DESIGN PROPOSAL FOR CULTURAL MUSEUM OF ART, BENIN CITY, NIGERIA.

(WITH EMPHASIS ON LIGHTING TECHNIQUES)

BY

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ABSTRACT

It has been generally known and accepted that a museum is a place where objects are kept and preserved for the view of the public. The major challenge in museums is to use only as much light of the right type as is necessary to make exhibits comfortably visible for visitors while protecting the collections from damage. Lighting in museums and art galleries plays a key role in a visitor's ability to perceive and enjoy both the artefacts in a museum and the building in total. In order to develop a successful lighting scheme, a museum lighting designer must satisfy many conflicting design requirements. Their primary concern is effectively illuminating artwork, but this should be done by considering the preservation of the artefacts also. A lack of consideration for the visual comfort of visitors to the museum on a designer's part can potentially handicap an individual's ability to view displays. Dramatic variations in light levels from exhibit to exhibit, or from exterior to interior, can affect a visitor's ability to appreciate artwork because the human eye requires several minutes to adjust to large changes in light levels. Sharply contrasting light levels between a bright entry and a dark gallery can be very disturbing, and potentially even painful. The paper tends to look into various lighting schemes used in museums and how they are be applicable in the design of the museum considering all the necessary lighting factors in the museum. This is aimed at creating well lit exhibition spaces for visual comfort of museum visitors.

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DEFINITION OF TERMS

(a) **Ogiso:** This in Edo language means “kings of the sky” or “rulers of the sky”. This was said to be the first Oba to rule the Benin kingdom.

(b) **Oba:** The king or ruler of the Benin kingdom.

(c) **Bronze:** A hard yellowish brown alloy of tin and copper, sometimes containing small amounts of other metals. Bronze is harder than copper and is often cast to make statutes.

(d) **Osanobua:** God, the Creator.

(e) **Ivory:** A hard cream-coloured dentine that forms the tusk of animals such as the elephant, walrus, and sperm whale was formerly used to carve small decorative objects.

(f) **Eben:** This is a ceremonial sceptre mostly made of brass material, used mainly by the Chiefs during the *Igue* festival, which is usually at every December of every year.

(g) **Igue:** The Igue festival is an annual festival organised every December of every year in the Benin kingdom for the Oba of Benin to wish him good health and long life. This is usually carried out by the chiefs of the Benin kingdom with mostly white attire worn.

(h) **Utu:** This is a yam festival celebrated annual in most part of Edo State.

(i) **Igbu:** Traditionally woven loincloth worn by both male and female.

(j) **Ogiukpo;** The Oba’s royal seat or chamber.

(k) **Ugie;** Traditional dance carried out by the Benin chiefs during the Igue festival.

(l) **Agba;** Traditional drum which sounds once every forty years uses during the ancestral worship.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The idea of a museum as a place for keeping collection of arts started in 1793. During this period we saw the beginning of removing of art collection from the private domain of aristocracy and the wealthy into public sphere where they are seen as sites for educating the masses in taste and cultural refinement.

The importance of light in the display of artefacts in the museum cannot be overemphasized. Garry Thompson (2005), in his book 'The Museum Environment' stressed;

> *"Museums, Fascinating places full of extraordinary priceless ancient exhibits, and visitors squinting in the dark trying to see what the exhibits are! Yes, well it's a style, perhaps to give the visitors an experience of mystery to simulate the feeling of discovery like the great explorers uncovering historic tombs and lost catacombs. No? Well apparently not - it's because the lighting has to be kept very dim to stop the light from fading and ageing the exhibits".*

Investigations has shown that light on one hand is a destructive force and thus conflicts with the museums role in preserving our heritage on the other it is essential to vision, the principal means of communicating the information held within and around the objects in the museum's collection, it is a key element in providing a context in time and space for the museum visitor, in an architectural sense as well as the relationship with the collection and it provides a key interpretive tool to extend the possibilities in communication.

1.2 STATEMENT OF THE PROBLEM

Light is not only a functional requirement but also a creative medium for use in museum exhibitions, therefore the research tends to look at practical lighting schemes which can beused for lighting spaces in the proposed Cultural Museum of Art, Benin City.Archaeological discoveries in the 20th century carried out in Benin City, brought to light the great art of Benin. This art, whose surviving masterpieces are principally in brass, is characterised by the variety of its form and its realism. These works of art goes a long way to tell us a lot about the culture of the people of Edo State, Nigeria. The rich and unique culture of the people of Benin should be preserved for generations yet unborn. And also there is need for institutions like a Cultural Museums of Art, which would serve as a point where one's culture is been preserved, studied and appreciated.

Egharevba (1953) narrated that most of Benin religious and cultural artefacts in British Museums and other institutions were looted in February 1897 from Benin City. This was carried out during the bloody British expedition to Nigeria to carve out spheres of influence by the major European powers. About three thousand brass, ivory and wooden objects were consigned to the western world. At the time, western scholars and artist were stunned by the quality and magnificence of these objects, more than one thousand brass plaques were appropriated from the oba's palace.

According to a report by Alison H. (1997), recent efforts were been made to solicit for the return of most of these stolen artefacts from British Museums back to where they were initially taken from. In 1997, in a bit to mark the centenary of the disappearance of these artefacts, a movement called *Africa Reparation Movement,* chaired by Mr. Bernie Grant MP, visited Museums like the *Glasgow Museum* in Scotland where requests were made for the return of Benin artefacts in their custody. This request was rejected by the

Museum's Director, Mr. Julian Spalding, for certain reasons which were not tangible. The largest collection of Benin relics in Britain is held at the *Museum of Mankind* in London, which refuses to enter discussions about their return. So many other examples can be seen from other Museums in Europe and around the world.

It is obvious that most of these museums and institutions keep these artefacts due to their aesthetic and monetary value; rather these objects have a deep historic and social value to the people of Edo State and Nigeria in general. These relics remind us that we have a surviving and living culture which should be preserved by the owners of such cultures.

This is why standard institutions like the Cultural Museum of Art should be considered and promoted. This would ensure the preservation, care, study and exhibition of these artefacts to the people of Nigeria and the generations yet unborn.

1.3 AIM AND OBJECTIVES OF THE PROJECT

The aim or purpose of this project is to study lighting techniques in museums and its effects on museum artefacts. This would be met through the following objectives;

(a) The provision of well-lighted exhibition spaces for display of art and artefacts.

(b) The preservation of museum objects through proper shielding of harmful radiation such as ultra-violet and infrared radiation.

(c) To enhance the presentation of arts and artefacts within spaces in its highest and widest conception.

(d) The provision of facilities that will take into consideration visual comfort of visitors from one space to another.

(e) The control of the amount of lighting entering the museum environment.

(f) To provide a facility that is architecturally sound and serves as a symbol of strong cultural presence in Edo State.

1.4 SCOPE AND LIMITATION OF STUDY

The scope of the study basically involves using various lighting techniques to lighten exhibition halls and other spaces that would be provided for in the proposed Museum building. The study covers the two basic light sources used for lighting buildings, namely; daylighting and artificial lighting. The research tends to look into the various ways in which these lighting sources can be effectively used, thereby providing the best visual comfort for the visitors to the Museum. The research makes use of lighting schemes that help to reduce the harmful effect of light on the artefacts on display.

1.5 JUSTIFICATION

Culture, as it is generally known, is the general way of life of a certain group of people or persons. Culture could also be referred to as a pattern of thinking and doing that runs through the activities of the people and distinguishes them from all other people. So in this regard, the people of Benin require a befitting Cultural Museum, where people would come in and experience the unique culture of their fore fathers and ancestors. Structures such as a Cultural Museum would help to showcase the great Benin's arts and artefacts; usually visual arts which are primarily paintings, illustrations, crafts and sculptures, statutes, reliefs and ornaments.

The extent of the design thesis is based on aspects that will aim at preserving the cultural heritage of the Edo people. It should also be based on helping people to understand and appreciate the history of the Benin Kingdom. The Museum should

collect objects of cultural, aesthetic and historical importance; care for them; study, interpret and exhibit them for the purpose of public education.

1.6 IMPORTANCE OF STUDY

Since the culture and cultural traits of a people can be a vital prerequisite for strategic planning, therefore much effort should be geared towards the preservation of certain objects which have historic and cultural importance to the cultural fulfilment of the people. The people of Benin City have a rich and very unique culture which is mostly been projected through their very popular artefacts scattered in major museums in the world.

The proposed Museum would serve as a centre of learning and research into Benin arts and antiquities. The project would offer many benefits to their visitors, the local communities, and the society as a whole. The Museum would serve as an educational institution, offering unparalleled opportunities for self-directed learning and exploration by people of diverse ages, interest, backgrounds and abilities. The building would serve as an icon, attracting public gathering; where visitors can be entertained, inspired and introduced to new ideas. This would help to enrich the local cultural life and make communities more appealing places to live and to visit.

CHAPTER TWO

LITERATURE REVIEW

2.1 THE CONCEPT OF A MUSEUM

A museum is a "permanent institution in the service of society and of its development, open to the public, which acquires, conserves, researches, communicates and exhibits, for purposes of study, education, enjoyment, the *tangible and intangible* evidence of people and their environment", as defined by the International Council of Museums. The UK Museums Association definition (adopted 1998) is:

> *"Museums enable people to explore collections for inspiration, learning and enjoyment. They are institutions that collect, safeguard and make accessible artefacts and specimens, which they hold in trust for society".*

The English word "museum" comes from the Latin word, and is pluralized as "museums" (or, rarely, "musea"). It is originally from the Greek*mouseion*, which denotes a place or temple dedicated to the Muses (the patron divinities in Greek mythology of the arts), and hence a building set apart for study and the arts, especially the institute for philosophy and research at the Library established at Alexandria by Ptolemy I Soter c280 BC. This was considered by many to be the first museum/library.

For the society as a whole, museums provide valuable intangible benefits as sources of national, regional, and local identity. They have the singular capacity to reflect both continuity and change, to preserve and protect cultural and natural heritage while vividly illustrating the progression of the human imagination and the natural world.

2.2 HISTORY OF MUSEUMS

Early museums began as the private collections of wealthy individuals, families or institutions of art and rare or curious natural objects and artifacts. These were often displayed in so-called wonder rooms or cabinets of curiosities. Public access was often possible for the "respectable", especially to private art collections, but at the whim of the owner and his staff.

The first public museums in the world opened in Europe during the 18th century's Age of Enlightenment:

1. The Ashmolean Museum of Art and Archaeology in Oxford is the world's oldest university museum, and the oldest museum in the United Kingdom. It opened in 1683 and the present building dates from 1845.
2. The MuseoSacro, the first museum in the Vatican Museums complex, was opened in Rome in 1756.
3. The British Museum in London, was founded in 1753 and opened to the public in 1759. Sir Hans Sloan's personal collection of curios provided the initial foundation for the British Museum's collection.
4. The Uffizi Gallery in Florence, which had been open to visitors on request since the 16th century, was officially opened to the public 1765.
5. The Belvedere Palace of the Habsburg monarchs in Vienna opened with an outstanding collection of art in 1781.

These "public" museums, however, were often accessible only by the middle and upper classes. It could be difficult to gain entrance. In London for example, prospective visitors to the British Museum had to apply in writing for admission. Even by 1800 it

was possible to have to wait two weeks for an admission ticket. Visitors in small groups were limited to stays of two hours. In Victorian times in England it became popular for museums to be open on a Sunday afternoon (the only such facility allowed to do so) to enable the opportunity for "self-improvement" of the other - working - classes.

