INTEGRATION OF VERNACULAR ARCHITECTURE FEATURES IN A POLO SPORTS CLUB, MINNA, NIGER STATE

BY

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MTech/SET/2017/7584

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ABSTRACT

Vernacular architecture is the expression of an individual person's or society's culture, history and locality or geographic area being reflected in their immediate environment and surrounding buildings. Buildings connect individuals to the culture, as the human desire to be culturally connected to ones surrounding is reflected in a harmonious architecture. The constant deterioration of the current Minna polo field, the bare nature of the field and the lack of supporting facilities as outlined by the Niger State Government mandates the need for a modern facility that incorporates indigenous culture and promotes development in the State; hence the need for a Polo Centre that adopts vernacular architecture. This research provides an example of how architecture can be an expression of a particular culture, exploring the influence of culture on architecture in Niger State by considering the major ethnic groups the Gwari's and the Nupe also with little interest on the minority ethnic groups in Niger State, Nigeria. The research adopted a descriptive research method, employing the use of observation schedule, an ample review of existing literature, a selection of local and foreign case studies for data deduction to obtain data concerning sports clubs and vernacular architecture design. Field survey and observation were conducted on five selected sports club using the purposive sampling technique case studies. The data obtained was analysed and presented using tables and pictures. Findings indicate a low level of implementation in the use of vernacular architecture design principles in the design of sports club. However the research also proposed a design of a Polo Centre in Minna, Nigeria, incorporating elements for optimum airflow, use of indigenous vegetation, incorporating of gender considerations in the allocation of spaces, and traditional materials and features within and outside built spaces. It is important to note that vernacular design principles are passive and sustainable measures; engravings, compound layout, house forms, and locally sourced building materials that can be adopted by the Government and other associated bodies to enhance the connections to the people's immediate environment, history and culture, which is highly recommended by the research. The research concludes by advocating for the use of vernacular design principles applicable to building architecture in Nigeria.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Architecture all over the world is a part of ones' daily life. In all outgrowth, architecture is about the users (Banta, 2006) It is imperative that Architecture responds to those users in the context within which they exist. The context here being defined as both the physical attribute that is the environment and cultural attribute which is the people and their way of life (Moore 2005; Rapoport 1969). The Hausa aristocracy had historically developed a horse based culture. Still a standing depiction of the traditional superiority in Northern culture. Horses are trained and ridden for practical purposes such as police work or for controlling herd animals on a ranch, they are used for competitive sports including, but not limited to dressage, events, endurance riding, show jumping, vaulting, polo, driving, horse racing and rodeo. A polo facility is created and maintained for the purpose of accommodating, training or competing equids, some of the examples are horses, donkeys and mules, especially horses. Based on their use, they may be known as a barn, stables, or riding hall and may include commercial operations described by terms such as a boarding stable, livery yard, or livery stable. Larger facilities may be called polo centres and co-located with complementary services such as a riding school, farriers, vets, tack shops, or equipment repair.

Culture is an outlining of a concept which expresses all of the intellectual activities of a civilization (İnceday 2007) Culture encompasses social interaction, infinite history of societal interaction and the analysis of the community's experience (Flinn, 1997; Linehan and Gross, 1998; Risjord, 2007; Muhammad & Ismail 2015). The culture is; diverse, expressed through the community as well as the individual, interpreted with each member of the community, shared with groups and transformed to new generation.

It involves a system of rules, and also attitudes, values, beliefs and norms, thereby, putting into practice by interpreting experience and generating behaviour. It conveys the sustainability of vitality of the community, and has the potential to change. Cultural values were deduced from cultural the cultural origin by breaking the information down into three major group. The three group are social value, cultural value, and environmental context.

Nigeria is a vast country with a rich diversity. This diversity is seen in various dimensions such as ethnic group representations, climatic conditions, religious affiliations, cultural beliefs and practices and art forms. Because of the vastness of its diversity, approaches to architecture also vary. Different ethnic groups in Nigeria approach architecture in different ways in an attempt to address local conditions and needs. To better understand and appreciate vernacular architecture in Nigeria (Lodson *et al.,* 2018). National identity could be forged through a five-tier synthesis of architectural strategies, to positively integrate form, space, and order imaginatively to fit user i.e. sense of rootedness. The application of the courtyard within the family compound (groups of dwelling units sharing common services), serves physical, social, and economic functions concurrently (Moukhtar & Sani 2019).

1.2 Statement of the Research Problem

The Minna polo field, although not relocated has been gradually deteriorating and is being encroached by the new Kure market, The Minna polo ground Is only a field with vast land and no supporting facilities to tender to the horses or the horse rides men.

1.3 Aim and Objectives of the Study

The aim of this study is to incorporate vernacular architecture in the design of polo center in Minna, Niger State.

The objective of this thesis includes

i. Investigate the characteristic nature of vernacular architecture in Minna.
ii. Evaluate the application of vernacular architecture in recreational areas in Minna.
iii. Examine the implementation of vernacular Architecture in polo and polo club.
iv. Propose a polo and polo center that incorporate vernacular Architecture.

1.4 Research Justification

In recent times there is increase in the popularity of the game polo, resulting in self-awareness, the rapid rates of social change, adaptation of technological innovations and population increase tend themselves to more demand for other recreational opportunities and an adaptation to new social requirements. This study create an avenue for convergence of sports, entertainment, recreation, job creation and a safe place for festivals and celebrations.

1.5 Scope of the Study

The design of the polo and polo centre is a complex where the sport is played professionally with a clubhouse for members of the polo club as well as a retreat centre for accommodation and relaxation of non-members. A well-equipped livery will be provided for breeding and training horses to maximise tourist inflow.

1.6 The Study Area

Minna, Niger State has a total area of 8000 sq. km and located in west-central Nigeria. It is the capital of Niger state. Its predominant tribes are the Nupes and Gbagyi, with a population of 304, 113 people from the 2007 census (NPC, 2007).

Muslim culture filtered into Minna by way of the ancient Saharan trade routes and has many Muslim organization, Christianity is also a major population in Niger state, where sharia laws is valid. The Minna town is surrounded by hills. The historical background of Minna Niger State was compiled by Maxlock group Nigeria limited. In its Minna master plan and report.

The city is located between latitude 8.25 and 9.25 north of the equator and longitude 6.45 and 7.39 east of the Greenwich Meridian, in a scenic valley of rolling grasslands which is relatively underdeveloped.

The location of the site is strategic for the development of this club because of its accessibility to the target users and also the availability of the important utilities and also it's the existing polo ground in Minna.

Figure 1.1: Showing the location of Niger state in Nigeria
(Source: Muhammad & Ismail, 2015)

Niger, state, west-central Nigeria, bounded to the south by the Niger River. It is also bounded by the states of Kebbi and Zamfara to the north, Kaduna to the north and northeast, Kogi to the southeast, and Kwara to the south. The Abuja Federal Capital Territory is on Niger state's eastern border, and the Republic of Benin is its western

border. The landscape consists mostly of wooded savannas and includes the floodplains of the Kaduna River.

Niger State is one of the most rural states of the Federation. Out of an estimated total population in 1979 of 1,623,704; more than 90% are rural, while the remainder are urban dwellers (Aiyedun 1998). It is situated in the middle belt region of Nigeria and lies between latitude 8"00 and 13"30 North and longitude 4"20 and 8"40 East.

Its area of 65,037 km2 represents about 8% of Nigeria Four major traditional societies live here, including the Nupe who occupy about one-quarter of the land area, make up one-third of the population and who are found in four Local Government Areas in the South (Larum, Gbako, Agaie and Lapai). Another is the Gwari who occupy about one-quarter of the land area and make one-third of the population.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 The Polo Club House

Polo being one of the oldest team sports known. Called the sports of kings, Polo is a team sports that is horseback mounted. Said to have originated from Persia (Iran) in the 6th century B.C, (Laffaye 2010; Hong, & Mangan 2005) which was a training game for elite groups or the kings guards. Which spread to the rest of the world. It is professionally played in 77 countries and was an Olympic sports in the early 20th century. Often called the Sport of Kings, the game continues to enjoy a strong following amongst the world's royalty. The spectator sports for the polo and society is often supported by sponsorships (Canepa, 2018).

Teams are selected based on how the players are rated, (skill levels – called goals – run from -2 to10) and the object is for them to be equally matched so that the sum of ratings is equal on both teams. The game is played by two opposing teams with the objective of scoring goals by using a long-handled wooden mallet to hit a small hard ball through the opposing team's goal. Each team has four mounted riders, and the game usually lasts one to two hours, divided into periods called chukkas (or "chukkers").

Arena polo has similar rules, and is played with three players per team. The playing area is smaller, enclosed, and usually of compacted sand or fine aggregate, often indoors. Arena polo has more manoeuvring due to space limitations, and uses an air inflated ball, slightly larger than the hard field polo ball. Standard mallets are used, though slightly larger head arena mallets are an option.

As one of the oldest team sports, polo is an exhilarating combination of horsepower, athleticism and control. Competing on a 300 by 160-yard grass field (outdoor polo) or a

300 by 150-foot dirt arena (indoor polo), players score by driving the ball between the opposing team's goal posts using a bamboo mallet while riding at speeds of up to 35 mph. The team with the highest score after 4 to 6 chukkas (periods) of play win the game. If both teams are tied at the end of the final chukka, play will go into overtime. The game follows some established rules that keep the horses and riders safe.

Forms of arena polo include beach polo, played in many countries between teams of three riders on a sand surface and cowboy polo, played almost exclusively in the western United States by teams of five riders on a dirt surface (Carlebach, 2011). Another modern variant is snow polo, which is played on compacted snow on flat ground or a frozen lake. The format of snow polo varies depending on the space available. Each team generally consists of three players and a bright coloured light plastic ball is preferred

Polo is not played exclusively on horseback. Such polo variants are mostly played for recreational or tourist purposes; they include canoe polo, cycle polo, camel polo, elephant polo, golf-cart polo, Segway polo and yak polo. According to the United States polo Association, in the early 1900s in the United States, cars were used instead of horses in the sport of Auto polo. Hobby Horse Polo is using hobby horses instead of ponies. It uses parts of the polo rules but has its own specialities, as e.g. 'punitive sherries.

2.2 Outdoor Polo

The game usually divided into Periods called chukkas could last one or two hours (Heitner 2018) The game consists of 4 to 8 minutes chukkas, with 4minuutes between chukkas where the players change mount or even during chukkas. The playing field is 300 by 160 yards (270 by 150 m), the area of approximately six soccer fields or 9

football fields (10 acres), with an objective to score by hitting the ball between the goal post. Each team has four mounted riders.

2.3 Indoor Polo

The indoor game has similar rules to the field game and not as strenuous as the fields for players. Played in a field of 300 by 150feet (91 by 46m) -150 by 75 feet (46 by 23m) enclosed arena same as those used for other polo sports. The major differences between the outdoor and indoor games are: speed (outdoor being faster), physicality/roughness (indoor/arena is more physical), ball size (indoor is larger), goal size (because the arena is smaller the goal is smaller), and some penalties.

2.4 Polo in Nigeria

Polo was introduced to Nigeria in as early as 1904 when British Naval Officers played on an air strip that was shared between what has come to be the Lagos Polo Club and the Ikoyi Club, but back then the area comprised an open playing field and temporary tents. The Lagos Polo Club and Ikoyi Club were later established by the British, and teams from Lagos and the then German Cameroun began competing. One of the first tournaments they played for was the Kaiser Wilhelm Cup (now renamed the Independence Cup) in 1914, which was a sterling silver cup presented by the King of Germany Kaiser Wilhelm II. Polo membership and players soon evolved, with British colonial masters – mostly naval officers – giving way to expatriates and top Nigerian civil servants and the educated elites of the newly independent country.

The game was soon introduced to the Northern states of Nigeria where it was received with passion. Since then the game has continued to attract the country's royalty, elites, politicians and other highly influential dignitaries. The late Emir of Katsina, Alhaji Muhammadu Dikko's passion and enthusiasm for the game further spread its appeal and

heightened its adoption amongst the Northern elite, and the Game of Kings quickly spread with polo clubs springing up in Katsina, Zaria, Kaduna and Kano. By 1922, Katsina had become a major polo centre in the north. The games' ruling body, the Nigerian Polo Association (NPA), now federation, was founded in the early 20s and its first head was Sir Nagogo, nicknamed the 'Father of Nigerian polo,' whose extensive travels gave the Nigerian body international recognition. Today, the high profile game of Polo in played across the country, with Lagos, Kaduna, Kano, Katsina and Port Harcourt being the major clubs. The game is also popular in cities like Ibadan, Abraka, Jos, Bauchi, Yola, Maiduguri, Zaria, Sokoto and Benin.

Polo in Nigeria is a seasonal sport, played between the duration of October and April and the subsequent months mostly the wet rainy season polo is out of session. In the seasonal session the most active aspects is the socialization, spectators stand, first aid and the stable. But in the subsequent season it's the horses and the stable. The members involved in the polo club house are playing members, social members, sponsors, visiting players, staff, the press and spectators. A club signifies an association of persons united by some common interests. A clubhouse is where most of the activities of the clubs are planned, which may include; active sports, social and entertainment activities, cultural and educational activities. There are two principal types of sponsorship, the private club and the public club (Suraj, 2017).

A private club is usually a cooperatively owned and subsidized social and recreational facility for exclusive use of owner-member. Makes available social and recreational as well as sporting needs its members can afford. Has a restricted membership usually with high membership fee.

The public club provides adequate and accessible facilities for as many persons as possible at affordable rates (i.e. all frills and extra services are reduced to the minimum, with a profitable operation). Usually such clubs are owned by government institutions, while some services are profit based the main motive if the club is its member's welfare.

2.5 Categories of Club Houses in Nigeria

First category those owned by the workers union in some institution or by a group of persons although offer some services on profit basis, its member's welfare is their aim like fifth chukka, Lagos polo club, plateau clubs. Some of the established clubs have facilities like lawn tennis court, darts, indoor games, gyms and restaurants. The second category usually owned by individual and operates solely for commercial purpose (Suraj, 2017).

2.6 Evolution of Architecture in Nigeria

According to Prucnal (2001), the strongest influences on indigenous architecture was the introduction of Islam into Northern Nigeria, the return of the ex-slaves from the Americas (especially Brazil), and colonization. The Historical Style consists of the European Trend followed by the Colonial Style. The Brazilian Trend evolved into the Brazilian Style while the North African Trend evolved into Sudanese Architecture. The blend of Traditional Architecture and Historical Styles formed Vernacular Architecture. Agboola and Zango (2014) are of the opinion that the Trans-Sahara trade coupled with the new religion of Islam had the most enormous impact on the settlement pattern and local building practices of Northern Nigeria. Some of the effects can be seen reflected in the facades of their buildings as a number of the designs employed were borrowed from other parts of the Islamic world.

In a city like Kano, group masons and other specialized trades could be found in the past, basic elements of a real building industry. From the 15th century, the mosque was one of the most prominent buildings in Hausa towns. Houses, boundary walls and roofs in the towns were built of mud. In the villages the roofs were almost always of grass and boundary walls were of matting or corn stalks. In the Traditional Style the roofs of the houses were constructed of thatch, but quite early in the development of Northern Nigerian towns the thatched roof was replaced by the flat or dome-shaped mud roof (Prucnal, 2001). The climate, human physiology and geography led to the development of curvilinear, conical and mud-roofed structures in the North and the rectilinear thatch-roof mud houses of the South (Awotona, 1986).

The influence of Britain started mainly through the trade of slaves in the 18th century, which was however brought to an end in the middle of the 19th century. Nigeria became a protectorate of England with Lagos as a colony. In 1914 Southern Nigeria, Northern Nigeria and the Colony of Lagos got united and became the Colony and Protectorate of Nigeria. Because of the expansion of Britain in the landscape of Nigerian architecture new types of buildings were introduced. These were usually either imported 18th century houses of the English countryside or prefabricated constructions with deep verandas and overhanging eaves. These were sometimes raised on stilts (Adeyemi, 1976), and they usually had a continuous horizontal band of windows. The physical appearance of settlements changed because of the introduction of new building materials from Europe. Corrugated iron sheeting and cement have had perhaps the greatest effect (Denyer, 1978). These buildings represent the Colonial Style, whose character is nevertheless most distinctively represented by public and administrative buildings from that era. These are reminiscent of the classic revival in England with the classic orders carved out of walls to give impressive scale.

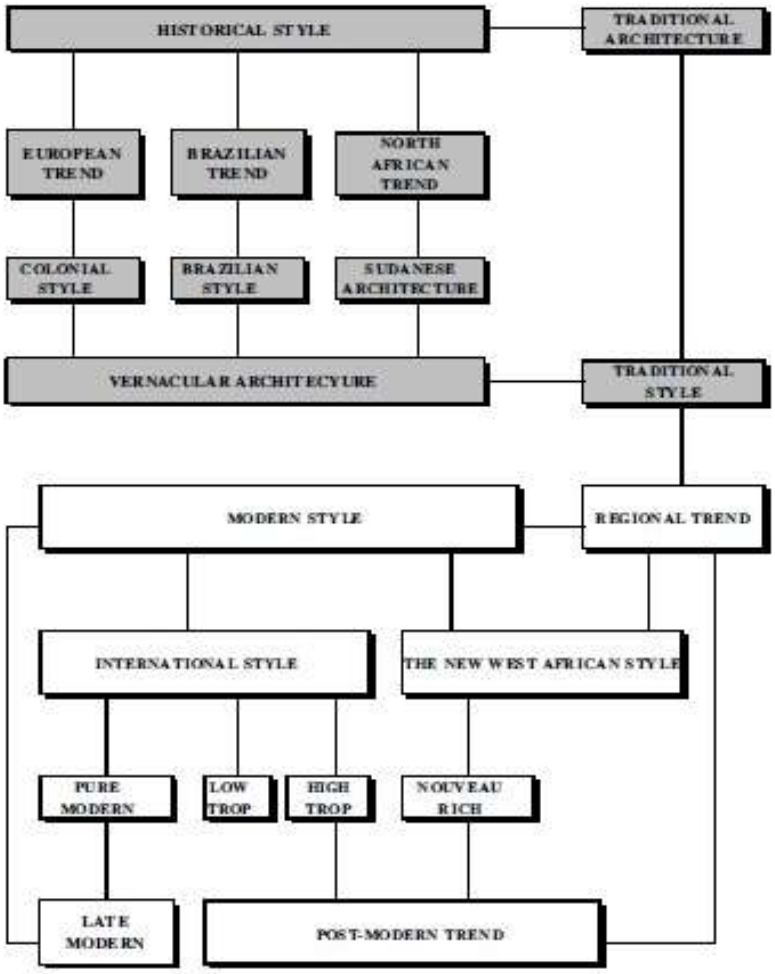

Figure 2.1: Showing the evolution of Nigerian architecture (Source: Prucnal, 2001)

For four centuries, the slave trade dominated relations between the peoples of Nigeria and peoples of Europe and America. Many Nigerians who were forcibly settled in the New World soon lost their identities. The Yoruba, on the other hand frequently preserved his cultural individuality. A large group of slaves revolted in Brazil in the 1800s, for example, and were repatriated to Nigeria. At the time when freed slaves returned to West Africa from the Americas, there appeared a new style called the Brazilian Style. Which it emerged with a new architecture different from the traditional huts and colonial structures. It also fulfilled the need for a more distinguished form. There were very often two-story houses built in cement and embellished with heavy

ornamental pillars and balustrades and can still be seen in Lagos and other Southern cities (Osasona 2008).

