 bhp

- speed 54km/hr

- endurance .....- - - -

Height x length x brodth .....2.6x7.48x3.14 m

Weight .....26,306 kg

Mamimum range 16,8000m

5:3 - Motars

1 - 4.2 inch motar, type MK 3

Characteristics:-

Calibre 107mm

Barrele length 1980mm

Barrel wieght 41.3kg

Bipod weight 20.8kg

Base plate weight 84kg

Total weight in action.....550kg

Ammunition option .....H E (9.1kg) smoke (10,2kg)

Range 3750m

Rate of fire.....12rds/min

Elevation limits .....145°, -80°

Traverse limits.....7° - 21°

Detachments 6

2 - 120mm light Tampella motar. Produced by Findland.

Characteristics:-

Calibre 120mm

Barrel length 1726mm

Barrel weight 43kg

Bipod weight 31.5kg

Total weight inaction -----136kg

Ammunition options .....H E (M58F) (12.9kg)

.....H E (58F0 (13kg)

.....smoke

.....Illuminating

.....Practice(blank)

Range 6,250m

Rate of fire .....5 - 10 rds/min

Elevation limits ---------- T 45° T 70°

Traverse limits ..... - - - - - -

Detachments 3

3 - 120mm M6 - 120 - AM50 heavy motar.

Characteristics:-

Calibre 120mm

Barrel length 1,746mm

Barrel weight .....76kg (with towing ring)

Bipod weight ..... - - - - -

Base plate weight 80kg

Total weight in action.....402kg (242kg without under carriage)

Ammunition options.....H E (PEPA/LP) (13.4kg)

.....H E (M44) (13kg)

.....Coloured smoke (13kg)

.....Illuminating (MK 62ED) (13.6kg)

.....smoke WP (MK60) (13kg)

.....practice (blank)

Range .....9,000m (with PEPA Ammunition)

Rate of fire .....8 - 12 rds/min

Elevation limits ..... T 45° T 80°

Travers limits .....17°

Detachments 4

4 - 120mm Mo - 120 - M65 heavy motar. Produced in France.

<u>Characteristics:-</u>

Calibre 120mm

Barrel length 16,40mm

Barrel weight -.....44kg

Bipod weight 24kg

Base plate weight 26kg

Total weight in action 104kg

Ammunition options .....H E (PEPA/LP) (13,4kg)

.....H E (M44) (13kg)

.....Coloured H E

.....Ilumminating (MK60) (13.6kg)

.....smoke WP

.....practice (blank)

Range 9,000m

Rate of fire .....8 - 12 rds/min

Elevation limits .....T45° T 85°

Traverse limits .....17°

Detachments.....2 - 3

5.4 - Artillery Rockets

1 - 557mm battle field missile lanbe produced by the United States of America.

Characteristics:-

Calibre 557mm

Rocket length 6.146m

Rocket weight 1,285kg

Stages.....one

Fuel .....Liquid

Guidance .....Innertial

Maximum speed - - - 0 0 0----------

Range 112km

war head .....Nuclear

Tubes or Rails .....one

Travers limits ..... - - - -

Reload time ..... - - - -

Detachments 6

2 - 762mm Honest John Produced by the U. S.

CHARACTERISTICS:-

Calibre 762mm

Rocket length 7.5m

Rocket weight 2,040kg

Fuel .....solid

stages .....one

Guidance.....Nil

Range 37,000m

War head .....Nuclear

.....H E

Tubes/Rails ..... One

Travers limits ..... 4°

Reload time ..... -

Detachments 4

3 - 790mm Sergent battle field support missile produced by U. S.

Characteristics:-

Calibre 79 0

Rocket length 10.5m

Rocket weight 4,536kg

Fuel .....Solid

Stages .....one

Guidance .....Internal

Range .....45 - 140km

War head .....Nuclear

Tubes/Rails .....one

Travers limits .....N/A

Reload time ..... -

Detachments .....

4 - Battle field support missile. Pershing (m6m31) Produced by U. S.

Characteristics:-

Calibre 1,000mm

Rocket length 12.2m

Rocket weight 4,600kg

Fuel .....Solid

Stages .....two

Guidance .....Innertial

Range .....160 - 750km

[illegible] .....[illegible]

Tubes/[illegible] .....[illegible]

War head .....Nuclear

Tubes/Rails .....One

Travers limits.....N/A

Reload time..... -

Detachments..... -

4 - 140mm RAP 14 rocket launcher produced by France.

Characteristics:-

Calibre 140mm

Rocket length 2,000mm

Rocket weight 52kg

Fuel .....Solid

Stage .....One

Guidance .....Nil

Range 16,000m

War head .....H E (19kg)

.....Incendiary

.....smoke

.....Illuminating

Tubes/Rails .....22 tubes

Travers limits .....360°

Reload time .....1 minute

Detachment..... -

5 - 108mm R - 6 - B - 2 rocket produced by spain.

Caharacteristics:-

Calibre 108m

Rocket length 935

Rocket weight 19.4kg

Fuel .....Solid

Stages .....One

Guidance .....Nil

Range 10,000mm

War head options ----------H E (8,8kg)

.....Smoke

.....Incendiary

Tubes/Rails .....32 cages ls.....

Travers limits .....45°

Reload time ..... -

Detachments..... -

CHAPTER SIX

THE MILITARY AND ARCHITECTURE

World wide, the military is one of the oldest institutions dating as far back into the history of the primitive man to the prasent day computarised, military services.

The military has had a tradition of regimentatio n with an unwavering regard for power or command structure. The military organisation itsel is a rather complex one but it's architecture rather entails foundamentalism and simplicity. Thus simplicity is highly emphasised in the military set ups with raspect to its contemprory architecture. Military architecture could simply be subdivided into three classes.

1. The flow diagram architecture or the architecture of horachy.
2. Architecture of parpendicularity
3. Architecture of solidity

In the flow diagram architecture, flow diagrams are used to indicate movements in relation to the distribution and daspusition of structures.

The military aspect of architecture which falls into this group is that of the command posts sturcture, battle formation, form ups for movements and in the communication system.

These aspect expose the intimidation of ranks in the military where the highest in whatever parameter of measure, takes the command.

On the parade grounds, the highest ranking personel takes the front most place, followers by t the subcommanders and lastly the ranks.

In this aspect of "flow diagram architecture" or architecture of Hierarchy", the lowly submisivoly look up to the leader.

Suprise as a form of battle strategy is usually manifested in the proper utilisetion and cordination of time. Being charged with the defence of a country, the military has to evolve coays of supris-ing the enemy through fast movement of troops with other attendant disciplinary measures like silence.

In the Roman Army from where it is assumed this idea has been borrowed, they designed their barracks or roar bases with perpendicular roads

4.1 Barracks (rear base) Architecture

Barracks in military usage referes to the permanent or semi permanent buildings used to house troops aspecially in garisons. These house have all the conviniences and fusulities for human habitation and generally used for the accommodation of the fighting forces and police. Certain military posts in the United states are also refured to as barracks e.g. Jeffersons barracks. In local usage, barracks could also refere to rows of houses joined together, which are erected for gangs of workmen.

The growth of the Nigerian Army over the years made it necessary to replace the old practice of billeting troops in the homes of private citizens by providing specially constructed barracks for military personels. This constructions were ostensively embarked upon around 1970 after the civil war. This was as a result of the problem of housing the troops returning from the war fronts. During the war, homes of private and institutions were commendered by the soldiers for their housing in addition to trenches in the fronts.

Barracks buildings are usually designed to shel-

ters

ter a complet company, battery, or troops and are used in camps and cantonements as well as garisons during peaceful times.

The nature and site of barracks constructions are determined by other factors rather than just the deployment of troops.

Unlike in the United States and British Armies, the Nigerian Army provides special quaters for its military officers commonly refered to as officers quaters. Hence its only the bulk of the other ranks' especially the junior N C Os. In the Nigerian Army, Senior N C Os are sometimes housed in quaters specially designed and constructed for them. These senior N C Os includes sergents, staff sergents and warrant officers class one and two (WOI and WOII). Those quaters are commonly refered to as sergents quaters.

The sites for the construction of Army barracks in Nigeria were chosen based on some factors which includes health considerations and deployment strategies. The deployment of the Nigerian Army is governed by the following factors.

1. Terrain
2. Theeat
3. Availability of good communication network
4. The need to use existing military barracks
5. Effective command controle.

The organisation of the Nigerian Army into four divisions is also based on the above five factors.

Barracks generally do not only refere to only the limits of habitation of military personels but also includes the parade ground and other open spaces for drill and the the logistics. There are also houses for accomodating officers and others for married ones. The troops are catered for by the regimental institute, which also consists of the conteen and tre recreational establishments. Reading rooms coffee bars, gymnasia, billiard rooms and other recreation rooms are provided in the barracks to make life as comfortable as neccessary in times of peace.

Seperate buildings are constructed and placed away as hospitals miniature ranges, guard rooms, cook house, school rooms for children and in divisional and brigafe headquaters or larger garrisons, schools and libraries are provided.

There are very numberouse problems associated with barrack housing withn the Nigerian Army. This is mainly the problem of maintainance. Even though the Nigerian Army is a highly disciplined organisation, one cannot deny the fact that the soldiers especially the other ranks potray a rather careless and somewhat distructive attitude towards the usage of barracks fascilities, especially services such as easments. Most of the services and fixtures provided withen military barracks, are certainly being either over used and imadiquate or mishandled by the soldiers thus resulting into such faults as leakage of plumbing popes and water supply systems.

Even the different units of habitation meant for the soldiers themselves are grossly inadequate in view of the fact that married soldiers with families are housed in single room apartments just like a students hostel room.

It will then be left for the individual soldier to compentmentise the single open space withen to provide for a living room or palour and a bedroom. One can now immagin how a soldier with a wife and four children will live [illegible] apartment of about 7m by 4m.

Generally the bulk of the blame should be put on the designers of these barracks for lack of forsight and intensive feasibility studies. The expected population occupancy of these barracks was highly under estimated by the designers. An apartment that was probably designed to house say 1 - 3 people i.e. a soldier and a dependant or a soldier his wife and perharps just a child is now seen to house an extended family of up to sic or even more.

In recent times, the army has embarked on a campaign to reduce the barracks population by specifying the number of children or dependants a soldier is espected to accomodate withen the army barracks. Any soldier with more than the specified number of family stated will be expected to find an alternative accomodation for the rest in any nearby civil settlement or town outside the barracks

military zone.

Also the concept of placing all easments such as bathroom and toilets to the exteem ends of blocks of apartments in the barracks has resulted intn lack of proper care and cleanliness of these easments. If the bathrooms and toilets had been incorporated right withen the living units or a apartments in such a way as to maintain the concept of sharing by two or more soldiers as required. This could result to a charge of attitude of the soldiers as regards maintanance to the better. There will definately be an improved level of maintance and hygene.

Also the concept of going high rise up to four floors seemed to have been ineritable due to the high density, compactness and easy coordination of troops neccessary for any military order.

The mode of construction too was rather sub-standared and industrialised building system would have been the most appropriate methode for the construction of military barracks in Nigeria as this will antail standardisation of elements and components.

In recent times, new barracks have been and are being constructed in the United Kingdom to incorporate many mordern innovations such as lifts, shower baths, central heating, television, public address systems etc.

In Aden, Singapore and other tropical countries, new barracks includes central air conditioning systems.

6.2 War Architecture (Operational headquaters)

War in the broad sence of it referes to any act of hostilities between human beings or conflicts between opposing forces or principles. This defination leads us to the different types of wars which includes the following.

1. Civil wars
2. Political wars
3. Holly wars
4. Class wars
5. International wars
6. Inperial wars

But in a narrowed modern military sence of the word war, it can be defined as the kind of operation or campaign in which the contention of armed forces (Army, Navy and Airforce) is carried on; fighting as a

department of activity and as a proffession or as an art;

War in military usage is the act of forwarding group ends by use of armed forces.

Architects over the centuries have not been able to give a unique, unified and universal defination of architecture to any degree of exactness. Many people have through history defined architecture in different ways but there are a few acceptable expressions used for the defination of architecture today.

Architecture could simply be defined as the art and science of building.

From the above defination, it is prominent that the type of architecture needed by soldiers in times of war and for the purpose of war will be quit defferent from that of peacfull times. Thus the fussion of war and architevture will lead us to a kind of construction and architecture specially for war and known as fortifications.

Fortification is the art and science of fortifying places in order to defend them against and enemy. It is the military art and science of strengthening positions against enemy attacks by construction works.

The act of fortification has undergon a lot of metamorphoses over the years as a result of technological advancement of arms of war. There are bascially three types of fortifications.

1. Permanent fortifications
2. Semi permanent fortifications
3. Field fortifications

Generally, the main purpose of fortifications are:

1. To obtain the greates advantage from ones own strength and weapons
2. To prevent the enemy from using his resources to advantage
3. To shield the defender
4. To delay and minimise or reduce the impetus of the enemy by obstacles

Permanent fortifications are those usually continuously built in times of peace to defend some unlnerable points in the defence of a country. Mobility in war as in the second world war and the comming of unclear weapons have largely made permanent fortifications obsolet.

Semi parmanent fortifications are those errected when war seems to be eminent and care is being taken to see that all points of defence are made secure.

Field fortifications e.g. such military works as are constructed by military engineers during an operation which have no real permanence and which are only of value during the operation itself. Such works are built to strengthen the positions taken up by an army and to provide as many obstacles as possible to the attacks of the enemy.

Fortifications of this types were neccesitated by the principles and strategies of war and available arms which gave defence a priority over attack.

Practically up to present time; the great object aimed at by field engineers was to obtain command and to defend by obstacles; nowadays, military engineers aim at obtaining concealment and protection.

The outstanding lessons from the two world wars is that it is practically useless to depend on permanent works of defence constucted some years before a campaign because the continues progress of scientific and industrial development in relation to effensive weapons more than counter balances the military values of such works.

In view of the fact that warfare today entails both advancing, attacking and defending, it then renders the use of past types of fortifications useless

since they can only cater for defence. Thus military works of architecture for the purpose of war can be better refered to as field (military) architecture. This kind of architectural works should incoporate all aspects of speed in errection, flexibility in assemblage of components and 100% temporary as the war is very likely to progress in the form of advance. This housing units should be dismantable, compact and light weight to ease the problem of mobility in mordern warfare.

Field defence in mordern warfare is not usually as a result of massive and monumental construction works as was the case in war history but as a result of effective deployment of sophisticated arms and efficient command and coordination of troops.

The architecture of battle fields should thus emphasise simplicity, economy, maximum utilisation of available space, compactness for efficient harmony of force and most of all high weight and dismantable for the advancing troops.

Commandeering of civilian houses during wars should be as much as possible be discouraged. The act of construction itself is an aspect of military engineering.

The use of tents, posts and cordages has always dorminated the kind of materials used in the types of military camps though not itself defensive as a fort to even low calibre missiles.

The prolification of mordern artillery hardware has dominated the defensive capabilities of troops rather than massive constryction works.

Trenches are still very vital aspects of field fortifications in mordern times and are very likely to persist into the future decades.

CHAPTER SEVEN

CASE STUDIES

A camp could be defined as a collection of tents or huts which is used to lodge soldiers or troops on a campaign or during field manouvers. On active service, it is sometimes difficult to transport tennage for the troops and contonments hence bivovacs (Q.V) take their place. But when the force is comparatively small and stationed in a hot country, the troops are still placed under canvas. The different canwas were distringuished by various ensigns in the daytime and by different collourad lamps by night. Thus a field hospital has a white flag with a red geneva cross or a red camp; a conter or a green camp; an ordnance store contre has a blue flag with a red center or yallow camp.

7.1 Case Study - I

Camp Roman:- The Romans were the first to carry the science of encampment to any degree of perfection. The camp was the same in outline from the time of Polybius to the fall of the Roman empire and was in form as follows:

The site was an exact squar with sides of 2017 Roman feet. The via principalis or principal street, 100 ft wide divided the camp into two equall parts. Facing the middle of the via principals was the praetorium or commander in chiefs tent. There were four gates in the camp, one at each end of the main street named.

1. Porta principal's dexta (right principal gate)
2. Porta principalis sinigtra (Left principal gate)
3. Porta preatoria (commander in chief's (praetoria) gate)
4. Porta decumana (decuman gate)

The whole camp was sarrounded by a vallum (rampart) and a fossa (ditch). The former (valum) was composed of earth from the latter (ditch) and was surmounted by a palabase.

The basic critique I found with this type of camps is it's rather parmanent features which makes it static. It was though a military camp but I'll prefere to refere to it as a military fort. This could not be ideal for the conventional warfare of

today which requires a lot functional dynamics and flexibity for a continuag war

As As I have earlier mentioned, the architecture of a battle operational base does not require any form of permanence, rather, it should be dismantable, compact or foldable, low volume cubage and hight weight for easy transportation from one place to tha ther as a neccessity for morden warfare. This is Sermon to say that all my case studies apart fom tha first, only existed for a 'about three weeks and latter dismantled.

These camps were basically used for bush camping excercises undertaken by "boy" from the Nigerian military school over a span of about four years. This is to say that as at the time of carrying out this research (1986) no structures were still in existance on the sites specified except for some few masonry construction at the Kuru camp near Jos. The parmanent houses are only meant to house the trainers of any bush camp excercise especially the officers.

I happen to have been fortunate enough to have participated in four of these operations during my earlier college days in the Nigerian Military School Zaria (1975 - 1980).