The first truly public museum was the Louvre Museum in Paris, opened in 1793 during the French Revolution, which enabled for the first time in history free access to the former French royal collections for people of all stations and status. The fabulous art treasures collected by the French monarchy over centuries were accessible to the public three days each "*décade*" (the 10-day unit which had replaced the week in the French Republican Calendar). The *Conservatoire du muséum national des Arts* (National Museum of Arts's Conservatory) was charged with organizing the Louvre as a national public museum and the centerpiece of a planned national museum system. As Napoléon I conquered the great cities of Europe, confiscating art objects as he went, the collections grew and the organizational task became more and more complicated. After Napoleon was defeated in 1815, many of the treasures he had amassed were gradually returned to their owners (and many were not). His plan was never fully realized, but his concept of a museum as an agent of nationalistic fervor had a profound influence throughout Europe.

American museums eventually joined European museums as the world's leading centers for the production of new knowledge in their fields of interest. A period of intense museum building, in both an intellectual and physical sense was realized in the late 19th and early 20th centuries (this is often called "The Museum Period" or "The Museum Age"). While many American museums, both Natural History museums and Art museums alike, were founded with the intention of focusing on the scientific discoveries

and artistic developments in North America, many moved to emulate their European counterparts in certain ways (including the development of Classical collections from ancient Egypt, Greece, Mesopotamia and Rome). It is typically understood that universities took the place of museums as the centers for innovative research in the United States well before the start of the Second World War however, museums to this day contribute new knowledge to their fields and continue to build collections that are useful for both research and display.

2.3 TYPES OF MUSEUM

There are very many types of museums, from very large collections in major cities, covering many of the categories below, to very small museums covering either a particular location in a general way, or a particular subject, such an individual notable person. Categories include: *fine arts, applied arts, craft, archaeology, anthropology* and *ethnology, history, cultural history, military history, science, technology, children's museums, natural history, numismatics, botanical* and *zoological gardens*. Within these categories many museums specialize further, e.g. *museums of modern art, local history, aviation history, agriculture or geology*.

A museum normally houses a core collection of important selected objects in its field. Objects are formally accessioned by being registered in the museum's collection with an artifact number and details recorded about their provenance. The persons in charge of the collection and of the exhibits are known as curators. Museums collect and care for objects of scientific, artistic, or historical.

For the purpose of this project, the type of Museum highlighted here is the Art Museum. An Art museum, also known as an art gallery, is a space for the exhibition of art,

usually *visual art*, and usually primarily *paintings*, *illustrations*, and *sculpture*. Collections of drawings and old master prints are often not displayed on the walls, but kept in a print room. There may be collections of *applied art*, including *ceramics, metalwork, furniture*, *artist's books* and other types of object.

2.4 FUNCTIONS OF A MUSEUM

Museums collect and care for objects of scientific, artistic, or historical importance and make them available for public viewing through exhibits that may be permanent or temporary. Large museums are located in major cities throughout the world and more local ones exist in small cities. Most museums offer programs and activities for a range of audiences, including adults, children, and families, as well as those for more specific professions. Programs for the public may consist of lectures or tutorials by the museum faculty or field experts, films, musical or dance performances, and technology demonstrations. Many times, museums concentrate on the host region's culture. Although most museums do not allow physical contact with the associated artifacts, there are some that are interactive and encourage a more hands-on approach. Modern trends in museology have broadened the range of subject matter and introduced many interactive exhibits, which give the public the opportunity to make choices and engage in activities that may vary the experience from person to person. With the advent of the internet, there are growing numbers of virtual exhibits, i.e. web versions of exhibits showing images and playing recorded sound.

2.5 MUSEUMS IN NIGERIA

In 2001, Nigeria had over 30 museums. The National Museum in Lagos contains many specimens of Nigerian art, mostly pieces of statuary and carvings, remarkable for their variety and quality. It also has archaeological and ethnographic exhibits. Other

museums represent more specialized interests: the museum at Ife opened in 1955 in response to halt the looting of national art treasures, and contains world-renowned bronze and terra cotta heads; the decorative arts museum at Benin City has a collection of bronzes; and that at Oron has a valuable collection of ancestor carvings. The museum at Jos, opened in 1952 originally as the National Museum, is a center of research into the prehistoric culture of Nigeria. The EsieMuseum, at Ilorin in Kwara State, has stone antiquities, and the National Museum at Kaduna has archaeological and ethnographic exhibits, including a "craft village." The Owo Museum, in Ondo State, displays arts, crafts, and ethnographic relics. There are also museums in Kano, Argungu, and Oshogbo. The National Museum, Lagos also houses the Centre for Black and African Art and Civilization.

2.5.1 NATIONAL COMMISSION FOR MUSEUMS AND MONUMENTS

The National Commission for Museums and Monuments was established by an act on the 28th of September, 1979. "*An Act to provide for the dissolution of both the Antiquities Commission and the Federal Department of Antiquities and to create a Nation Commission for Museums and Monuments there from and other matters ancillary thereto*" (Chapter 242, Laws of the Federation of Nigeria 1990).

The National Commission controls the registration and clearance for export of antiquities as well as arts and crafts (even newly made) for Museums and Monuments. There are severe penalties for attempting to export antiquities without a permit issued by the National Commission for Museum and Monuments. Export permits can be obtained at any of the National Museums in the country. The clearance permit serves as a conclusive part that an object is not an antiquity. Permits for export of antiquities should be directed, and with as much notice as possible, to the Director-General,

National Commission for Museums and Monuments, National Museum, Lagos or to the Director-general, through the Curator and head of station of the National Museum in the state in which the applicant is located.

2.5.2 FUNCTIONS OF THE NATIONAL COMMISSION FOR MUSEUMS AND MONUMENTS

According to the act creating the Commission, the functions of the Commission shall be;

(a) To administer National Museums, antiquities and Monuments.

(b) To establish and maintain National Museums and other outlets for or in connection with, but not restricted only to the following, that is;

i. Antiquities,
ii. Science and Technology,
iii. Warfare,
iv. African, Black and other antiquities,
v. Arts and Crafts,
vi. Architecture,
vii. Natural History, and
viii. Educational services;

(c) To make recommendations to any State Government of other person or authority concerning the establishment and management of museums and the preservation of antiquities and monuments, not being national museums or antiquities and monuments declared to be national antiquities and monuments; and

(d) To approve any museum, which is privately established and maintained, for the purposes of this Act and at any time withdraw such approval.

2.6 EDO TRADITION AND HISTORY

The sources for the early history of Benin, apart from archaeological finding, are limited to oral tradition, which was carefully handed down the generation by court chronicles.According to Benin mythology by Egharevba (1953), the son of the high god *Osanobua*was the founder of the kingdom. He also became the first Oba of the semi-mythical dynasty of rulers called *Ogiso* (Ogie – ruler and Iso- the sky). The era of the first kingdom ended with a revolt, followed by a period of interregnum. Subsequently the Edo people requested the ruler of Ife, Oduduwa, to send his son Prince Oranmiyan to Benin to become the first Oba of the second kingdom. At this time, around the thirteenth century, the land of Benin was known as Ile. Oranmiyan`sEweka I, began along line of Obas of which Oba Akenzua II was according to tradition, the thirty fifth. The fifth Oba, Oguola is said to have introduced bronze casting in Benin. In order to do so he brought from Uke (Ife) where this art flourished, a bronze-smith called Igue-Igha. He was a great artist and left many disciples deified, he is still worshipped by the bronze-smiths. It is further said that Oba Oguola erected the main wall around the city.

The period of great expansion of the Benin Empire was begun by Oba Ogun, entitled Ewuare. He was a great magician and physician, traveller and patron of the arts of ivory and wood carvings, and of music. He was also a successful warrior and captured many towns and villages, which paid tribute to him. He made powerful charms and buried them at each of the nine gateways to the city. He was given the title Ewuare the Great. According to historians, churches were built, missions established and ambassadors exchanged during his reign. During Oba Esigie's reign, firearms were introduced,

followed by the development of the slave trade. The territorial expansion of the empire was promoted by an efficient political system, described by Dutch travellers. The aristocracy of the kingdom and the palace societies, with the authority of the sacred Oba, fulfilled the various functions of the State- administrative, commercial, military and ceremonial. At this time Dutch and English travellers ousted the Portuguese, although the cultural influence of the Portuguese still remained alive.

From the seventeenth century onwards, the first signs of decline appeared. Conflicts stemming from the early 17th century helped bring about the decline of the kingdom in 1897, when an official British delegation was ambushed on route to the kingdom. In retaliation, the British sent the Oba into exile and burned the palaces. In order to further weaken the Oba and to deter additional bloodshed the Oba had made sacrifices to the gods. The British removed over two thousand objects from the palace. These objects including the Oba's primary symbol of power, the stool were auctioned off to defray the costs of the military expedition.Today Benin City is the capital of Edo State and part of Nigeria's federal structure.

2.7 THE COURT ART OF BENIN

Perhaps the best known and certainly the most numerous sculptures in bronze in the whole of Black Africa come from the city of Benin, capital of the Edo kingdom. Knowledge of them reached the outside world as a result of a British punitive expenditure to that city in 1897, when thousands of sculptures, not only in bronze but also in wood and ivory, were removed first to England and from there to many parts of the world.

Benin art has rightly been referred to as “court art” because the Oba (king) had a monopoly of the works. He maintained specialist guilds of bronze-smiths, wood and ivory carvers and bead workers. The bronze-smiths in particular were forbidden on pain of death, to work for anyone outside the court, where everything was concentrated. Some ninety percent of Benin works are in bronze, the rest in ivory, terracotta and wood. The various arts done with this, ranges from memorial heads of their kings to figures of noble men and warriors. Memorial plaques were made in rectangular form to record life and events in the court.

Plate I: A cast brass plaque of three men. The figure in the middle is carrying a leather or bark box called an ekpokin used for ceremonial presentations. The warriors on either side of him are wearing collars of leopards’ teeth around their necks. Leopards’ teeth were believed to give the warriors spiritual protection in battle. (Source: www.prm.ox.ac.uk), 2008

The art of Benin is the product of an urban royal court, and is meant to symbolize and to extol the power, mystique, grandeur, continuity, and endurance of the ruling dynasty and its governing institutions.

The tradition of the *oba* as patron of the arts has continued. In 1914, Oba Eweka II lifted the restrictions on the sales of art work, and traditional craftsmen began to create for the public as well. Benin art has been resilient in the face of political, economic, social, and religious change. Traditional forms continue to be made today, and new forms are emerging to become part of contemporary Benin culture.

2.7.1 EDO ARTS AND ARTEFACTS

The sophistication and symbolism of Benin art illustrate the monarchy's ability at using the arts as instruments of the state. As the influence of the chiefs grew over the centuries, the office of the Oba became increasingly ceremonial. As a result, court ritual and art focused on what set the Oba apart from the chiefs: his ability to claim divine origins.

The divinity of the Benin monarchy is linked to Osanobua, the Creator God, and Olokun, his eldest son, who is associated intimately with the human world and with aspects of wealth, fertility and beauty. His symbols are the python and the crocodile: animals that can live in water and on land, sent by Olokun to punish wrongdoing. The midfish also inhabit the dual worlds of the riverbank and the shallow waters, and its powerful electric shock exemplified the potential violence of ancestors, warriors and Obas. Symbols such as these; help reinforce the political legitimacy of the monarchy.

Benin royal art is primarily made of ivory and bronze. Ivory carving has been part of court life since the early 12th century. In the past, all trade in ivory was controlled by the Oba, and any hunter who killed an elephant was obliged to give one of its tusks to the palace. In this way the rulers of Benin amassed huge stocks of ivory, to be carved by the Igbesanmwan, the herediatry guild of ivory carvers. Ivory's ritual importance stems

from its color, *orhue* (chalk), considered the perfect symbol of purity, prosperity and peace.