Islam undoubtedly had a strong effect on homegrown architecture because: it applies geometric designs and it had an impact on form, scale, proportion and aesthetics. The dome-shaped mud roof became very popular. It gave the North a distinctive appearance reminiscent of cities in North Africa. Worth noting is that Hausa vaults or Bakan Gizo were mostly used for ceiling construction and architectural decorations were adopted in mosque's ceiling construction. Further on in Hausa towns merchants began to adorn the outside walls of the otherwise traditional houses with elaborate molded designs executed in cement. The old, non-figurative clay walls gave way to painted decorations executed in paint and sometimes in figurative patterns (Adamu, 2005).

The International Style architecture is best portrayed by the term Pure Modern (Denyer 1978). The International Style is also represented in Nigeria by high rise buildings portrayed by the term High-Trop and by housing for the low income group referred to as Low-Trop architecture. More than one third of modern buildings in Nigeria urban centers belong to the International Style. The buildings are designed here along with modern ideas with the use of clean forms like cubes, cuboids or compositions of simple geometrical solids. They explore the ideas of simplicity and functionality.

New West African Style was recognized by Akinsemoyin & Vanghan (1977) and Kultermann (1969) and it was meant to cover buildings, which are more suitable for the country (designed with climate). Late-Modernism according to Jencks is a pragmatic and technocratic architecture, which draws its inspirations from the highest achievements of Modernism. The buildings that must be mentioned here are political party offices by Triad Associates, which from the beginning strongly dominated the

landscape of Nigerian Architecture, “international style” later on amended to suit the purpose.

The Regional Trend is represented by contemporary modern buildings using the motif of a hut or using courtyard or impluvium concepts. Natural materials like timber or stone may be explored but most essential is the natural ventilation. Very important in this trend is the functional layout of residences, which is most capable of reflecting the Nigerian way of life and generally important here is the closeness to nature through outdoor areas. For example in Muslim residences a characteristic observed is the separation of sitting rooms from family living rooms.

2.7 Vernacular Architecture

Vernacular architecture according to Porphyros (2006) is the idea and technology of a particular group’s manner of constructing shelter under the conditions of scarcity of materials and operative constructional techniques. Furthermore, Kirbas and Hizli (2016) equate vernacular architecture to local or regional architecture and define it as the unconscious realization and embodiment of the culture of the society with the requirements of the people in nature vernacular architecture in northern Nigeria.

In the Nigerian context, vernacular architecture is expressed in forms deriving from the culture influences of Brazil, North Africa and Europe. These forms have a traditional base in the socio-cultural organization of the Nigerian society and the interaction between it and the other influences have crystallized into the Nigerian Vernacular Architecture (Adeyemi 1976). For example in the rural areas of South-Eastern Nigeria, family mutual help gradually disappeared, and a housing model inspired from the “Brazilian” urban houses, involving the use of new materials and new building techniques spread rapidly. In the evolution of historic settlements, external models

dominated increasingly the choice of materials and techniques as well as decoration, the size and relationship of the rooms and the formal organization of the dwellings. These models mastered by the people would, according to Langley (1976) become the foundations for a vernacular architecture, an architecture specific to a country and a people". In the Nigerian context, vernacular architecture is expressed in forms deriving from the culture influences of Brazil, North Africa and Europe. These forms have a traditional base in the socio-cultural organization of the Nigerian society and the interaction between it and the other influences have crystallized into the Nigerian Vernacular Architecture" (Adeyemi, 1976). For example in the rural areas of South-Eastern Nigeria, family mutual help gradually disappeared, and a housing model inspired from the "Brazilian" urban houses, involving the use of new materials and new building techniques spread rapidly.

2.7.1 Perceptions in the vernacular environment

Perceptions concerning vernacular architecture have early beginnings with the Latin description, 'things that are homemade, homespun, home-grown and not destined for the market place' (Bourdier & Minh'ha, 1996), while comparable views consider vernacular as the embodiment of social values, ecological, economic, material and political interrelations (Ozkan, 2006; Fathy 1986; Lawrence, 2006).

The principals of vernacular architecture together with the perceptions held with the primary purpose of edification in the 'market place' are essential for continued contemporary applications. The culture of each society is identified through its manifestation such as language, arts and architecture and analysis in the field of culture is related to the study of cultural manifestation (Ettehad *et al.*, 2014) In order to improve the understanding and impact of culture and social values on an individual personality

one needs to consider the relationship between variables at both a social and individual level.

According to Rapoport (1977) the direct effects of the environment, directly affect the behaviour, mood, satisfaction, performance and interaction. The indirect effects of the environment are used to draw conclusions about the social standing or status of its occupants and behaviour is modified accordingly. It can be argued that a house can become a personal expression that reflects the social standing, status or persona of the homeowner. These provide for a set cultural objects which symbolizes a shared schematic experience which we recognize as cultural value (Report, 2011). Lodson *et al.* (2018) describes vernacular architecture as "unpretentious, simple, indigenous, traditional structures made of local materials and following well-tried forms and types." Man has always sought to provide shelter for himself through the use of local materials and techniques in ways best suited to meet his own individual, socio-cultural needs and also fit into the existing climatic conditions.

Nigeria is a vast country with a rich diversity. This diversity is seen in various dimensions such as: ethnic group representations, climatic conditions, religious affiliations, cultural beliefs and practices and art forms. Because of the vastness of its diversity, approaches to architecture also vary. Different ethnic groups in Nigeria approach architecture in different ways in an attempt to address local conditions and needs.

2.8 Features of Vernacular Architecture of Northern Nigeria

Vernacular architecture of northern Nigeria has many unique features which distinguish it from any other architecture. Some of the notable features are the engravings on the façade of the building walls, use of building materials such as mud, reeds, stones, and

timber within the structures like foundations, walls, columns, slab, beams, doors, windows, plastering, and process of renovations. This feature forms an intricate, diverse and colorful form of architecture which can only be found in northern Nigeria.

This research concentrates on the architecture of the four major traditional societies, the Nupe, Gwari, Kambari and the Hausa. The smallest nucleated settlement among rural societies in Niger State is a compound, known as *gida* in Hausa and *emi* in Nupe. A number of compounds make up a ward known as *efu* in Nupe and as *Unguwa* in Hausa, while a number of wards make up a village, known as *k'auye* in Hausa and *tunga* in Nupe. Each compound, often consisting of members of the same family in most cases, but not in some, is surrounded by a perimeter fence which could be constructed of mud wall or of grasses. In almost all cases the compound was entered through a principal entrance building known as katamba (Nadel 1942, Drnochowski 1990,). Usually inside the house are smaller partitions and a number of smaller *katamba,* all invisible from outside, including living rooms, the kitchen, the animal section, the barn or granaries and the main hall (Nadel, 1942).

Apart from earth, and loam, used as basic structural building material, other materials are used for plastering and roofing. The walls of the interior and exterior are plastered with egunaelajibana among the Nupe. This is a mixture of earth and liquid, water and liquid additives such as grass, dried horse or cow-manure, and vegetable refuse, usually prepared over a period of about four days. Among the Gwari a mixture of clay made into a paste, pounded with locust bean pod and gore wood, is used; while the Kambari and the Hausa use the same material for building: black soil, bakin kasa or red soil, jan kasa, or even white soil, faran kasa, mixed with landa water for preparing a thick paste

for plastering the walls. Roofing poles or sticks include gora from bamboo poles (Drnochowski 1990).

2.8.1 Engravings

Engraving is the practice of incising a design onto a hard, usually flat surface, by cutting grooves into it. The result may be a decorated object in itself in northern Nigeria, the wall engravings are designed by traditional builders, professional artisans and highly experienced hand engravers who are able to draw out minimal outlines directly on the wall surface just prior to engraving (Adamu 2005), categorize decoration in Hausa traditional architecture in to three groups, namely surface design, calligraphy and ornamental. Agboola & Zango (2014), argues that the Hausa practiced form of "graffito" on which decorative patterns are scratched in to smooth wall patterns resulted from texturing the interstices of the decorative layout by roughing it with a piece of metal.

Plate I: showing the use of motif in buildings
(Source: Google, 2019)

2.8.2 Locally sourced building materials

The materials used in the vernacular architecture has been discussed by many researchers which includes but not limited to: The three well-defined materials that are

prominent in the building traditions of Africans are; stone, straw, and earth which have been independently and jointly used and skillfully applied in Hausa land, the four major building materials are: earth, timber, reeds/grasses, and stones. Though in most cities, stones are less used, apart from this mud is more tolerant to climate be-cause of its poor conductivity. Examples of local materials to achieve outstanding architectural monuments are: Bight of Benin (stabilized mud brick and plaster, thatch, timber, shingles); The Kano wall (mud and vegetable mat); Centenary Hall, Ake, Abeokuta (stone, mud, timber) (Pacheco & Jalili, 2012). Earth as a building material**,** the use of earth as a building construction material dates back to12000 BC It was a phase in the historic development of human shelter. The basic house walls in most of traditional architecture in Nigeria were built of earth in simple low-cost and self-help construction arrangement Ejiga *et al.* (2012) opined that very little of adobe/earth/mud/ brick architecture have lasted, apart from some of the monuments, temples and mosques. Nevertheless, the enduring cultural practices of rural people indicates that adobe or mud surely has been one of the most common and abundantly obtainable material Oliver (1983).

Stone as a building material Ejiga *et al.* (2012), states that the basic form of the use of stones/rock for dwellings had begun with the habitation of naturally occurring caves about which walls and roofs are in mud or thatch, bricks and straws were erected converting them in to livable places Hamed *et al.* (2013). In some parts of Northern Nigeria, stones are used in building foundations because of its moisture proofing property. In some areas with heavy rainfall, layers of stones or un-coursed rubbles are used in other to reduce the amount of the moisture movement from the foundation upwards.

Thatch and Grass as building materials According to Eneh (2006), the grass and earth forms a compo-site material. While the grass is the reinforcement, the earth serves as a matrix or binder as it surrounds the straw or thatch. The thatch/ straw possess a tensile strength while the earth has compressive strength .Thatch is one of the oldest of building materials known; grass is a good insulator and easily harvested. Timber as building materials Wood has been used as a building material for thousands of years in its natural state. Today, engineered wood is becoming very common in industrialized countries. Wood is a product of trees, and sometimes other fibrous plants, used for construction purposes when cut or pressed into lumber and timber, such as boards, planks and similar materials. It is a generic building material and is used in building just about any type of structure in most climates. The best timber used in Hausa traditional buildings are obtained from the trunks of male palm tree (Daleb or Giginya). The timbers are commonly called “Azara” beams. They are rigid and heavy, resistant to termite attack, and very durable because they took several years to decay. They serve as wooden reinforcement to strengthen the structures of the wall and pillars (Aiyedun 1998).

2.8.3 Compound layout

According to Sa’ad (1996), “A typical Hausa compound as maybe found in some major cities in Northern Nigeria displays complexity and clear order of spatial privacy as one moves from the outside to the inside. It is habitually surrounded by a mud wall, a grass matting fence called “Zana” or more recently, by a concrete block wall. The main entrance hall opening to the street is known as the “Zaure” which creates a separation between an outside public zone and a private inside zone for the extended family.

The Zaure is a significant space due to the security and control measures it offers to the compound. After the zaure, is the first courtyard of the house known as “kofar gida” (literally meaning entrance door to the house). As seen in plate below It is an ‘opening’ or ‘space’ through which one accesses the interior of the compound, according to Auwalu (2019) this is a semi-public territory often enclosed by buildings and parts of the compound wall.

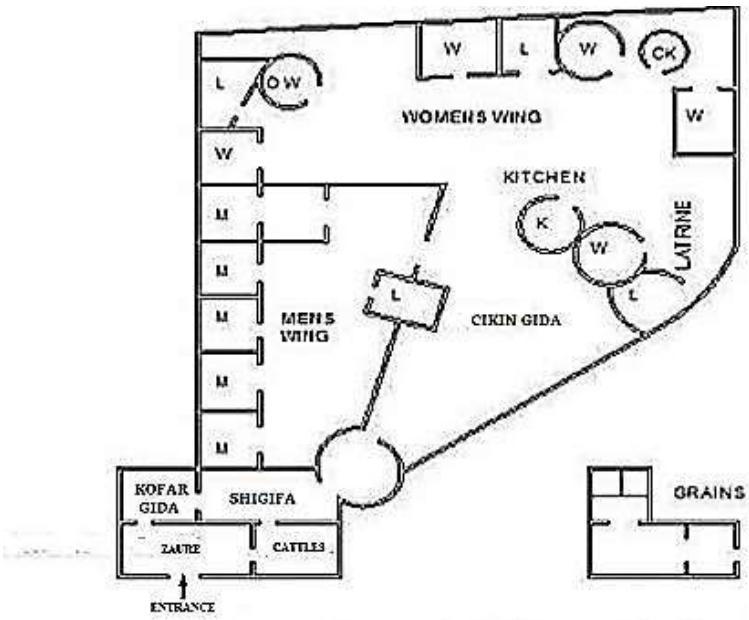

Figure 2.2: Compound Layout of the Hausa’s in Northern Nigeria

The space defines the access limit adult male visitors have to the compound except for close relatives and intimate friends of the household head. An inner reception hall known as “Shigifa” opens into this outer courtyard. The “shigifa” opens into the inner courtyard (cikin gida) of the compound and adjacent to the ‘shigifa’, is the domain or private sleeping quarter of the household head which often opens into the inner courtyard. In other words, traditionally, the “cikin gida” is considered as the women quarters and constitute the major part of the compound. The married women spend most of their day within this part of the house especially. In this part of the compound, facilities that will help in the wellbeing of the women are located there. For instance,

sleeping quarters (for the women, their young children and female visitors or relatives), children play area, kitchens, storage, granaries, chicken coops, bath rooms and toilets, and a number of other functional spaces (Auwalu, 2019)

2.8.4 House form

Residential buildings mainly consisted of mud round huts with thatch roofs but gradually through natural decay and changes in taste and forces of urbanization which made thatch more scarce, (Auwalu, 2019) these architecture forms had to be changed to rectangular structures of conical shaped sun dried bricks (Tubali) to be roofed with "Azara" as well as reinforced mud roofs in the form of domes or flat roofs (Sa'ad, 1996).

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Methods

The research method employed the descriptive survey methods of conducting and analysing research (Kumar,1999). Using observation schedules to obtain data. The observation schedule was structured to evaluate the vernacular architecture elements available in polo sports club. The survey was conducted by directly observing the categories of spaces provided in the polo sports club and the vernacular design features adopted in the selected polo sports club.

The observation schedule was structured to evaluate the vernacular architecture elements available in polo sports club. A structured observation schedule was developed and administered on respective polo sports club buildings in which five (5) were selected randomly out of a study population of 10 polo sports club across the country and it was done on the basis of observing and documenting what is obtainable on site while comparing to the laid down requirement according to vernacular architecture features design considerations. Data analysis took the form of simple descriptive statistics and content analysis represented in the form of percentages. Data collated was computed manually and tabulated in Microsoft Excel Spread Sheet Program. Component pie charts were used to represent the frequency distribution. Pictures of some selected design variables presented as plates to explain further the issues within the discussion of results with the view of establishing recommendations of the research. The Table 3.1 below shows the list of facilities observed for the study.

Table 3.1: List of Observed Facilities

s/no	facility	Location	Scale	sport
Case study 1	Fifth chukka	Kaduna	Large	Polo
Case study 2	12-12	Abuja	Medium	Polo
Case study 3	Mornington's	Australia	Medium	Polo
Case study 4	Carlos and Carla	Portugal	Large	Equestrian
Case study 5	Port-Harcourt	Port-Harcourt	medium	Polo

(Source: Author's Fieldwork, 2019)

3.2 Data Type and Sources

This research aims to collect qualitative data; such data will be gathered from field visits to selected case studies. The data to be collected will include variables obtained from the literature review.

3.2.1 Primary source of information

In line with the objectives of this research, gathering of the Primary data were gotten from the fieldwork in this research includes: Field survey, checklist and photographs, done at the polo sports centre in the Nigeria making use of case studies and observation schedules. The collection of primary data was performed to assist the researcher obtain actual evidence from the field on the subject matter.

Field survey was used to verify the data that cannot be collected through other means because of the nature of the research. Three (3) polo sports centre were visited. Field visits were supported by comprehensive notes and photographs taken, giving an insight on their physical presence and spatial relativities of each case.

3.2.2 Secondary source of information

The secondary statistics received for this study were acquired from the appraisal of relevant literature on vernacular or traditional architecture, journals and seminar papers, and the internet. The data collated allowed the researcher to have a right contextual framework of the conceptual issues ascertain to the studies. The literature became used for 2 primary purposes: i) to provide the general framework that set the tone for the literature and ii) proof to assist the evaluation of the primary information drawn from the above noted respondents in order to achieve the set goals.

3.3 Population of Study and Sample Frame

The research population for this study are polo sports facilities selected from Nigeria. Sampling is the process of selecting a few (a sample) from a bigger group (the sampling population) to become the benchmark for estimating or foreseeing the prevalence of an unknown piece of information, situation or outcome regarding the bigger group. A sample is a subgroup of the population (Kumar, 1999). The Population of study comprises the totality of all subjects that have a set of specifications and characteristics that are of interest to the researcher and to whom the research results can be generalised (Polit and Hungler, 1999). A sample size of five polo sports clubs were studied from clubs available in the country. Sampling involves a subset of the research population selected to represent the research population. For the purpose of this research, purposive sampling was used and the selection was random where five polo facilities were selected from over 10 polo sports clubs available in the country, after careful consideration and due to particular interest of the study. The sampling was limited to five polo facilities building within the research scope Table 1.0 below shows the names and location of the polo sports clubs visited.

3.4 Method of Data Collection

During the process of procuring data, case studies and observation schedule were used to gather information for the research. Data from the case studies, field survey, checklist, photographs, sketches and notes. Subsequently, the secondary source of data is discussed as information from literature review. Observation schedule were employed, which were administered to observe the physical attributes of the selected polo sports clubs as it pertains vernacular architecture features.

3.5 Variable of the Study

The review of relevant literature such as work of researchers including (Aiyedun, 1998; Bamidele & Akande, 2018; Danja *et al.,* 2017) informed the careful selection of variables necessary for the assessment vernacular architecture features in polo sports clubs. Table 3.2 below shows the list of variables necessary for vernacular architecture features in polo sports clubs.

Table 3.2: Design Variables According To Observation Schedule

S/N	Variables for the observation
i	Motifs
ii	Locally sourced building Materials
iii	Layouts
iv	Forms

(Source: Author's Fieldwork, 2019)

3.6 Method of Data Analysis and Presentation

The technique for analysis and exhibiting this information are table's information, and plates. Plates were pictures taken of the structures and research to give further clarification case studies and research finding. Tables were utilized to demonstrate

spatial requirement of information acquired stating the area required for each space provided.

3.7 Summary

This chapter identified the research method employed in carryout the research. It revealed the primary and secondary data types and sources. Extensive review of relevant literature assisted in the selection of variables necessary for the observation, case study analysis and observation schedule were utilized in the collection of data thereafter the result were analysed using the SPSS in combination with the Microsoft excel spreadsheet.