7.2 - Case Study - 2

Operation black falcuns - Yemoji camp

Although this camp obeyed certain principles of site selection with regards to availability of natural water but disregarded a lot of architectural, functional and human problems.

Critique - Site location - This camp was located at Yemaji village along the high way between Ijebu-Ode and Ekpe. It was situated right in the heart of this civiliam settlement which caused a lot of military civilian friction. The absence of mess fascilities

also propounded the problems of this location through the inflax of soldiers into the villages for the porchase of such private nouds as cigaretts bear and provisions. This act usually results results to a laps in military discipline and molestation of civilians by the soldiers.

There was also not enough land space causing the congestion of tents and compact desposition of the many tent units just near the manucipal water works

--- Structures: The structural elements used here were of the basic tapolin tents (5mx8m) pitched at the top by a wooden post and supported by cordages pected into the ground. Ir is basically a membrane structure in its entirety which though not highly combustable as a situation of war may warrant the use of huricane lanterns instead of electricity as s security measure. No substurctures are only works are neccessary as the entire camp stuructures are only menat to be tempory. A typical floor plan is usually rectangular in nature with no flooring material.

--- Function Although certain functions were provided for but others were completly lacking.

FUNCTIONS

Existing		Lacking	
1.	Quater guard	1.	Toilets (inadequate)
2.	Boys camping huts	2.	Laundry
3.	Senior NCOs Camps	3.	Mess
4.	Junior NCOs Camps	4.	Admin block
5.	Armory	5.	Maintanance workshop
6.	Cook house	6.	Bathing places
7.	MT yard	7.	Field water works
8.	QM store		
9.	MI room		
10.	F.U.P.		

--Site Zonning The motor transporr (MT) yard was too far away from the form up place (FUP). The quater masters (QM) store was also isolated from the cook house

7.3 Case study - 3.

—— Operation wild cats - Kianji Camp

Although this camp is situated in a site quit ramot from any nearby civil settlement and close to one of the Kianji dam tributries as a source of water supply yet it is lacking in the provision of certain

basic facilities.

Critique

—— Site Location: This camp was located at a point between Kinji dam and new Bussa toron. The site had it's own problems with respect to teriain. The camp was located on a rather very steep slope near this Niger river tributary thus making it not quit condusive for the tent types of structures being usad for shelter. No provision is usually made for the flooring and levelling of the internal space as almost no substructural work is undertaken during erection. A more flat site near the stream would have been a better location for such camp structures.

—— Structures: The structural elements used for sheltering here are the same as in case study[2] cullminating into similer problems as previously explained.

—— Functions:

Functionally, provision was not made for certain vital facilities such as toilets and batting area. Instead troops are expected to just deficate in the open areas around the camp site which could poise a seriouse health hazards to the 'boys' and soldiers in

training. Also the nearby stream is used as a bathing place for both solders and "boy". The officers had a caved and seperate place near their sleeping tents for both bathing and toileting. Pit laterins were duged up for use by the officers.

The troops also eat in the open areas around the FUP, the cook house or even take their meals into their sleeping places. A closed a shaded kitchen and bukateriate would have been better used for this purpose for a little degree of comfort at least.

No recreational fasilities such as a mess and kiosks were provided for either the boys or NCOs. Only the officers were provided with a mess for drinking and eating.

The rectangular forms of the tents though ensured maximum horizontal spaces on plant but arit functional enough with regards to exit speeds.

The motor transport yard was quit reasonably placed in relation to other vital structures around it such as the FUP, cook house and quater masters store.

Functions

	Existing		Lacking
1.	Boys camping units	1.	Quater guard
2.	Junior NCOs camping Units	2.	O.R. mess and cafe
3.	Senior NCOs camping Units	3.	Water trentment plant
4.	Armory	4.	Administrive tent
5.	Motor transpor yard	5.	Maintanance works
6.	Medical inspection room	6.	Lamdry services
7.	Cook house	7.	Toilets (not adequate)
8.	Signals unit		
9.	Quater masters store		
10.	Generator tent		
11.	Officers camping tents		

7:4 Case Study - 4

Operation Damisa - Outsen kuru camp- Jos

This camp was situated in a fairely very ideal place off the major road between 3 rd armoured division headquaters Rukuba dnd the Jos main town. It was located along ehe minor road leading to Miango settlement at the base of the Dutsen Kura hills.

The camp was bounded on two sides by two natural streams with good and pure natural water. The water treatment plant was situated at the confluence of these two strems. The camp was also bounded on one side by the untared road to maiango village.

The site topography was also fairely good and flat for the location of such a military cam. Though there were scattered settlements and cultivated land near this camp yet there was enough training and operations fields, for mock warfare.

Most of the problems eminent with this location are the same with the last two case studies with regards to the provision of fasilities.

Fasilities

Existing	Lacking
1. Boys camping tents	1. Toilets (not adequate)
2. Form upp place (FUP	2. Laundry services
3. Arms store (Armoury)	3. Mess
4. Senior NCOS camping	4. Bath rooms
5. tents	
6. [illegible]	

Existing	Lacking
5. Junior NCOs camping tents	5. Administrative tent
6. Medical inspection room (MIR)	6. Maintainance workshop
7. Signals tent	7. Quater guard
8. Quater masters store (AMs)	
9, Motor transport yard (MTYd)	
10. Cook house (kitchen)	
11. Officers camping tents	
12. Field water works	
13. Electrivity generating plant	

7:5 Case Study -- 5

Operation Golan Hights - Kuru Camp - Jos

This camp is located in Bukuru town near Jos and it's the only such camp in the country with some few parmanent structures meant to house the trainer officers.

Critique

Location - This camp is located withen the urban civilian settlement of Bukuru town resulting

into a major problem of military civilian friction. Kiosks and mess fasilities were not provided for both the NCOs and "boys". This meant that the troops will not of the time enter into the urban areas to purchase their private needs resulting to a laps in military discipline.

Structures - Certain parmanent structures are available for re-use e.g. the officers camping units and the armory. This is not very ideal and quit possible in real war situations because of the time and risk associated with battle strategies. The remaining structures are made up of the usual membrnace tents centrally supported by wooden posts and held in place by cordages peeked to the ground.

Functions - No special provision was made for such vital fasilities as toilets and bath places. Troops usually make use of the open tin mining ponds for bothing and the open spaces around for defeacating. No mess or dining fasilities were made available for use of the other ranks (O.R.) thus feeding is done in any place convinient to the individual soldier.

Cooking was also done in the open air with all it's prevailent health risk.

There wasn't even enough open spaces withen close viscinity of the camp for field maneouvers meaning that troops would have to transported eatride the camps to open field for maneouvers. This ment more cost and inconviniences.

Even though the site planning of this camp was to some extend in consonance with the military planning concept of herachy but the junior NCOs, some of whom are expected to be directly attached to officers are two far off.

The water supply system herelis rather very poor and unfortunate.

Fasilities

Existing		Lacking	
1.	Quater guard and guard room	1.	Toilets (not adiquate)
2.	Boy camping tents	2.	Laundry fasilities
3.	Arms store (Armory)	3.	Mess fasilities
4.	Senior NCOs camping tents	4.	Bath area
5.	Junior NCOs camping tents	5.	Administrative tents
6.	Medical Inspection Room (MIR)	6.	Tyeld water works

7. Form up place (FUP)
8. Signal tent
9. Quater masters store (QMS)
10. Motor transport yard (MTYd)
11. Cook house kitchen
12. Officers camping tents
13. Water tank reserviour
14. Generating plant