Before the arrival of the Portuguese, the supply of bronze would have come from trade with northern neighbors. In the 15th century a great expansion in bronze-casting took place, reflecting the increased commercial importance of Benin. Bronze heads of Obas and queen mothers form the pinnacle of this artistic tradition.

While it is common to emphasize the continuity of art and culture in traditional societies, Benin's development was far from static. Contact with the neighboring Yoruba groups, the introduction of Christianity and Islam and the formation of the nation of Nigeria impacted the arts. Although the kingdom of Benin ended in 1897, the Oba continues to commission art to inspire public loyalty and pride, as well as preserve historical memory during the changes of 20th century Nigeria.

Examples of Benin Art

(A) Ivory Armlet, box, wand

Ivory symbolized royalty and the continuity of dynastic rule. White was the color of ritual purity, so ivory was often worn by the *Oba* on ceremonial occasions. Such was the skill of ivory carvers that they worked the pieces without any preliminary sketches.

(B) Brass Belt Masks

Cast in high relief, these small pendants were worn by chiefs of all rank to decorate the fastening of the typical Benin men's kilt, which was secured on the left hip (as seen in the picture of Commemorative Plaque above). Leopard faces and portraits of court members were common.

(C) Quadrangular Brass Bells

These were used on altars to attract the attention of the ancestors. They were also worn around the neck by warriors in battle; the sound of these bells also announced their victories upon returning home.

(D) Brass and Ivory Armlets and Bracelets

Armlets and bracelets were worn by royalty and nobility. Ivory armlets were worn only by the *Oba*, especially in ceremonies where he danced with the *eben* sword or handled a gong, because they kept his elaborate coral bead costume from getting tangled.

Plate II: A Carved elephant tusk, Benin City.(Source: www.prm.ox.ac.uk), 2008.

Plate III:The Ada, a ceremonial sword, sheathed in coral beadwork. Aside from a sword like this one, the Oba would also have owned ceremonial garments – a headdress, fly whisk, and jewellery, all of coral beadwork. (Source: www.prm.ox.ac.uk), 2008.

Plate IV: An Ivory armlet inlaid with brass and carved with mudfish and heads of Europeans, Benin City. (Source: www.prm.ox.ac.uk), 2008.

Plate V: Some Benin Traditional artefacts on display in a shrine at the Oba's Palace. (Source: www. Mitpress.mit.edu), 2008

Plate VI: A memorial head of an Oba, bronze, Kingdom of Benin, Nigeria. 1550 - 1650 A.D. (Source: www.prm.ox.ac.uk), 2008.

Plate VII: The head of an Oba (King), 18th century Nigeria; Edo peoples, court of Benin. (Source: www. Mitpress.mit.edu), 2008.

2.8 INTRODUCTION TO LIGHTING

Light is arguably the single greatest cause of deterioration in museum collections. Several factors contribute to its damaging effects: the materials from which objects are made, the type and intensity of light they are exposed to and the duration of the exposure. Especially sensitive to light are objects made of organic material – documents and letters, photographs, works of art on paper, textiles, clothing and accessories. Yet these items, when featured in museum exhibits, spend a great deal of time exposed to light. And because exhibits take so much time and money to develop, displays often remain up for years – far longer than is ideal for the preservation of the items exhibited. The result can be irreparable damage to museum artifacts – damage that is cumulative over the life of the objects and usually irreversible.

2.9 THE CONCEPT OF LIGHT

Light, form of energy visible to the human eye that is radiated by moving charged particles (Encarta 2007). The concept of *Light* is applied to stimuli that affect the sense of vision, i.e., it allows us to see things! Light travels in straight lines and we often refer to rays of light. Evidence for light travelling in straight lines comes from shadows made opaque objects which block the rays of light; the shape of the shadow is clearly related to the shape of the object. Because the object blocks light, e.g., sunlight, a shadow is formed by the absence of light.

Light is composed of elementary particles called photons.Light can exhibit properties of both waves and particles. This property is referred to as wave–particle duality. The study of light, known as optics, is an important research area in modern physics. Light travels at speed of 3 x 10^8 m s^{-1} in a vacuum(300 000 km s^{-1} or 186 000 mile s^{-1}) and the speed (c = m s^{-1}), frequency (f Hz) and wavelength (l m) are related by the simple equation:

$$\text{Speed} = \text{frequency} \times \text{wavelength}$$

$$\text{or} \quad c = f.\lambda$$

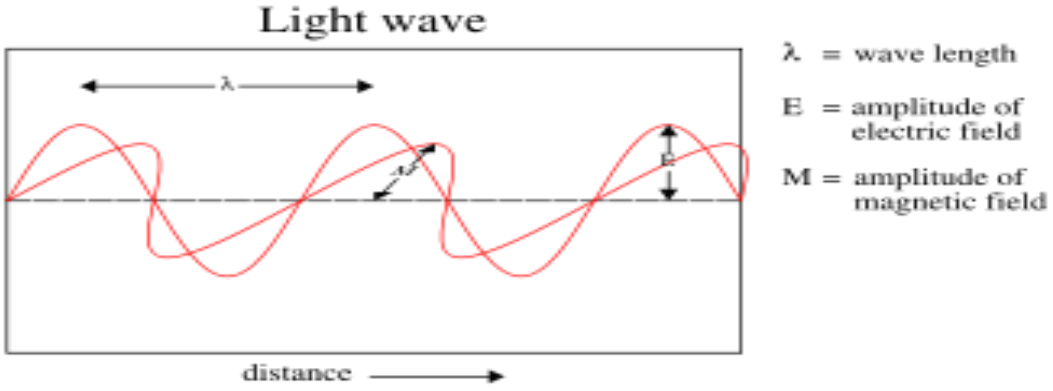

Figure 2.1: The wave oscillating nature of light; its wave length and amplitude

2.9.1 THE ELECTROMAGNETIC SPECTRUM

The term electromagnetic radiation refers to all the types of radiation that resemble light and can be characterized by frequency and wavelengthand these are, in order of increasing wavelength, cosmic rays**,** γ–rays**,** X-rays**,** ultra-violet light**,** visiblelight**,** infra-red radiation**,** microwaves, and radio waves.

The electromagnetic spectrum refers to the entire range of frequencies or wavelengths of electromagnetic waves. Light traditionally refers to the range of frequencies that can be seen by humans. The frequencies of these waves are very high, about one-half to three-quarters of a million billion (5×10^{14} to 7.5×10^{14}) Hz. Their wavelengths range from 400 to 700 nm. X rays have wavelengths ranging from several thousandths of a nanometer to several nanometers, and radio waves have wavelengths ranging from several meters to several thousand meters.

Waves with frequencies a little lower than the range of human vision (and with wavelengths correspondingly longer) are called infrared. Waves with frequencies a little higher and wavelengths shorter than human eyes can see are called ultraviolet. About half the energy of sunlight at Earth's surface is visible electromagnetic waves, about 3 percent is ultraviolet, and the rest is infrared.

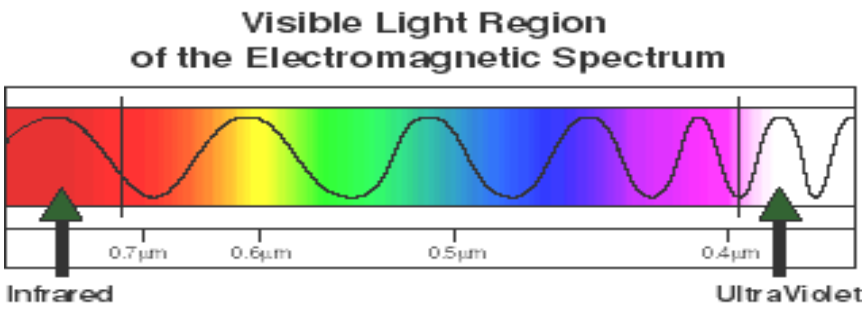

Figure 2.2:Thevisible light region of the electromagnetic spectrum which includes infrared light, visible light and ultraviolet light.

Visible light waves are the only electromagnetic waves we can see. We see these waves as the colors of the rainbow. Each color has a different wavelength. Red has the longest wavelength and violet has the shortest wavelength. When all the waves are seen together, they make white light. When white light shines through a prism, the white light is broken apart into the colors of the visible light spectrum. Water vapor in the atmosphere can also break apart wavelengths creating a rainbow. Each colour in a rainbow corresponds to a different wavelength of electromagnetic spectrum.

2.9.2 BEHAVIOR OF LIGHT

Light exhibits certain behaviours which are characteristic of any wave and would be difficult to explain with a purely particle-view. Light reflects in the same manner that any wave would reflect. Light refracts in the same manner that any wave would refract. Light diffracts in the same manner that any wave would diffract. Light undergoes interferencein the same manner that any wave would interfere. Light behaves in a way that is consistent with our conceptual and mathematical understanding of waves. Since light behaves like a wave, one would have good reason to believe that it might be a wave.

(a) Reflection of Light Waves

All waves are known to undergo reflection or the bouncing off of an obstacle. Most people are very accustomed to the fact that light waves also undergo reflection. The reflection of light waves off of a mirrored surface results in the formation of an image. One characteristic of wave reflection is that the angle at which the wave approaches a flat reflecting surface is equal to the angle at which the wave leaves the surface. This characteristic is observed for water waves and sound waves. It is also observed for light waves. Light, like any wave, follows the law of reflection when bouncing off surfaces.

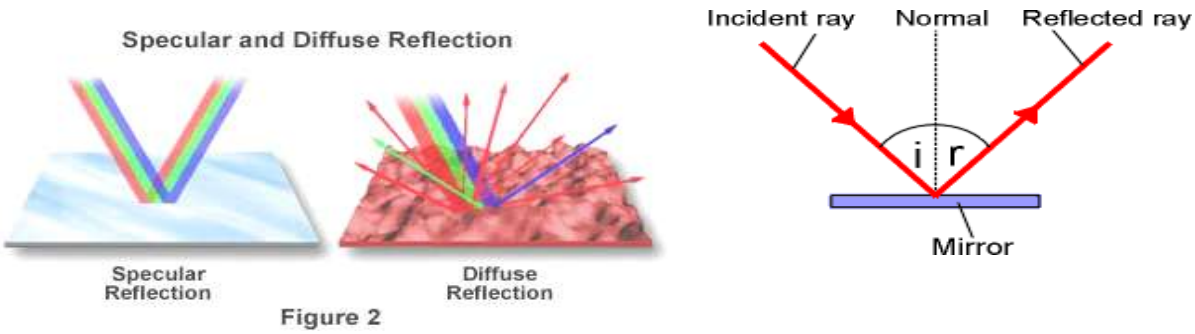

Figure 2.3: Thereflective nature of light on different type of surfaces.

(b) Refraction of Light Waves

Refraction occurs when the light ray changes mediums. Light traveling through air and then going through water is an example of a light ray changing medium. The speed of the light ray changes when it enters a different medium. In most cases the direction of the light also changes. We say the light *bends.* Depending on the new medium the light will travel faster or slower. It is the different densities that causes the ray to slow down or speed up which then causes it to bend. Light rays slow down about 25% when passing through water and 35% when passing through glass. If the light travels slower then this medium is called the *denser medium*. If the light ray travels faster then the medium is called the *rarer medium*. When light enters a denser medium the ray bends toward the normal - when light enters a rarer medium it is bent away from the normal.