CHAPTER FOUR

4.0 DATA PRESENTATION AND DISCUSSION

4.1 Data Analysis

In this chapter, details of the analysis and results of the survey attained from the field work conducted in the selected polo sports club. Descriptive statistics was performed to indicate the significance of the variables identified from available literature. The data gotten and analysis was done based on the objectives earlier stated in the chapter one of this research.

4.2 Criteria for Case Study Selection

The case studies selected for this project are based on the following criteria;

1. A selective system of similar type of buildings to ensure cases that represent others globally
2. Traditional design feature as the research area
3. Site planning
4. Day lighting and natural ventilation

4.3 Case Studies

4.3.1 Case study 1: Fifth Chukka Kaduna Nigeria

Location: Kangimi Resort in Kaduna State.

Fifth Chukker Polo & Country Club, located at the picturesque Kangimi Resort in Kaduna State, was founded in 2001 as a private polo club and is recognised as a private public business that represents the new, in the old world of the polo sport of Polo in Nigeria.

Figure 4.1: Google map showing the satellite map for Fifth Chukker Kaduna (Source: Google maps, n.d.-a)

The club has over four hundred thoroughbred polo ponies stabled in a three-thousand-hectare resort. Set within Kangimi Resorts three thousand picturesque hectares, the club offers a range of lodging, dining, polo and outdoor leisure activities. The club is part of Kangimi Resorts, a lifestyle development project boasting a signature golf course, horse racing track, hotels and spa, as well as business plazas and entertainment parks when completed.

Plate II: A view of the guest chalet. Showing the circular clay huts (Source: Authors Fieldwork, 2019)

Plate II: A view of the polo field
(Source: http://fifthchukker.com 2019)

4.3.1.1 Vernacular architecture strategies adopted in the design and construction of the building

Fifth Chukker Polo & Country Club, Kaduna has average amount of motifs, building façade does not have visually or physically appeal to the culture of the study area. Cultural art works/sculpture are absent. While, local building materials were applied in construction. Reflecting culture tradition in history and design. Building materials used were gotten from the region, the area has abundant clay, trees, and thatch grass material 80% of waste generated by construction was reused, recycled, or otherwise diverted from landfills. The buildings reflect cultural type of design. Courtyards are present. The shape and design are in accordance with culture. The shape of the polo field is an imperfect rectangle, the huts are round and arranged in a liner pattern. The site layout attends to beliefs and convictions of the people. The layout improves quality of life through communal relationship.

i. **Spaces**

Lodging,

Dining,

Polo and outdoor leisure activities golf course,

Horse racing track,

Stables,

Hotels and spa,

Business plazas

Plate III: A facade view of the polo club house
(Source: http://fifthchukker.com 2019)

Plate V: Birds view of the polo field
(Source: http://fifthchukker.com 2019)

4.3.1.2 Summary of findings

Below is a tabulated summary of the findings based on the researcher's assessments and the vernacular architecture features in the building.

Table 4.1: Tabulated summary for Fifth Chukker

Vernacular architecture design Checklist
Scale Factor: Excellent=5. Adequate =4, Acceptable=3, Fair=2, Poor=1

Variable	Features	Method Adopted	Scale Factor	Remarks
Engravings (motifs)	The use of design and decoration that reflect the culture of the people in the region.	none	1	poor
form	Circular building forms Square building forms	circular huts	3	Acceptable
Locally sourced building Materials	Locally sourced building Materials	Mud, clay, thatch were from construction materials gotten from the region.	4	Adequate
layout	A building layout that reflect the ways of the people.	Use of courtyards.	3	Acceptable

(Source: Researchers Fieldwork, 2019)

4.3.2 Case Study 2: 12-12 Polo and Turf Club Nigeria

Location: Gwarimpa Hills, FCT, Abuja.

12-12 Polo and Turf Club is a world class facility for Polo, Horseracing and other equestrian sports. The club derived its name from the day and month Abuja was officially inaugurated as the Federal Capital Territory; December 12, 1991. This gesture is a tribute to Abuja the Nigeria's political and administrative centre, and a symbol of Nigeria's unity in cultural diversity.

Figure 4.2: Google map showing the satellite map for 12 - 12 Polo Club, Gwarimpa (Source: Goggle maps, n.d.-b)

The 12-12 polo and turf club comprises of 100 horse-capacity Stables; Paddocks for grazing and walking the horses; Standard 10 furlong Sultan Sir Abubakar III Horseracing Track; Sir Usman Nagoggo Polo Field; the 12-12 History Hall and Yaya Hassana VIP Stand; Late Sen. Idris Ibrahim Kuta Stand and the RJ Jose Stand. Our Riding Schools (one medium and one standard riding schools) are designed to cater for horse enthusiasts ranging from a minimum age of 5.

The Club House is with two terraces providing unobstructed view of the Polo field and the entire city of Abuja and they serve as a restaurant and bar respectively. The parking lot has the capacity to accommodate over 250 cars. The wide parking space is provided to encourage people to park their cars and take long walks.

Plate VI: A view of the club house
(Source: Author's Fieldwork, 2019)

Plate VIIIV: A view of the polo field
(Source: Author's Fieldwork, 2019)

Plate VIII: A view of the polo administrative building
(Source: Author's Fieldwork, 2019)

Plate IX: A view of the polo field from the pavilion
(Source: Author's Fieldwork, 2019)

PLATE V: A view of the parking area/entrance
(Source: Author's Fieldwork, 2019)

4.3.2.1 Vernacular architecture strategies adopted in the design and construction of the building

12 -12 has an average amount of engravings, building façade does not have visually or physically appeal to the culture of the study area. Cultural art works/sculpture are absent. Locally sourced building material were applied in construction. Reflecting culture tradition in history and design. Building materials used were gotten from the

region, the area has abundant trees and rocks. However, the buildings form does not reflect cultural type of design. Layouts: attends to beliefs and convictions of the people. The layout improves quality of life through communal relationship.

i. Spaces

100 horse-capacity Stables;

Paddocks for grazing and walking the horses;

Standard 10 furlong Horseracing Track;

The Polo Field;

The 12-12 History Hall;

The Riding Schools (one medium and one standard riding schools)

The Club House with two terraces and they serve as a restaurant and bar respectively.

The parking lot capacity to accommodate over 250 cars.

4.3.2.2 Summary of findings

Below is a tabulated summary of the findings based on the researcher's assessments and the vernacular architecture features in the building.

Table 4.2: Tabulated summary for 12-12 polo club

Vernacular architecture design Checklist **Scale Factor: Excellent=5. Adequate =4, Acceptable=3, Fair=2, Poor=1**				
Variable	**Features**	**Method Adopted**	**Scale Factor**	**Remarks**
Engravings (motifs)	The use of design and decoration that reflect the culture of the people in the region.	none	1	poor
form	Circular building forms, Square building forms	none	1	poor
Locally sourced building Materials	Locally sourced building Materials	Stones, wood, were from construction materials gotten from the region.	4	Adequate
layout	A building layout that reflect the ways of the people.	Use of courtyards.	2	Fair

(Source: Researchers Fieldwork, 2019)

4.3.3 Case Study 3: Mornington

Location: Merricks VIC 3916, Australia.

In terms of cultural context a polo building is a recognisable characteristic of the region. It was necessary however to locate the buildings on level terrain, in particular to accommodate the ménage covering 3000m/sq, within an undulating landscape. Extensive landscaping works were required to stabilise and drain the land that provided the opportunity to create a small reservoir lake containing a bird island sanctuary.

Plate VI: A view of the barn/livery
(Source: Nathan, 2015)

The building is arranged in a crescent plan that provides enclosed stables for 6 horses, wash, tack and laundry, workshop and feed as well as a small accommodation. A barn wing provides straw and hay storage and parking for the stable's vehicles. Externally there is a small pool for the horses, day yards (hard and grass) as well as the ménage for event practice and jumping.

Plate VIIII: A view of the ménage
(Source: Nathan, 2015)

Plate VIII: A view of the barn showing local building materials (Source: Nathan, 2015)

Plate IX: A view of the entrance of the barn (Source: Nathan, 2015)

4.3.3.1 Vernacular architecture strategies adopted in the design and construction of the building

The Mornington equestrian centre has no engravings, building façade does have visually or physically appeal to the culture of the study area. Cultural art works/sculpture are absent. While, local building materials were functional in construction. Reflecting culture tradition in history and design. Building materials used were gotten from the region. Furthermore, the buildings do reflect cultural type of design of the region. The site layout attends to beliefs and convictions of the people. The following are the supporting spaces/facilities.

Stables, wash, tack and laundry, workshop and a small accommodation. A barn wing provides straw and hay storage and parking for the stable's vehicles a small pool for the horses, day yards (hard and grass) ménage for event practice and jumping.

4.3.3.2 Summary of findings

Below is a tabulated summary of the findings based on the researcher's assessments and the vernacular architecture features in the building.

Table 4.3: Tabulated summary for Mornington

Vernacular architecture design Checklist
Scale Factor: Excellent=5. Adequate =4, Acceptable=3, Fair=2, Poor=1

Variable	Features	Method Adopted	Scale Factor	Remarks
Engravings (motifs)	The use of design and decoration that reflect the culture of the people in the region.	-	1	poor
form	Circular building forms, Square building forms	Square building forms	3	adequate
Locally sourced building Materials	Locally sourced building Materials	Stones, wood, were from construction materials gotten from the region.	4	Adequate
layout	A building layout that reflect the ways of the people.	Use of courtyards.	2	Fair

(Source: Researchers Fieldwork, 2019)

4.3.4 Case Study 4: Carlos Castanheira & Clara Bastai Equestrian Centre

Location: Leça da Palmeira, Portugal.

The Carlos Castanheira & Clara Bastai Polo Centre is a place for horses. The design enhances function and comfort. The need for indoor spaces has to do with protection from the more aggressive aspects of the climate, such as storms.

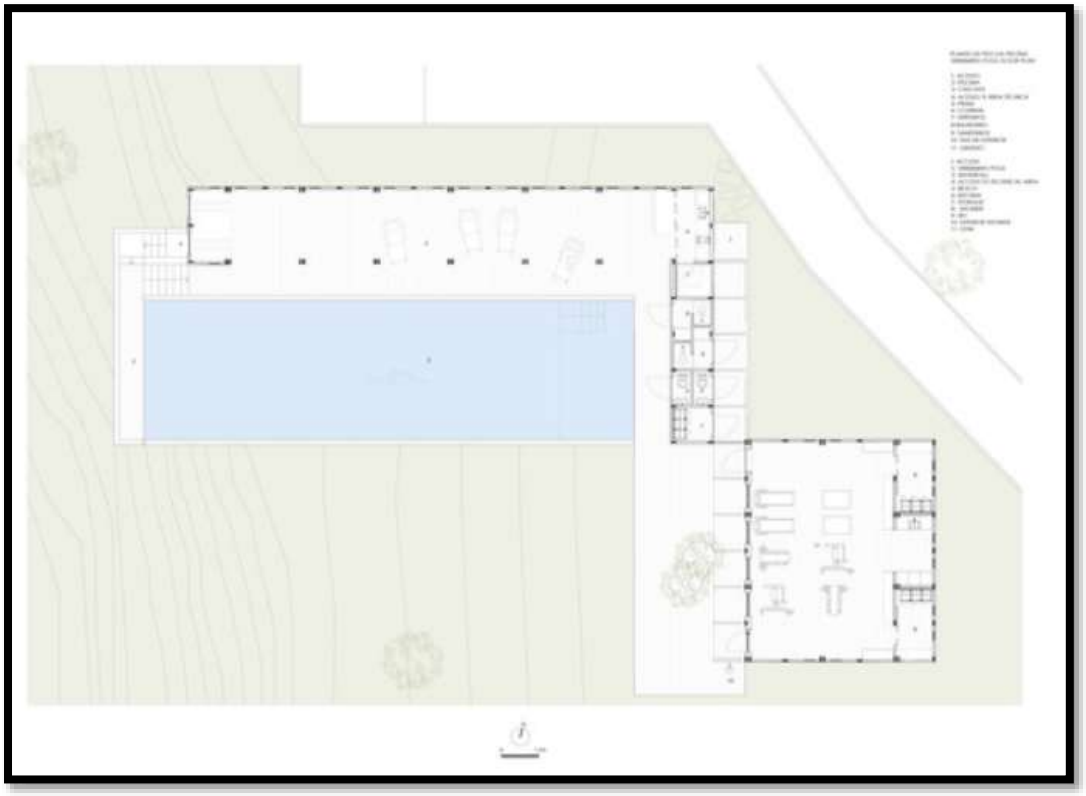

Figure 4.3: The site plan of Carlos Castanheira & Clara Bastai (Source: Matheus, 2019)

The two covered riding arenas, of different sizes, developed into an interesting structural challenge due to the considerably large spans, and this led to some experimentation. Structure defines space and functions. Structure is both the base and the finish. Structure defines the building because every element is both structure and space. The polo activities extend beyond the indoor areas. The site was moulded to create terraces where an external riding arena, paddocks, jumping arenas and riding paths were built.

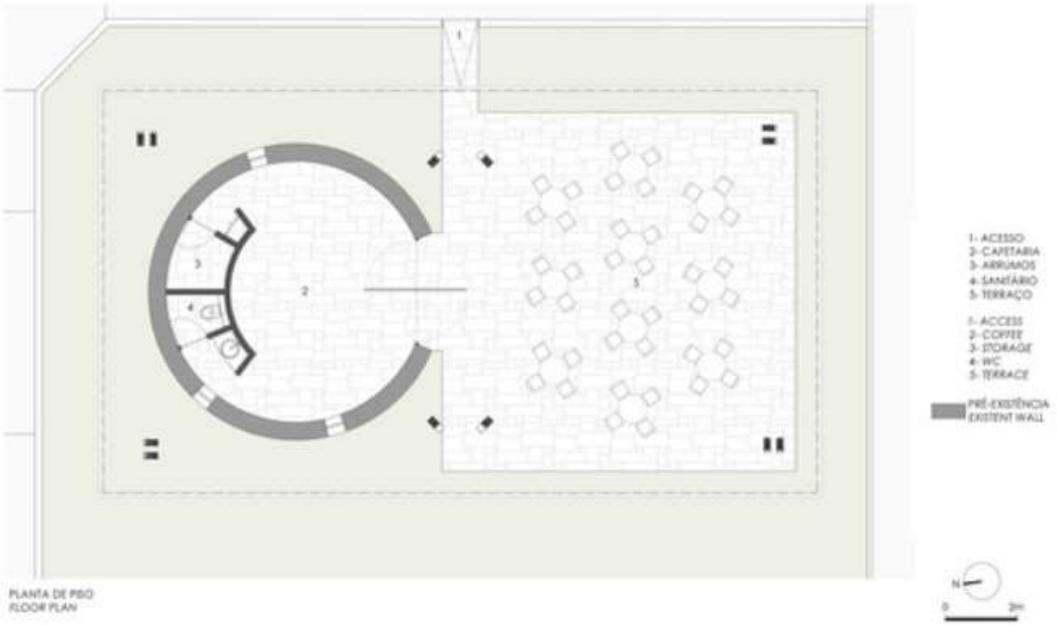

Figure 4.4: The floor plan of the ménage
(Source: Matheus, 2019)

Plate X: Interior view of the training pen
(Source: Matheus, 2019)

Plate XI: Interior view of the barn
(Source: Matheus, 2019)

Plate XII: A view of the cafeteria showing local building materials
(Source: Matheus, 2019)

4.3.4.1 Vernacular architecture strategies adopted in the design and construction of the building

Carlos Castanheira & Clara Bastai has no engravings, building façade does not have visually or physically appeal to the culture of the region. Cultural art works/sculpture are absent. Nevertheless, local building materials were applied in construction. the

building does reflect cultural type of design, courtyards are present. The building design and shape are in accordance with the culture of the region and the layout attends to beliefs and convictions of the people. The layout improves quality of life through communal relationship.

Spaces

i. external riding arena,

ii. paddocks,

iii. jumping arenas and

iv. Riding paths were built.

4.3.4.2 Summary of findings

Below is a tabulated summary of the findings based on the researcher's assessments and the vernacular architecture features in the building.

Table 4.4: Tabulated summary for Carlos Castanheira & Clara Bastai

Vernacular architecture design Checklist
Scale Factor: Excellent=5. Adequate =4, Acceptable=3, Fair=2, Poor=1

Variable	Features	Method Adopted	Scale Factor	Remarks
Engravings (motifs)	The use of design and decoration that reflect the culture of the people in the region.	none	1	poor
form	Circular building forms, Square building forms	Circular building forms,	3	Acceptable
Locally sourced building Materials	Locally sourced building Materials	Stones, wood, were from construction materials gotten from the region.	3	Acceptable
layout	A building layout that reflect the ways of the people.	Use of courtyards.	2	Fair

(Source: Researchers Fieldwork, 2019)

4.3.5 Case Study 4: Port Harcourt Polo Club

Located: along Tombia Street, G.R.A. Phase 11, Port Harcourt.

The Port–Harcourt polo club was established in 1972 by the Nigerian Army's under the able leadership of Lt Gen T. Y. Danjuma (RTD) who is also a patron of the club. By 1974 the club was handed over to civilian management.

Plate XIIIIII: A view of the polo club house
(Source: http://poloclubph.org 2019)

The club is duly recognized as a polo playing club by one of the best polo playing fields in the country. The club premises have the following:

A large polo field and practice field Paddocks, Stables, lush green lawns, tree lined drive way Serene Club house. All these provide a unique environment for relaxation, horse riding and polo playing. NPA polo tournament is regularly organized to attract tourist and to improve the social life of the people of Port Harcourt and its environment. This is done to encourage horse riding, equestrian sporting activities and of course the game of polo. The Port Harcourt polo club has a board of trustees and a management committee to look into its affairs.

Plate XIV: An Ariel view of the Port Harcourt polo club
(Source: http://poloclubph.org/ 2019)

Plate XV: A view of the ambulance dock
(Source: http://poloclubph.org/ 2019)

Plate XVI: A view of the cafeteria
(Source: http://poloclubph.org/ 2019)

Plate XVII: Statue at the polo club
(Source: http://poloclubph.org/ 2019)

4.3.5.1 Vernacular architecture strategies adopted in the design and construction of the building

The Port–Harcourt polo club has no engravings, building façade does not have visually or physically appeal to the culture of the region. Nonetheless, cultural art works/sculpture are present, local building materials were applied in construction the building design and shape are in accordance with the culture of the region. Also, layout

attends to beliefs and convictions of the people. The layout improves quality of life through communal relationship

i. Spaces

A large polo field and

Practice field Paddocks,

Stables,

Lush green lawns,

Tree lined drive way

Serene Club house.

4.3.5.2 Summary of findings

Below is a tabulated summary of the findings based on the researcher's assessments and the vernacular architecture features in the building.

Table 4.5: Tabulated summary for Port Harcourt polo club

Vernacular architecture design Checklist
Scale Factor: Excellent=5. Adequate =4, Acceptable=3, Fair=2, Poor=1

Variable	Features	Method Adopted	Scale Factor	Remarks
Engravings (motifs)	The use of design and decoration that reflect the culture of the people in the region.	none	1	poor
form	Circular building forms, Square building forms	Circular huts	5	Excellent
Locally sourced building Materials	Locally sourced building Materials	Stones, wood, thatch, mud were from construction materials gotten from the region.	4	Adequate
layout	A building layout that reflect the ways of the people.	Use of courtyards.	2	Fair

(Source: Researchers Fieldwork, 2019)

4.4 The Site

Figure 4.5: A goggle earth map of the site
(Source: Researcher's Fieldwork, 2019)

4.4.1 Site Location

The proposed site for the building is located between Ahmadu Bahago road and western bypass opposite Eng. A.A. Kure market. The site is also easily accessed from all parts of Minna Niger State Nigeria, and has a link to all the major roads.