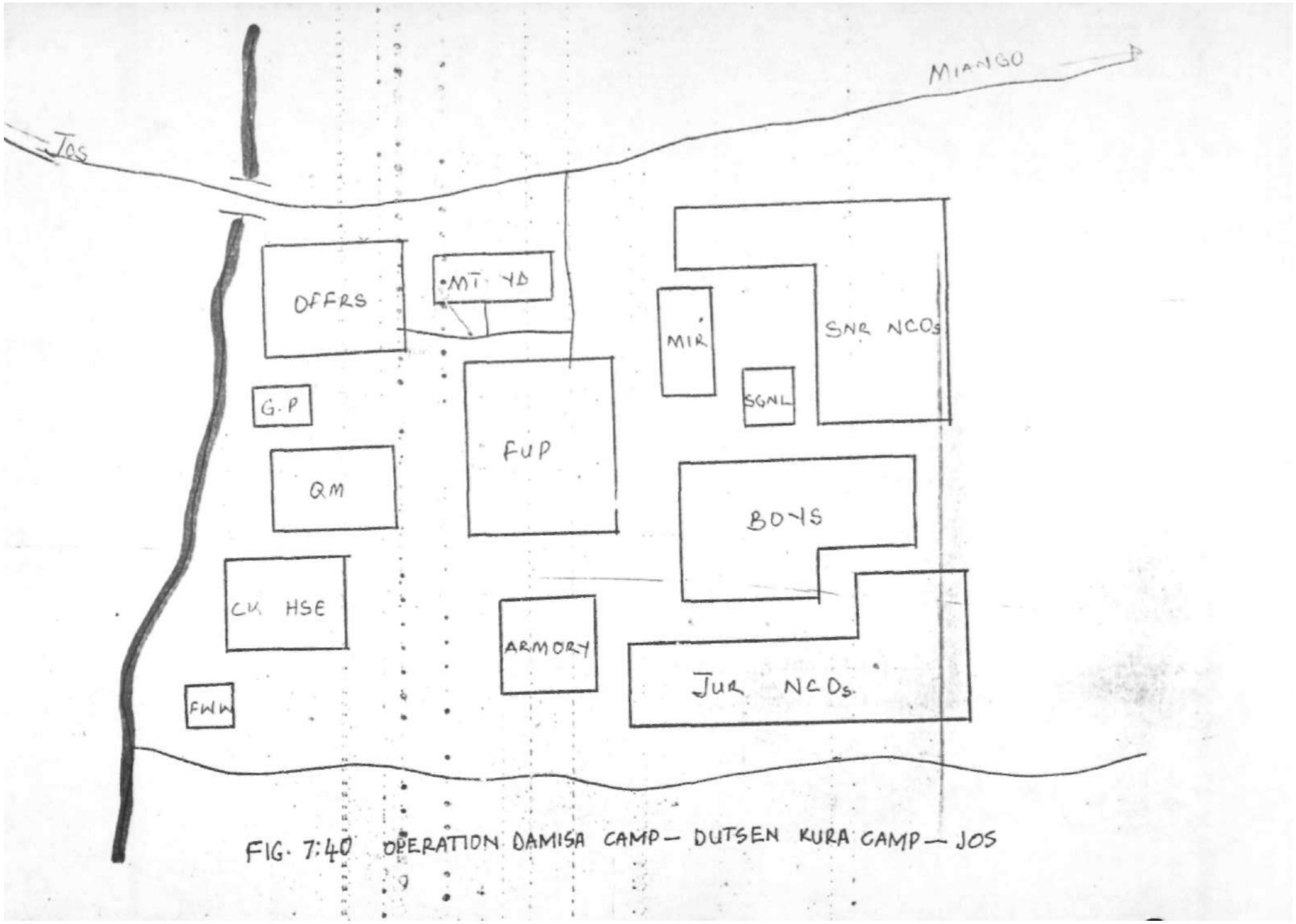


FIG. 7:40 OPERATION DAMISA CAMP – DUTSEN KURA CAMP – JOS

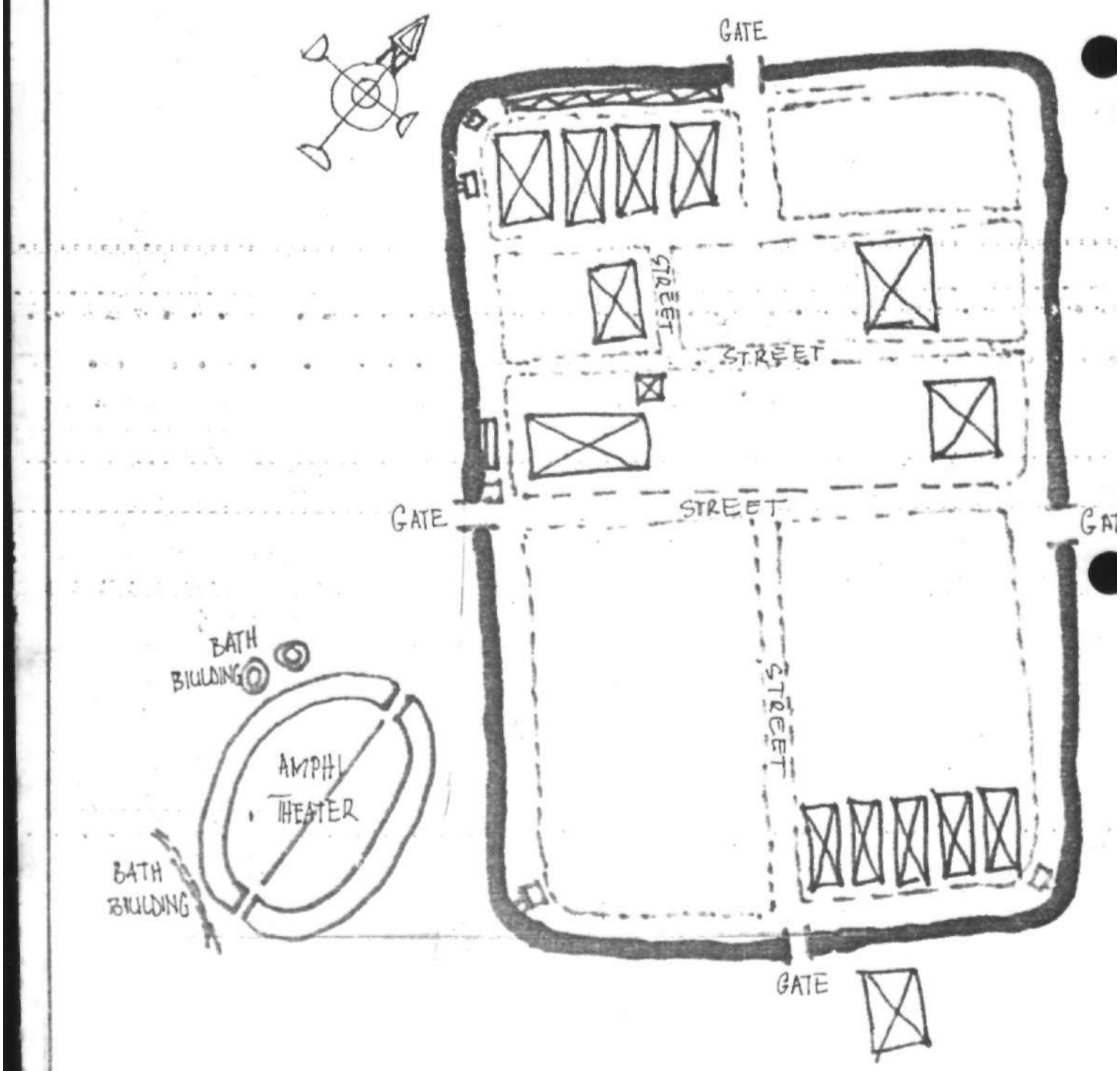


FIG. 7:10 CAMP ROMAN

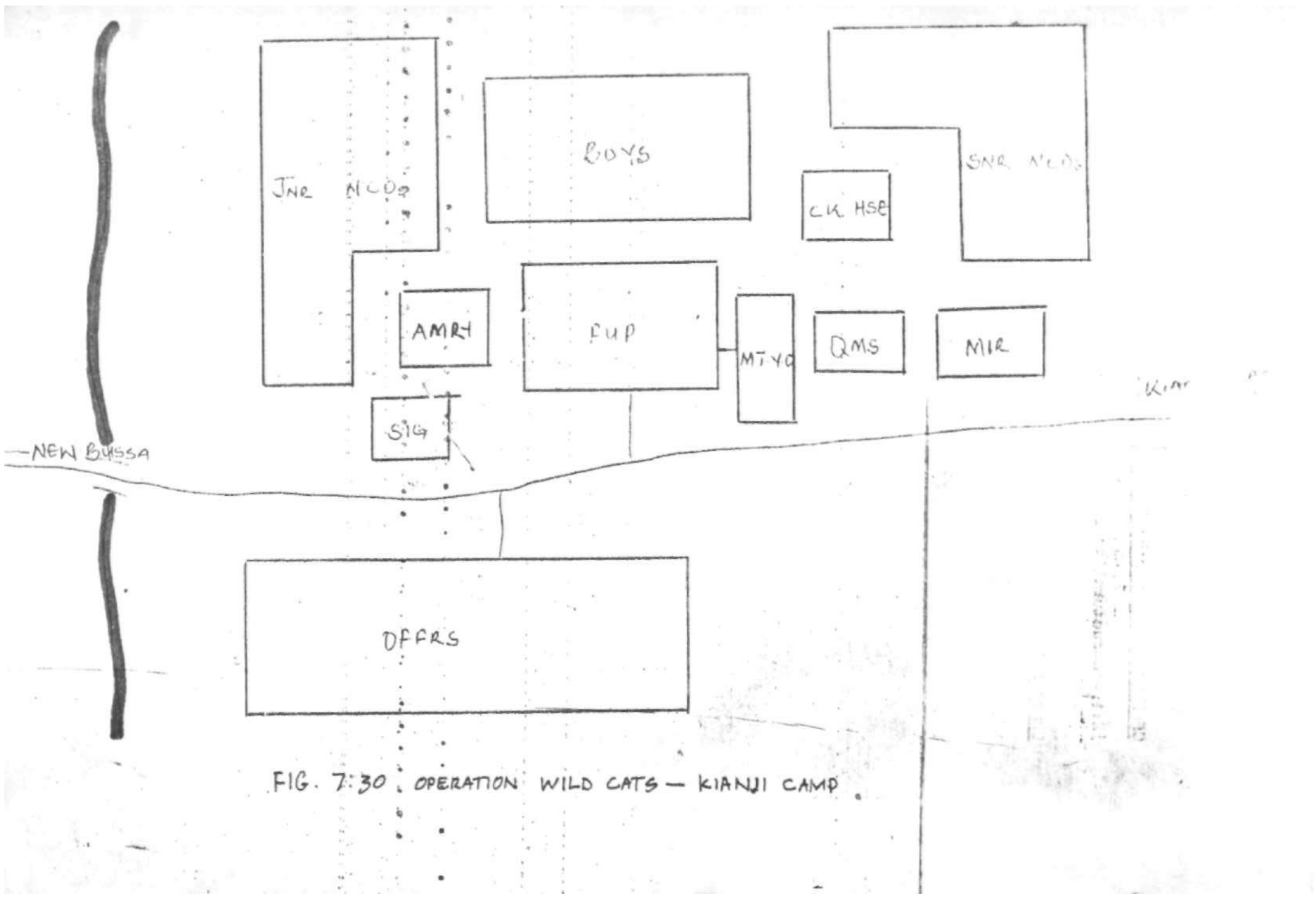


FIG. 7:30 OPERATION WILD CATS — KIANJI CAMP

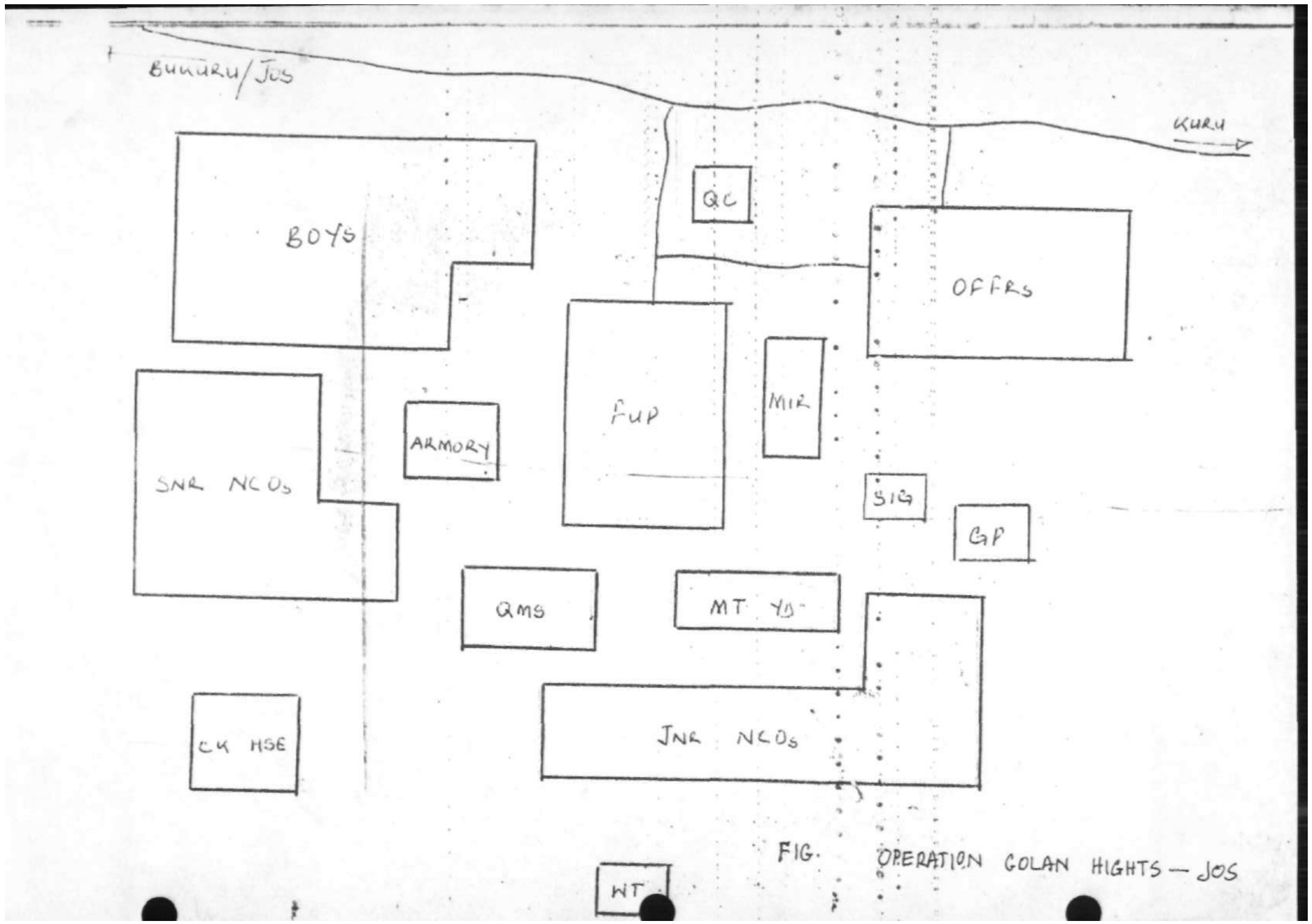
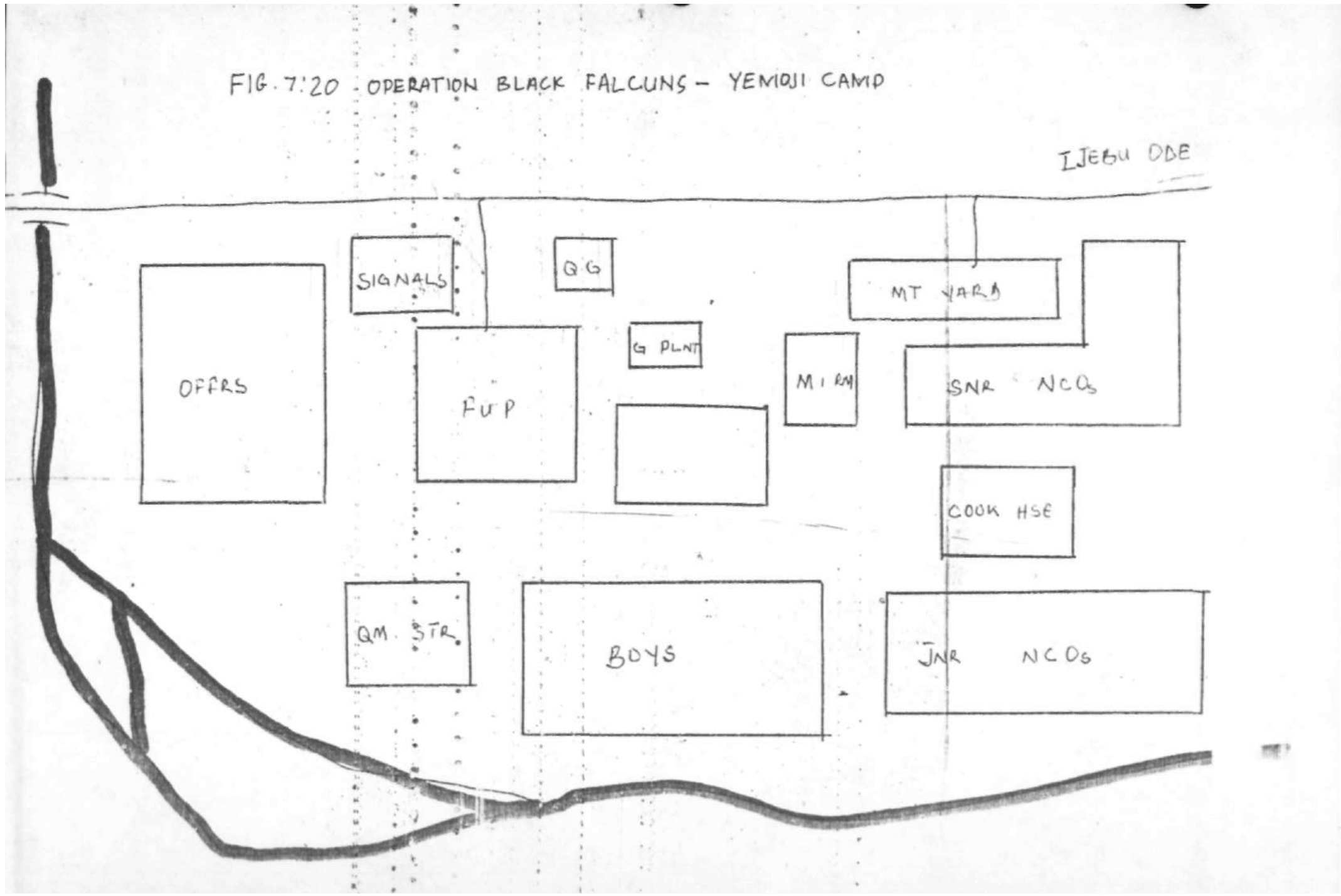


FIG. OPERATION GOLAN HIGHTS — JOS

FIG. 7.20 - OPERATION BLACK FALCONS – YEMOJI CAMP



CHAPTER EIGHT

FEASIBILITY ANALYSIS OF MOUNTAIN SAVANAH WARFARE IN NIGERIA

The primary essence of the Nigerian Army as earlier mentioned is to defend the territorial integrity of this great country from land, sea, and air.

The confidence reposed on any army and the financial involuement of the government means that all efforts must be made by the army to justify these luge investments. For instance, during the 4th national development plan 1980-85 about ₦1,200 million was made available for the programs of the Nigerian Army.

The only justification for this kind of huge investment of money for the defonce of this country can only be shown in the ability of the army to perform according to expection in battle. Battles do not usually come up that easily and fast but they do however come up.

It will only be a smack of seriouse irresponsibility on the side of the Nigerian Army to wait for an attacks before preparing for battle. Even though this countries army cannot be calssed as unprepared this research work aims at making the army more prepared.

The preparedness and conbat readyness of an army can be viewd frnm numerouse perspectives.

For an army to be able to totally stand to the test of any invasion of the territory for which it is that armies responsible to defend; that army must be very much accustomed to the terrain types of that territory. The reasoning behind this is not far fetched; if soldier is not trained to bear on the tacfic and obvious hardships of a very rocky and mountanouse or savanah terrains, for example, the moral of such a soldier and the army as whole deplets rapidly as he gets the pinch of such a fearful situation for which he has not been previously prepared for.

Nigeria as a country is very much blessed with voriouse terrain types ranging from sahel savanah in the far nurth and the swanpy forests next to the sea in the south. Also mountains, hills, plateans, valleys and plains also abound the Nigerian terrains. This thesis aims at analysing the eminent military problms of the mountain and savanah terrains of this country. The essence of special warfare to an army cannot be over emphasised.1 The resultant preduct of this analyses shall be to encourage regular training and operations

by the Nigeria Army in this special terrians through designing a camp in one of thses terrains.

These camps in military parlance could simply be refered to as infantry warfare camps or rear base for military operations.

Moving around and across Nigeria exposes to a keen observer, or variegated territory.

From the military point of view, the Nigerian terrain could be a costly asset to a forward marching infantry army. The Nigerian Army is such but as I have observed and experienced has not been adequately and impressively utilising this territorial military advantage and blessing.

Nigeria has five stragegic terrain types which if properly exploited and mastered will produce a varile and ever combat ready carmy. Going through any book on the 2nd world war campaigns in the far East Asia particularly in Burma and also some experiences narated by General Moshe Dayan on his participation as an observer in vietnam, in one of his books, one outrightly sees the overimportance of the knowledge of a terrian type for military excercise. Also in the book by General Alex Madiebo on the Nigerian Civil War struck home the big need to get the soldiers trained

on all the available terrains in this country no matter the hardships entailed there in.

This need is the bases for this thesis and my 'bush camping' gave me the impetus to tackle this problem of special warfare with respect to the Nigerian terrain and Army.

"The best, and only, military laboratory at the time was Vietnam. So I agreed to write newspaper articles and was accredited as a war correspondent. When he heared about it, as I latter discovered, the United States secretary of Defence Robert McNamara ---- to open all doors ------- So in early August 1966 I found myself in an American helicopter flying from Danany to the rear headquaters of 1st Air calvary Division. From there I was flown toward to join a jungle patrol. "We circled the camp before landing -----And beyond that, closing in from all direction, the jungle, a thick dark green mass of vegetation unlike any terrain I have ever fought over".

"American warfare in vietnam was primarily helicopter warfare. There were altogether 17000 helicopters in the country when I was there - more than all the all helicrafts in Europe----------

It was the American answer to the problem of movement in the jungle-----"

Ninety out of every onehundred battles in vietnam war began on vietcong initiative, when they deamed the circumstances of favourable------"

"------- the (Vietcong) were expert at moving through the jungle and when they wished to avoid combat, the split their units into small groups of not move than fifteen men and each took a different rout to reach the new rendervous.

"-----that the airm calvaty (helicopters) was the perfect, though expensive, answer to the problem of mobility in the jungle. There was no place they could not reach. But there units quietlg, secretly, without detection. The helicopters announced themselves every inch of the way and advertised every landing in the jungle. The vietcong, on the land might take three months to walk from the North but neither enroute nor before their engagements did they give themselves away".

The above excerpt from General Moshe Dayan's book on his life, indicates the obviouse advantage of knowing the terrain well.

8.1 Savanah Regions of Nigeria

More than two thirds (⅔) of the entire Nigerian land area is covered by the savanah vegetation. This in essence could also mean that a torgugh understanding of the Savanah terrain by Nigerian troops will also mean an over 70% battle readyness with respect to defence. There are three major types of vegetation zones in the country.

1. The swamp forests of the coastal belt
2. The high forests of the humid south
3. The Savanah of the subhumid middle belt and north

The parttern of vegetation distribution in Nigeria follows closely that of rainfall distribution. The most striking features here are the break in the continuity of the rain forest zone in the Western Yoruba provinces and the South wards penetration of the Savanah grassland conditions in the dry zone of Oyo providnce and also along the Cameroons upland belts in the extream East. This two features are of some vital importance to the feasibility of Savanah oriented maneavers in this country. The replacement of rain forest by a more open type of forest in the provinces of Oyo and Abeokuta provides an environment

more infrnit and more favourable to man them the rain soaked forests of the east. The open Savanahs of Oyo and the Cameroons represents extensions South wards of the great belt of Savanah grasslands of Northern Nigeria and, like these latter, affered no serious obstacles to the extension of military power based on calvery; in consequence, it is in these two areas that Mahammedan and Fulani influences archieved their greates south wards penetration during the nintaenth century.

The Nigerian Savanah regions are basically divided into six belts.

1. Dirived Savanah
2. Southern Guinea Savanah
3. Norther Guinea Savanah
4. Sudan Savanah
5. Sanel Savanah
6. Jos Plateau and mountain vegetation

The northern limit of the derived savanah represents the probable climatic limit of high forest. Beyond this limit, over much of the middle belt and the north, the dry season is severe and protracted annual rainfall totals drop bellow 112cm and forest is replaced by Savanah as the climax vegetation.

The Southern gunea zone represents a transition zone between forest and Savanah with a form of "transition woodland" as its climax regetation. Small patches of such woodland, consisting of both fire tolerant and fire tender trees (many of the latter having high forest affinities), can still be seen but over laxg arears the vegetation has been degraded by fire and farming into open savanah woodland with tussocky grasses of 1.5m - 3m high and short-bold, braad leared trees up to 15m in hight. Tgis zone is seept annually by fierce grass fires; in consequence, though the typical trees possesos remarkable powers of recuperation, fresh sucker growth is usually burned back and the trees grow gnarled and crooked and are useless for timber. Local variations on this general paterm, due to local soil variations may be recognised; thus the occasional rocky hills which break the monotony of the Plateau surfaces have an irregular, brocken vegetation with an aboundant fire tender climbers; while the more eatensive fload plains support a tall grass vegetation with wide spaced trees, especially fan palms.

The climax vegetation of the Northern Funea zone consists of broad leared Savanah woodlands;

representing a western estension of the great miombo woodlands of Eastern and Southern Africa. When well developed, the tree cover many attain hights of a - 14m, forming a continuos cover which may be dense enough to suppress grass; more usually, as a result of cultivation and grazing, the vegetation is relatively open and grass is dominant, though shorter. Than in the Southern Gunea zone. The larger floads, plains carry a distrinctive vegetation of grass and raphia or fan palms, while relatively dense gallery forest occures along some of the streams; in this gallery forest, the dominant tree species have Savanah affinities and this contrasts sharply with the gallery forest of the Southern Gunea zone in which the trees are simillar to those of the southern high forest. The human modification of the vegetation cover is very marked in this zone and the vegetation arround the larger settlaments are sarrounded by a zone of more or less parmanent cultivation withen which the natural vegetation is completely suppressed. This gives place to a zone of regrowth Savanah which is cultivated for short periods and then grazed, and this in turn merges, on the outer fringe of the village

territory into savanah woodlands, locally exploited for fuel but in remoter areas mature and relatively undistrubed in character.

Withen the Gunea zone, the Jos Plateau merits mention as a districtive region. It's climax vegetation appears to have been savanah woodland, and the vegetation includes several spedies with south or East African affinities. It has however suffered extensive and sereve degradation by am,man, with the result that today woodland is confined to the steep and less accessible Plateau margins while most of the high Plateau consista of open grassy plains. These are hearily farmed and grazed, and the only woody vegetation surviving consists of occasional patches of coppiced shrubs.