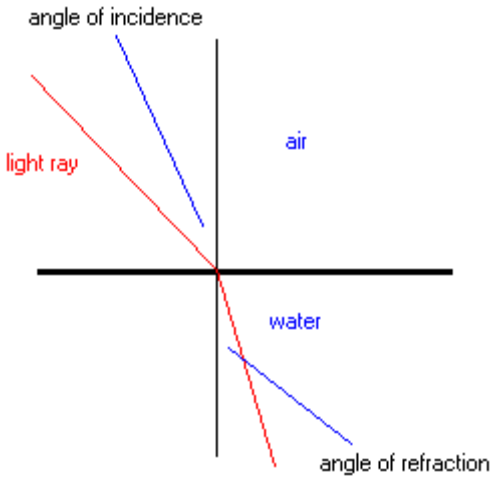

Figure 2.4: Therefraction of light when it passes through a medium.

(c) Scattering

Scattering occurs when the atoms of a transparent material are not smoothly distributed over distances greater than the length of a light wave, but are bunched up into lumps of molecules or particles. The sky is bright because molecules and particles in the air scatter sunlight. Light with higher frequencies and shorter wavelengths is scattered more than light with lower frequencies and longer wavelengths. The atmosphere scatters violet light the most, but human eyes do not see this color, or frequency, well. The eye responds well to blue, though, which is the next most scattered color. Sunsets look red because when the Sun is at the horizon, sunlight has to travel through a longer distance of atmosphere to reach the eye. The thick layer of air, dust and haze scatters away much of the blue. The spectrum of light scattered from small impurities within materials carries important information about the impurities.

2.10 SOURCES OF LIGHT

There are many sources of light. Sources of light differ in how they provide energy to the charged particles, such as electrons, whose motion creates the light. If the energy comes from heat, then the source is called *incandescent*. If the energy comes from another source, such as chemical or electric energy, the source is called *luminescent*. Therefore, for the purpose of this research, we are looking at two lighting sources;

(a) Daylighting,

(b) Artificial lighting.

2.11 DAYLIGHTING IN MUSEUMS

Since the late 19th Century the destructive effect of light on colours and materials has been studied specifically in relation to works of art and museum exhibits. The full spectrum of daylight has been seen to be particularly damaging due to the Ultraviolet

(UV) content and the high levels of light normally experienced. The colour quality of daylight is however not satisfactorily reproducible and this quality is highly desirable in the viewing of art and artifacts.

A perceptual contact with the sky is also a strong and desirable contact between the displays and artifacts and the real world without the museum building. these requirements of low level controlled lighting and the dynamic high level natural light are apparently in conflict and one of the principal challenges in designing the modern museum building is to develop a strategy to resolve these issues.

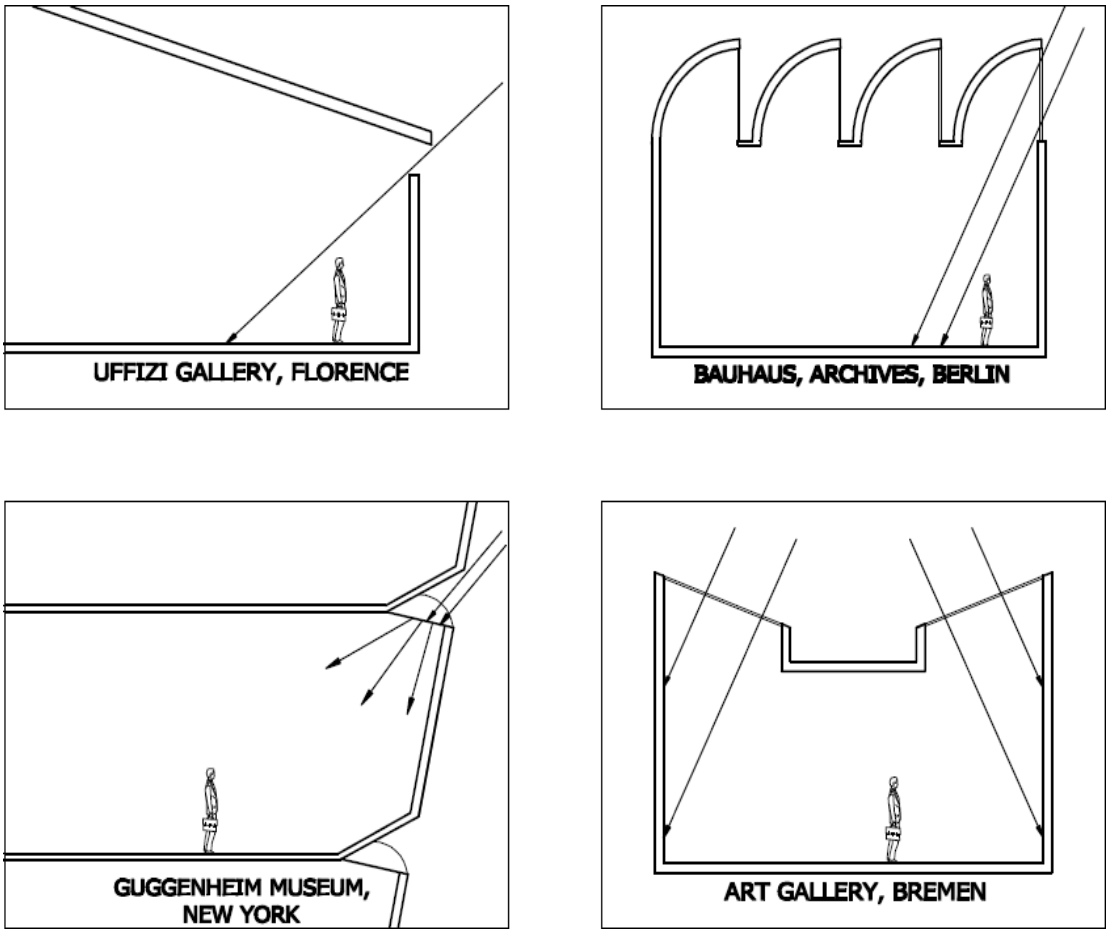

Figure 2.5: Various daylighting schemes used by some popular Museums in the world.
(Source: Architect' Data, 2000)

2.11.1 ARTEFACTS SUSCEPTIBILITY TO LIGHT

According to Shaw R. (2006), In respect of potential light damage, museum objects can be considered in three broad categories:

(1) Extremely Susceptible to Light Damage

This category includes works on paper, textiles, naturally occurring dyes, Natural history exhibits including fur, feather, insect and plant material etc. This category of object requires strictly controlled lighting conditions.

At a practical level objects that fall in this category cannot be displayed under natural lighting. The levels for these need to be set to the narrow band before the eye loses the ability to fully appreciate colours. In nature this is the early morning when the sun is just below the horizon or the evening as the sun has set, controlling natural light to these levels creates a perpetual gloom as if on a rainy winter's afternoon, conditions not conducive to feelings of comfort and well-being that you wish to enjoy in a museum environment.

(2) Susceptibleto Light Damage

This includes Oil paintings on canvas, most wood bone and Ivory and other materials painted or coloured. This category of exhibits can be lit to levels and with sufficient variation to accommodate changing natural light conditions in a much controlled way.

(3) Non - Susceptibleto Light Damage

Metal most Stone, most ceramics and glass, wooden objects that have largely been used out doors or have otherwise lost their natural colouring through design or use etc. These categories of objects are easily displayed under natural lighting without substantial risk of damage.

2.12 ARTIFICIAL LIGHTING IN MUSEUMS

The principal requirement of a artificial lighting is to create optimum conditions for viewing objects, this does not only include the lighting of the object but also general conditions of visual comfort, that is suitable light for orientation and movement, ease of visual adaption to differing light levels required throughout the museum. Consideration of other lighting requirements for example emergency lighting, security and service lighting for cleaning are also important and require effective integration to a complete system.

2.12.1 LIGHTING SOURCES

When considering artificial lighting, the light source should always be the first decision in the development of a lighting scheme. The ability of light sources to render colours accurately is crucial in museums. The standard measure for this is the colour rendering index (CRI) Conventionally a CRI of 100 represents daylight. Comparison of the ability to distinguish colours under artificial light sources and daylight forms the basis of this measure. The best light source in this respect will be tungsten halogen (TH) with a CRI of 99. Now we are already aware that TH is quite different from daylight in so far as it is much stronger in the red and yellow end of the spectrum however it does share with daylight a continuous spectrum which is a key factor in the human response to light. The only other light sources in the range of CRI between 90 to 100 are some fluorescent lamps. These do not have continuous spectra however do get reasonably close to the response of the eye.

Other light sources including the majority of fluorescent lamps, Metal Halide and White SON considered to have a good colour rendering barely reach a CRI of 85 and cannot

be considered acceptable for museum applications where any sense of colour rendering and discrimination are important. These sources do have a role to play in providing energy efficient lighting in areas separate from the exhibition and for non colour critical tasks such as emergency lighting, service and security lighting etc.

Figure 2.6: A Halogen lamp behind a round UV filter. A separate lens is included with some halogen light fixtures to filter out UV light.(Source: www.wikipedia .com), 2008.

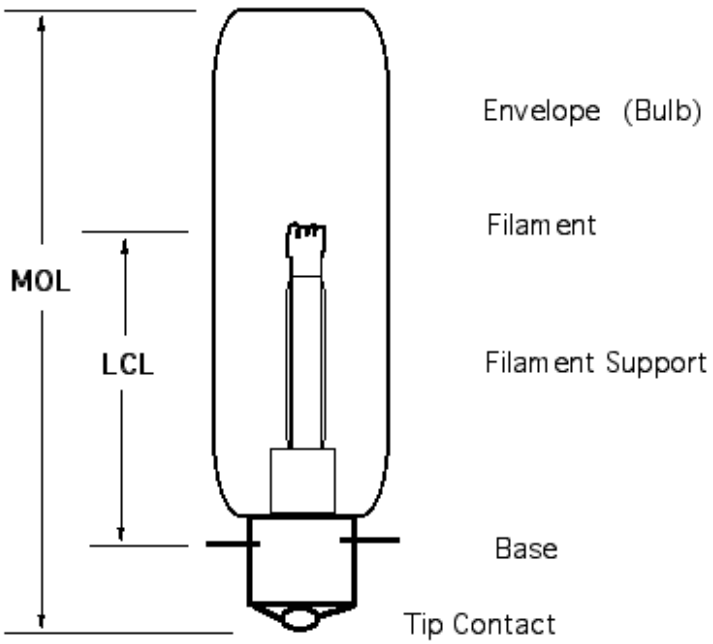

Figure 2.7: A detail halogen tungsten lamp.

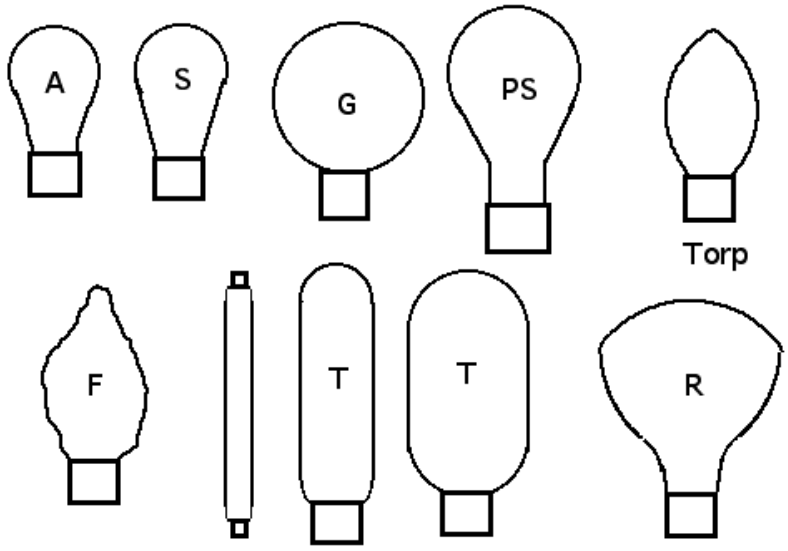

Figure 2.8: Various types of lamp heads such as A- (Arbitrary) shaped. G- (Globe) and PS- (Pear shaped) were once common but are now rare. T- (Tubular) is probably most common in theatre today, while R (Reflector).