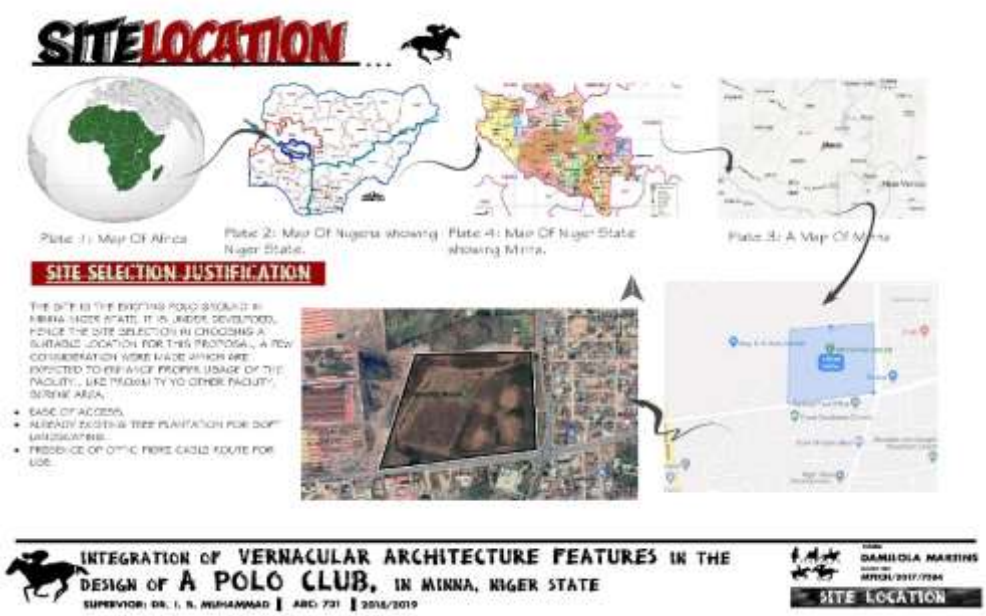

Figure 4.6: A picture of the site location
(Source: Researcher's Fieldwork, 2019)

4.4.2 Site Selection Criteria

The selection of an appropriate site for the proposed polo & polo club is based on the following criteria

1. Conformity with the master plan proposed by Development control

The site is the existing polo ground used for polo and other polo sports in Minna Niger State and has set aside by the Development control under the Federal Capital Development Authority for the growth of this facility as a key development objective of the Federal Government of Nigeria.

2. Proximity to users

The proximity of the site to the intended users who are Nigerians across the country is a key criterion for the selection of the site. The facility is located where it will be put to a functional and optimal use. Niger State is located in the heart of Nigeria and can be accessed from any part of the country. The polo ground is located in a position where it can be easily accessed from all the local governments in Minna. The users can easily join the transit to be transported from that point to other points of the town.

3. Proximity to aid

The fire service and police station are located within 3km of the site.

4. Adequacy of land

The site size is ideal for the proposed building because it is 14.3 hectares and the building estimated building area is 9292.2 m2, this means that adequate space can be left around the building for circulation, setbacks and other building regulation laws.

5. Orientation and landscaping

The longer side of the site faces the north, eliminating the need to position the building at an obtuse angle, this means that the longer side of the building can be aligned with the longer side of the site. This implies that the shorter side of the building gains more

sun, therefore, the solar panels and the shading devices can be placed accordingly. The landscape of the site allows proper vegetation and water efficient landscape.

6. Availability of utilities

The district has sufficient electricity and water for the building to operate

4.4.3 Site justification

The site is located in the dominant commerce area, and is easily accessed from any part of Minna. The access roads around the site makes it easier to navigate the site, there are adequate utilities, efficient landscape and topography. The site is also located around buildings and activities that complement the proposed structure, these include transit for commuters, a sports park for recreation, mosque, a bank, clinics and supermarkets.

4.4.4 Site characteristics

This refers to the Inventory of features that exist on and off the site. The site has a light vegetation of shrubs and grasses with a few deciduous trees and is relatively flat with gentle slopes on the North eastern part.

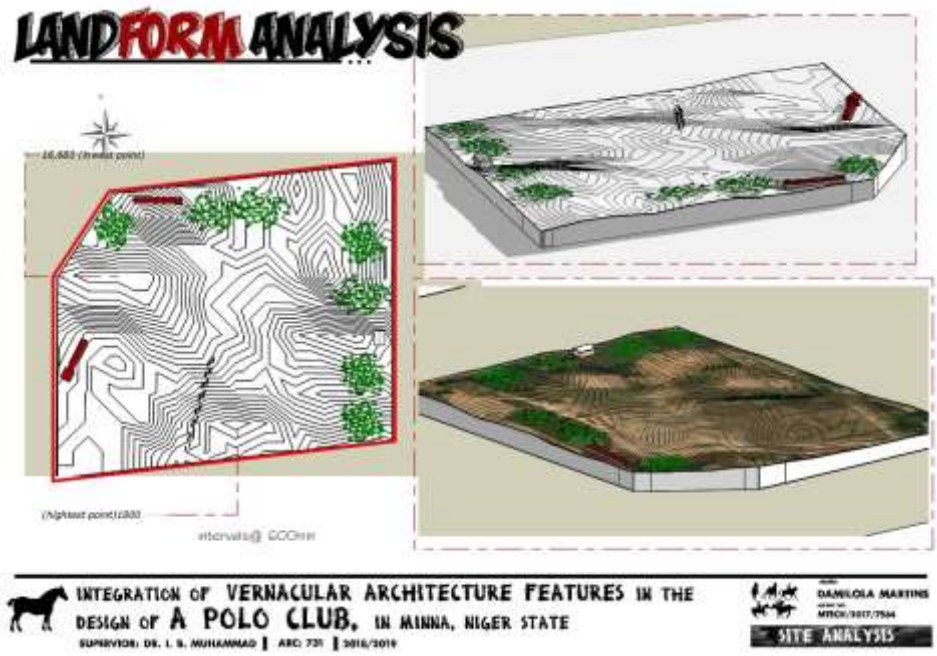

Figure 4.7: A picture showing the land form analysis (Source: Researcher's Fieldwork, 2019)

4.4.5 Climatic Data of Minna

Temperature: The most n0teworthy temperature esteem which has been documented at dry season is 45°C in the day and 26°C while the least temperature esteem 25°. This circumstance represents the unordinary ascend in the surrounding temperature of the manufactured environment.

Sun: The sun ascends at around 6:15am with a gentle impact on the earth and sets at around 6:45pm with its most elevated impact at 12:00pm early afternoon.

Precipitation: is the prevalent type of precipitation. It begins in the month of March to the month of October with the most noteworthy measure of precipitation recorded at around 186 mm in the month of August. The most extreme wind pace managed spoke the truth 74km/h.

Rainfall: Minna is characterized by rainy season which is habitually from March to October. It rains heavily from September to October and also rains lightly i the month of August.

Wind:

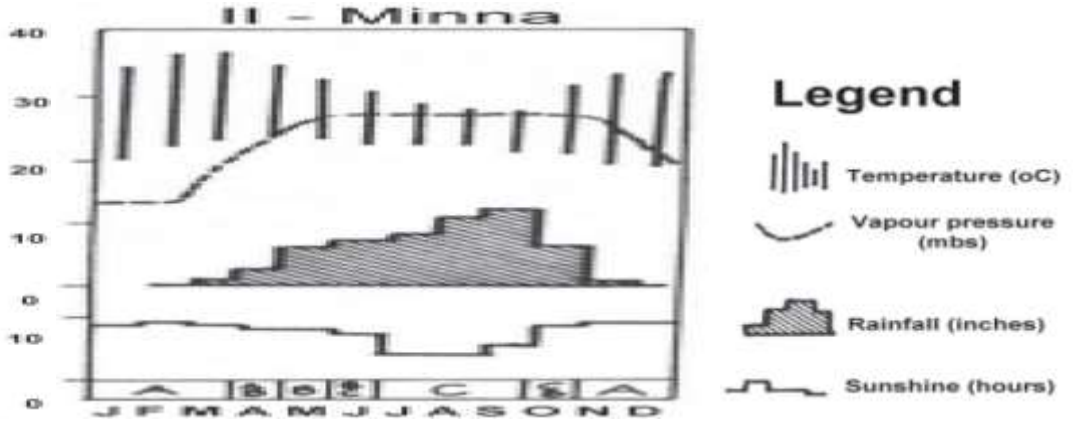

Figure 4.8: Characteristics of the climatic regions in Nigeria
(Source: Ogunsote, 2002)

4.4.6 Site Planning Bye Laws and Regulations

The building bye-laws set standards for building work. Their aim is to ensure the health and safety of people in and around buildings by setting requirements for building design and construction.

4.4.7 Site Analysis

It is a design principle that building should be design as an integral part of the site regardless of the shape and the terrain. It should be note that every site irrespective of the shape, size, terrain and topography offer itself to be taken advantages of in the design process. Hence the need for a site and environmental analysis is necessary.

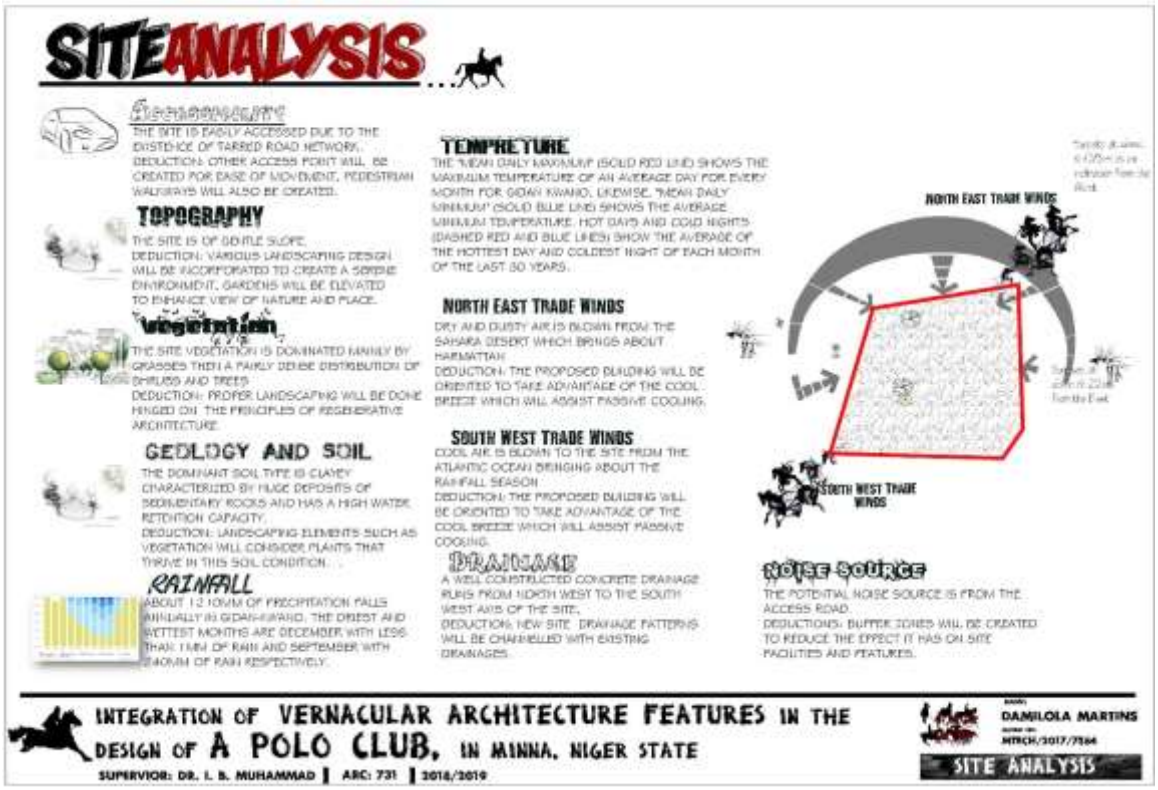

Figure 4.9: A picture of the site analysis
Source: Researcher's Fieldwork, 2019)

I. Orientation

This deals with the way the site is positioned relative to certain element around and with its vicinity. This is usually needed to ensure that in case there is any culture that is been

maintained with respect to the image of the streetscape or townscape as the case may be, the same might be complied with. This will be express in two ways:

i. Alignment with road
ii. Orientation with respect to the sunrise and sunset in order to minimize thermal expansion in building

ii. Accessibility

The site is accessible from the road Ahmadu Bahago road and western bypass.

iii. Sunrise and Sunset

The sunrises at about 6:30am in the morning and sets at about 6:30pm in the evening on the site. The east and west side of the building should be shaded from the sun; solar panels can also be placed on the building to utilise the sun light hitting that part of the building to generate energy for the building.

iv. Vegetation

The site is characterized by grasses and shrubs with a scanty spread of trees; region specific plants that require less amount of water can be planted on the site to improve site vegetation.

v. Topography

The site is relatively flat; it is characterised by gentle hill on the borders of the north eastern side. A proper site survey will be carried out to determine the actual site slope from its cross section. This will aid both the Architect and the Structural Engineer in designing a stable structure.

Vi. Soil Type

The site is characterised by humus soil. Humus soil is great for growing plants, this means that the soil will encourage the growth of all kinds of plants for vegetation and soft landscaping on the site.

vii. Prevailing winds

The region two prevailing winds; the tropical maritime mass and the tropical continental air mass. The tropical maritime air mass emanates from the Atlantic Ocean over the south of Nigeria. It moves inland in a south-west to north-west direction. The tropical continental air mass is over the Sahara Desert and therefore it is warm and dry. It blows in a north-east to south-west direction. The actions of these two prevailing winds are what cause the seasons.

Trees and other plants will serve as wind breakers in windy seasons, and water can be harvested for use on the site in the rainy seasons. Also perennial plants will be planted on the site to ensure that there are trees all year round.

viii. Noise

The major sources of noise is from both vehicular and pedestrian along access road to the site and the adjacent market aside the one that will be generated within the building itself.

ix. Pollution (solid and gaseous)

Since there are no industrial activities with such pollutants within the proposed site vicinity, there is no fear of soiling by such means (soiling from industrial chemical pollutants) that could threaten surface or the materials as a whole.

4.5 Design Report

4.5.1 Design brief

The built environment has an enormous has a positive impact on its immediate environment the region and the people. This impact can be further enhanced by the adoption of vernacular building design methods through careful attention to its features and construction practices in the design and construction of the building. The

considerations and criteria for vernacular building design and construction include features like forms, motifs, layouts and locally sourced building materials.

The proposed polo sports club is comprised of a combination of facilities to support the polo game. The administrative building comprises of offices, accounts department, tack shops, facility managements. And the clinic comprises of a small first aid admission area for humans, an in-care stable for horses, theatre, offices, consultation rooms vet-nurses station and quarantine area. The polo training school, barn/livery guest chalet and the pavilion.

4.5.2 Schedule of accommodation

The proposed polo sports club is made up of several facilities namely; the administrative building comprises of offices, accounts department, tack shops, facility managements. And the clinic comprises of a small first aid admission area for humans, an in-care stable for horses, theatre, offices, consultation rooms vet-nurses station and quarantine area. The polo training school, barn/livery guest chalet and the pavilion.

1.) The administrative building
    a.) offices,
    b.) accounts department,
    c.) tack shops,
    d.) records
    e.) toilets
2.) the clinic
    a.) first aid admission area (for humans)
    b.) an in-care stable for horses
    c.) theatre,

d.) offices,

e.) consultation rooms

f.) vet-nurses station

g.) quarantine area, and

h.) toilets

3.) The polo training school

a.) Lecture room

b.) Reception

c.) Gym

d.) Saddle storage

e.) Library

f.) Manager's office

4.) Barn/Livery

a.) Offices

b.) Stalls

c.) Storage

d.) Staff rooms

e.) Fountain

5.) Guest chalet

a.) Room

b.) Toilet

c.) Kitchenette

6.) Pavilion (roofed)

7.) Pavilion

Table 4.6: Schedule of Accommodation

FLOOR	AREA (m^2)	No of rooms
Administrative Building		
ground floor	203.2 m^2	7
first floor	203.2 m^2	7
Equine Clinic		
ground floor	1,810 m^2	20 and 14stalls
Barn/Livery		
ground floor	2,059.4 m^2	10 rooms and 39stalls
Polo Training School		
ground floor	1,317.1 m^2	10
first floor	1,317.1 m^2	10
Guest Chalet		
9 units	4.6 m^2 /each	9 units
Pavilion (Roofed)		
ground floor	2,486.1 m^2	1 tier
Pavilion		
ground floor	1,353 m^2	1 tier

(Source: Researchers Fieldwork, 2019)

4.5.3 Design consideration and planning principle

Factors to be considered in the design include;

i. The user: the polo sports club is to be intended for the towns people as a social space where people who share their affinity for the game of polo come together with a common goal to have fun and share their love and experience for the sport and also to get entertained and relief stress to be designated would be efficient, and foster sharing, along these lines making an in number obligation of solidarity among the users.

ii. Thermal comfort: air quality and temperature control would be critical parts of the design thought. A decent (sans contaminants) air quality would be accomplished basically through ventilation, that is, the free stream of fresh air from the outside environment to supplant the utilized air as a part of the building. Abundance heat would likewise be removed from the building through ventilation.

Design for horses

Considering the occupants of a building is an integral part of any design. Animal care buildings are distinctive for their kind and purpose adaptive design, it entails detailing to engage the animal needs and a comfortable scale of environment. Bulfinch (2015) identified the criteria for design for animals as follows; Identifying with animals, spaces for owner, care takers, users and stress-free way finding, details for animal comfort, natural lighting and connection to nature. These criteria was achieved in this design by a selection of area, adoption of the universal spaces, creation of green area for nearness to natures, provision of care area and large openings to admit day lighting into the interior spaces.

Air flow is a vital factor to be considered in plan of an animal farm. Ideal airflow was attained in this design by a variation in height levels of the units. The courtyard with open spaces boosts continuous airflow into and out of the buildings.

4.5.3.2 Security

Establishing a perimeter fence being the first line of defence in a security situation this becomes imperative that the detail and construction technique matches the standard set for security and safety purpose. Substantial data from researchers reveal that security design features has a positive influence on the efficiency of the design. In this design, a full integration of interior and exterior landscaping was ensured. Water features were included on the site and plants of different textures and sizes were selected to the give form of security barrier on the site.

The precautionary measures considered in this building are building materials and elements with a good fire resistivity taken into account. Fire detecting equipment's such

as fire alarm, smoke detectors and fire extinguishers. Hydrants will also be positioned at strategic places on the site to compliment fire fighters.

Security surveillance systems will be installed in the building and around the site to support the human efforts that will be available in the security units and the gate houses. Motion detecting systems will be provided in areas of the building where much security is needed. Street and security lighting fixtures will be installed on the site.

4.5.4 Design concept

An analogical concept was adopted for the project design after a critical consideration of all objectives outlined in chapter one. The idea is form follows function which means that the building relates to its intended function form as a concept, for all the buildings except one the polo training school. In which the concept is gotten from the round shape of the calabash and a spoon (ladder) over it which is widely used in all homes in the north for different culinary purpose creating an affiliation between the space and culture.