With decreasing annual rainfall and increasing length and severity of dry season, the Gunea Savanahs give place to sudan Savanahs, the zone of transition between the two vegetation types running broadly east-est through northern Zaria province. The typical Sudan vegetation is more open and favourable to man than the Savanahs to the South (though this openness is certainly in part man - inclucad) and consists of fine-leaved, thorny trees (especially acacias), often of Saher affinities, mixed with broad leaved species of Gunea

affinities. There is a more or less continuous grass-cover, the grasses being short and feathery and contrasting with the tall, coarse, tussocky grasses typical of the Gunea zone, while many valleys carry a discontinous belf of fringing forest. This consist of a dense tangle of dry-zone spedies with isolated larger trees and patches of tall grass, and it's very different from the dense ever green gallery forest of the Gunea zone. As elswhere in the teritory, the vegetation has been extensively modified by man, the modification being most stricking in the closely farmed areas around the larger towns; here, the original plant cover has been more or less completely obliterated and replaced by continouous stretches of arable land dotted with farm trees, such as the shea butter tree, acacia albida and tamarindus indica.
In view of this profound alteration, it is difficult to decide with certaintly what was the original climax vegetation. Though the general similarity of environmental conditions suggests that it was probably similar to the mutemwa vegetation of Northern Rhodesia, consisting of "a dense understory of deciduous shrubs, with larger emergent trees forming a rather open canopy and grass absent or sparse". Relict vegetation

of this type survives in isolated rocky areas throughout the Sudan zone.

Vegetation of the sahel type is represented only in the exteem North-East of the country, the boundry between the Sudan and Sahel Savanahs coinciding broadly with the 6m Isohyet. Typically the Sahel vegetation consist of open thorn Savanah some 4-10m high and with a sparse, short grass-cover; acacia Seyal forms almost pure stands in low-lying sites. Owing to the in accessibility of mountaneous areas, data on the vegetation of the cameroons highland belt is extreenly fragmentry. In the South, on Carmaroon mountain itself, there is a distinct altitudinal zonation of the vegetation. Between 5,500 and 6,000 feet humidities are high for much of the year and the vegetation may convinently be discribed as "mist forest"; it is characterised by an often broken and irregular tree canopy, and by a profusion of mosses, epiphytes and tree ferns. Above 6,000 feet, the vegetation is drier and more stunted, tree ferns are absent and the mosses and epiphytes of the mist belf are replaced by lichens; this forest zone gives place to grass lands: at lower levels coarse and

tussocky and dotted with stunted trees; at greater elevations (above approximately 10,000 ft) shorter and more compact with thick cushions of moss. This zone of rolling mountain grasslands extends northwards into Adamawa and has played an important role in the diffusion of the Fulani and their pastoral economy

8.2 Mountanenus Regions of Nigeria

Nigeria could be said to be a land of contrast because of the variety of its topograph: cal features. Mountanouse regions are greatly scattered all over the country with move withen the Savanah belt. These mountanouse regions can be divided into five basic topographical units

1. North central Plateau
2. Eastern Nigerian mountains
3. North Western plains
4. South western plains and ranges
5. South - East central hills

8.2.1 North Central Plateau

The most prominent and most imposing highlands in the country are found on the North central Plateau which rises gently at about 2000 feet on the lowlands to its highest peak of 5829 at the shere-hills on the Jos Plateau. This could substantiates the concept that any military operation or maneurer executed on the shere hills will qualify the soldier to adequately engage and defeat the enemy on any mountanouse (or commonly refered to difficult) terrain withen the borders of this country and anywhere else deem. Most of the

prominent uplands are almost barren of vegetation except for the weather resistant and water conserving cactus and acacia plants. The terrains are mostly rocky. It is not very likely that this part of the country can suffer any direct dien military confrontation because of its distance from the borders but with the present day military strategy of paratrapping, enemy forces could be paratrooped right into the heart of the Nigerian teritory. But with this countries strategy of mountain Savanah warfare as special tactical force, the paratrooped enemy could be given the greates shockers of their lives.

Promiminent amongst the highlands in this zone includes

	Hight above sea level
Shere hills	5829 ft
Tembia hills	5569 ft
Bumail hill	2393 ft
Ra hill	2299 ft
Kutchi hill	5202 ft
Zaranda hill	3800 ft
Shetu hill	4035 ft
Limi hill	3864 ft
Shira hill	2074

Rhino hill	3015
Baza hill	1680
Lerda Hill	1803
Zuma Hill	2262

8.2.2 Eastern Nigerian Mountains

Land forms in the North Eastern part of Nigeria generally lie between 1000 - 5000 ft above sea level. The highest point in Nigeria (Wadd mountain peak - 2419m) is found in this region. The mountanouse ranges here are more rocky than those found in the North Central Plateau. This country stands the greatest risk of military invasion through the almost continuous extend of mountains bounding your entire Esatern border. Mountain warfare troops can be effectively employed here to bring the wanting enemy to submission.

Prominent amongst the hills and mountains in this region includes:

	Hight above sea level
Kerawa hill	4409 ft
Wiga hill	2626 ft
Vogel mountains	5000 ft
Chapel lindu mountains	6673

Chapel Wadi mountains	1936
Maigwan mountains	5887
Urban hills	3295
Kumbo hills	2214
Vere hills	2350
Lamurda hills	2390
Kunatatu hills	4047
Ovemaka mountains	5962

8.2.3 North Western Plains and Ranges

Land forms in this part of the country generally lie bellow 610m above sea level. They are less rocky in nature and better refered to as hills of inselbergos Scattered all over the area.

In the advent of any military intervention or campaign in this region which is also an open Savanah with distant horizon and long unabstructed view, the concept and strategy of Savanah warfare will be better employed. But a combined operation of mountain Savanah warfare will be the best alternative.

Prominent amongst the hills and insel beges found this region includes;

Hill	Hight above sea level
Bamji hills	1205 ft
Metsenkai hills	1164 ft
Yakuniji hills	1242 ft
Chiri hills	1015 ft
Ransa hills	1038 ft
Buzi hills	1117 ft
Ganjiji hills	1072 ft
Tama hills	1982
Diriri hills	1189
Yanga hills	1535
Dunia hills	2696

8.2.4 South-Western Ranges

Highlands in this part of the country could be rocky or just errosion resistant mountains in the form of extensive inselberges. They are fairely more vegetated than plainly rocky like those of the Jos Plateau and Eastern Nigerian bordar mountains.

The principal strategy for warfare in this region should be geared more towards internal defence than attack. The strategy of forest or jungle warfare will be better employed here.

But a combination of jungle, mountain and marin operations could yield the best results. The intricater corrolation of terrain types here could place our troops at the best advantageous position.

Prominant amongst the hills here includes:

Hill	hight above sea
Apata hills	2500 ft
Epemi hills	2079 ft
Idanre	3217 ft
Effon Ridge	2380 ft
Ilehe hills	1170 ft
Oba hills	20009
Alashia hills	1200 ft
Abi hills	1684 ft
Ikinri hills	2137 ft
Yampodi hills	1022 ft
Ososo hills	2145

8.2.5 South-East-Central Ranges

The Landform types here are mostly Cuesta which includes escarpments and less rocky hills and Plateau.

They are usually thickly forested just as it is in the South-Western region and less rocky too. During the last Nigerian Civil war, the Biafran troops maximised the better understanding of their terrains as a battle strategy to hold this whole country to ransom for two and half years in a sustained and intensive civil war. A good knowledge and understanding of the various terrain types in this country cannot then be over emphasised.

Prominent amongst these terrain types in this region includes the following.

Hills	Hight above sea level
Apro hills	1622 ft
Enugu and Awgu escarpments	2000 ft
Udi-Nsuka Plateau	700-1800 ft
Awka-Orlu uplands	1100 ft

CHAPTER 9

Any design project should begin with a background data search. This preliminary investigation of project needs relevant issues and exiting information serves as a bare for the take off of the design project. It al so helps in establishing project goals, organising, programing effort and documenting whatever data are available before futher investigation.

The objective of this background data is to obtain and organise as much usefull information as possible and to analyse existing data by sorting out relevant informations and determining what needs futher investigation and analyses.

Historical data

The Jos area has one of the earliest evidence of human settlement im west Africa. The area is said to have been first inhabited by pagan tribes living in scattered communities However, the opening up of the area to mordern settlements and commerse own it's origin to the development of tin mining industries,

The town of Jos itself was laid in 1915 with seperate areas for various ethnic groups most of which were none indegens to the area. The town was in two sections, Jos township and Jos native town. The township consisted of a commercial area adjacent to the railway line and G.R.A. The native town was situated to the north of the township. The township was administered through a provincial commisioner while the native town came under authority of the native system of administration with a town council headed by the chief of Jos. The two town were physically seperated by the line of the Bauchi light railway line .

I Immigrants from many parts of Nigeria were drawn to the employment opportunities created by the growth of the town.

The tin industry and its associated urban development have given rise to many distructive features in the settlement pattern such as dispersed expatriates and elite housing, mining camps, roads and railways.

CHAPTER 9

9:1 - SITE SELECTION CRITERIA

A typical camp provides spaces and fasilities of average size totalling about 200 and above boys or men. Which is the accepted max size for effective administration and programing for a boys scout or youth camp, effective administration and the maximum number of troops is between 10-14 totalling only 200 boys as maximum size. The main portion of the camp in this case should cover about 180 acres for living units and other basic facilities. To provide buffer zones and other additiobal program facilities, for a boys scout camp camp, the area ranges from 200 acres and above.

Im the case of a boys or youth camp, water fronts or swiming pool with showers is usually installed near the camp centre but in amilitary camp of short short, all these are unnecessary luxeries.

To determine the best possible layout for a particular site, a clear understanding of established principles and standards is necessary. The application of these principles will be affected to some extend by the character of the particular site and its location but this should not be considered sufficient reason to lay aside well proven foundamentals.

The following principles (except statement on multiple camp reservations) apply in the layout of short term camp, a single long term camp and each camp in a multiple camp reservation,

Priority is first given to the location of the troop campsites. The priorities considered here are:-

1 - Good tarrain with not more than 7% slope

2 - Approximately 3 to 4 acres of usable land to provide for 6 to 10 patrol sites (2 - 4 to be used at one time).

3 - Good drainage to provide run off and to permit disposal of waste water.

4 - Good soil to permit driving of tent stakes and pegs.

5 - Cover ⊖ sod and/ or trees depending on the site

6 - Spacing - Troop sites to be at least 450ft apart, centre to centre and at least 450ft from any progamed area or building.

7 - Distance - maximum distance from a troop site to such points as the water front or central lodge should be about 1,800ft. In some instances, troop sites have been successfully located up to 2,500ft from the central area of the camp travel time within the camp should also be considered with respect to pedestrian circulation especially.

Central area - Logistics

After troop sites are tentatrioly located and program features noted, an area should be provided for instalation of central facilities to serve all the troops. Most of the camp tents should be arround so the terraim should provide good building area. In the location of the central area, the following factors should be considered.

1 - Entrance road will be built to this area

2 - Parking area should be provided so that all visitors park artes just on entering the central area.

3 - Administration building should be readily seen and accessible from the parking lat so people entering camp will go their first.

4 - Health lodg (MIR) should be convenient to both the logistics area and the camping area especially the general messes. It should also in a reasonably quet area.

5 - Bathing and toilets should be conviniently placed for the troops and within their camping areas. Water supply system should also be conviniently suitable to the troops.

6 - All buildings within the logistic central area should be accessible

be conviniently suitable to the troops.

6 - All buildings within the logistic central area should be accessible by service road.

7 - Aroid crowding buildings. Take advantage of terrain and tree cover to screen and seperate buildings

8 - Consider need for access by campers, instalation of utilities, health, and safety measures, drainage, ventilation, sunshine and conservation measures.

Access, Protection and Control

Establish a single entrance to the camp. It is wiseto provide one or more aditional points of access for imergemcy use obly; but whenever possible, all regular access should be at one point.

The camp entrance should be convieniently place to permit safe entrance and exit for vehicles and troops.

Table 9:10 - Requirments for short - term camp or reservation.

Land and troops site	Program facilities	General Service Facilities
100 to 200 acres minimum recomended	Scautcraft activity nature conservation Ropes, knots and pioneering	water system - supply, storage and sistribution Q Access road
10 to 14 troops sits, with latrins, patrol tables and fire places; water at each site or nearby; twottroop tents for shetter	Q Field maneuver area orientation	Parking area with control gate (guard room) service roads trails
	Additional facilities as dictated by need and program	
	Field for maneuvers Chapel Camp fire circle Additional program area as dictated by troops strength	Residence for camp rangers Maintenance facilities Activity Shelter (tent) for severe weather use. Sanitation facilities service [illegible] for use in camp master program (staff) Meeting Storage and issue of equipment [illegible] overnight outdoor activities

	Additional Facilities as Dictated by need and Program	
	Field for maneuvers Chapel Camp fire circle Additional program, area as ditated troops strength	Residence for camp rangers Maintanance facilities Activity shelters (Mess) for servere weather use. First aid facilities Service building for use in camp master program (staff) Meetings Storage and issue of equipment Training Course Explorer activities Electricity to residence and service buildings.
Additional requirments for camps serving large numbers of troops		
Additional acreage on the basis of 200 acres per 10 to 14 troops. Troop sites as needed	provide seperate program facilities for each camp serving to to 14 troops of the camp or reservation	Provide seperate facilities for campmasters in each camp serving 10 to 14 troops in the camp or reservation

TABLE 9:11 REQUIREMENTS FOR SMALL LONG-TERM CAMP OR RESERVATION

Land and Troop Sites	Program Facilities		General Services Facilities
200 acres minimum recommended Six to eight troop sites, each with latrine, washstand, patrol tables, and fireplaces two-boy tents for shelter 22 shotgim Angling Orcenteeing Scouteraft activities area. Ropes, knots, and pioneering woods toods Nature - conservation . Find your way-tracking Compcraft Handicraft Campfire circle Cheapel Outpost camps Picnic area	Swimming area with Piers or Swimming pool Boating and canoeing facilities field sports areas Rifle range Archery range	Water system - supply, storage, and distribution Sewage and waste- disposal facilities Access road and entrance gateway gateway parking area with control gate service roads Trails Electric power Telephone Health Wdge central shower shower (may include staff toilets) Service building for camp with troops cooking by patrols Administration and progam office Staff dining room staff Kitchen Trading st	Commissary Equipment storage and issue Service building for camp with central dining: Administration and program offic office Equipment storage and issue Director's cabin Ranger's residence Maintenance shop Food-handling facilities Troop cooking by patrols commissary or store staff dining room and kitchen Central dining Central lodge with Kitchen for Serving neals daily to some or all troops and staff commissary service Cook's quarters

ADDITIONAL FACILITIES WITH PROGRAM MAY DICTATE

Program headquaters shelter	Activities shelters for service weather use staff family cabins facilities for l... leader training adapt service building and or	Central lodge to provide meeting space staff ... family cabins may provide off-season quarters for adults.

TABLE 9: 12 REQUIREMENTS FOR TYPICAL LONG-TERM CAMP OR RESERVATION

Land and troops site	Program Facilities	GENERAL SERVICE FACILITIES	
200 acres minimum 10 to 14 troop sites each with latrin and washstand, patrol tables and fire places, two-boy tents for the shelter	swimming area with piers or swimming pool. Boating and canoeing facilities field sports areas Rifle range archery range Angling Angling Orienteering Scoutcraft activity areas: Ropes, knots and Pioneering woods tools Nature conservation find your way tracking camp craft Handicraft Personel fitness camp fire circle chapel out post camps Picnic area	water system, - supply, storage and distribution Sewage and wase disposal services Access road and entrance gateway parking area with control gate service roads Trails Electric power Telephone Health lodge Central shower (may include staff toilets) Equipment storage and trading post Administration building: Administration office Program office (may be in equipment issue building) staff meeting room (where troops cook by patrols) or meeting and dining room	(where there is central dining and patrol cooking) staff kitchen (when troops cook by patrols) visitors toilets staff area - trailer platforms and director's cabin: c k tr ls) Ranger's residence Storage building Maintainance shop and yard Food-handling facilities: Troops cooking by patrol commissary or store staff dining room and kitchen central dining p;us patrol cooking central lodge with kitchen for serving meals daily to some or all troops and staff commisary service cooks quaters

TABLE 9:13 REQUIREMENTS FOR MULTIPLE - CAMP RESERVATION

Land and Troop sits	Program facilities	General	service facilities
1,000 acres - ablut 200 acres for each camp and the explorer case: balance of acreage for administration area, staff family area, picnic area, and Buffer lands Each camp will provide 10 to 14 troop sites, equipped as outlined for typical long-term camp.	for each camp program facility requirements will be the same as outlined for typical long-term camp.	for administration area and to serve all camps; water system-supply, storage, and distribution sewage and water disposal facilities parking area Service Roads trails Electric power telephone ranger's residence Assistand ranger's residence Maintenance shop Storage building Vehicle storage Food storage and handling Administration building dealth lodge staff family cabins for each bi Scout camp: Central shower (may include staff toilets) Equiment issue and trading post staff area - tentage, platforms, toilets. Fuel Fire aid tent	Administration building-program and administration office staff meeting or dining room visitor's toilets Food-handling facilities Each camp may provide a different type of food service for example-camp 1 central lodge to serve meals to some or all troops and staff kitchen to prepare meals for camp 1 and to cook food to be delivered to camp 2 commissary to provide food for patrol cooking camp 2 Preparod for delivered from camp 1 for some troops commissary to provide for patrol cooking Camp 3 Commissary to provide food patrol cooking

Additional	Facilities with program may	Dictate
Program headquarters shelter	Activity shelters for severe weather use staff family babins facilities for leader training-fdapt the administration.	Building and/ or central lodge to provide meeting spaces. staff family cabins may provide off-seasom quaiters for adults.