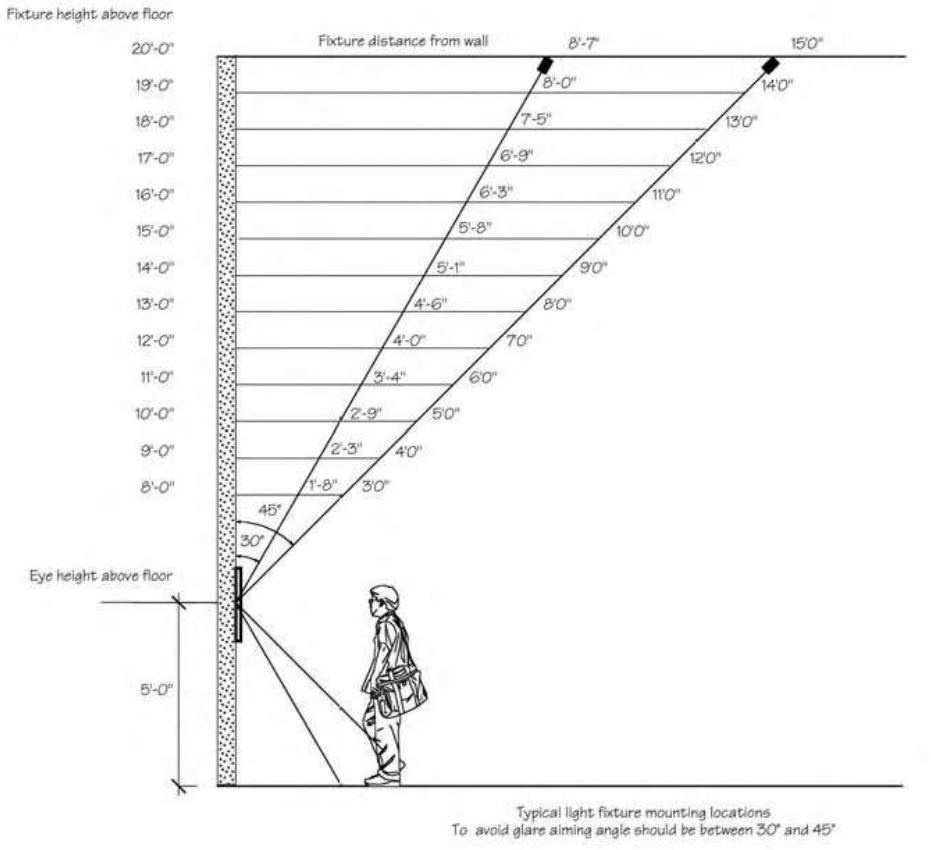

Figure 2.9: The optimum distance from a wall for mounting track lights depends on ceiling height. To avoid glare and shadows, angle lights between 30 and 45 degrees.

2.12.2 DELIVERY SYSTEMS

(a) Reflectors

How do we get light from the source to the object? In the majority of situations a lamp will sit within a reflector in a light fitting. The reflector is usually the single most important optical component, shaping the beam and controlling, or not as the case may be, any stray light. Reflectors can form part of the fitting or part of the lamp, which is preferable, is a consistent source of debate in Lighting Design circles. Reflectors are usually either metal, bright anodisedaluminium for example, or coated glass. The argument for the reflector forming part of the fitting is that when lamps are changed the optics remains constant, however in service setting a lamp accurately in the reflector is not always easy to achieve or is time consuming. Reflectors also need to be carefully cleaned at least as often as the lamp is changed otherwise the efficiency and even beam shape are affected by dulling or in extreme cases blackening of sections of the reflector.

(b) Lenses

At its most complex Lens systems for exhibition range will be two or three elements arranged to provide simple pattern projection similar to a theatre profile spot, in fact there are some situations where suitable theatre equipment can prove a useful tool for museum lighting designers. More common in the Museum environment are simpler lenses added to the front of display spotlights.

(c) Sculpture lenses or spread lenses.

These are usually pressed or ribbed cast glass which changes the shape of the light beam from the circular created by the reflector to an elongated oval or elliptical pattern which helps in lighting tall and thin or wide and long displays or creating lit bands on walls to encompass a range of objects.

(d) Filters.

These are placed at the front of the fitting and are sometimes referred to as lenses. These are intended to change the quality of the light from the lamp either by colouring it for effect or more importantly for museums applications to remove UV from the light beam.

(e) Fibre Optics.

In recent years manufacturers have heavily sold fibre optics as the solution to all museum lighting problems. Well, they are not. Fibre Optics is just another useful tool. What they are is a light delivery system; you can consider them as a very long and thin lens on the front of a lamp. What they allow you to do is distribute the light from one lamp over a greater area. They allow you to subdivide the light from a single lamp and they allow you to locate the lamp at some distance away from where you want to have the light. These characteristics are extremely useful in lighting museum cases where low light levels are required along with flexibility and the desire to remove the lamp from the volume of the case for ease of maintenance. For most museum applications Glass fibre is preferable, this will naturally reduce UV content of light but will pass IR. Considerations as to lamp type are the same as elsewhere, Fibre does not improve colour rendering, if anything it will impart a green cast, the longer the fibre the more apparent this becomes. Lighting large cases is also problematic and in using fibre you have a large number of small pools of light within a case these must be carefully focussed to prevent a very bitty appearance.

2.12.3 ARTIFICIAL LIGHTING SCHEMES

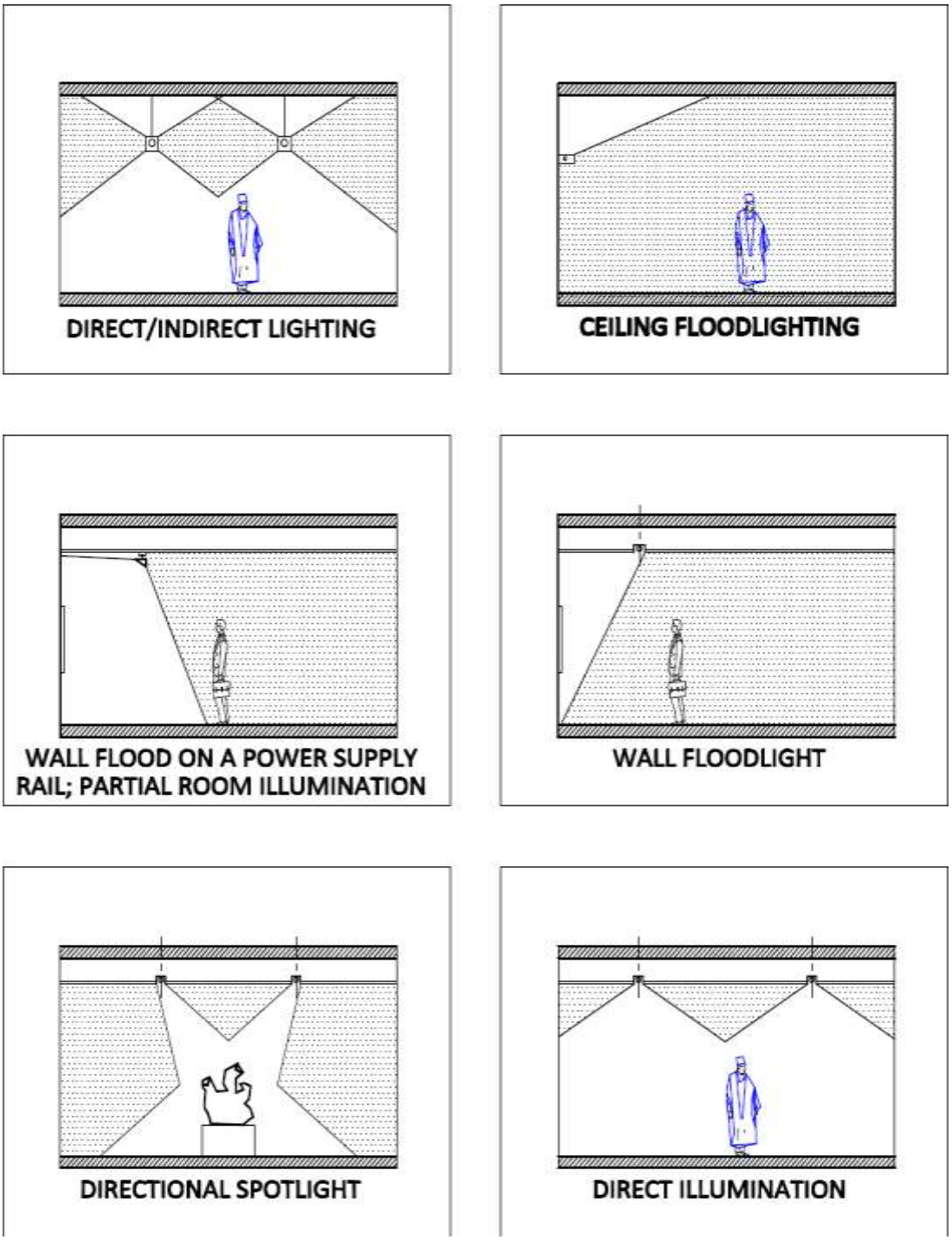

Figure 2.10: The use of various lighting schemes from artificial light sources.

(Source: Architect' Data, 2000)

2.13 SUMMARY

From the research, it has been deduced that lighting is an integral part of the story-telling process of museums. Today, more than ever, there are a greater variety of museum types, each one distinct in its own 'story,' mission, collection and method of representation. Traditionally, museums have addressed the presentation of collections as the most important criteria in exhibition design. The visual environment surrounding these works of art and specimens usually plays an important yet supporting role, with the collections as the 'stars' of the show, so to speak. In addition to these more traditional institutions, there are other types of exhibition spaces where the visual environment may be as much a part of the viewer's experience as the objects on display. New methods of presentation by architects and exhibition designers are increasing the variety of gallery space typologies, which in turn, challenge the lighting designer to find solutions that go beyond the traditional body of museum lighting approaches and techniques.

The research has identified several important elements from the study of lighting that can be applicable in the design of museums. Some of these include;

(a) Classification of Exhibits

Artefacts to be placed in exhibition rooms should mostly be grouped according to their level of sensitivity to light. This would help in controlling the amount of light required in such exhibition rooms.

(b) Use of Photo chromatic Glass (UV filter)

All artificial light sources should be covered with UV filters and also all daylight openings should be covered with Photo chromatic Glass to reduce UV rays.

(c) Use of Curved Walls

Since light mostly travels in straight lines, when it hits a surface it is been reflected. So also, light behaves differently when hits a flat surface and a curved surface (wall) See fig. 3.11.