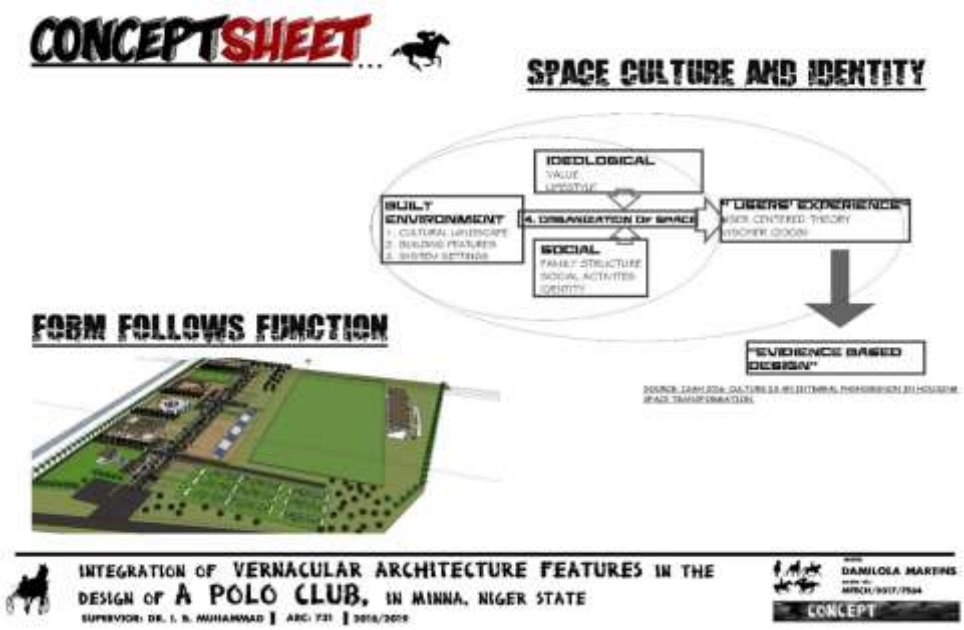

Figure 4.10: The concept sheet
(Source: Researcher's Fieldwork, 2019)

The site design concept

The concept adopted for the project design after a critical consideration of all objectives outlined in chapter one. The idea is form follows function which means that the site relates to its intended function form as a concept, also integrating it with the typical compound layout of the Niger state people, usually in a concentric manner where most of the major activities takes place at the centre (the court yard) to strengthen communism and promote security

4.5.5 Application of research findings to design

Some design features were well thought-out in the integration vernacular design features in a polo sports club

i. The use of building forms that represent the culture of the area.

ii. The use of engravings on the exterior of the buildings.

iii. The use of locally sourced building materials like burnt bricks.

iv. The layout of the site

Figure 4.11: Design Application of Variables
(Source: Researcher's Fieldwork, 2019)

4.5.6 Construction

The foundation is made up of the sub structural elements which act as an anchorage between the building and the ground and also distributes vertical load safely to the ground. Due to the nature of the soil which is, a pad strip foundation was adopted for this design. For the walls framed construction system will be adopted for the proposed design and this entails the build-up of all vertical and horizontal structural elements before infilling non-structural elements and the entire building envelope. The building envelope will be filled using mud bricks of 225mm thickness while all interior non load bearing walls will be of 150mm thickness. The partitioning systems for some interior spaces will be constructed of glass with frames which will be frosted with patterns to allow for privacy. Sound insulation materials will be used on walls in areas where unwanted sound will be distracting. While, the floors of the structure will be designed and constructed using composite floor system where drop beams are not required and the load bearing reinforcements are spread in the slab which is expected to carry the load. And finally, Steel trusses covered with standing steam long span aluminium roofing sheets are used in the other areas; covered by parapet walls. The construction of the proposed pavilion (covered) design will require details by both the architect and the structural engineer. Due to the nature of the pavilion, post tensioned beam system will be adopted. The system is mostly for large cantilevers and spans. It is mostly used in road constructions.

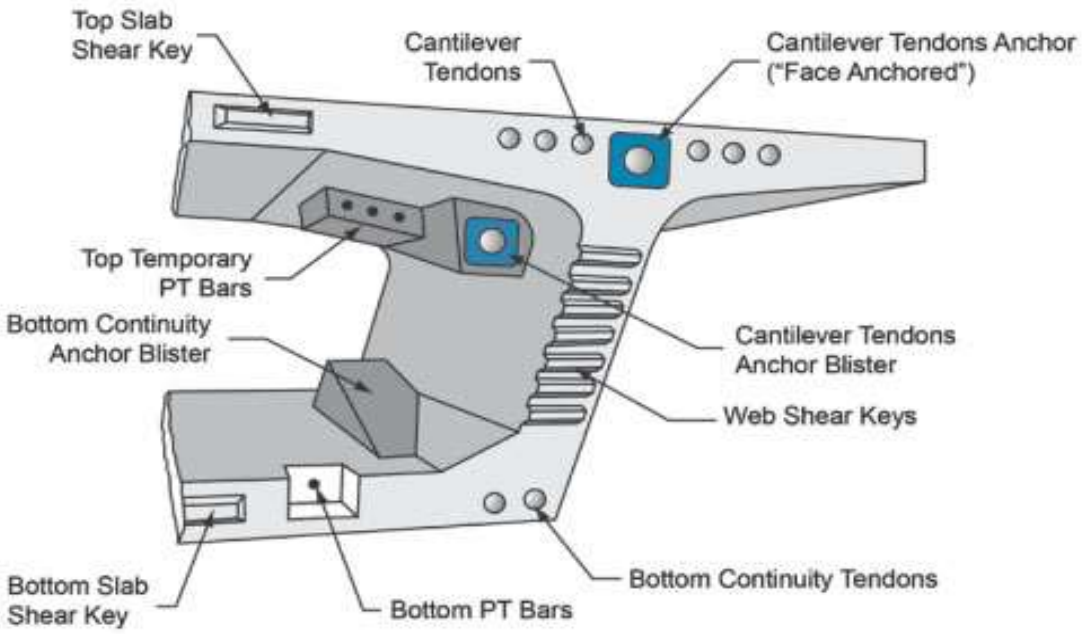

Figure 4.12: Cross section of a typical balanced post-tensioned beam (Source: Barry, 1996)

Post tensioning beam system helps to strengthen concrete which is strong in compression but weak in tension. It helps prevent cracks in longer spans and deflection in reinforced concrete beams. Post-tension beam system can be constructed in-situ and be used for any building form. Its advantage is that beams are not only run from column to column but can also be continuous.

4.5.9 Materials and finishes specification

The materials and finishes specified for the proposed project is based on their sustainability and aesthetical value; due to the aim and function of the design.

Light asphalt will be used on the drive ways because of its adhesive and waterproofing properties. Prime and tact coats will be placed on the unpaved surface to prevent slippage between the surfaces and overlay during or after compaction. Kerbs with 150mm thickness will be used on the boundary of the asphalt coats. While, paving stones will be stalled on the sand bed for pedestrian walkways. A plastic edge constraint will be used because it doesn't allow rot or decay and it allows the growing of grass up

to the edge of the pavement. And as for the water features Proper attention will be given to the details of the fountains and pond incorporated in this design. Water inlet and outlets will be properly designed to ensure effectiveness of the water features which are aimed at beautifying the environment.

4.5.8 Landscape and external works

An elevated vegetation strip of 150mm in height will be used for the outdoor green areas. These areas will comprise of shrubs, flowers and trees. Shady trees will be used in the gardens while palm trees will be used to enhance aesthetics in some areas. Trees will be planted to act as noise breakers in potential noise areas such as parking and power plants. Also, landscaping aids security. Landscaping is an important factor that must be considered in the design of polo sports clubs. It is very essential in polo sports clubs due to its therapeutic benefits and control of the micro-climate such as control of airflow, sunshade and temperature regulation in buildings. However, plants and fountains are the predominant landscape elements that were adopted for this design because of their important functions. External works such as the gate houses, fencing and the power house were sited appropriately as they serve the design security strategies.

4.5.9 Building services

Mechanical services

The facility will be powered from the national power grid. There will be a dedicated transformer to power the facility and provision will be made for alternative power supply and generator plants because of the unstable power supply in the country. The entire cabling systems will be concealed in ducts and the lighting within the site will be trunked underground.

Mechanical (Heating, Cooling and Ventilation) The proposed design has taken into consideration natural means of ventilation; however mechanical heating, ventilation and cooling systems will still be installed for maximum user satisfaction. The effect of the sun on the interior spaces will be reduced by sun shading devices. The devices will be horizontal systems which will be made up of projected louvers and projected concrete fins.

Water supply, Drainage and Sewage disposal

Water supply into the site will be from the National water supply board. An alternative water body will be sunk on the site. The water reservoir will be buried underground on the site and will be distributed into the building with the aid of mechanized pressure pumps. Water outlets would be installed around the gardens for the water features. Fire hydrants will also be installed around the site for the ease of firefighting.

In this design proposal, appropriate underground drainage channels will be constructed to ensure effective collection of waste from the building and the site to the underground drainage systems. The drainage system will be constructed of precast concrete and inspection chambers will be provided at intervals. Liquid waste from the building will be collected and drained into the soak way systems. Water from the green roofs will be drained via filters.

Maintenance

Buildings deteriorate over time due to age, environment conditions, usage of the building, and method of design, materials used for construction, the methods and quality of construction. It is very essential to maintain buildings in order to sustain their life span. Therefore, planned preventive maintenance is recommended.

Polo sports clubs are expected to be neat at all times. Refuse disposal cans and baskets will be placed at strategic locations on the site for effective waste disposal. A major disposal outlet will also be provided outside the gate for effective disposal by the Environmental sanitation board. Small and aesthetically pleasing refuse bins will also be place in all interior spaces to ensure tidiness.

4.6 Summary Findings

Findings from the case studies revealed that some of the buildings studied possessed elements of vernacular design features by using motifs, conical plan, locally sourced building material such as the mud brick guest chalet at the fifth Chukker, the stature at Port Harcourt polo club, the engravings on the walls at 12-12 polo club. The use of locally sourced building material which is common to all the buildings are seen to be more of availability considerations than vernacular architecture design techniques. Intricate vernacular features were not really adhered to in the Buildings save for building materials, Hence, vernacular architecture design techniques were not really incorporated in the studied buildings and the features used are referred to as vernacular architecture of northern Nigeria.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Vernacular architecture design features in building is considered as a way for the building industry to preserve the heritage of the people. The aim of integrating of vernacular architecture design features building practices and principles in building design and construction is to pursue a balance between the man-made environment, the natural environment and cultural preservation. In order to achieve this, the principles of vernacular architecture design features; the use of forms, using locally sourced building material, layout and engravings. These principles form the basis for the planning, design and construction of vernacular architecture design features in buildings.

Re-establishing the essence to integrate traditional form, ideas, expressions, materials into their modern/ recent designs and techniques. Creation of a new vernacular approach enhances the subsequent interplay between the modern and traditional design concepts in combination with materials utilization. Through this, the utilization of cheaper building materials such as earth, wood, stone and thatch and the design principles of privacy, space, comfort rooted in the Nigerian Traditional Architecture would be enhanced.

The creditable impact of modernization cannot be underrated, additionally; this research encourages the significance of merging the modern concept and traditional concept. It will be unfortunate and a monumental loss if our traditional building styles and construction process disappear from the continent. The benefits derived from our indigenous methods and materials were vast and need to be proliferated, while any inadequacy associated with the traditional approach could be improved.

5.2 Recommendation

With proper study and selection of vernacular design features, this thesis has been able to use cultural features to generate a culturally preserving design for polo sports club. This enlightened the people about their culture and gives balance in the cultural practices and preserve the heritage of the state in general. The need for a conscious study of vernacular design features when designing a polo sports club. This research also infers that with the dying cultures of many cities in Nigeria, The use of cultural elements as sources of forms in the design of polo sports club will help revive create a cultural identity for the people of Niger state. In addition, it is recommended that more in-depth study of cultural elements should be carried out in order to have more variety of cultural elements and feature that can be used in a designing a sport centre of particular area place.

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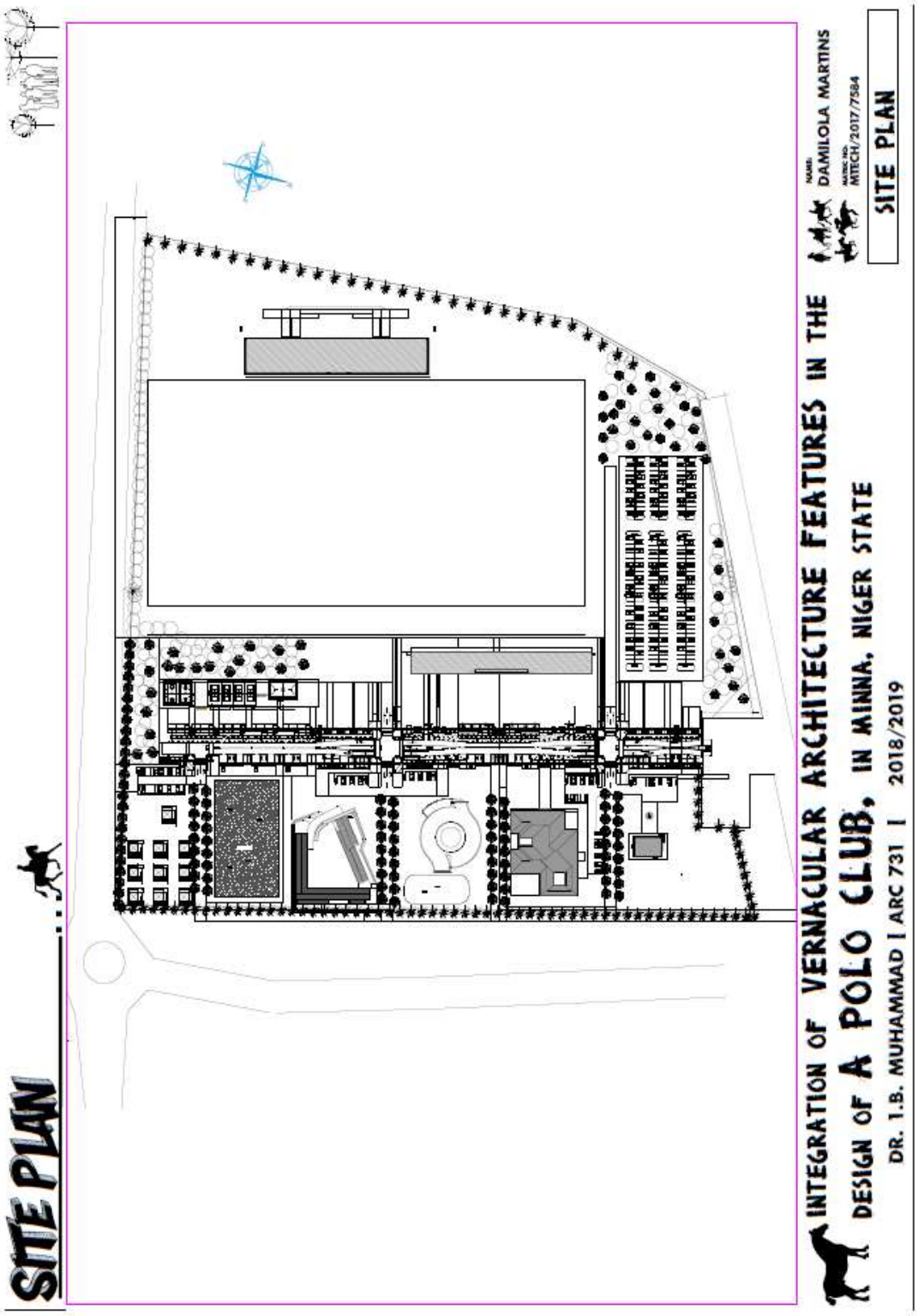
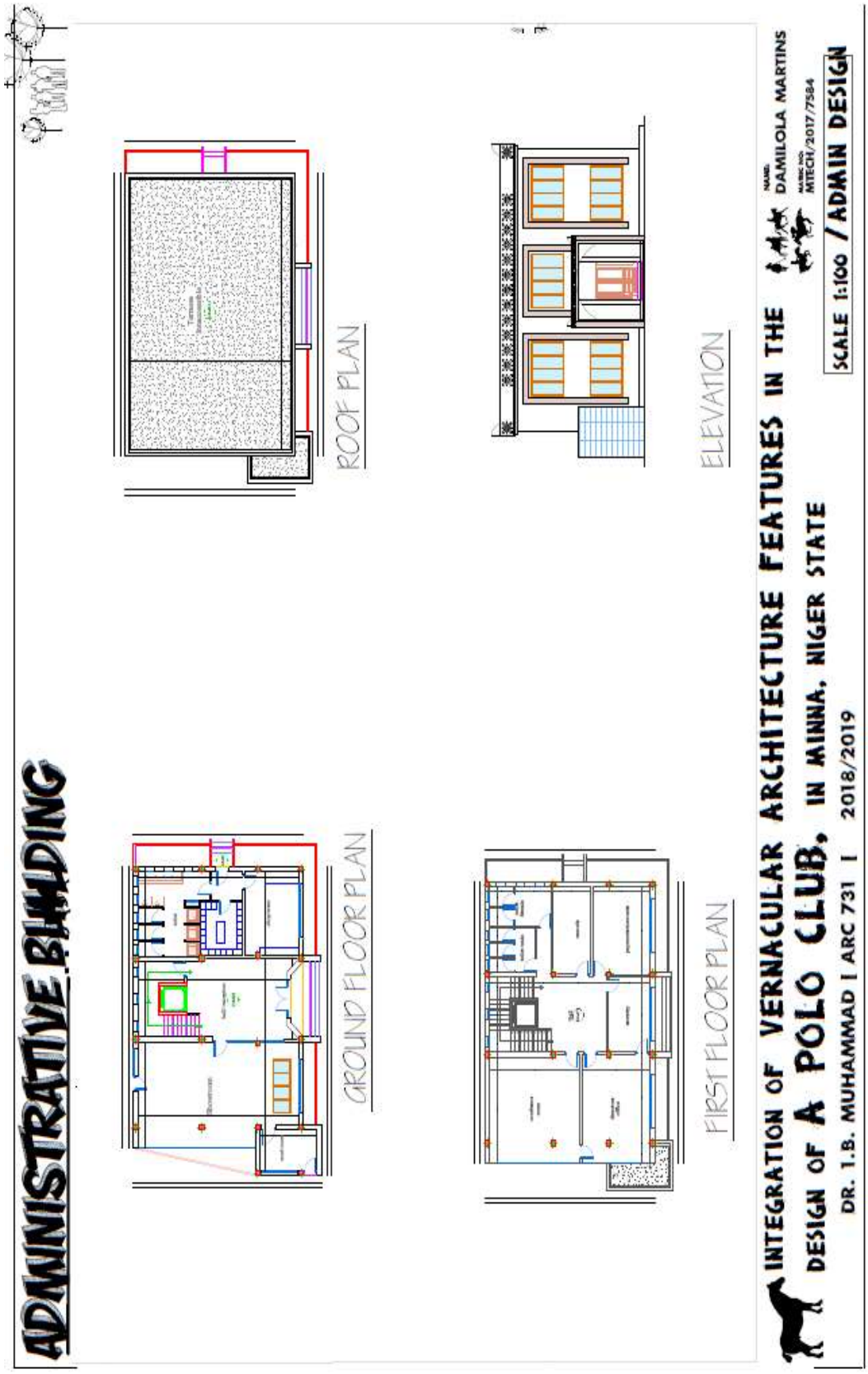
APPENDICES