9:1:1 - ATTRIBUTES OF SITE

ACCESSIBILITY:-

The proposed site for the military aperations base is accessible from the southern end beyond the Bar bomga settlement which is situated south of this site. This village became accessible as a result of tin mining activities on the platoon and it has a moterable untared road up to this point. This moterable road can be extended from this village especally along the foot path which pases besides the site.

Water Supply

This site has the unique advantage of two streams bounding it on two sides which could be utilised to supply water fortthe troops using the camp. Field water works is already a part of military science which is usually handled by the field military ecgineers. Treatment of drinking and cooking water within military camps of this nature is usually done by sedimentation No network work of piping is considered neccessary as there are always water transport tanks from the motor this transport unit which will supply the water from this treament plant to the membrance neservours stationed at specific points around the camp.

Source of water in addition to soils and topography is always a primary determinigh factor in the choice of all sorts of camp sites.

The problem of power supply is usually solved by the use of thermal electricity g enerations plants.

Sewage Disposal

Solid wasts in the form of feaces will usually be disposed of in pit latrins dug right on the camp site and wast water can easily be elisposed of by the use of soack aways.

This problem is going to be handled and takeled in a unique and special way that will entail max cmmfort and ease of usage in a rather simple way. This I also consider as a special attribute and contribution of my kind of architecture. Refe- rence should be made to the neccessary figures for better understanding of these solutions.

Storm Drainage

Since the site slopes in about three directions the problem of storm will be minimal. Storms water will easily be drained streamwards following the slopes of the site which is already well drained with no fear of stagnant water bodies or marshy areas.

Military Consideration

Since this camp is going to be specifically used for i military operations and maneuvers that will bost a kind of special warfare strategy, certain military considerations will have to be taken into view.

The problem of bomb blasts nuis ance to peacefully living civiliance will have to be taken into seriouse consideration to avoid supriss shock or panic. Since blank armour will be mostly used through out the excercise, the fear and risk of l long range stray missiles does not come in. The nearest civil settlement to this site is the Bar Bonga tim mining village which is now scantily inhabited because of it's farness to the neighbouring settlements. No other civil settlement is situated within less than 20km.to this camp. Thus the problem of settlement as a cost factor is also shelved off.

This camp site i.e. the sheve-hills has a long standing history of military occupation since the post civil war period and as earlier discused in chapter 8, this site has a very special attribute of the battle strategy being emphasised.

The camp and site could also be used for bush exeercises by boys of the Nigerian Military School Zaria or cadets from Nigerian Defence Accademy or even cadet from the Command and Staff College Jaji.

There is also enough open and undevelloped fields within and around the shere hill are for field maneuvers by the troops concerned.

9:2 - GEO. DATA

The local facto rs that might influence any architecture on the shere hills are Geographical in nature.

Shere hills which is found near Jos main town has the same climatic conditions as Jos itself. Which is typical of Northern Nigerian. The climatic variation is primarily caused by the movement of the intercontinential tropical convergence zone (ITCZ) the main climatic element are therefore discused as bellow. Also, the Jos plateau of which sere hills is part of our its climatic distinctiveness to its high elevation above the sea level. The distinctiveness is measured in terms of temperature, everpouration (humidity) and water balance. The Jos plateam is cooler than the plaims arround it at all times of the yeay. It also experiences lower rates rates of ever poutranspiration and partly for this reason enjoys a higher wet season water surplus and a lower dry season water deficiet. This makes the climate of Jos much more pleasant turning the Jos area into a holiday and health resort for European nationals working in Nigeria.

9:2:1 Wind

The principal air masses that effect this area are the south westerlies or south west monsoon which is partly responsible for the rains and the North East trade winds (locally called the harmattan). From April to late November, the area under consideration experiences the moisture laden south west monsoon winds as a result of the intercontinental convergence zone. (ITCZ) being North of the area; the result is rains which usually comes with a lot of thunder storms.

Hence most of the rains in this area fall within this period April to November a duration of eight months. However during the months of december and January, the daily wind pattern becomes more complex indicating the southerly movement of the intercontinental convergence zone (ITCZ).

Between th period of November to march i,e. during the dry season, the prevailing wind direction is south west,see illustration. As I have earlier stated, the south-weat monsoon winds are moisture laden and always perceds storms which are generally short lived by strong Gust exceeding zmsecy are usual but mean speed exceeds 2.5 mesc obly in April/May.

The implication of the winds during this period of April to November on architectural structures are that tall buildings and roofs of buildings must be properly designed bearing in mind the wind strength which could be dangerous to structures at times; and that openings facing the direction of the south west prevailing winds must be properly protected against penetration by rains driven by the strong winds.

The other prevailing wind direction i.e. the North East trade winds are also of architectural significance and accures between December and March. The wind is dust laden, dry and cold. The winds come during the dry season when the disectiing harmattan blows. It is usually very trying to Nigerians from the coastal areas. The open nature of the

plateau reinforces the wind speed, while the dry and bare ground provides considerable dust particles which intensities the hazy nature of the hamattan. The wind speed during this period rarely exceeds 2.0msec. The hamattan which occurs during this period, has a considerable nuisance value in terms of human comforts and physical effect on persons and environment. Resistance to seekness is very low at this period as a result of the cold characteristics at the period. The dust too contributes towards lowering resistance to seekness - catarh is a commom desease during this period. In order to protect people against these lazards, at least within an architectural structure, the hamattam wind must be controled with a view to reducing the dust content and the cold character To this buildings must be properly sealed up permitting a build up of heat during the day which could be released at night on the time-lag principle; and the North-East winds must be screened from directly entering the interior of buildings.

Within this period the relatively hamidity of the air is very low; less than 25%, and there is usually a sensation of dryness felt by people. This condition can be improved by introducing of moisture in the air which could help in traping the dust particles and improving the relative humidity. One One way of doing this is by the indroducing of fauntains within the structural encironments or pools of water which could everpourate. The fountain principles helps to cleans the air of dust particles. The problems, however, may be the danger of the dust, which is removed from the air, to the function of the fountain. This forseen problem nowithstanding, fountain will go a long way in improving the enviroment within the period of December of April.

See table of design recomendations for Jos.

9:2:2 = Air Pressure

Because of the high relief of the Jos plateau, air pressure is always low. The effect of this can be seen in the low temperature of the air on the Jos plateau which is generally lower than in places of lower relief.

Air pressure is calculated as the weight of air collumn above a given piunts This by natural principles is bound to decrease with i increase in altitude as the hight of air collum also decrease simultaneously. This explains the reason for the low pressure on the Jos plateau.

The resultant effect of this is a lower quantity and precentage of oxygen in the air people breath. This also explains why mountaineers carry oxygen cylinders when combing high mountains.

The instrument used for the calulation and calibration of air prwssure is known as the barometer

See graph of air pressure.

9:2:3: - Humidity

The highest actual mean relative humidity is about 88% and it occures during the vainy season expecially in August. Table 9:2:30 and figure 6:2:3) show the relative humidity of Jos by months. During the month of August, actual mean values of relative humidity are 69% in the morining and 39% in the afternoon. A lot of discomfort caused at this time is due to the prevention of the escape of water or moisture from human bodies expecially when the humidity is highes. To solve thsi problem w would mean to introduce a means by which body water can be lost at a reasonable speed to cause a sensation of coolness. Thsi may be naturally achieved by proper cross vehtilatioh .

This process may include manupulation of the air to increase it's speed. Another solution may be by artificial means whereby fans and air conditioners are usedtto ameliorate the interior climatic condition.

The lowest actual mean monthly relative humidity occurs in February and it's 20%. This means that the air at this time is very dry. In collaboration with other climatic elements, thsi could be very uncomfortable use to fountains or water bodies as earlier discused could be very usefully in conditioning the microclimatic conditions of the environment concerned.

Tables 9:2:30 - Relative humidity in percentage and humidity group

Month	Mean Max R.H.	Mean Min R.H	Actual Mean R.H	Humidity group
Jan.	31.00	13.00	[illegible].00	(1) one
Feb.	38,00	11.00	20.50	(1) one
March	51.00	17.00	34.00	(2) two
April	79.00	41.00	60.00	(3) three
May	89.00	56.00	72.00	(4) four
June	91.00	64100	78.00	(4) four
July	95.00	75.00	85.00	(4) four
Aug	93.00	77.00	88.00	(4) four
Sept	93.00	65.00	79.00	(4) four
Oct.	81.00	41,00	61.00	(3) three
Nov.	43.00	19.00	31.00	(2) two
Dec.	37.00	15.00	28.00	(1) one

Note: Humidity average for the period 1951 - 75

Table 9:2:30 - Daily Variations of Relative Humidity

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
6 am(%)	33	40	45	66	88	92	95	97	76	86	51	46
12 nnon (%)	14	17	18	24	46	62	71	76	63	45	21	17

Month (%)	Mean
6 am (%)	69
12 noon (%)	39

9:2:4 - Sun shin hours / Glabal radiation levels VIZ cloud over and insulation

The variation of sunshin throughout the year is highest during the dry season due to clear skies and lowest during the rainy season due to increased cloud cover. Figur 9:2:40 show the variation of sunshine hours by month is Jos are. Figure 9:2:41 also show the classification chart of the different types of cloud covers by hight during the rainy season. The cariations of the sunshine hours in this part of the country implies that natural day lighting of buildings is not always sufficient all year round. Thus artificial lighting will be neccessary ever during the day time at certain periods of the year during the dry season, the intensity of solar radiation could also be reduced by suspended dust particles causing a hazy effect that could considrably reduce cisibility to ohlya short distance. Sometines it may be neccessary to protect people against the sun this adquate protection should be provide againbst the heat and glare of the sun.

The global radiation level exceeds 500 calcm^{-2} in February and March. Excessive cloud cover during the rainy season could result.into a drastc drop in relative hmidity of the air causing discomfort to humans. During the dry season (hamattan) the reverse is the case causing excessive dryness and scaling of the skin of people

9:2:5 Rainfall

Jos area the location fo the camp site inclusive has a rainy period of about eight months i.e. from April to November, Most of the rain occurs as a storms duration but with high intensity. About 90% of the rain falls in six months between April and October, the wettest months being July and August. The distributiob of the rainfall during any single storm is usually very irregular. Grove has recorded that during one storm in September, 3.5 inches were recorded at Jos old airport in four hours while the guagw at shen, six miles away registered 1.8 inches and that at Sabon Gida only 0.8 inches. The extimated daily maximum is in the order of 350mm, and the anuall mean rainfall is about 1413mm. Table 9:2:50 show the variation of rain by moths and figure 9:2:50 too.

As a result of the high intensity of rain, ground drainage must be of sufficient slope to aviod water logging of the site for the proposed military base. Soil surfaces were there is sufficient slppe must be protected against erosion. This can be done effectively by planting grasses and shurbs or by paving, which ever is more appropriate in a given situation. For the purpose of the project and it's nature, it might not be very possible to adopt any of these measures. Other architectural significane of the intensity of the rains is that the roof slopes must sufficient enough to allow easy run of water. In addition to these architectural implications is that of the limitation

of open air activities after operations during the two dominant climatic periods (April) to November and December to April). The most threatening period of the two periods is the April to November; but fortunately, the rains are usually of short duration and the conditions after the rains are favourable to open air activities if the open air activities are well designed that the rain water drains away easily and fast.

During the period of December to April the hamattan is usually seaverelfor the months of February to March. The peak annual participation rate of these operations is anticipated to be highest during the dry season for convinience sake/

Conclusions

During the months of November to April the temperature ranges are highest and lowest, the global radiations are also highest and lowest and the North- East winds are predominant, - it is dust laden dry and cold - the lowest relative humidity also accures: the combined eftect of all these factors is of great significance for the design of a comfortable human environment withen the Jos area of platean state (Shere hills inclusive). The skin loses moisture at a high rate to the dry air, a sensation of dryness is felt both on the skin and in the throat. This condition can be improved by the use of fountains or other water bodies as earlier mentioned.

The period of April to November is characterised by high humidity content of the air, high rain intensity byt shaort hirdd moderately high temperature and low wind speed. The result is a condition whereby less of body water is [illegible]

[illegible]

The effect of rains during the months of April to November is that vegetation grows very rapidly and insects multiply - especially mosquitoes. This may draw the attention tof the architect ot consider a meahs by which openings can be screened to stop the invasion of insects.

9:2:6 - Temperature

The Jos Jos platoon is generally know for it's cool moderate temperatures for most part of the year. The temperature variation through out the year is almost negligeble as can be seem from the mean minimum and max.temperature chart. The highest emperatures are usually experience during the dry season rising to a maximum mean value of 30.9°C in march just before the conset of the rainy sason. The lowest mean monthly max temperature is always experience in August with a value of about 23.9 ° C. There is a significant relationship between temperature values, and level of solar insulation, humidity and rainfall

See table and figure 9:2:60

Table 9:2:60 - Mean Daily Temperature

Month	J J	F F	M	A	M	J J	J J	A	S S	O	N D
Max (°C)	27.5	29.5	30.4	31	29	27	24	23.6	25.6	27.6	28.5
Min (°C)	15.8	15	17.7	18.9	18.4	17.3	16.8	16.7	16,6	16.6	15.4

Month	D	Mean
Max (°C)	27.7	27.6
Min (°C)	13.9	16.5

Table 9:2:61 - Dry bulb temperatures

Month	Mean max tempt	Mean min tempt	Mean range
Jan	27,40	13,50	13.90
Feb	29.30	13.80	13.50
March	30.90	13.10	12.50
April	30.20	18.70	11.50
May	28.50	18.10	10.40
June	26.70	17.20	9.50
July	24.40	16.80	7.50
August	23.90	16.00	7.00
Sept	23.80	15.50	9.20
October	27.90	13 70	11,20
Nov	28.00	13.70	12.30
Dec.	27.50	13.90	13.60

Note: All temperature values are in ^{o}C

The highest monthly mean maximum temperature is 30.90 ^{o}C

The lowest monthly mean minimum temperature is 13.3 ^{o}C

The annual mean temperature is 22.20 ^{o}C

The annual mean range is 17.40

N.B T Temperature average for the period 1931 - 1975

Table 9:2:62 - Mean monthly temperature chart for Jos

Month	J	F	M	A	M	J	J	A	S	O	N	D	Mean
°C	20.7	22,1	24.3	24.3	23.1	21.7	20.2	20	21	21.8	21.9	20.5	21.8

9:2:3-Design Recomendations for Jos WRT Climatic Data

Table 9:2:70 - Thermal Stress

Month	Day Time		Night Time	
January	Comfort	(0)	Cold	(-1)
February	Comfrot	(0)	Cold	(-1)
March	Comfort	(0)	Comfrot	(0)
April	Hot	(1)	Comft	(0)
May	Hot	(1)	Comfort	(0)
June	Comfort	(0)	Comfort	(0)
July	Comfort	(0)	Cold	(-1)
August	Comfrot	(0)	Cold	(-1)
September	Comfort	(0)	Cold	(-1)
October	Comfort	(0)	Cold	(-1)
November	Comfort	(0)	Cold	(-1)
December	Comfort	(0)	Cold	(1)

Table 9:2:71 - Thermal Indicators

Month	Humid Indicators			Arid Indicators		
	HY	H2	H3	A1	A2	A3
Jan.	0	0	0	1	0	0
Feb	0	0	0	1	0	0
March	0	0	0	1	0	0
April	0	0	0	1	0	0
May	1	0	0	0	0	0
June	0	1	1	0	0	0
July	0	1	1	0	0	0
Aug.	0	1	1	0	0	0
Sept.	0	1	1	0	0	0
Oct.	0	0	0	1	0	0
Nov.	0	0	0	1	0	0
Dec.	0	0	0	1	0	0
Total	1	4	4	7	0	0

Note: H1 - Air movement - essential

H2 - Air movement - desirable

H3 - Precuations against raim penetration

A1 - Need for thermal storage

A2 - Outdoor sleeping space

A3 - Winter or cold season problems

Table 9:2:72 - Comfort Limits (LMT)

Month	Day Time		Night Time	
	Upper Limit	Lower Limit	Upper limit	Lower Limit
Jan	34	25	25	17
Feb	34	25	25	17
March	31	25	24	17
April	29	23	23	17
May	27	22	21	17
June	27	22	21	17
July	27	22	21	17
August	27	22	21	17
Sept	27	22	21	17
October	29	23	23	17
Nov.	34	25	24	17
Dec.	34	25	25	17

Table 9:2:73 – Thermal requirements

A – Heavy Roofs

- Maximum "V" value – 0,85 Wm^{-2}
- Maximum Solar heat factor = 3%

Minimum Time lag – 8 hrs

Examples of heavy roofs

1) A thick layer of white chippings

Felt or other water proofing membrance

30mm expanded polysterene

100mm minimum concret slab

2) 300mm shading block and 30mm cavity

Asphalt or other water proofing membrance

50mm Vermicolite or hight weight screed

100mm concret slab.