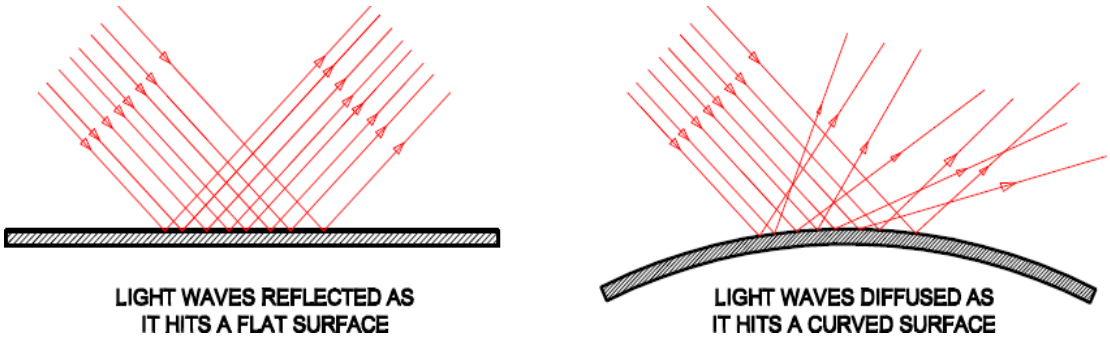

Figure 2.11: The behaviour of light as it falls on a flat/ straight wall and a curved wall.

(d) Building Orientation

The actual source of daylight is the sun. And the sun has a specific path it takes everyday, therefore proper orientation of the museum building is necessary so as to reduce direct entry of daylight into the building.

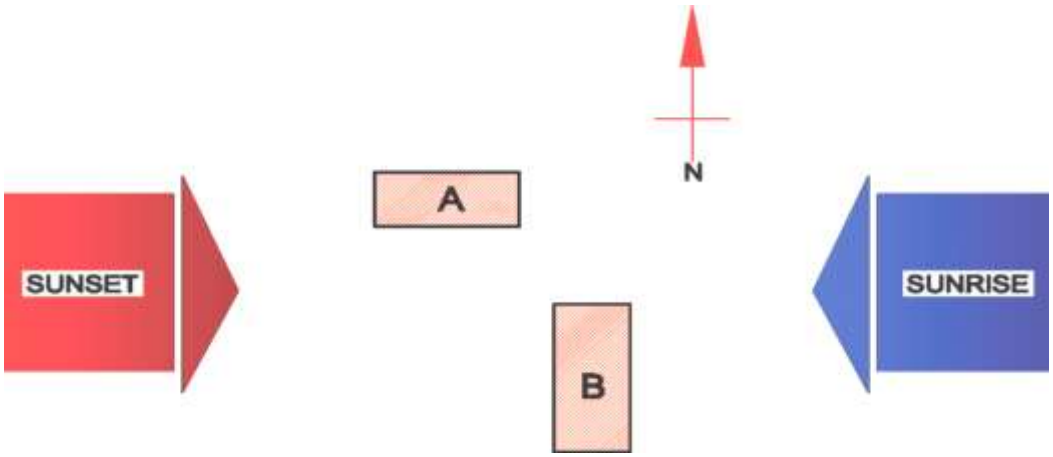

Figure 2.12: How light entering a building can be controlled by proper building orientation, where fewer windows are exposed to the Eastern and Western axis.

(e) The principle of light redirection

The principle of light redirection simply involves lighting interior spaces further than 6 metres; this is because the intensity of daylight in rooms diminishes. Redirecting the light allows rooms to be completely illuminated with daylight. The aim of redirection is;

(i) To obtain a uniform distribution of daylight,

(ii) To obtain better daylight illumination in the depths of the room,

(iii) To avoid glare when the sun is high,

(iv) To redirect particularly diffuse radiation.

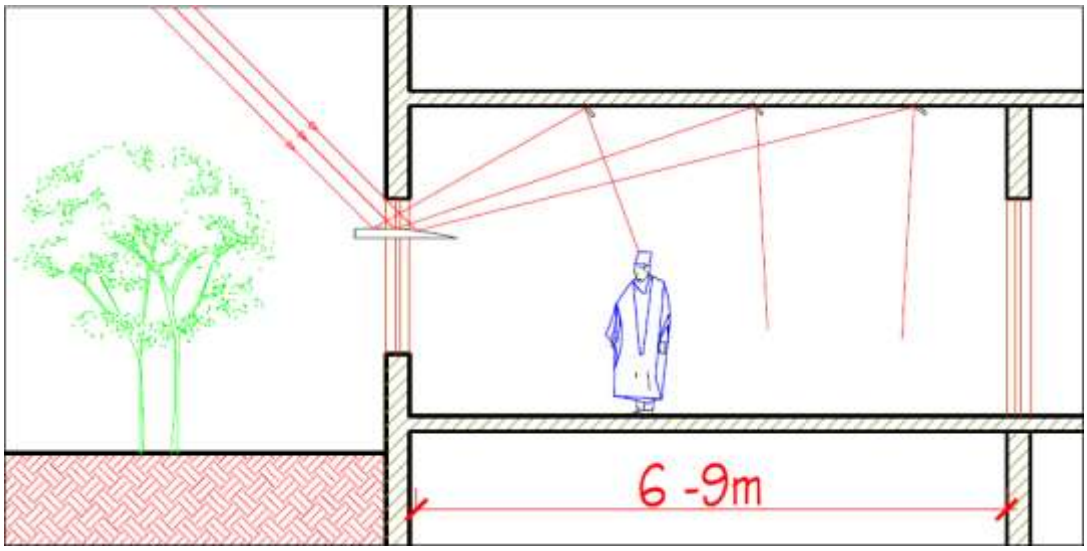

Fig 2.13: How light entering a building can be controlled through the principle of light redirection. (Source: Architect' Data, 2000)

(f) The use of Controlled Openings

Most openings (daylight openings) would be highly or partially controlled to direct light entry into the museum. The double blind system can be used on window openings; a diffusing blind is fitted to the outside and an 'upside down' blind to the inside. The latter blind allows control of daylight by creating an adjustable clerestory.

(g) Other Possible Solutions

The use of low reflectance wall colours in exhibition rooms would help to enhance the visitors' visual comfort. Another solution is ensuring that direct sunlight does not fall on light sensitive objects in the museum. The use of fluted walls can also be useful tool in controlling light entering the exhibition spaces.

CHAPTER THREE

MATERIALS AND METHODS

3.1 PROPOSED SITE

The proposed site for the Cultural Museum of Arts, Benin City is situated along Ikpoba Slope in Benin City, Edo State; the Mid-western part of Nigeria.

3.2 RESEARCH METHOD

Research method is the overall operational pattern framework of the project. It stipulates the information to be collected, from which source or sources and by what procedure through which the information will be collected and also the nature of analysis required to analyse the collected information.

3.2.1 METHOD OF DATA COLLECTION

During the course of this project, the following methods of research and procedure were employed:

(e) **Historical method**: Literature review from publication extracts, books, Internet, journals, magazines; all highlighting the uses, importance and effects of lighting in the museum.

(f) **Descriptive survey method:** Visits and research studies to existing case studies with similar characteristics. This museums include; National museum, Makurdi, National museum of Mali and Luxor Museum, Egypt. A brief analysis of the lighting schemes used in the museums was carried out.

(g) Meeting and contacts with relevant people and organisations concerned with the preservation of artefacts.

(h) Direct interviews and enquires from various related fields, such as art and craft.

3.3 INTRODUCTION TO CASE STUDIES

3.3.1 NATIONAL MUSEUM MAKURDI, BENUE STATE.

INTRODUCTION

The National Museum, Makurdi is located at GP4 Ahmadu Bello way, Makurdi. It was first established in 1988 but was formally commissioned on March 24, 2004 by the then Director General of National Commission for Museums and Monuments, (late) Dr.OmotoshoOluyemi. The Museum is amongst the 28 National Museums in Nigeria.

The initial design proposal for the museum was that the Museum would be an agricultural museum but that proposal was not implemented. So the Museum can now best be described as an Ethnographic museum with certain zoological and Natural history elements. The Museum is more of antiquities and not a contemporary Museum. The Museum is been managed by the Federal Ministry of Culture and Tourism.

The major areas of operation of the centre are;

(a) Preservation and display

(b) Research and documentation

(c) Holiday programs

(d) Teaching/children programmes

(e) Skeletal commercial services

EXISTING FACILITIES

The museum complex comprises of various facilities such as the Museum building, Restaurant, Bar, Administrative offices, Educational unit.

MUSEUM DESCRIPTION

The main Museum building is a duplex, designed and constructed in 1927 by the Colonial masters during their stay in pre-colonial Makurdi. The building has 2 floors, the ground floor consist of the entrance hall, reception, documentation section, two (2) exhibition galleries for the display of artefacts, restoration unit while the upper floor is mainly for administrative purposes. This is where the curators' office is located.

MUSEUM COLLECTIONS

The Museum showcases some Archaeological Ethnographic objects of worship, ceremonies, defence, hunting, and agricultural implements with few contemporary arts works found amongst the people of the Lower Benue Region (Benue, Kogi, Nassarawa, Plateau, Taraba, and some part of Adamawa).

GENERAL APPRAISAL

The Museum has very old and rare exhibits on display. It has a poor lighting scheme in its exhibition galleries; making visibility difficult for the visitors. It also makes use of artificial lighting in its exhibition galleries, with no alternative light source in the event of power outage. The Museum has limited collection of artefacts due to the small nature of it galleries. The museum is hidden in a secluded part of the Makurdi town. It is actually located within the vicinity of the Benue State Government House, making accessibility into the Museum difficult at certain times.The Museum building was initially design as a residential building in 1927 but was later converted into a Museum building.

Plate VIII: Showing the approach view of the National Museum, Makurdi Benue State, Nigeria.

Plate IX:Showing the left side view of the Museum building, Makurdi Benue State, Nigeria.

3.3.2 NATIONAL MUSEUM MALI, BAMAKO MALI

INTRODUCTION

The National Museum of Mali is an archaeological and anthropological Museum located in Bamako, the capital of Mali. The National Museum began under French rule as the Sudanese Museum, part of the InstitutFrançaisd'Afrique Noire (IFAN) under Théodore Monod. It was opened on February 14, 1953, under the direction of Ukrainian archeologist Y. Shumowskyi. Archaeologist Y. Shumovskyi had worked in the museum for nine years, gathering the half (nearly 3000 findings) of today's founds.

With the independence of the Republic of Mali in 1960, the Sudanese Museum became the National Museum of Mali, with the new objectives of promoting national unity and celebrating Malian traditional culture. However, lack of financial means and absence of qualified personnel caused some deterioration in the museum's collections.

On March 30, 1956, the National Museum moved into a new cemented structure, created by architect Jean-Loup Pivin from traditional Mayan designs. Since the 1996 election of former archaeologist Alpha OumarKonaré to Mali's presidency, the museum's funding has increased considerably, leaving it among the best in West Africa.

EXISTING FACILITIES

The Museum consist of several facilities such as; an information technology system, conservatory facilities, cafeteria, library.

MUSEUM COLLECTIONS

Today the National Museum has a collection of 6,000 pieces made up essentially of objects of ethnographic and archaeological interest, a photographic collection with estimated holdings of some 40,000 black and white prints and 12,000 slides, a tape collection of 500 audio cassettes and 300 video cassettes, of which fifteen are documentaries. Apart from a number of musical instruments, which survived previous numerous moves and poor conservation conditions, the traditional musical instruments, exhibited during the 1978 Biennial, constituted the first musical heritage collection of the Museum.

The Museum has three (3) exposition sections; each of the three large exposition sections with tasteful lighting has its own theme.

(1) Ritual Art section.

(2) Monumental Section.

(3) Archaeological Section.

GENERAL APPRAISAL

The provision of central courtyards within the museum building is to enhance lighting in the interior spaces. The exhibition areas of the Museum are lighted artificially. The Museum has a large collection of traditional Malian artefacts. The Museum was well designed using traditional building materials. The excellent use of wood for some of the building elements. Exhibition areas are sometimes not well lighted. The building materials used are facing deterioration due to lack of proper maintenance. The deterioration of artefacts due to lack of qualified personnel. The Museum is not centrally located in the heart of the city of Bamako.