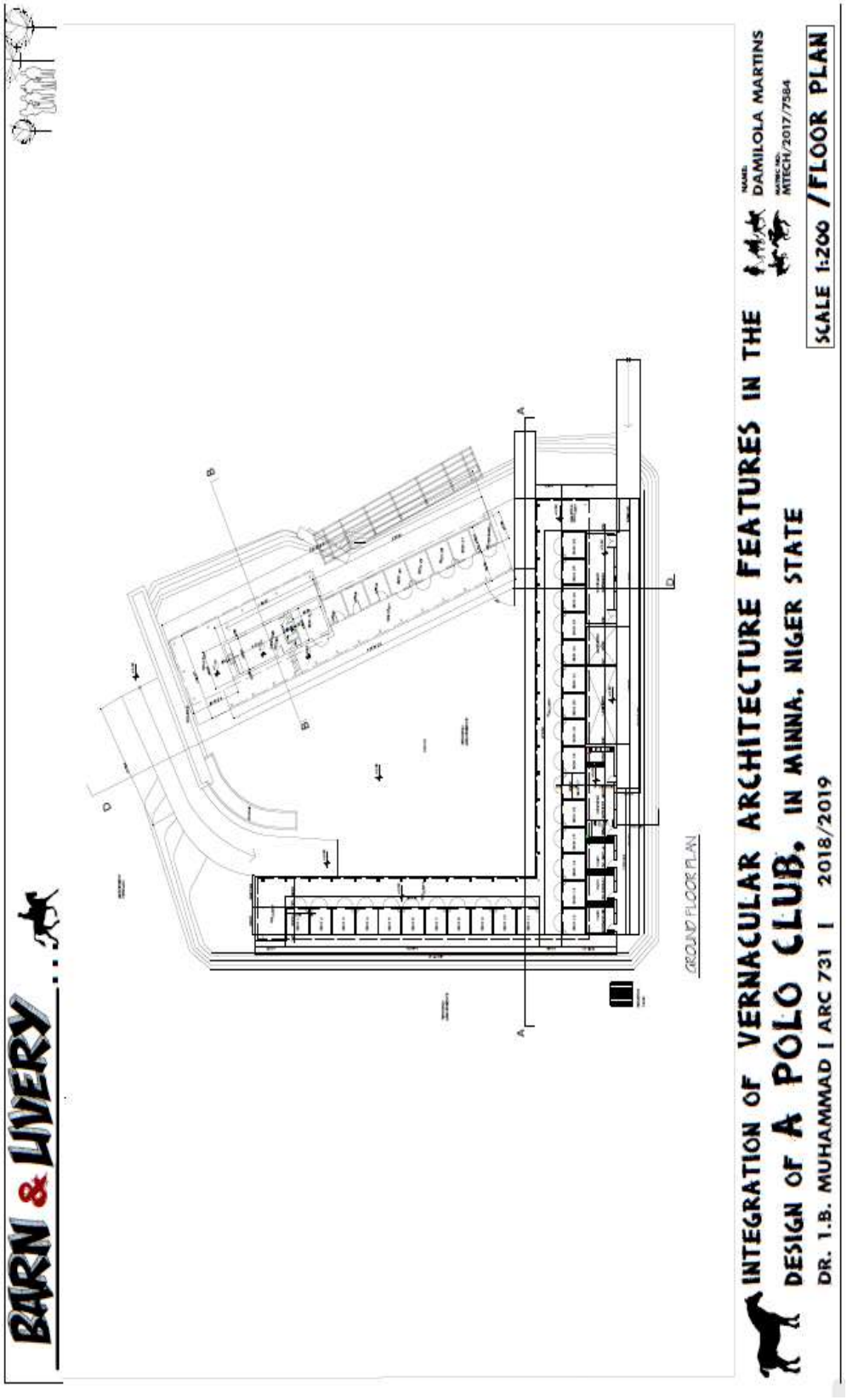
Appendix A: Site plan



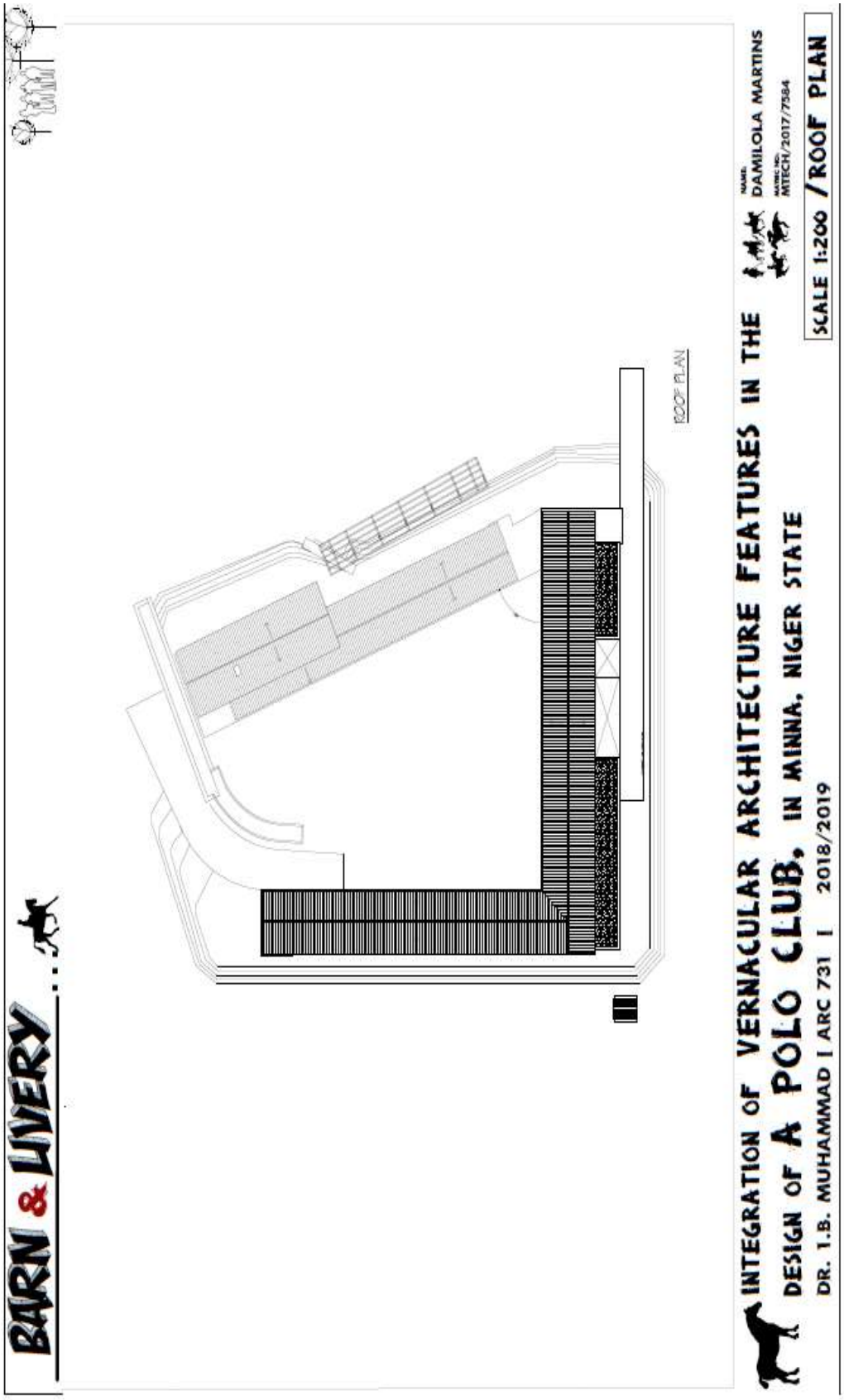
Appendix B: Administrative building



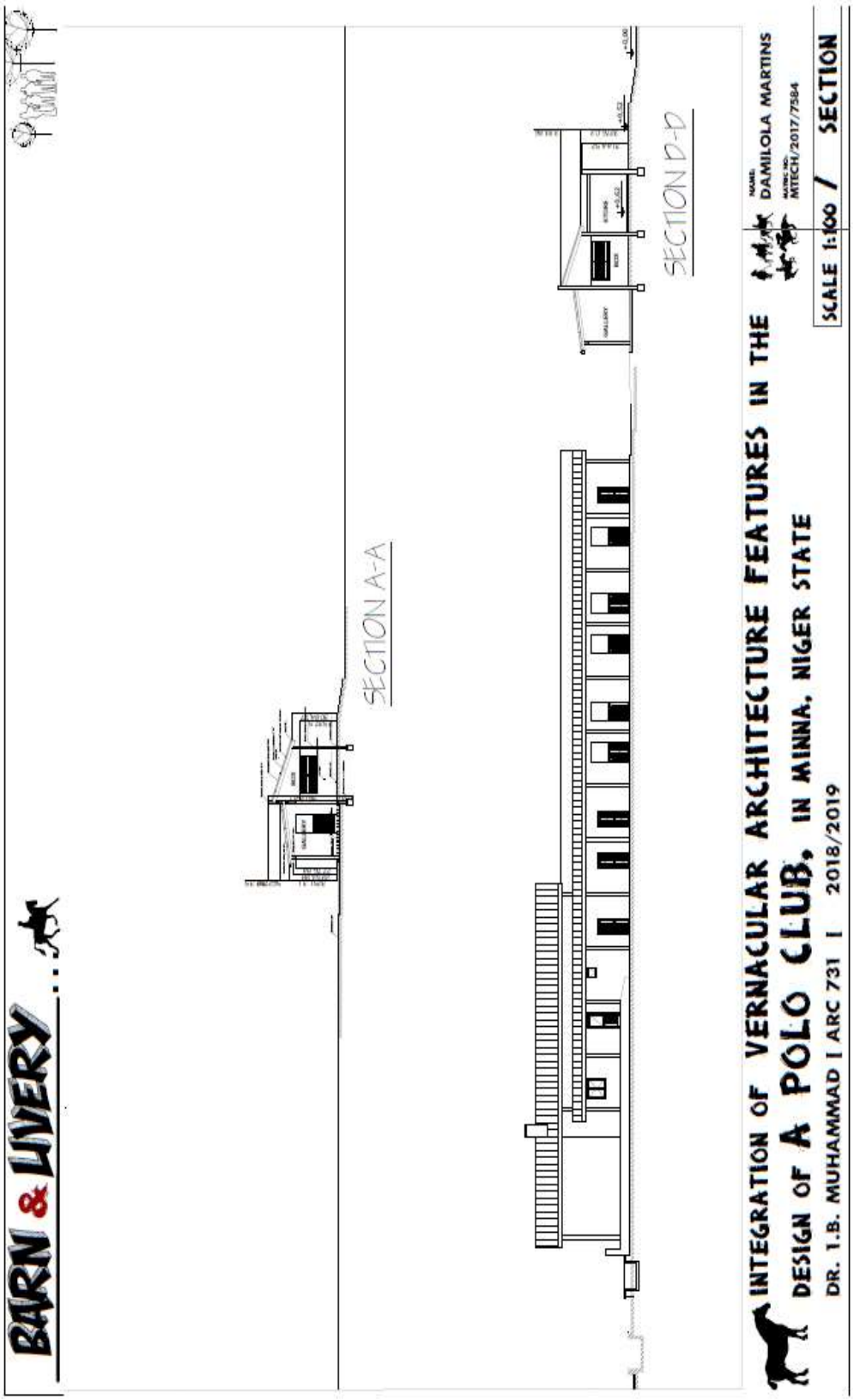
Appendix C: Floor plan barn/livery



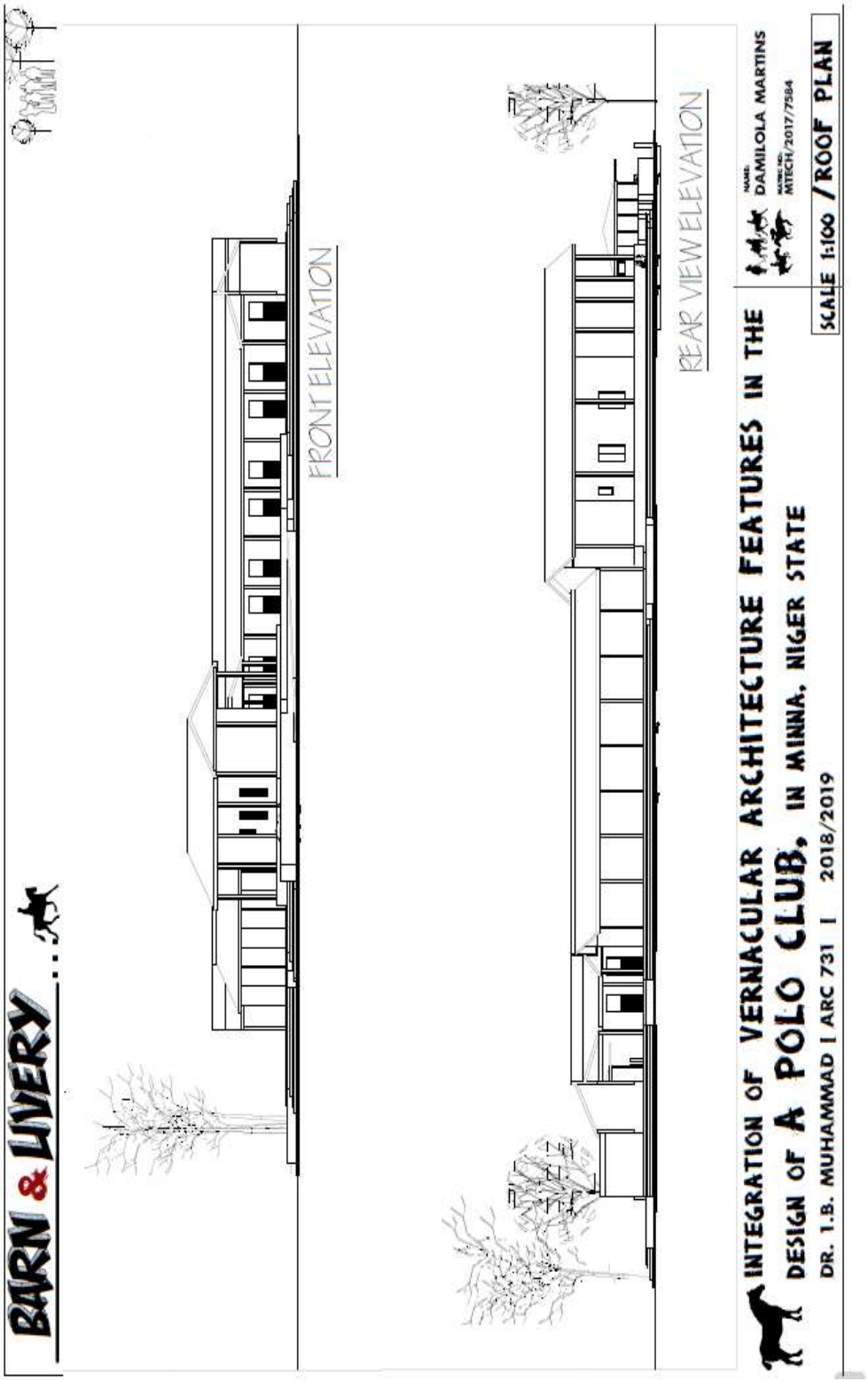
Appendix D: Roof plan barn/livery



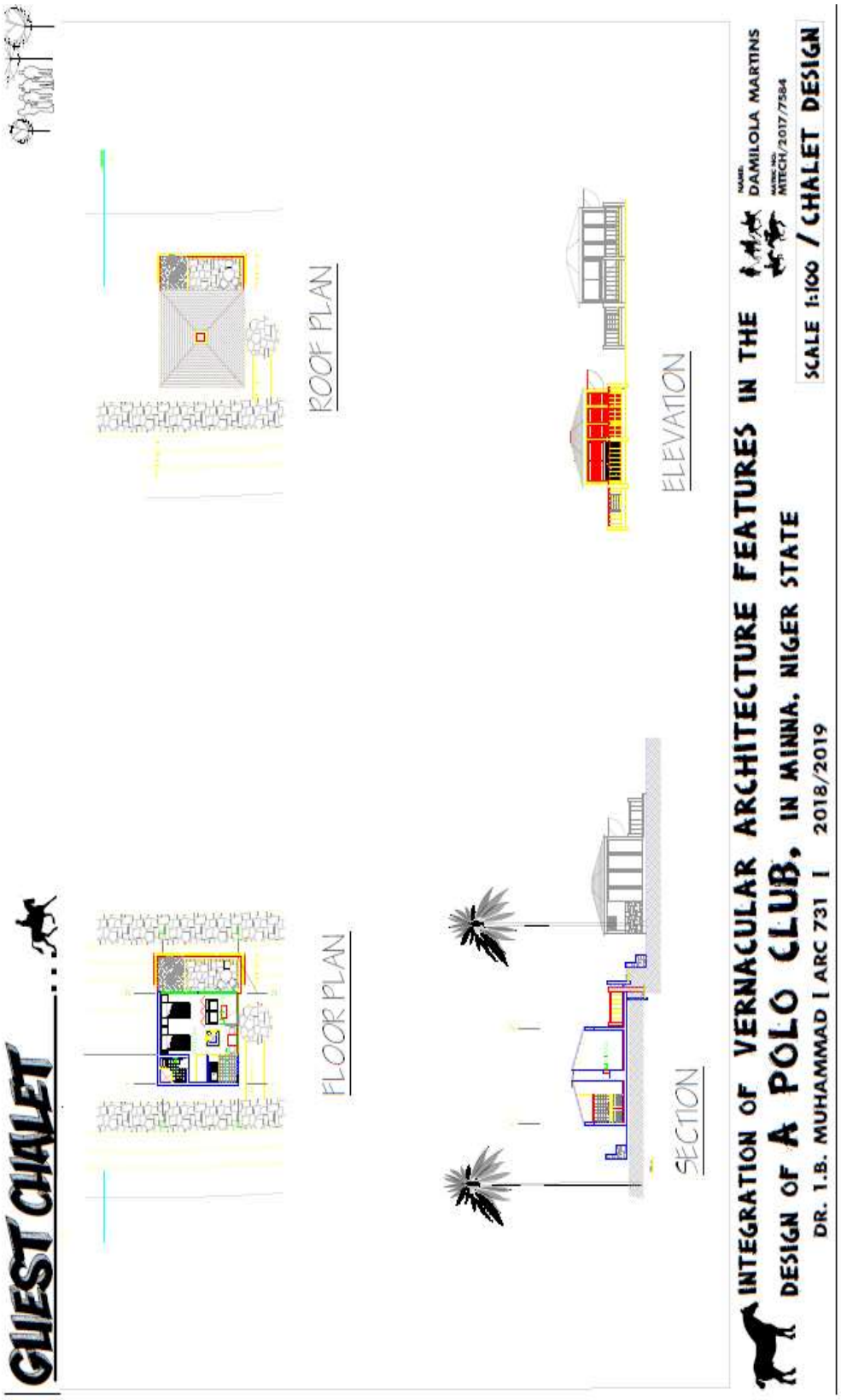
Appendix E: Section barn/livery



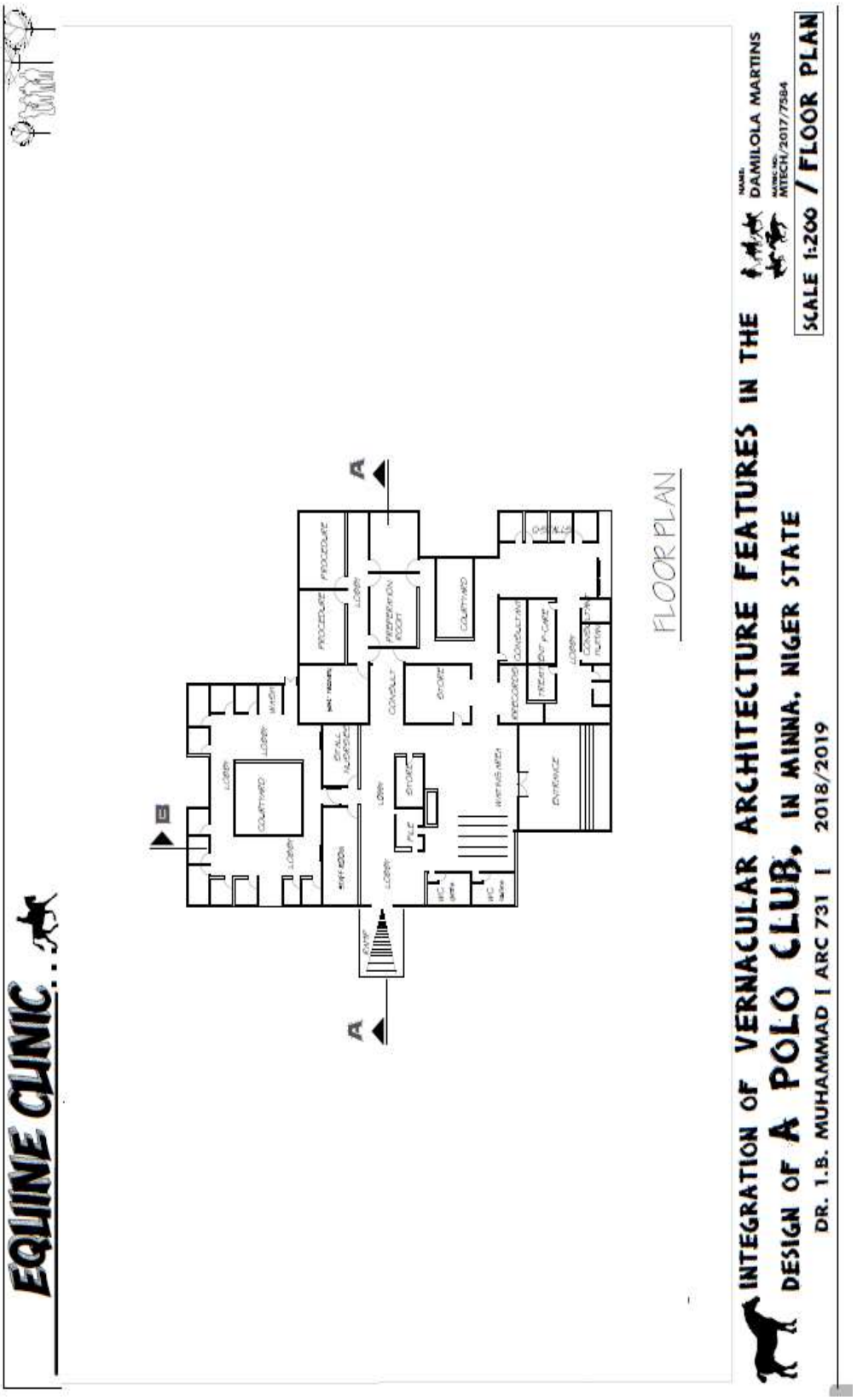
Appendix F: Elevation barn/liver