3) Corrugalted aluminium sheets

30mm expanded polysterene [illegible] ts

50mm precast concret planks or shell

Cavity .

B – Heavy Walls

Maximum "V" value – 2,4 $Wm^{-2}\ ^{o}C$

Maximum solar heat factor – 4%

Minimum time lag – 8Hrs

Maximum time lag – 14hrs.

Examples of heavy Walls

1) Hollow block cavity 25mm thick

Solid block concret 100mm minimum thickness

An outside, painted white, cream or yellow

2) Compacted earth or earth cement block 300mm

An outside painted white cream or yellow

3) Any sheet material

Cavity 25mm wide

solid concret block 200mm thick

An outside wall painted light

4) Any sheet material

Solid concret block 100mm thick

Expanded polystyrene 25mm thick

An outside wall hightly painted

9:2:8 - Geology and Soils

The Jos platear is probably the most striking morphological feature in in Nigeria. Thsi region has a unique but simple geological history.

Four groups of rocks comprises the geology of the Jos area. The basement complex consists of migmatites, gnessis and various graints. Jos in particular is made up of the group of rocks of which the principal rocks are rhylites and granites. Basalts are also commom features of the gelogy of the area.

The main division of rocks found in the area are as follows:-

- Litho Soils

Characterises area where erosion is important. It is a low agricultural soil by good for afforestation.

- Ent ropic Brown Soils

These are rich in organic matter, rich in plant nutrients and are formed on crystaline basic rocks and alluvial deposits. The are young soils and are very fertile.

- Ferruginuous Tropical Soils

These are normally formed on crystaline acid rocks The have a high quartz content, light and often leadched. Their fertility is of moderate range.

9:2:9 - Relief and topography

The Jos plateau today is an erosion relic which covers an area of about 3,00 squar miles at a general level of about 4,200ft above sea level and its sarrounded by high plains with altidudes ranging from ?,000 to 3,000 feet above sea level. The highest surface of the plateau occures in the sarounding of Ngell and Bukuru from where the head.

waters of rivers flowing into lake chad, the Niger, the Bennue and the Gongola radiate approximately north, west, south, and East respectively.. The Ngell Bukuru neighbourhood therefore constitutes the hydrological centre of Nigeria.

Jos constitutes a small portion of the high risiing relief region called the Jos plateau which ranges in hight from 1160m to 1341m.

The topography of the Jos area is rather a complex one or military refered to as difficult terrain. Generally it consist of a wide gently undulation topograph with occasional but very large and conspicouse residuals rising above the rocky and intensely disected plateau. The shere hills which is over 1524m high is a food example of such.

9:2:10 - Vegetation

The present day vegetation of the plateau is largly a product of centuries of distructive exploitation of the original woodland, which is now replaced by open grassland. In the centre of Jos division i.e. in the districts of kuru, Gyel and know where almost every tree has beeb felled, the vegetation consist of only grass except near some villages where thic k ledges of cactus (Euphorbia Kameruica) have been planted around the house hold farms or compound lands. Small groves of male and atilis (canarium) are also found around small villages but the main farmlands are completely devoid of trees and the flat-topped lateritic hills. Fringing woodlands and bamboo thickets may still be found along the valleys of more isolated streams and these relics of vegetation confirm the existence in the past of a vegetation of extensive savanah woodland. The plateau still has the potential of

supporting a dense woodland vegetation.

Imperata grass (speargrass) predominates in new fallows, but may be partially replaced by pennisetum pedicallatum (Kasuwa) and hyparrhenia spp (yama) If the land remains uncultivated for many years, the cover which eventually emerges is a fire climax which consist of tall savanah grasses in which hyperrhenia andropogon gayanus and heteropogon predominate. These grasses come up at the end of the dry season and have remarkable powers of regrowth after the annual bush-burning. The provide excellent fodder when young and are also used for thatching.

Vegetation in the Jos area is thus generally sparse. The land is more of less open in character and in some places a form of secondary vegetation hace develloped.

9:3 - Sik Analyses

9:3:1 - Site Location

The site chosen for the propesed military military operations base is within the shere hills near Jos. It is located righ within the share hills so as to imcorporate the type of battle stratetegy emphasised.

Shere hills as earlier mentioned has a lony standing history of military excercises since the post civil war times uptill present day. The hills are located North East of the Jos main town and about 30km from the main town. The site is bounded on three major sides by mountain ranges and valleys which form part of the shere hills. On the southern boundry of the site, it is open to the plains towards the laminga dam a small village settlements that sprung up as a result of tim mining activities. Right close to the side is a boundry of two streams which are located to the Eastern and Western boundaries. These two streams meat at a point up the Northern boundry of the site.

The atribute of this site have already been extensively discused in 9:1.

9:3:2 - Topography

The site gently slopes in three major directions towards the two st streams that bound it. These directions are North, East and West. The area towards the western stream is so steep that devellopement will not be very advicable while the area close to the Eastern stream is fairly flat enough for architectural planning and also not very likely proned to float or water logging by the adjacent stream.

Shrubs are scattered all over the site with a higher concentation near the banks and cliffs of the streams.

On the southern side of the site me two rock outcrops with one (a'rock pinacle) right within the site and adjacent to it the rock outcrope bounding part of the Sothern boundry. These two streams looth flow notthwards.

9:3:3 - Microclimatic Conditions

The microclimatic condition of the site are basically determined and affected by the two streams and the valley location of the camp. The land and sea breezes help to condition the climate of the site. Cool breezes blow from the streams towards and over the site during the day time adn the situation is reversed during the night with the land breezes blowing towards the lake. This phenomena sets up air movement over people and buildings providing for natural ventitation.

The two major air masses that is the North East trade winds and the Soth west monsoon winds which blow over the shere hills generates a suction current within the valleys which sucks the hot air upwards and over the hills wihile cooller breezes blw accross the streams towards the site in three major diredtons.

From this site views are obstructed on three major sides by the mountaim ranges but they could be regarded as fair views. These views are views towards the North, East and Western directions. The best view which has a long and disfan horizion is towards the southern direction which ocens up forwards the plains.

This site has a total land area of about $160,000m^2$

The most appropriate point of ingress should be from the southern plains which are fairly flat and unobstructed by the stream.

CHAPTER 10

10:1 - Site concept

The site organised in such a way as to conform to certain fundamental military principles of herachy as discused in chapter 6 and abstacted from my case studies in chapter 7. The officers are physically segrated from the other ranks in the form of zones.

There are three basic zonings adapted in this site concept with the form up place (F.U.P) acting as the focal point of all camp activities. This three zones are:-

1 - Officers camping tents

2 - Other ranks camping tents

3 - Lagistic tents.

The other ranks are usually larger in number compared to the afficers. For example in a battalion stationed in the barracks with a total number of 880 soldiers; 85% of than are "other ranks" (i.e. from the ranks of private to warrant officers class one (WO LL) and only 29 are officers between the ranks of 2nd leutenants to leutent colonel. This figure exludes all other attoches such as looks. The highes ranking officer in a battalion is a leutenant colonel.

For the purpose of a battalion, operation in battle, this number is again usually less especially for the other ranks. Based on this demographic data, I've decided to plan. My site (site concept) in such a way as to comform with the military concept of planning herachy by segregating the officers from the other ranks especially in their living tents. The small portion of the site south wards is alocated to the officers. This zone is bounded by two rock out crops on the southern and northern portions but with a link to the

logistics. Also on the Eastern section is a vally area that can be assecoble by cars from the outside directly to the Officers camping tents. This is so because as I have observed, the officers sometimes have the prevalage of going on an operation with their private cars; though its not always the case. Also, the officers could have the privalage of going out of the camp and comming back kite at nights. This outings are usually for certain types of private social engagements and they could come back with such private guests as girl friends with is a common fact with soldiers in the ware fronts. This acts are not part of the militarys' protocal but the have come to stay as they encanloo cannot immagine a soldier who has been in the war front for over two years without meeting with a woman even once. Infact the soldiers should ever be encarrage to go out chasing at their spare though not at the expence of their primary goal and profficionialism which is war. This will go a long way is reducing cases of vape and orutality of woman by soldiers during battles. It's just a nutural instinct that we cannot deny our concsience of or the soldeirs themselves.

The other ranks do not usually have much of this privilages as compared to the officers and I thinks proffesional prostitutes could be secretly used to satisfy this natural urge of the other ranks. This is a fact because it has been used in history especially during the second world war; to reduce the mental a phsycological stresses of battling soldiers.

The officers could also have private guest especially civiliance and pressmen as battle correspondences who do not need to be brough directly and face to face with military rates and regulating withen

the camp as this could be sometimes very scaring.

As for the other ranks, the zone between them is physically separated by the logistic fasilities which includes the

- Armory
- MIR
- M T yad
- Admin Unit
- Laindry services
- Signals and surrelnce
- Quaterguard
- Generator tent
- Water works
- Religious tents (Masque & Church)

The other ranks have been allocated the larger section of this site in view of their larger number. This area is also a largly flat area bounded by the two main stream bounding the site on the northern and south western boundries. This is so planned as to maximise the use of the stream by this category of soldeirs especially for bathing and washing. Alhough bathrooms, toilets and loundry services are provided for the troops but this cannot be sufficient enough especially at their peak hours. For instance in the mornings and perharps in the evenings, enough bathrooms cannot be provided for 351 soldiers all to be bathing at the same time as this will be a mere wast of spaces and fasciIities. Also the soldiers cannot decide to all go and bath at the same time. It has been the practice in the past that this type of facilities were not even provided for all the other ranks. Also the laundry services are mostly meant for the officers

and some of the senior none commisioned officers (NCOS). Thus the greater bulk of the other rants need the natural water bodies for this purpose. That's why I have dicided to allocated this area based on its topography and utility to the other ranks. This area has such fascilities as the camping tents and general mess facilities together with other auxilliary fasilities and is fed with a road network mainly for the purpose of water supply.

In view of the high number of these troops, their living units will be clustered to gether in groups in such a way as to fascilitate the sharing of such fascilities as control water supply systems and bath-rooms and toilets.

The very steepy hreas will be avoided in my planning areas because of the complex and cost implications.

The logistic fasilities as afformentioned are so placed as to fasilitate there use by other ranks and officers and its also the first point of call by an outsider when entering the camp on any official engagement. The logistic facilities are altogether linked to the outside of the camp through the quater guard. These logistic fasilities includes all those things that will be needed for the effective co-ordination and running of the camp. By defination, logistics is refered to as the arts and science of moving troops and there are usually facilities that are needed for this movement and co-ordination of the troops and are refered as the logistic facilities. The form up place (F.U.P) could also be refered to as a logistic facility even though its just an open field for assembling of troops This form up place (F.U.P) (Parade ground in the barracks) is commonly use in battle fields to refer to a predertrmined open space or area in a statogic location withen the camp for easy assemblage and evaccation

of troops. Also it is in this FUP that troops are usually assembled for briefing or for reatine inspection. It is the focal point of all organised and cordinated activities on the camp . It is also a place where disciplin in respect to reciept and its dischaurge of odors are made sometimes refered to as RVL (redervourse one).

The zone for "other ranks" is usually the most populated and basiest area with a gereral mess. In the case where "boys" or cadets are on regular bush camping excercise, it will again be subdirided into two sections i.e. the "boys" or "cadets" and "other rank" troops Even the other ranks could be subdivided into junior and senior N.C.O.S but one larg mess complex will be provided for then all. In the case of cadets (depending on their class) their fasilities will be almost similar to these of the officers while "boys" have common fasilities as the junior NCOS. The senior NCOS have the the same type of fasilities as the cadets, with respe ct to living tent spaces and mess fasilities.

For the officers of ranks between second leutenant and leutenat colonel; (with transit officers inclusive) and their fasilities (i.e. living tents and mess) will be all grouped together in a cluster to ease movement and circulation. There will also be a diffrentiation of spaces within the living tents depending on their ranks.

Spaces for a few private car parks will be provided near the the offiocers mess and by the living tents of the officers. No spaces will be provided for outdoor games as a matter of fanctional reality and bearing in mind that this is not a leasure or holiday camp.

This camp site generally enjoys a fairly good microclimatic condition with respect to soil types neccessary for pocking and dictated by the two water bodies and it's valley location.

The camp will be so planed as to harmonise the forms and the structures to achieve a good degree of camounflage. (organic architecture).

10:2 - FUNCTIONAL ARALYSES

This section deals with the detaile architectural requirements of this camp. This includes all fasilities to be provided for bearing in mind their dual impdications of both military and architectural reasons.

From the forgoing section 10:2 it can be seen that the camp has been generally and architecturally divided into three zones based on their functional differences. This zones are:-

1 - Officers camping fasilities

2 - Other ranks camping fasilities

3 - Logistic fasilities.

Taking these zones by the above oder:-

10:2:1 - Officers camping tents :

The fascilities to be provided here are the sleeping tents and the mess fasilities.

For the living tents, they will be desigued in such a way as to house at least twenty nine officers and as earlier mentined, I will employ a horachy of spaces based on a chosen space madule to solve the problem of space differences between the different cadres of officers. Iire here chosen the second leutenant and captains as a group and the majors in another group with finally the only expected senior officer i.e. leutenant colonel having a seperate space allocation

The leutenant colorels living unit will be usbdivided into three sections,

1 - Sleeping tent

2 - Lanch (rest room for reciept of private guest)

3 - Private casments (toilet and bathroom)

The bed room is expected to be spacious enough to contain such personel gadgets as boots, uniforing, files, books, mufty, and all other private military kits. The launch or palar should be spacious enough to accomodate relaxation sofas to contain at least five private guest at a time. He may also enjoy other fascilities as a high friquency powered radio to keep himselfe informed of haponings arround the world and perharps a television set and a video casset for his private entertainment and relaxation.

The batman or private attendant will always be arround for easy reciept and discharge of oders as the colonel feels deem and also he will be responsible for the upkeep and tidyness of the colonels living unit including his bedroom. The private casments of the colonel (i.e. his toilets and bathroom) should be physically seperated from the main lounch and bedroom by an open or partially closed courtyard which could be accessible from outside and from the launch. This will mean that the cleaner or attach doesn't disrupt or interfare with the activities of the colonel in the palour while trying to attend to certain duties withen the coutyard, bathroom or toilet, Bathing water will supplie to the colonel in buckets fetched from central water reservour. The batman will see to this and also to upkeep of the toilet (pit latrin) The living space of captains and majors will differ in size and amenities to that of the Lt. Colonel (battalion camp commander).

It will be about two third of the space allocated to the Lt. colonel in the case of a major and the captains will be expected to pair up in a similar tent or as the case may warant. This tent will have a private lanuch especially for the keeping of military kits (general) such as belts, boots, and dirty uniforms or other fabricks. Toilets and bathrooms will be commonly shared with all the other officers withor one tent complex. The laungo will have about two to four chairs for relaxation and dailly news papers will be regularly supplied to them. This will generally keep the officers well infromed about happenings in the outside world. This group of officers i.e. captains and majors are also entitled to individual batmen who are responsible for the upkeep of the tents in terms of cleanliness. The batmen may also be sometimes expected to go into this officers sleeping tents to keep then clean. All the other officers i.e. second leutenants and full leutenants share almost every fasility withon the camping tents. For instance two officers of this cadre will share a sleeping tent of about 3 x 3.5m with no provision for individual privacy as there will be only one point of entrance into this sleeping apartment. A common laungo will be shared by about four of this officers. It is through this laungo that the officers get into their saperate sldeping units or into the general central courtyard which connects their to the bath rooms and toilets. T his courtyards could be either open or closed. The laungo might not be provided with any relaxation fasilities as this group

of officers will ks not be expected to have any cause to relax here except when they want to sleep which the can easily go an streeght to bed. The lounge is expected to serve as an alcove for keeping of dirty lonins, hanging of belts, berets and boots pdus other military oriented kits. This is to facilitate easy accessibility by their individually private batmen who are responsility for the upkeep of their belongings and supply of bathing water and other functions as may be directed by the individual officers. Not even journals and or dailly newspapers will be supplied to this group of officers im their tent as all this will be available im the offices mess for who ever might be interested. Officers withen this group are not usually expected to have any cause for relaxation in their living units except when they want to sleep. This is because a greater part of their leasure and spare time will be expected to be spent in the officers mess as a military rule. This is believed to help in bringing the officers together to one another and to instill the necessary military mentality and conciousness withen the officers.

The officers mess will basically comprise of:-

- a bar
- an indoors game area
- Dinning room
- Kitchen
- Mini shop

The bar will be subdivided into two sections:-

1 - indoor dinking area (closed bar)

2 - Outdoor drinking area (garden bar)

Basically the bar caters for the drinking nedds of the officers which is mainly alcohol and a little soft drinks with hot drinks. A bar man mostly an other rank of the junior NCO cader will be in service here with on or two bar attendant who are juncor NCOS too. The bar should be design in such a way as to have the same bar man attending to both indoor and outdoor drinking spaces. An indoors games space will also be provided for very close and adjacent to the bar area to ease access from the bar or it should be even incorporated into the bar fasilities. Games of cards, chess, domino, ludo etc. will also be encarrage withen the bar as this has been believed to help in easying the anxiety and weiveness of battle situations.

Also easment, such as toilets and urinaries will be located in such a way as to avoid dublucation of fasilities. It will be located in a position for easy accessibility from both the garden and indoors bar.

The dinning room is expected to catter for all the feeding problems of all the officers. It will be expected to serve only breakfast lunch and dinner and all the officers are expected to be present for every meal withen a given period of time.