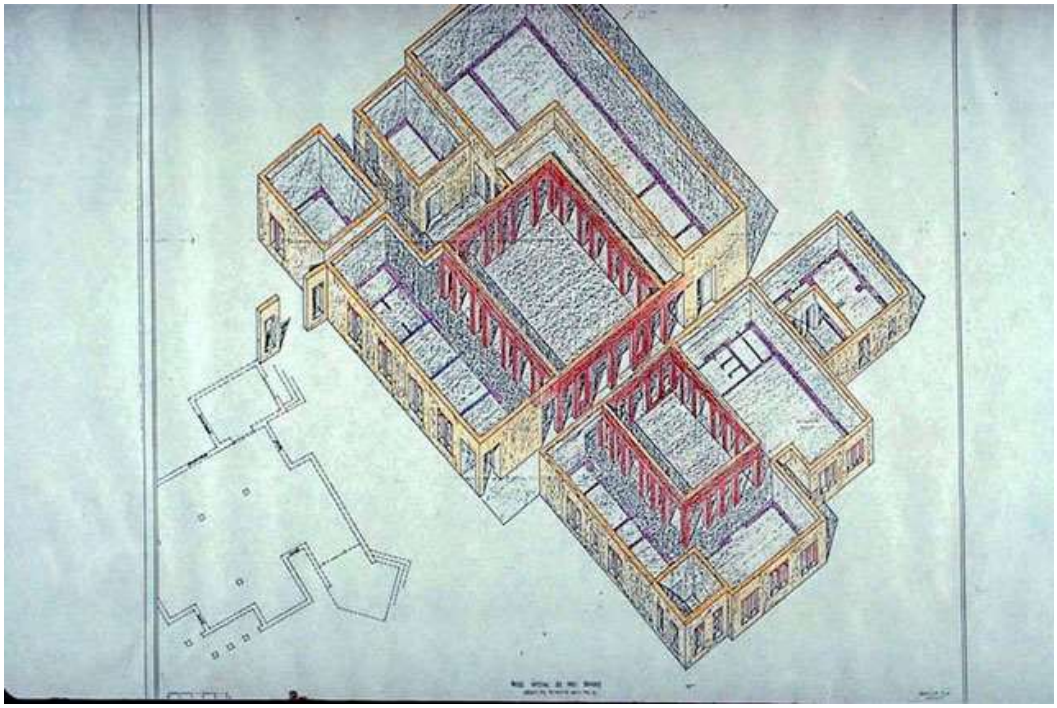

Plate X:Showing the plan layout of the National Museum of Mali.

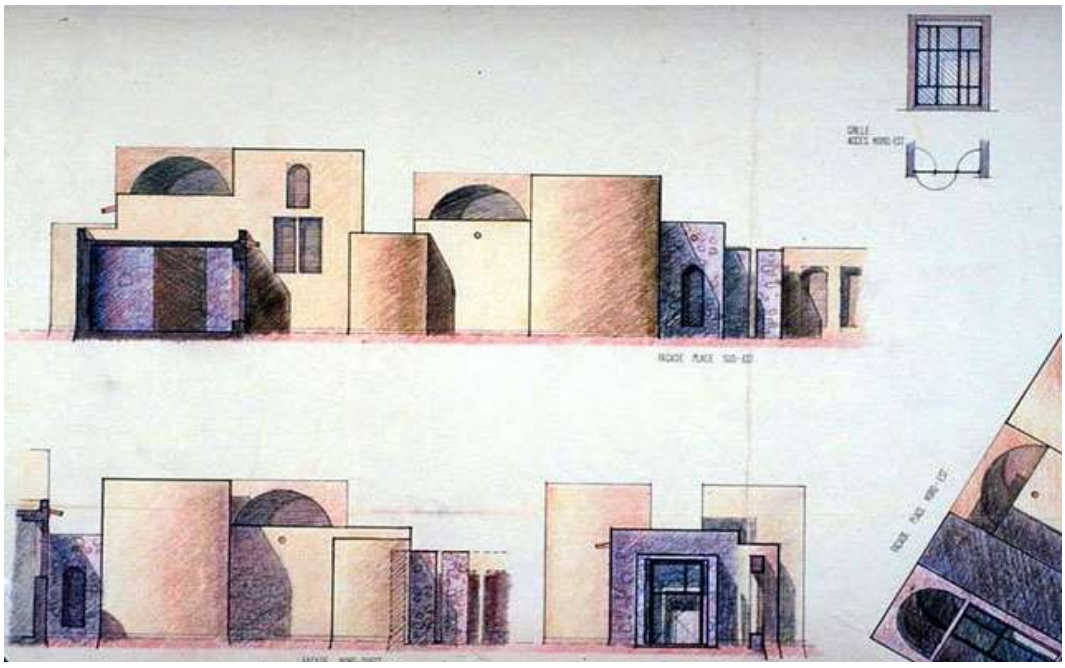

Plate XI:Showing the sketch views of the National Museum of Mali.

Plate XII: Showing the approach view of the National Museum of Mali.

Plate XIII: Showing the Right side view of the National Museum of Mali.

3.3 LUXOR MUSEUM, EGYPT.

INTRODUCTION

The Museum is located in the city of Luxor, Egypt. It stands on the corniche overlooking the River Nile in the central part of the city. Inaugurated in 1975, the museum is housed in a small, purpose-built building. The range of artifacts on display is far more restricted than the country's main collections in the Museum of Antiquities in Cairo; this was, however, deliberate, since the museum prides itself on the quality of the pieces it has, the uncluttered way in which they are displayed, and the clear multilingual labelling used.

FACILITIES

The museum complex comprises of various facilities such as the;

(1) Gift shop.
(2) Galleries.
(3) Visitors Centre.
(4) Library.
(5) Conservatory Facilities.

MUSEUM DESCRIPTION

Upon entering the museum, there is a small giftshop on the right. Once inside the main museum area, two of the first items that catch one's attention are an enormous red granite head of Amenhotep III and the cow-goddess head from the tomb of Tutankhamun. Spaced out around the ground floor are masterpieces of sculpture including a calcite double statue of the crocodile god Sobek and the 18th Dynasty

pharaoh Amenhotep III (below right). It was discovered at the bottom of a water-filled shaft in 1967.

MUSEUM COLLECTIONS

There exist several collections in the Museum, amongst these collection include;

(a) The royal mummies of two Pharaohs Ahmose I and Ramesses I.

(b) Grave goods from the tomb of Tutankhamun.

(c) 18th century dynasty Pharaoh Amenhotep III.

(d) Stone Sculptures/coffins.

(e) Assembled wall of 283 painted stone.

GENERAL APPRAISAL

There is a proper control of daylight in the Museum. The Museum also has one of the finest displays of Egyptian antiquities. The Museum is purpose-built.The artefacts in the Museum are restricted and limited. The museum is basically lighted artificially, although this is due to the nature of the artefacts on display.The museum is considerably small when compared with other Museums in Egypt.

Plate XIV: Showing the approach view of the Luxor Museum Egypt.

Plate XV Showing the interior view of the exhibition area Luxor Museum Egypt**.**

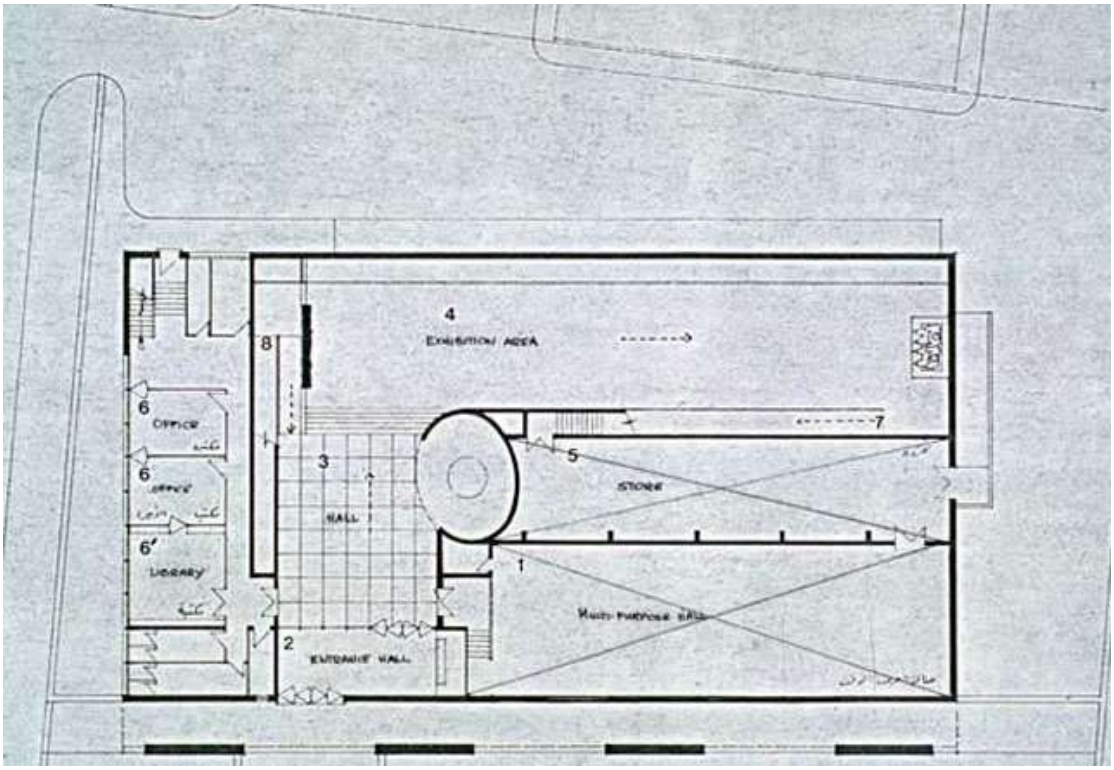

Plate XVI Showing the floor plan layout of Luxor Museum Egypt**.**

(www.arch.net), 2008

3.4 DATA COLLECTION AND BACKGROUND INFORMATION

The State was created in 1991 out of the former Bendel State. Edo State lies roughly between longitude 06º 04'E and 06º 43'E and latitude 05º44' N and 07º34' N. It is bounded in the south by Delta State, in the west by Ondo State, in the north by Kogi State and in the east by Kogi and Anambra States. It occupies a land area of about 17,802 square kilometers. From the 2006 census the state has a population of 3,497,502 persons.

Edo State is one of the more homogenous states in Nigeria; the cultural and linguistic affinities that exist among the various groups in the state points to this fact. A lot of the communities in the State trace their roots to the ancient kingdom of Benin. Customs, burial rites, diet and traditional modes of dress tend to be similar throughout the State. The political pattern and behavior were based on a system under which both monarchial and republican ideas flourished in an integrated manner. The monarchial (or chieftaincy) system revolved largely on primogeniture, while the republican element was reflected in the free selection by villages and communities of elders.

The administrative capital is Benin City, and the State is made up of 18 Local Government Areas. Other major towns in the State include Uromi, Ekpoma, Auchi, Sabongida-Ora, Ubiaja and Afuze.