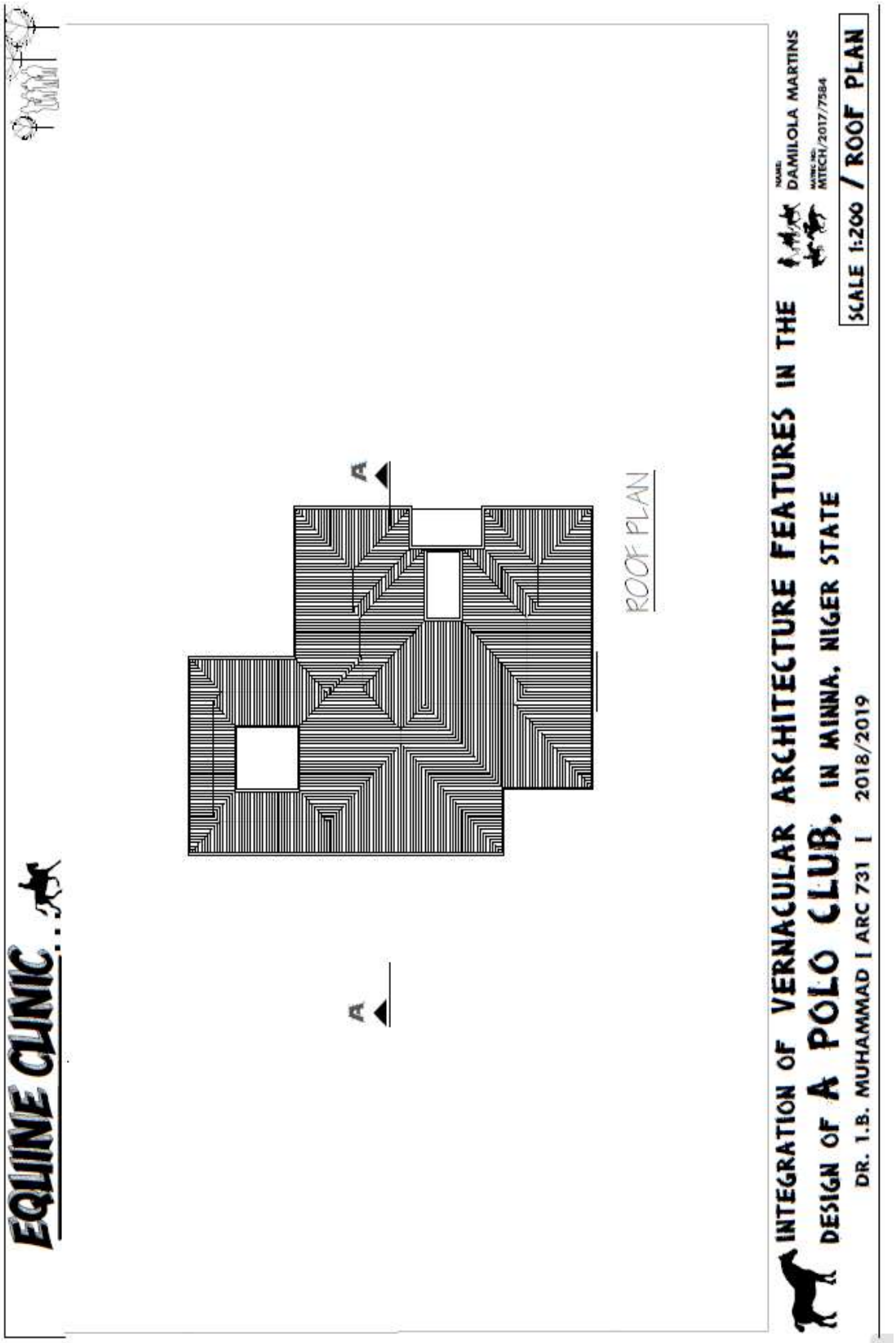
Appendix G: Guest chalet



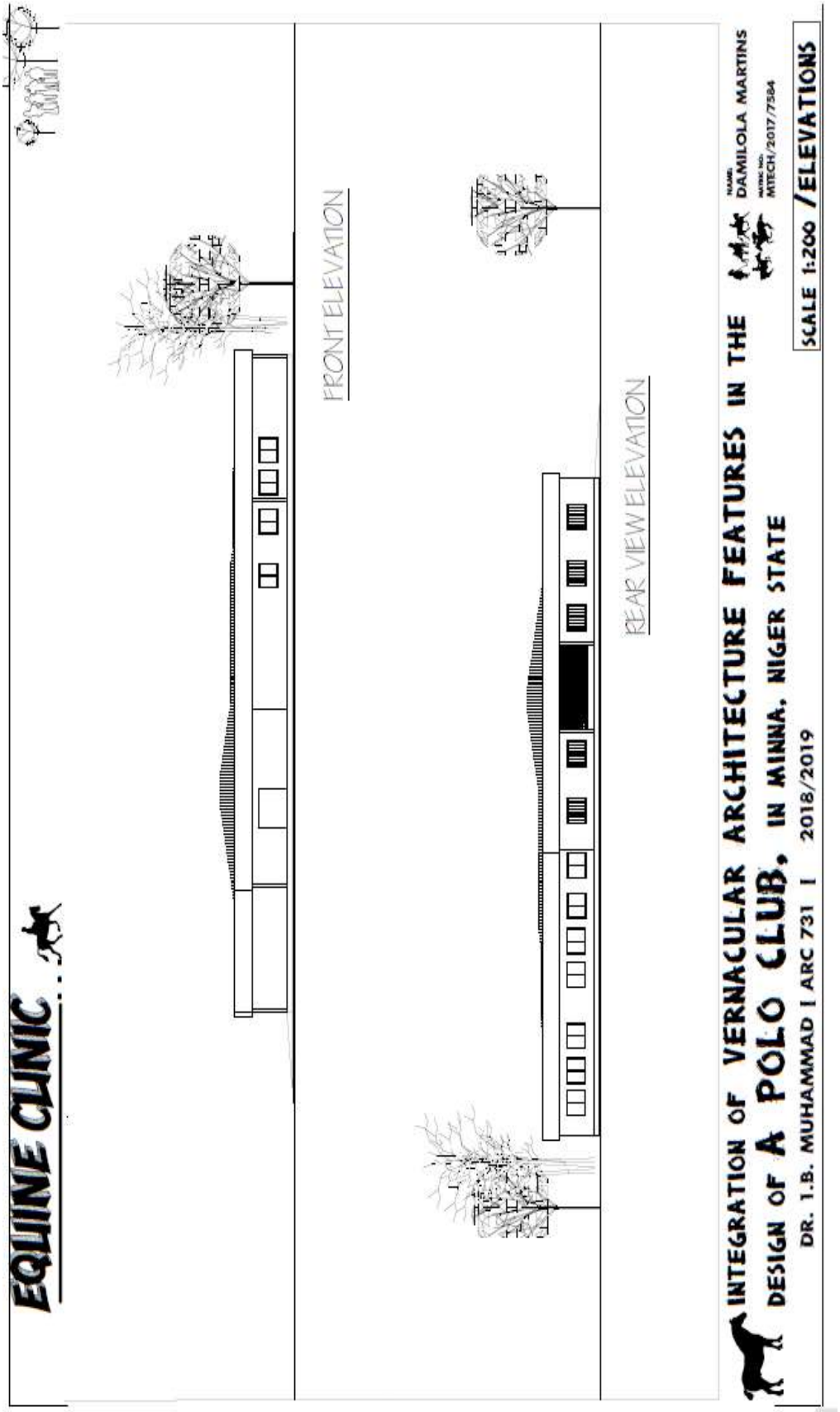
Appendix H: Floor plan clinic



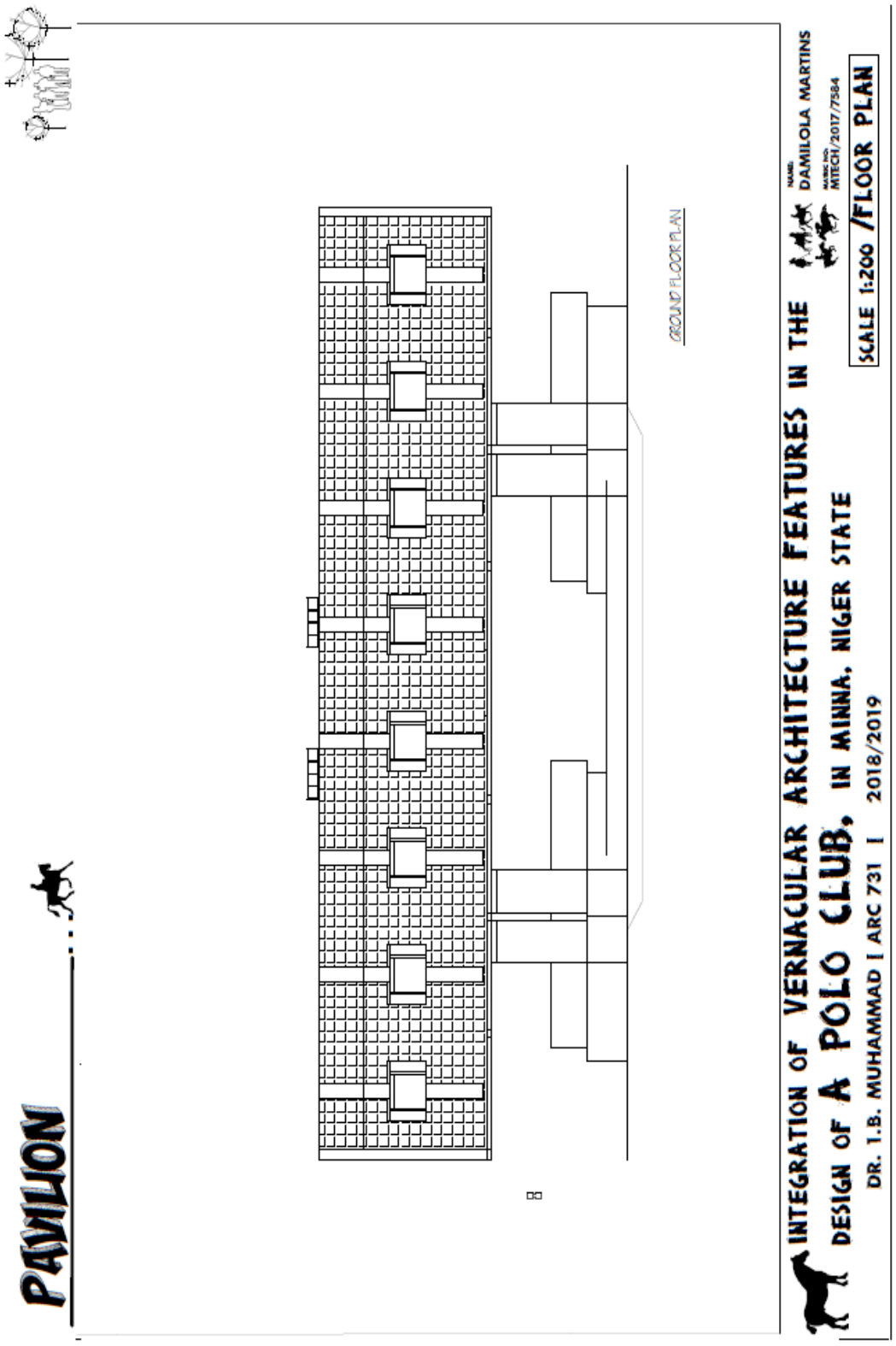
Appendix I: Roof plan clinic



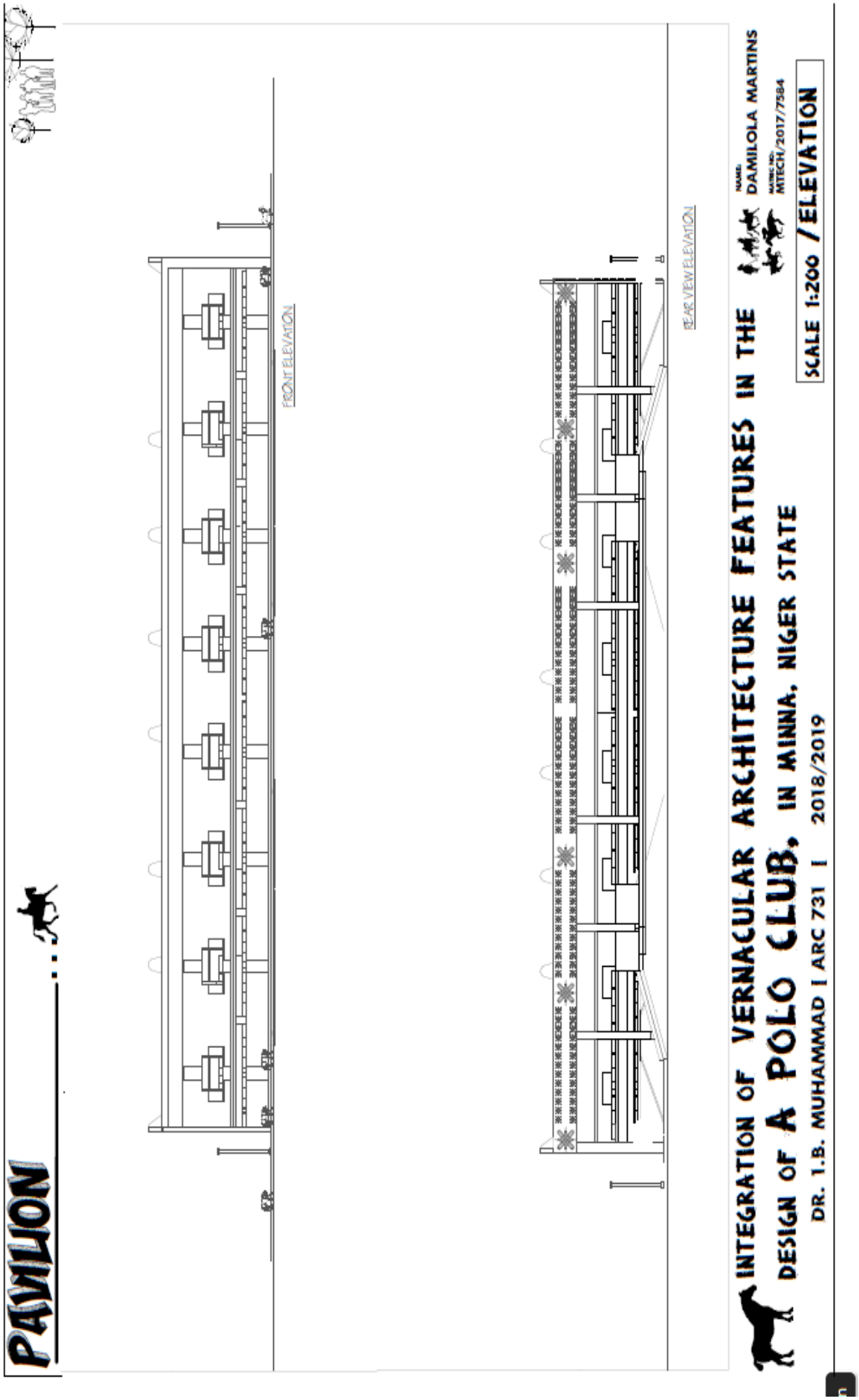
Appendix J: Elevation clinic



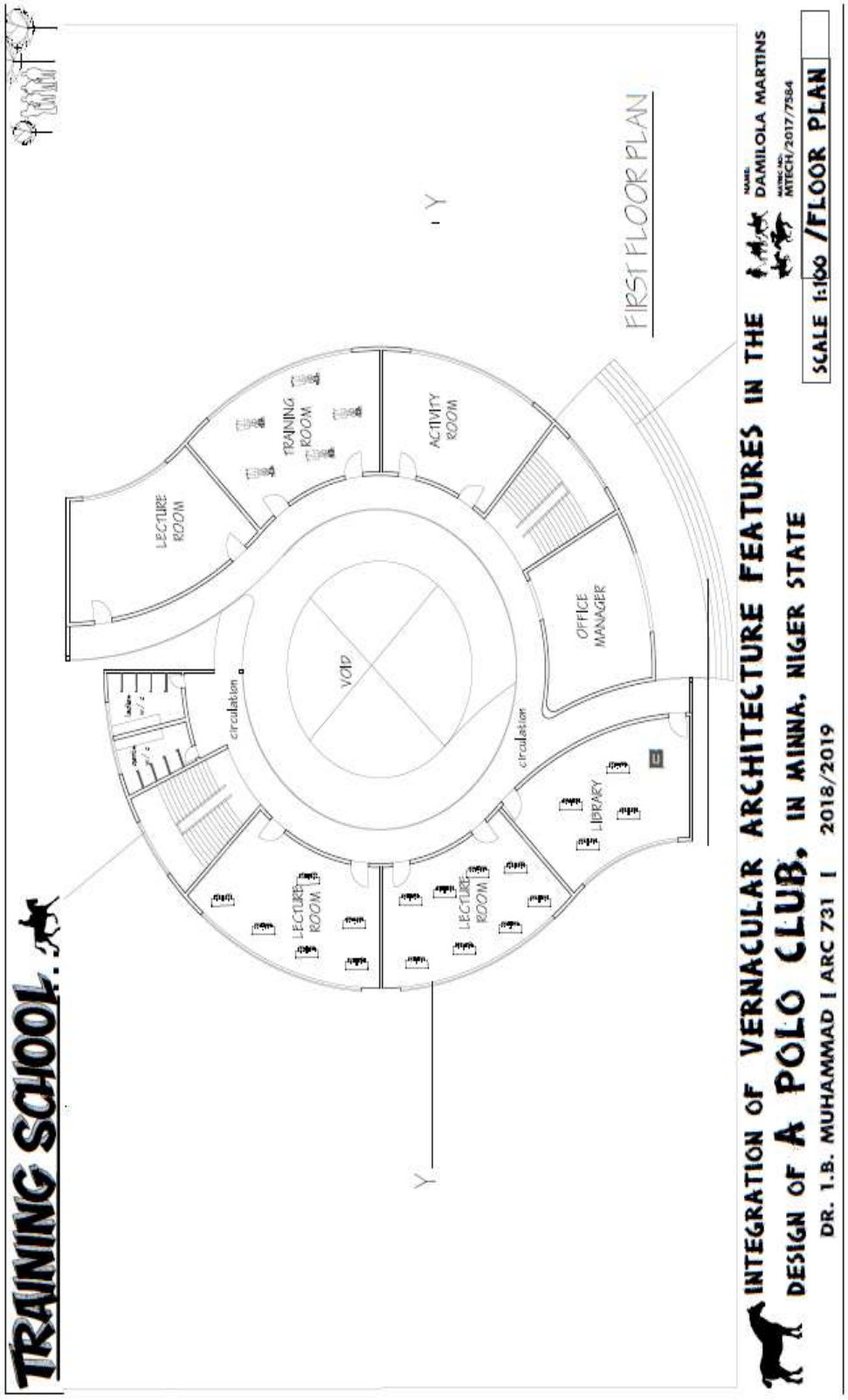
Appendix K: Floor plan pavilion



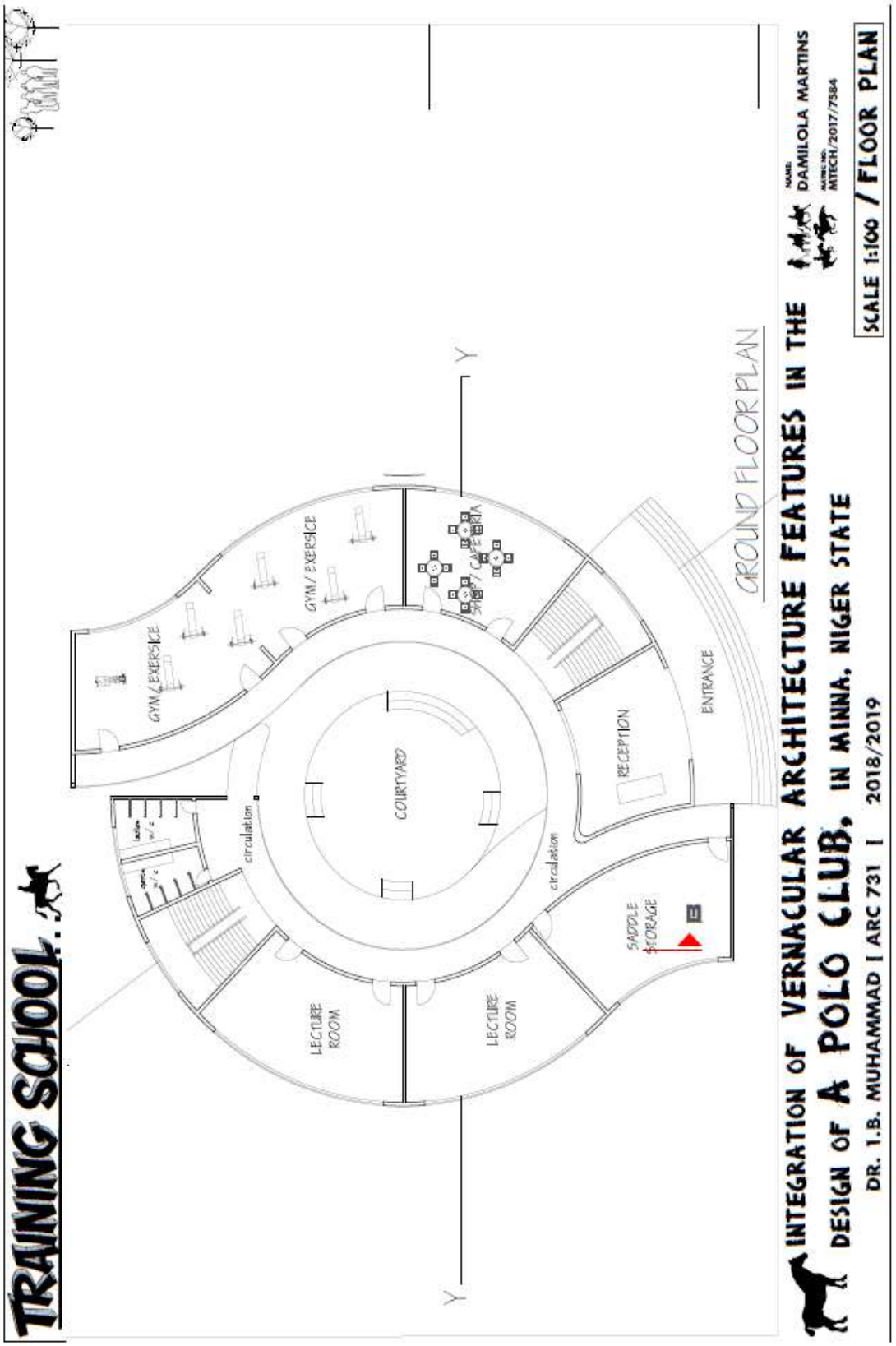
Appendix 1: Elevation pavilion