6:30pm - 7.00 pm breakfast

1:30am - 2.00 am lunch

7:00am - 8:00 am dinner

Any officer who does not go for his meal withen the given time will have to for fiet that meal till the next one as he will be expected to proceed for another military engagement that will not warant him time to wast eating. The waiter service system will be used here as the officers will only be expected to take their seats and place their order which will be brought to then by the service staff. Officers are not expected to come into

the dinning room with their harts and belts on; for this reason, provision will be made withen the entrance lobby for hanging of those items while going into the cafe.

The kitchen will be expected to be completely isolated from the dinning area as counter service will not be used. A camp mess officer will be detailed to be responsible for both the drinking bar and cattering services.

The cooking area will be subdivided into two basic areas.

1 - Indoor cooking space

2 - Outdoor courtyard cooking space.

Both of these two cooking spaces will be directly accessible to the food stores will could have a weekly storage capacity or as the case may be. These food staros will be of two types;

1 - Cold store

2 - dry store

and the will be expected to have a direct relationship with the dolivery bay area as this is the place through which the foods will be brought into the kitchen. These stores are also expected to have a direct relationship with the cooking areas (indoors and outdoors) via the preparation tops. Locker rooms will also be provided for with changing areas and toilets excluding bathing fasilities. These locker rooms will aso be expected to be directly related to the entrance bay as this will be expected to be the first point of call of the workers before proceeding into the cooking area. There is an intricately complex interelationship between all the sections of the mess complex as can be seen from the ketchen organisation. The kitchen complex and the bar complex will all be in the same complex unit but the design should be in such a way that the two sections will be completely isolated from each other as their functions differ

ardhitecturally.

A barbers shade will be affiliated to the bar area but not from inside it . It will accessible from the outside and prefarably from the officers living tents. A khosk or minishop will also be affiliated to the dinning section but it be accessible from outside too. The barbars shade is meant to catter for the barbing and sometimes sharing need of the officers only. This is nocessary because as a military because as a military personel is concerned, one is expected to look and dress smartly at all times. Thus the officers are not suppose to keep bushy haires or bears except by medical recomendation. His haire is expdcted to be low (low-cut) at all times and a good and clean neck share should be taken as regularly as possible. The minishops will cater for the private needs of the officers such as provisions, razor blades and sharing kits, snacks, toileteries etc.

The officers mess complex will be expected to be the focal point of activities for the officers during their leasure time as the way and manner in which an officer spends his leasure time is a parade of military significance. Mess attendance has been categorised as leasure but if is at the same time a parade thus making if mandatory for the officer to be physically present for such leasure activities. Eating itself is a parade too in the military sence of it as you may sometimes be expected to be present in the cafe, even if you don't want eat.

The officers mess and their living tents are considered as one unit intricate complex of organisation seperated only by open spaces which are of architectural significance too. See figure diagram of functional relationship.

10:2: - Other ranks camping fasilities:

The type of fasilities to previded here are the same to those of the officers camping unit. This includes

1 - The living tents

2 - The general mess fasilities

The living tents will also be subdivided into two sections with respect to a complet battalion operation or other hush comping excerses by undertaken by "boy" or cadets. These two sections are:-

1 - Junior NCSs and or "boy" camping tents

2 - Senior NCOs and or cadets camping tents.

The junior NCOs camping tents will be clustered together in such a way as to fasilitate their common sharing of one water reservi-our. Withen each tent in each of these clusters, the soldiers will be expected to share a common fasilities. Such as toilets and both-rooms. These bathrooms and toilets will be specially and uniguely designed so as to comform with the camps temporary existence. Hence the use of special pit catrins according to my conception which can be seen from my detailes. These fasilities will be located in such a way as to be easily accessible yet. Physically seper-ated from the sleeping rooms by a common open or partially closed courtyard. Each soldier will individually cater for his bathing needs as the water will be fetched from the membrane water reservour just outside the tents.

The upkeep of the toilets with respect to deanliness will be the responsibility of all the troops withen a tent complex. The soldiers will be paired up in each room and a single bucket will be allocated to each paire. All the rooms will be connected by a comm-on partilly enclosed and well shaded corridor passage. The rooms may not be individually connected to the court yard which leads to the general toilets and bathrooms but all the rooms will be directly

linked and open to this coridor pa ssage which will collect all the circulation fratic and link it to the courtyards and consequently the casments. This means that these casments (toilets and bathrooms) could be directtly accessible from the outside of one tent complex. The concentric circles condcpt employed here can be seen to obey certain principles and order displayed by even rentangular row housing with the corridor acting as the long connecting varander or frontage leading to the casments on one side. Plumbing network will be rather combasome due to the temprorary nature of the camp thus the central water reservour shared by a groups of tents. These type of tent planning will be used by junior NCOs and or "boy" on regular maneuvers but the boy and the junior NCOs should be group seperately in different clusters. Each cluster will be accessible by a water transport trunck which will be expected to drive in and refill the water reservour from time to time, as the situation warrants.

For the senior NCOs and or cadets, the internal planning will differ to some extend but the external clustering planning will be the same with respect to the location

of the central water reseriour. The difference here will be in respect to the internal planning of the living units. Two senior NCOs will be pared up in a single like the junior NCOs like cudet but each of these rooms opens into a launch or posch which leads directly to the outside or into the open or partrally enclosed courtyard. The relationship of this courtyard to the casments toilets and bathrooms is the same to that prevailling in the junior NCOs or "boy" camping tents. This means that two sleeping rooms will open into a common launch implying that four senior NCOs or cadets will share a coommon launch unlike the officers whom two share a lamch (second lentenants and full lentenants). The captains and majors and the camp commandant (lantent colonel) have a launch individually. This means that there is a herachy of functional space differences between all the ranks and files of the troops.

Here the senior NCOs and or cadets have the prevallage of entering the courtyards and casments directly from their launches unlike the junior NCOs and boys who are linked to the courtyards through a long corridor passage. These senior NCOs tents also have a diroct link from the outside into the courtyards from the central water reservour. Some of the senior NCOs (WOI and Wo IIs) are entitled to batmen who serve them with regards to the maintananoe of their military Kits only but are not supposo to go into these senior NCOs bed apartments. Each pair of senior NCOS or cadets are entitled to only one buckot. Each bedroom has only one opening into the launch, hence there is not much privacy for the individual senior NCOs or cadets. The two sets of bedroom adjacent to the common lounch could be regarded as one semi detached housing unit not connet directly to

the next set. The only faslities common to all these senior NCOs and cadets are in the courtyard.

This camping units as earlier mentioned, will be grouped together in clusters with seperate clusters for the senior NCOs and cadets respectively as the case may warrant. Each cluster will be accessible by a water transport truck responsible for the refilling of the water reservour from time to time.

The other ranks mess complex will be shared by all other troops bellow the ranks of officers. This includes senior NCOs cadets, junior NCOs and "boys". The mess is expected to serve a variety of purposes such as drinking, eating, and relaxation with some table indoor games.

The eating areas will be divided into two section i.e.

1 - The senior NCOs and or cadets indoor dining room

2 - The open air bukateriate for junior NCOs and "biys"

The senior NCOs and cadets will eat in the same hall and the service system will be selfe service. The service counter system will be employed where the soldiers will be expected to come with their mespans and cutlerries from their rooms and que up to be served over the counters. Seats and table will bw provided for here and drinking water will be placed in jerican on each table. The drinking water will be supplied by service cooks and hand washing bowls will also be supplied.

The open air bukateriate for junior NCOs and "boys" will be partially shaded either naturally by trees or artificially by membranes tyed to posts or trees as the case may warrant. The sevice system here will be similar to that used in the senior NCOs and cadets dinning hallo i.e. self service or counter

service. The junior NCOs and boys will also be expected to come along with their eating mespans, cutleries and water bottles as no water jericans or hand washing bowls will be supplied. All the troops here will be responsible for the washing of their own mespans and catleries. This in itself justifies the reason for siting the other ranks mess close to the natural stream which runs at the back of the mess. Two water reservours are located within close viscinity of the mess, one will be meant for the kitchen hse and the other which will be close to the open air bukateriate will be responsible for the use of all the other soldiers either for drinking or washing of their mespans even through some may prefare to walk down to the stream to wash their mespans.

The kitchen unit will be so situated within mess complex in such a way as to avoid dublication of fasilities. The indoor cooking cooking space will be open to both the dinning hall and open air bukateriate through the self service counters. The relationship of all the kitchen fasililities here will be similar to those of the officers kitchen system. This will be divided into

1 - Indoor cooking area

2 - Outdoor cooking space

3 - Kitchen and staff fasilities.

The indoor cooking area will most extensively be used during the rainy season or when a reasonable state of hygen is expected. It will be directly linked to the outdoor cooking space and other kitchen and staff fasilites such as food stores and locker rooms. The work tops will all be within the indoors

cooking areas and these worktops should be directly related to the food stors and the cooking spaces. The food stores should be as much as possible related to the dilivery bay as this is always the place from where the foods are brought into the stores. The storage capacities of these food stores should be at least weekly except for the case of perishable food items like tomatoes, vegetables uniors etc. which could be supplied on dailly yases as deep freezers may not be in use. The locker rooms will also be related to the entrance lobby and the indoor and outdoor cooking areas. The locker rooms will only be providing with fasilities for changing only. No urinaries, toilets or bathing fasilities will be provided in here. This will in itself go a long way in improving the hygen and conviniences of working areas.

A small clpsed inddor bar will also be provided for use by only the senior N COs and sometimes cadets too depending on the caliber of cadets involved. The particilly closed or shaded open air bukateriate could also be used as an outdoor drinking area after meals (mostly diner). The bar service counter will be designed in such a way as to avoid it's dub-lication. The service should singularly be designed such as to serve both the indoor bar and outdoor drinking area. Toilets and urinaries will be located adjacent to the closed bar in such a way as to make it accessible from both inside the bar and also from the outdoor drinking space. The bulk of the users of this outdoor drinking space will be the junior NCOs only as "boys" are not allowed to take alcohol as a moral conduct.

All the three mess fasilitïes i.e.

1 - Indoor eating hall

2 - Outdoor eating space and bar

3 - Indoor drining bar

are connected and accessible through one major entrance lobby. The kitchen on cook house is mainly accessible through the delivery bay but staff could also come in through the outdoor cooking area.

The mess sergent or any other senior NCO will be responsible for all the cattering and bar services withen the mess. He will be responsible for the running and administration of this mess complex.

A minishope and kiosk will also be provided for by the mess to catter for such private needs of the troops such as cigarates, toiletries, detergents, provisions etc.

A barbers shope will not be provided here within the mess as any soldier wishing to frim his hair could go to the guardroom where there are always soldiers to do that for them

In a a camp of this sort, there are always no women to assist in cooking or other related functions, so every thing here is being done by men who are soldiers themselves.

10:2:3 - Logistic fasilites:

This section deals will all other fasilities which are needed for the effective running and administration of the camp. These fasilities are the core needed for the effective maintanance of the camp both morally, spiritually physically and mentally. The camp cannot exist on its own without the availability of these support fasilitïes which could be basically considered of these support fasilites which could be basically considered as follows:-

1 - Armory(Arms and ammunitions store)

2 - MIR (Medical inspections rom)

3 - Signal and survellance (wireless communition headquaters)

4 - MT yard (motor transport yard)

5 - Admin block (Administration unit)

6 - Guard rooms (including quater guard and sentry posts)

7 - QM store (Quater Masters store)

8 - Laundry services (wash-men)

9 - Generator tent

10 - Field water works (Booby traps)

The armory is a place where military arms are kept for supply and use by troops during the operation. This arms includes all kinds of guns both hight and heavy artillery support weapons, and ammunitions. The light guns and ammunitions will always be kept in an enclosed structure while the heavy artillery support guns such as tanks and towable missile lunchers could be kept in shades like car parks. The lighter guns such as rifles and moters are stored on shelves and arranged by a given military numbering system. The open air artillery weapons shade will be design in such a way as to make it an intricate part of the whole armory The armory will be well guarded as it is always considered to be the strategic strong hold of the troops concerned. It should also be closely related to the form up place for quik supply and easy evacuation of arms and troops.

The medical inspection room is usually a first aid post or purpularly refered to as a field ambulance for a battalion operations headquaters. It is responsible for the discharge of first aid duties to casualities from the war frout

and final evacuation of the more seriouse cases to the rear base military hospitals for futher attention and admission. It is divided into two subsections.

1 - The preventive medical department

2 - The curative department

The preventive medical department is responsible for the regular dispensation of drugs and general h/gen of the troops. This is not very neccessary for an operations camp of this sort. It is better applicable in barracks and rear base military hospitals. The curative medical department is subdivided into five sections, namely:-

1 - Pharmacy and despensing section

2 - Laboratory section

3 - X - ray section

4 - Wards for temporary admissions

In the barracks, this comprises of a regimental medical officer (R.M.O) who is usually a qualified doctor of general medicen and of the rank of major. Three RMOs and three captains with 3 leutenants (Lt) as nursing offices are neccessary for a battalion size hospital. The most senior doctor (RMO) heads the whole MIR while the nurses head the preventive, pharmacy, laboratory and X - ray wards. They are also assisted by other low ranking medical personel assistants.

Only the pharmacy and dispensing units are of any significant importance to an operations base of this sort. Temporary admission wards of limited number of beds are provided for as must of the soldiers will be expected to go back to duty immediately after discharge.

The signals and surrellance unit will be responsible for the reciept and discharge of wireless communication signals from both the rear base and the battle front. In most cases the signals unit is the sole source of communicating with other bases on the progress and state of the operation and also for the discharge of urgent messages regarding reinforcements.

The shrvelance unit of a battalion is based on the french rader system RASIT 3190. which is capable of high definition surveillance of up to 2.5 km for men and up to 14km and 18km for men and vehicles respectively for long range detection. The rader could be mounted as a $\frac{3}{4}$ ton landrover which enables the batteries to be charged or on a high altitude.

The motor transport unit which is responsible for the supply of transport trunks and mobilisation will be incorporated with a temporary main tainance workshop. It will comprise of a vehicle shade or park, workshops and general engeneering services, and a few offices. The drivers will always be on stand by. Reference should be made to chapter three of this thesis for a better understanding of both the signals and surrvellance units, and the motor transport unit (MTSC). These two units differ in size and capacity between the different formations (company, battalion Brigade etc) of the Nigerian Army

The administrative unit is usually the largest in terms of personal strength in the barracks but in the field, this is usually reduced to a minimum . This will be made up of offices and the orderly room. The offices will be allocated to the four battalion commanders, their second in commands (2ics), the overal battalion zic, adjutant, MTO and OMO. The battalion (RSM) regimental sergent major and the regimental chief clerk. The orderly room will be a large hall for general duties like a general

officd in civil institutions. A few car parks will be provided for in front of the administrative block to cattor for staff cars and irregular visitors from the rear base.

The guard room will be located at strutegic points arround the camp. in addition to the central guardroom or quater guard. In the quater guard, space will be provided for a contry post, flag, stand, rest area, duty room and prisoners dungeons. A mounted guard space is always in fromt of the guard room for special and important visiting dignitaries. Other guard rooms that will be situated at strategic points arround the camp could be better refered to as sentry posts to keep vigilance of the camp especially at nights. For this reason, the sentry posts will be designed in such a way as to overcome visual barriers to the sentry guard by high elevation. The main guardroom or quater guard is best located near the main entrance into the camp to fasilitate checks on all entries and exits.

A barbers shade will also be made available by the quater guard to handle the shaving of offenders heads and barbing of troops needing haire cuts.

The quater masters store is usually the main warehouse of all military kits such as boots, fabrics, toiletories, mospans, water bottles etc. In the case of a camp of this sort, the quater masters store could also be responsible for the storage of certain foods especially canned food like milk, beef, sugar, oils etc. and even mddical drugs and equipments. A few offices will also be provided for some of the quater masters attendants. A few tailors will be stationed withen the quate masters store close to the main entrance. These tailors are not actually responsible for sewing the army uniforms for the troops but will be responsible for mending turned out uniforms or triming of over size or patching of the uniforms. The importance of taillors in any military establishment is a matter

of noccessity.

In the lamdry services srotion usually managed by battalion or military attaches such as batmen is usually of vital significance as a military protocol. Those attaches usually are not directly involved in the battle operations but provide the necessary services needed for the phsycological balance of the troops especially the officers. This lamdry services will mostly only be arailable for use by officers and the senior NCOs and certain cadre of cadets Although even the junion NCOs and "boys" could go and use the fasilities in the laundry for their own bebefits but the laundry staff are only meant to serve the officers, senior NCOs and certain cadets as the case may warant.

The laundred will compriso of a collection Lobby, and dirty lonin storo, finished works storo, and a spaciouso area for starching and pressing of army uniforms oven starching is not always noccessary in war situations. Washing and drying of the aramy farbrics will easily be done by the stream thus justifying the siting of the laundry services near the stream.

The generator tent will be located at a point convinient enough to avoid any air and noise polution. The structure an open airy shade to fascilitate rentilation by natural means and a small fuel and dossel storrage will be provided for.

The water treatment plant is naturally an open air reserviour probably with a small shade for the pumbing plant.

10:3 - schedule of Accomodation;

This section deals with the various structural units that make up the entire military operations cump of a battalions capacity with the corresponding area reguirements of each fasility that make up the units. It is noccessary to remid the readers of

this thesis thats the given areas may not be strictly adhered, since they only help to give the author a rough idea of the size of the project with respect to the space requirements of each unit. This is architectural connotion is refered to as the the schedule of accomodation.

For this purpose, I will zone the camp into the three sections or zones used in my functional analyses, that is

1 - Officers camping fasilities

2 - Other ranks camping fasilities

3 - Logistic fasilities.

10:3:1 - Officers Camping fasilities

A - living tents

1) Lt. Col. - 1 x26m^2 - 26m^2

2) Maj. - 8 x 17m^2 - 136m^2

3) Capt - 11 x 13m^2- 143m^2

4) 2/Lt & Lt - 20x13m^2 - 260m^2

5) Easments - 14 x 3m^2 - 52m^2

(Living tents) Total ≙ 617m^2

N.B. This total space area does not include circulation spaces within the tents and the area values for the living units is based on the type of fasilities expected to be present in each unit compouled with its' specific function.

B - Mess Complex

Bar

1) Waiter service dining and bonquet hall - 1.9/pers x 45 - 85.5m^2

2) Indoor closed bar - 1.5/pers x 40 - 60m^2

3) Indoor games area - dart and billiard - 35m^2

4) Outdoor gaden bar - 25m^2

5) Eamonts - 15m^2

N.B. This drinking bar spaces do not include circulation areas back bar, storage and lobby. This will be cattered for in the final design.

Kitchen:

(6) Indoors cooking space - $\frac{1}{3}$ x 85.5 - $30m^2$

7) - Outdoors cooking area - $25m^2$

8) - Cold and dry stores including dirt bins - $20m^2$

9) - Locker rooms and easments - $18m^2$

10) - Cattering officers office - $15m^2$

Mini shops:

IO) - Kiosk - $9m^2$

II) - Barbers shade - $5m^2$/bay x3 - $I5m^2$

(Mess complex TOTAL - 352.5

N.B. Circulation spaces not inclusive.

Officers camp fasilities total - $969.5m^2$

IO:3:2 - Other ranks camping facilities

A Senior NCO_s or cadets hiring units

I - WOI - $4x9m^2$ - $36m^2$
2 - WOII - $I4x9m^2$ - $I26m^2$
3 - SSgts - $2Ix9m^2$ - $I89m^2$
4 - Sgts - $45x9m^2$ - $405m^2$

(Senior NCO_s Total $756m^2$

Junior NCO_s or "boys" living units

I Cpl - I26 x 6m^2 - 756m^2
2 Lcpl - I7I x6m^2 - I026m^2
3 Ptes - 5I9 x 6 - 3II4m^2

(Junior NCO$_s$) Total - 4896m^2

Total personel strength (other ranks) - 900 (attaches inclusive)
Total living area of other ranks - 5652m^2

N.B. This total living area for the other ranks does not include circulation spaces such as courtyards within each ten unit and also the space allocation forecasments and water reserviour.

B/Mess Complex

I self service senior NCO$_s$ or cadets dining hall - I.6m^2/pers x x84 - I35m^2

2 Senior NCOs closed indoorbar - I.I x 800 - 800m^2
3 Outdoor bar and junior NCO$_s$ bukateriate - I.Ix800 - 800m^2
4 Easments, backbar, and drinks store 50m^2
5 Indoor cooking area - ⅓x835 (Work tops inclusive) 270m^2
6 Outdoor cooking area including put washing I20m^2
7 Cold and dry storrage including dust binn I50m^2
8 Locker rooms (easments exclusive) 50m^2
9 Mini kiosk and provisions shape x4 50m^2

(Mess complex) Total - I7I3m^2

Ground total of other ranks campins facilities - 7365m^2

IO:3:3 - Logistic fasilities

A - Armoory

I - Light arms store 9.45m^2 x600 ÷ 2 - I50m^2
2 - Ammunitions store - 95m^2
3 - Heavy artillery guns parcking shade (3x5) 90m^2

Armory Total - 335m^2

B - MIR (Curratives medicen only - dispencing pharmacy)

First Aid

I	Lobby and waiting area - I.2xI00	I20m^2
2	Consulting rooms (3x3) 3 -	27m^2
3	Treatment and dispensing cubicles (2x2) 7	30m^2
4	Pharmacy and drug store	20m^2
	MIR Total -	I97m^2

C - Signal and survellance unit

I	Signal communication room and officers -	45m^2
2	Survellaince RASIT receptor rader room -	35m^2
	Total	80m^2

D - Laundry

I	Collection room -	30m^2
2	Lobby -	I5m^2
3	Dirty lenin store -	38m^2
4	Equipment store -	38m^2
5	Circulation space -	33m^2
6	Changing rooms -	I5m^2
7	Washing area -	60m^2
8	Services -	I5m^2
9	Ironing -	40m^2
	Laundry Total -	284m^2

E - Guardroom

I	- Prisoners cell dungeon -	30m^2
2	- Services	30m^2
3	- General rest room	I5m^2
4	- Guard room	I0m^2
5	- Lobby and circulation	I0m^2
6	- Sentry post 50m^{2}x3	I50m^2
	Guard room total	245m^2

E - Administrative unit

Offices

Battalion HQ

1)	IO - Lt. Col.	-	$Ix38m^2$	- $38m^2$
2)	Zic - Maj.	-	$Ix35m^2$	- $35m^2$
3)	Adjt. - Capt.	-	$Ix30m^2$	- $30m^2$
4)	RSM & WOI	-	$Ix24m^2$	$24m^2$

Battalion HQ Total - $I27m^2$

Coy. HQ

I)	OC - Maj.	-	5x35	- $I70m^2$
2)	Zic - Capt.	-	5x30	- $I50m^2$

Coy H.Q. Total - 490

Coy C.S.M.S will be attached tothe individual coys. which are five in number.

Platoon H.Q.

I)	Q.M.O.	Capt.	Ix30	- $30m^2$
2)	M.T.O.	Capt	Ix30	- $30m^2$

Patoon H.Q. Total - $60m^2$

RQM CSM$_s$ will be attached to the battalion control QM store to cater for the fire companies. Also the five MT WOIIs will be attached to the MT yard to cater for the five coys.

Orderly Room

I)	C.C - WOII	-	IxI0	- $I0m^2$	x3 i.e. for battation HQ, coy HQ and PL HQ
2)	O/RM - Sgt - ~~Sgt~~		Ix5	- $5m^2$	
3)	Ducas NCO - Sgt -		Ix5	- $5m^2$	
4)	clerks G.O. - Cpls	-	2x5.5	- IIm^2	
	- Lcpls	-	3x5.5	- $I7m^2$	
	- Pts	-	6x5.5	$34m^2$	

Orderly Total - 82x3 - $246m^2$

G - M T Yard

1) Vehicles shade - 3 x 3.5x30 = 500m^2

2) Stores, workshops and general engineering maintance 300m^2

3) Offices for five RMT wolIs and clerks = 80m^2

M T Yard Total = 880m^2

H - Q. M. STORE

1) Army uniforms and kits store = 120m^2

2) Troops dry and canned foods store55M^2

3) RGQM CSNS offices - 5x9 = 45M^2

4) Coy tailors (2/coy) = 5x5x2.5 = 55M^2

Q.M Store Total = 300M^2

I. Generator tent = 25M^2

1 - Water treatment plant shade = 18M^2

Ground total of logistic facilities = 3437M^2

Total area of camp covered space = 11772M^2

CHAPTER ELEVEN

11.1 Design Process

This section deals with the actual design itself and the reasons for certain decisions taken with respect to the general planning and the choice of materials. This also has to comform with the aims and objectives of the thesis which I have earlier mention in chapter one. It is necessary here to re-state this aims and objectives of the thesis for easy reference. This aims and objectives are:-

1. To evolue in the final design a model military camp for the purpose of training and operations that could be used on different terrains
2. To improve the combatants apreciation of all the theories of battle strategies acquired in the classrooms by exposing him to the terrain types he will eventually battle on.
3. To emphasize mountain savanal Warfare as a booster to our territorial defence strategy

4. To de-amphasize military/civilian friction as it's found in most advance countries. This is manifested in the choice of site for my model military camp

5. To harmorise the architectural forms evolved with the terrains to achieve a better comounflage

6. To through open the architectural challenges of military architectural science with respect to warfare in addition to barrack architecture.

In comformity with the above aims and objectives, the site planning has been executed in such a way as tally with the harachial concept of planning. The logistic fasilities have been group together towards the aproach area of the camp. This is so because of the nature of the kind of activities and functions tho perform. This follows a certain order in the entrance and exit of troops from the camp. All the troops in the camp aproach this this area intrinctively and unanimousely in the advent of any immergency or "fire alarm". This meansthat they will aither move towards the armory, M.T. yard and prahaps finallt assemble

on the form up place (RVY). Also after each axcercise when the troops are back to camp, the are first concentrated around the logistic area for any rebriefing, reorganisation, inspection and final dismisal from whore the will eventually disperse to their veripuse living tents before going to the masses for either any form of relaxation or eating.

The quater guard main has been located near the entrance point because of its vital function of halting and checking any intruder for the purpose of idantification. In every military establishmant, the quater is always the first point of contact and comming face to face with the military character and code of conduct.

Next to the quater guard is the form up plade which is located adjacent to it. The form up place is usually sited on a farirly flat terrain because of its vital function of drilling and assamblage of troops for routin inspection or briefing. The form up place could also serve the function of drilling and instilling disciplin in defaulters who are locked up in the guard room in the quater guard.

This drilling is a kind of punishment but if has also been proven to phsycologically and mentally and mentally bring the difaulter to comform with military codes of conduct with respect to disciplinary rules through the reciept of orders from the provost or military police which the defaulter must respond to. This means obidience and compliance to orders which the divient defaulter is expected to adapt to. This justifies my ruason for siting the form up place (FUP) close and adjacent to the quater guard and exit gate .

Opposite the form up place right accross the motorable road leading into the camp is the administrative Unit. This also has been sited witen close viscinity to the main entrance because it's usually the first point of call by visitors after the quater guard. This type of visitors especially journalists or other civilion visitors will have to go through some kind of routin interagation in the administrative block by the camp commandant or any other officar detailed to do so before the wairy gust could be allowed to proceed with his mission. Any other visitor will also be expected to sign a visiting warant in the administrative block or see the camp

commandant before proceeding with the purpose of his visit. When ever troops are assembled on the form up place to be addressed by the camp commandant, he will then come out of his office and visit walk on foot to parade ground. This arrange should make it possible for the guard in the quater to see his exit from the administration block so as to give him his usual saluta before he crosses to the parade ground where he will adress the troops. A bigular is always stationed by the quater to blow his giggle signalling the exit of the camp commandant and his aid de camp (ADC) from the office. Also automatically informs the parada commanders to get ready and take position as the camp commandant approaches the form up place (FUP).

This explains why the administrative block, quater guard and form up place are intricately related to each other and should be place close to one another. A few car parks are also provided for in front of the administrative block for use by important visitors especially military dignitaries.

The M.Y yard and armory all open up towards the form up place as a matter of functional reality.

This relationshipe is so because the vehicles from the M.T. yard will always be used to evacuated the troops assembled on the form up ground. Also, troops will be expected to sign for their rifles and ammunitions from the armory and immadiatetly move to the form up ground for final mobilisation to their objective.

The administrative block, quater guard, armory and M.T yard have this been jystifyably place around the form up place because of their complex and intricate interelationship.

The quater masters store does not neccessarily need to be closely related to any of the above unit are, as it will be meant to serve the troops in general and supply foods to the messes. This explains why it is more related to the camping tents and the main access roads leading to the two messes.

The sentry post have been so disposed all around the camp site to a rigilant eye to all the nook and conners around the camp. This helps in quik and easy identificat on of enemy recce spys or patole teams. This sentry post are mostly man by nights. The sentry posts are designed with a small closed room under

for rest and a shaded open top for round view.

The sergents mass and officers mess are located wither tha different living areas because of their function of providing relaxation areas and feading for the troops. There is usually a higher po concentration of troops wither the mess especially in evenings after hard days operation in the bush or fields. The mess have be so designed and located to make accessibility to the form up place easy and at the same time make it difficult for introducding to get straight to any of the messes.

The generating plant, water treatmant plant and laundred have been so sited in a way as to maximise the functional utility and minimise any inconviences.

The circles use for the living units comforms with my vision of speed evacuation and compart-mentalisation yet comforming with an order of straight courses for functional accessibility and ease of circulation. The covering system of geodecity implies a maximum internal space utility while archieving good rigity and stability in the effective use of steel and membrane.

Membranes and cables only entails stability but defies rigidity.

There is no predarmined pedestrain circulation as troops can move in all directions to any place they wish to within the camp. There is only predetevmined and proposed motorable access way connecting all the nuccessary places vehiches are suppose to reach.

The geodegic steel space frame and skew grid structures use for this camp tends to comform more easily with the natural terrian or topographical features in this area. This steel structures which are easy to arrect within a very short time and easy to dismant too are compact and hight. weight. The rigids steel structures provides the bases for both scaffolding and tying of the membrane tents. Whose partions and openings have been sewed all together.

The compound roof wall coverings. The membrane is not usually manufactured in pieces and elemants but sewed together as a unit whole.

The grouping of the living units into clusters is meant to bascilitate co-ordinate and unified organisation of troops for the purpose of easy

administration and foisting of the military's concept of brotherhood. Every soldier is one another keeper and guard. They placing of people together irrespective of regiligiouse or ethnic differences frosters friendship, and togetherness. Respect for one another rather than fear should be the prevalling code of conduct of military personel.

The other ranks who are usually move than the officers are allocated the site or area towards the steams because of the type of activities encludlge by them which reguri s the accassional washing of their lapins mostly by themselves. The streams could easily be used for this purpose. This grouping of the living tents will fasilitate easy and affective command and untole of the troops rather than being scattered all over the place in smaller clusters. For example each tent unit has a strength capacity of over fifty troops with respect to the other ranks aspecially the junior NCOs.

Every structure on this camp will be constructed of only steel pipes and membranes connected to the rigid hollow steel structures by cables as the case warrants.

Floors too will be raised by the use of folded steel plates prefabricated in a unighely predertined manner for the special functions the will perform with respect to storm drainage. The membranes will be of double to skins to take care of the any thermal variation problems aminant with the tropics.

Visual piracy with respect to the privacy of enlosed spaces will be maximised by the type of detailes proposed but the problems of acaustic transmision cannot proposed out the problems of acaustic transmission cannot be remedied as sound easily passes through membranes structures. These membranes are impervious to storm water thus could be used as water reservours.

The water treatment plant has been wisely located up stream to tap pure and unpoluted water which is easily poluted water which is easily poluted down stream by the camp users.

The forms used here are all basically space frames which display all the characteristics of stiffness and good rigidity especially with respect to uniformly distributed loads.

The temporary nature of the camp make it impossible and uneconomical for any sort of elaborate sub-structural works such as foundations. Since the soils around the camp site are quit idual for pegging the question of ground stability of the space frames will be rulled out.

CHAPTER TWELVE

12:1 Structural Analysis and Materials

This chapter deals with the types of sturctures and materials used in this design which will make it conform with my design goals. The system of construction has been tested and proven to be very useful for military purposes by the United States marins. The envention is Buckminster Fuller whom all the tribute of my inspiration goes to.

Geodesic domes are basically space frames which can be defined as a three dymensinal continouse assembly of elements resisting loads which can be applied at any points, inclined at any angle to the surface of the structure and acting in any direction.

The advantages of this structures are:-

1. Considerable reduction in required structural depth
2. Regidity of structure
3. Saving of materials
4. Possibility of using the same forms due to repetion of members

5. Possibility of covering large areas without intermidiete supports

6. Interesting architectural forms

Space frames have been affectively employed here as structural elaments for holding the membrane coverings in place. This space frams will be held to the ground by means of pegging to resist any tendancy of horizantal sheering at the ground contact and voritical buckling.

The floors will be made up hindged folded plates covered by flat steel grid decks. This makes a continouse smoth covering on the top while allowing storm drainage to flow easily beneth the floors.

The connection of the steel structural elements could be easily done by hand not requiring the use of cranes or any form of scafolding.

There are many examples of these type of structures which have already been used in the past.

Connection of the double skinned membranes could easily be executed by the use cables pre-fabricated together with the membrane tents.

The followings pictures shows the types of structures already in use in other parts of the world

CHAPTER THRITEEN

The method of voater supply in military camps is part and pacel of militory science. Camping arnics do not always need man ucipal water supply system as battle field as not normally dictated by manucipal water networks. The field engineers have to work out a means right on the camp by which water will be supplied to the troops. This is why one of the criteria for camp site selection is always an easy and possible source of water supply.

For this purpose as earlier mentioned field water plant will be in use in this camp. This will comprise of dessel pumping maching and membrane water reservioura. Water treatment here will be mainly by sedimentation filtration and chemical processing. The membrane reservours will be placed on raised folded plated floors just by the bank of the river. Piping network will not be in use here as this will be more complex and combersome. Instead, truck mounted water tanks will be used to convey the water from this giant reservioura to other smaller subreservours placed at stategic locations all over the camp for the service of the troops concerned.

The method of water disposal here especially storm drainage will be natural storm dranages will simply flow along the slopes of the site down towards the streams and could even pass under the tents beneath the groves of the filded plantes.

Soak always will be dug arround in places deemed neccessary for the draining of dirty water from bath rooms or toilets or even kitchen was areas. This soak always will be of some architectural importance as the will be specially designed and constructed from my detailes.

Reference should be made to the detailes of the easments for better understanding and appreciation of their architectural significance.

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