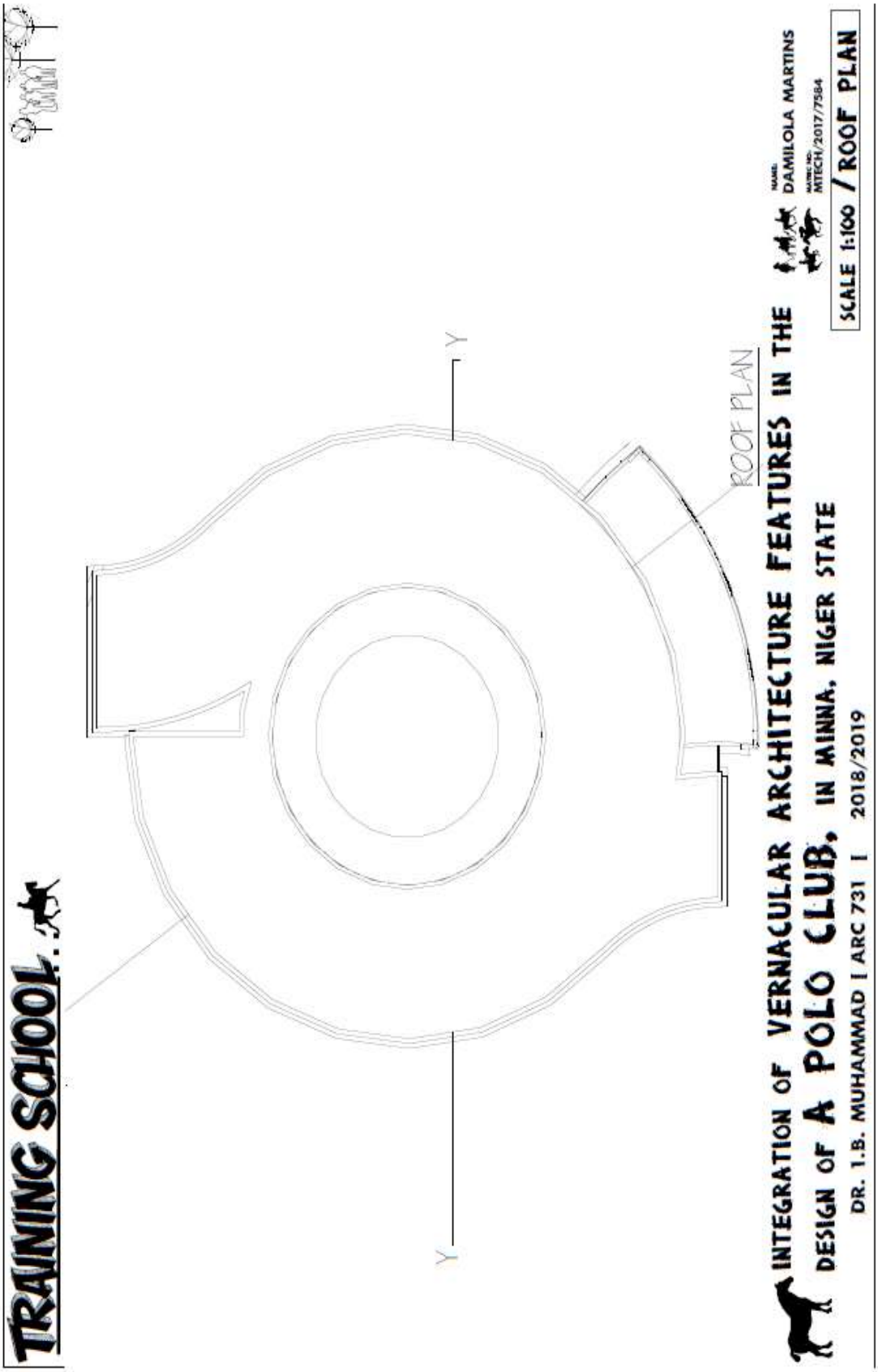
Appendix 2: Floor plan polo training school



Appendix N: Floor plan polo training school

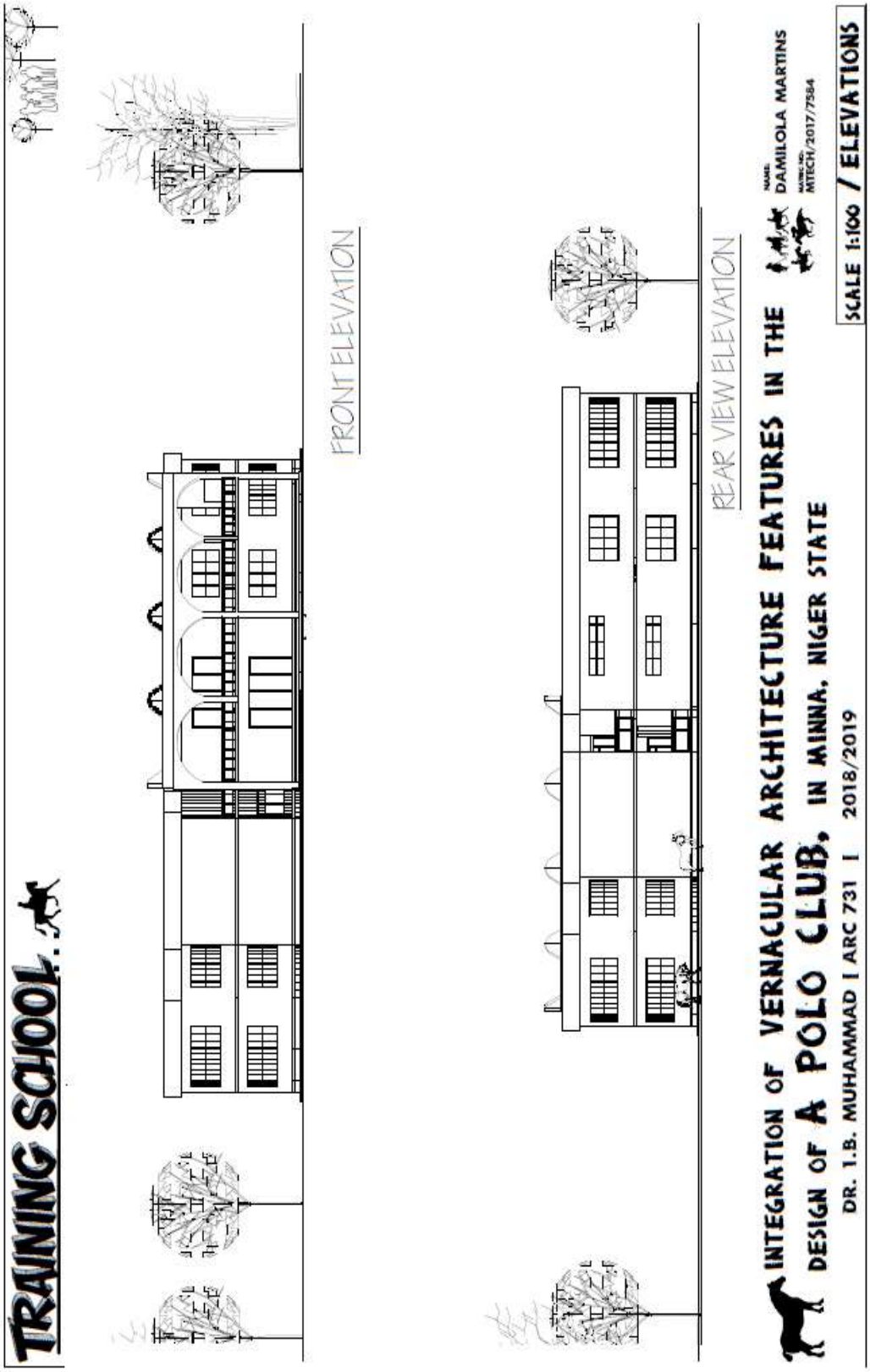


Appendix O: Roof plan polo training school

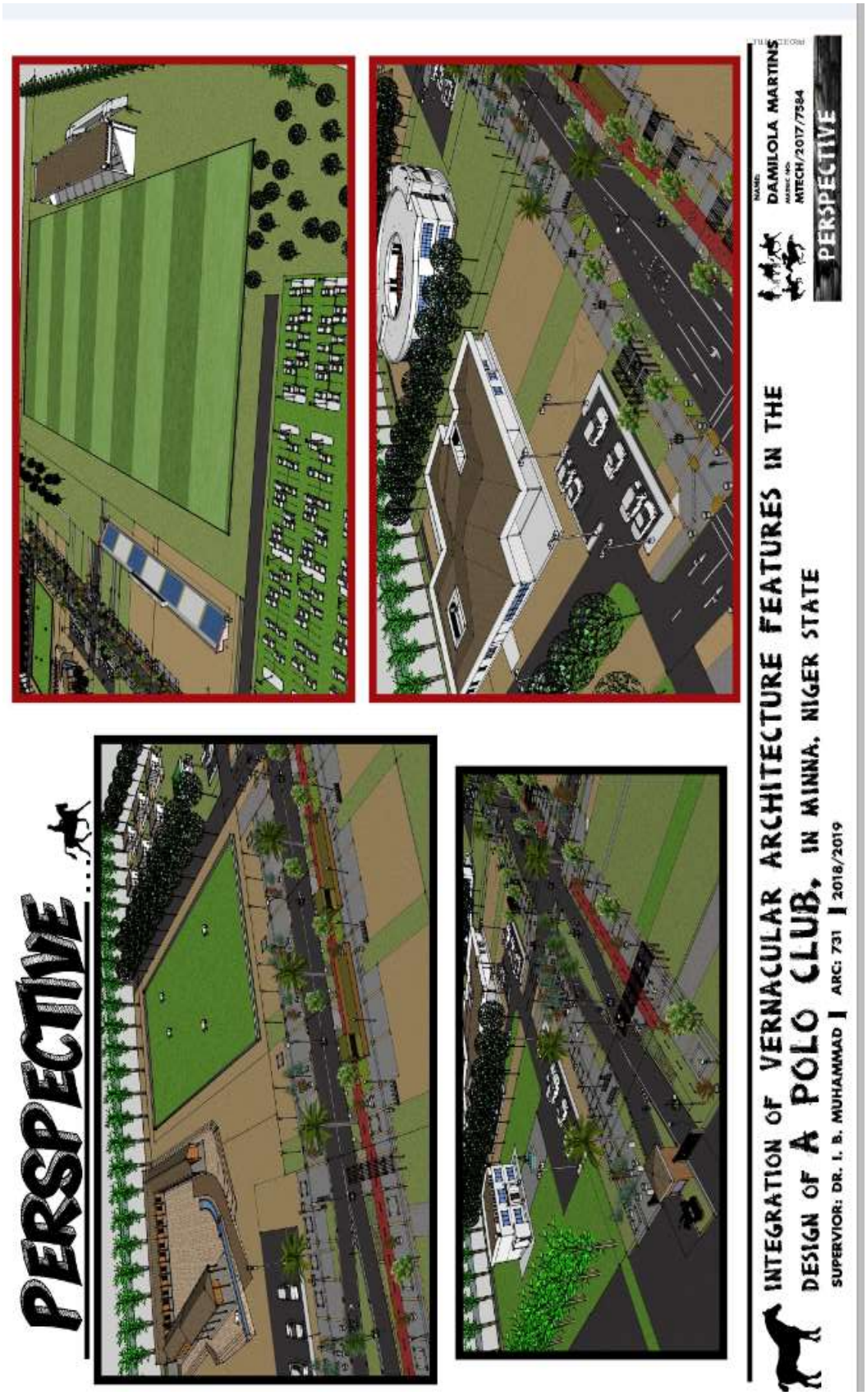


Appendix P: Section polo training school

Appendix 3 Elevation polo training school



Appendix R: Perspective



Appendix 4: Plan view

Appendix 5 Perspective

Appendix U: Perspective

Appendix V: Ariel view