Table 3.1 All the Local Government Areas in Edo State of Nigeria.(2008)

Local Government	***Headquarters***	***Local Government***	***Headquarters***
Akoko-Edo	Igarra	Igueben	Igueben
Egor	Uselu	Ikpoba-Okha	Idogbo
Esan Central	Irrua	Oredo	Benin City
Esan North-East	Uromi	Orhionmwon	Abudu
Esan South-East	Ubiaja	Ovia North East	Okada
Esan West	Ekpoma	Ovia South West	Iguobazuwa
Etsako Central	Fugar	Owan East	Afuze
Etsako East	Agenebode	Owan West	SabongidaOra
Etsako West	Auchi	Uhunmwonde	Ehor

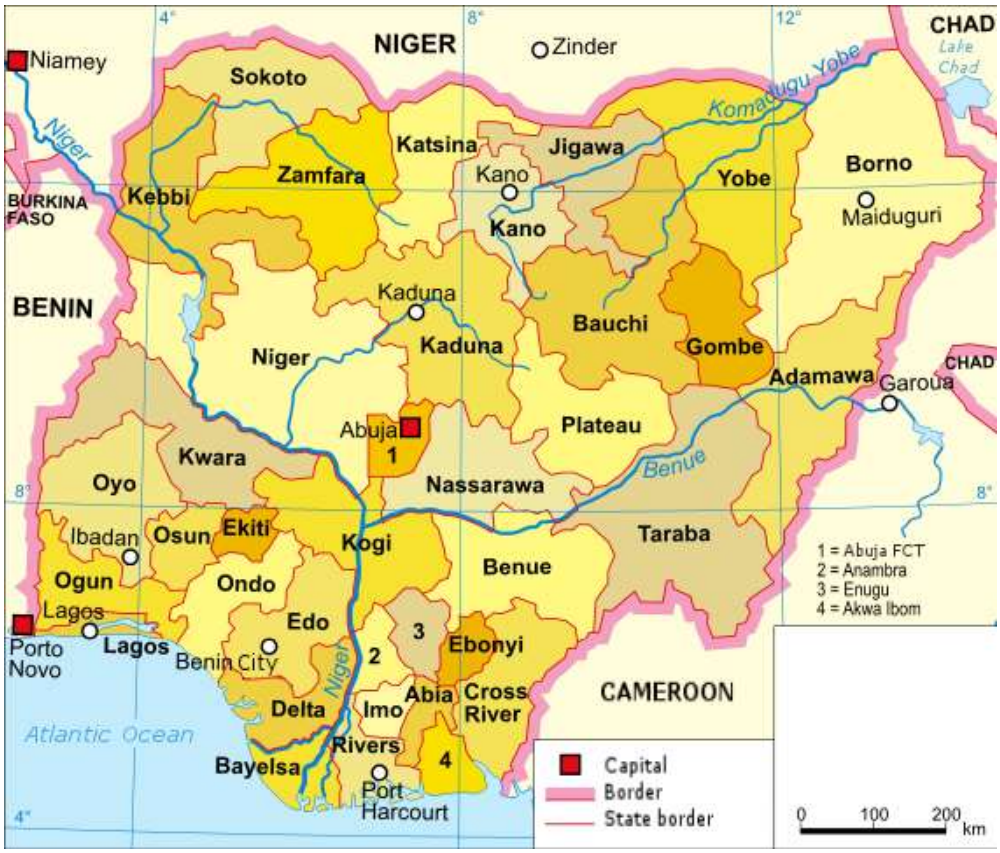

Figure 4.1: Map of Nigeriashowing all 36 States and theFederal Capital Territory (F.C.T.)

3.5 CLIMATIC CONDITIONS

Benin City has a humid climate with a characteristic striking conditions and continual presence of dampness, wet and dry seasons. The wet season occurs between April and October with a break in August, usually coincides with the period of high intensity of the sun. The dry season lasts from November to April with a cold harmattan spell between December and January and coincides with the period of low intensity of the sun. The climate is humid tropical in the south and sub-humid in the north.

3.5.1 TEMPERATURE

The temperature averages about 25 °C (77 °F) in the rainy season and about 28 °C (82 °F) in the dry season. However, the highest temperature in this region is between January to March, while the lowest in June and July. Air temperature in shades reaches a mean maximum during the day and is between 27 °C to 32 °. However it varies between 12 °C to 27 °C at night. Both the diurnal and annual ranges of temperature are quite narrow.

3.5.2 HUMIDITY

Relative humidity is slightly above 75% for most of the year, but it varies from 55% to almost 100%. Vapour pressure is steady on the site of about 2500 – 3000 w/m^2. Heavy clouds and water vapour in the air acts as a filter to direct solar radiation, it is thus reduced and mostly diffused.

3.5.3 SOLAR RADIATION

Solar radiation is path deflected and partly diffused by the cloud blank or the high vapour content of the air, thus radiation reaching the ground is barely minimal. But strong cloud and vapour content also prevent or reduces outgoing radiation from the earth and as to the sky and so accumulated heat is readily dissipated.

3.5.4 RAINFALL

The mean annual rainfall ranges from 150 cm (59") in the extreme north of the State to 250 cm (98") in the south. From statistics it was discovered that months like July and September have the highest rainfall while the months of December and January have the lowest rainfall in the year.

3.6 GEOLOGY AND TOPOGRAPHY

Northern Plateau: The plateau ranges from 183 to 305 m (600 to 1000 ft) of basement rock with occasional granite peaks rising above 610 m (2000 ft). Its southern portion is mainly sandstone. The Afenmai hills rise to a height of 672 metres (2204 ft), making it the highest elevation in the State.

Orle Valley: The valley was formed by an east-west river, which cut into the sandstone between the Northern Plateau and Esan Plateau. The Rivers Owan and Orle drain the Plateau to the west and east respectively.

Esan Plateau: The plateau is a continuation of the sandstone of the Northern Plateau and ranges from 213 to 305 metres (700 to 1000 ft). The north and south fall steeply to the Orle and Niger valleys while the south and west are gradual gradients to the Benin lowlands.

Benin Lowlands: A sandy plain, marked with rivers, generally running towards the Southwest. There are a few hills to the east and the lands are drained by the Rivers Osse, Orhionmwon and Ikpoba.

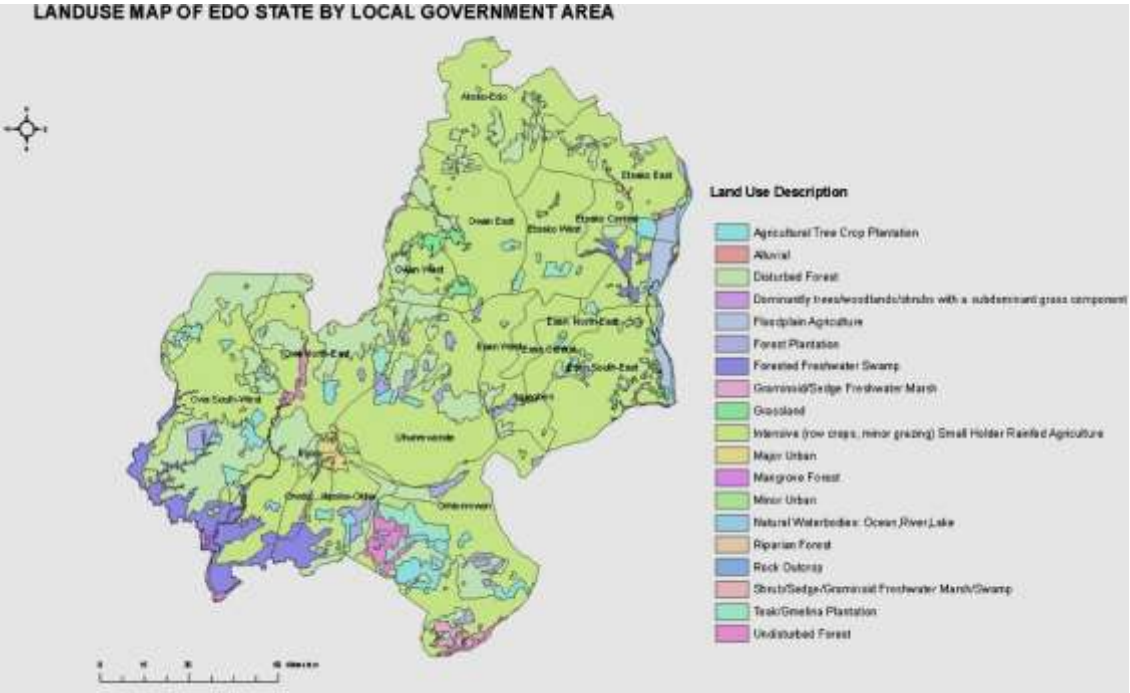

Figure 4.2: Map of Edo State showing the Land use Map as at 2006.

(Source; National Bureau of Statistics.), 2008.

3.7 VEGETATION

In the north, the area is mainly derived savannah. The oil palm grows in the wild. On higher levels the soil is gravely, becoming sandy towards the Orle Valley. The Esan Plateau is made up of diverse vegetation, savannah in the north and forest in the south. Where deforestation has occurred, elephant grass and secondary growth takes over. The soil is clayey or of porous red sand. Oil palm and rubber grow reasonably well. The Benin Lowlands used to be covered with a vast rain forest, but rubber plantations have displaced a lot of the original forests. Soil types range from low productive sand in the Southeast to fertile clayey soil in the Northwest. The riverine communities in the south have mainly mangrove swamp vegetation.

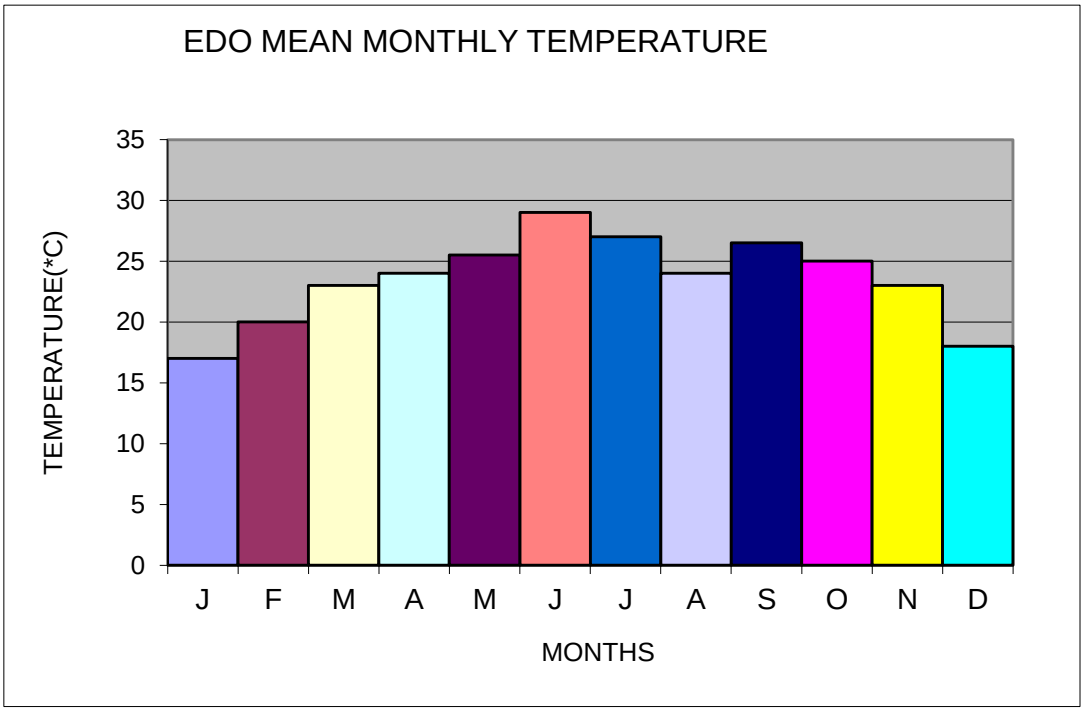

Figure 4.3: Chart Showing Mean Annual Temperaturein Edo State

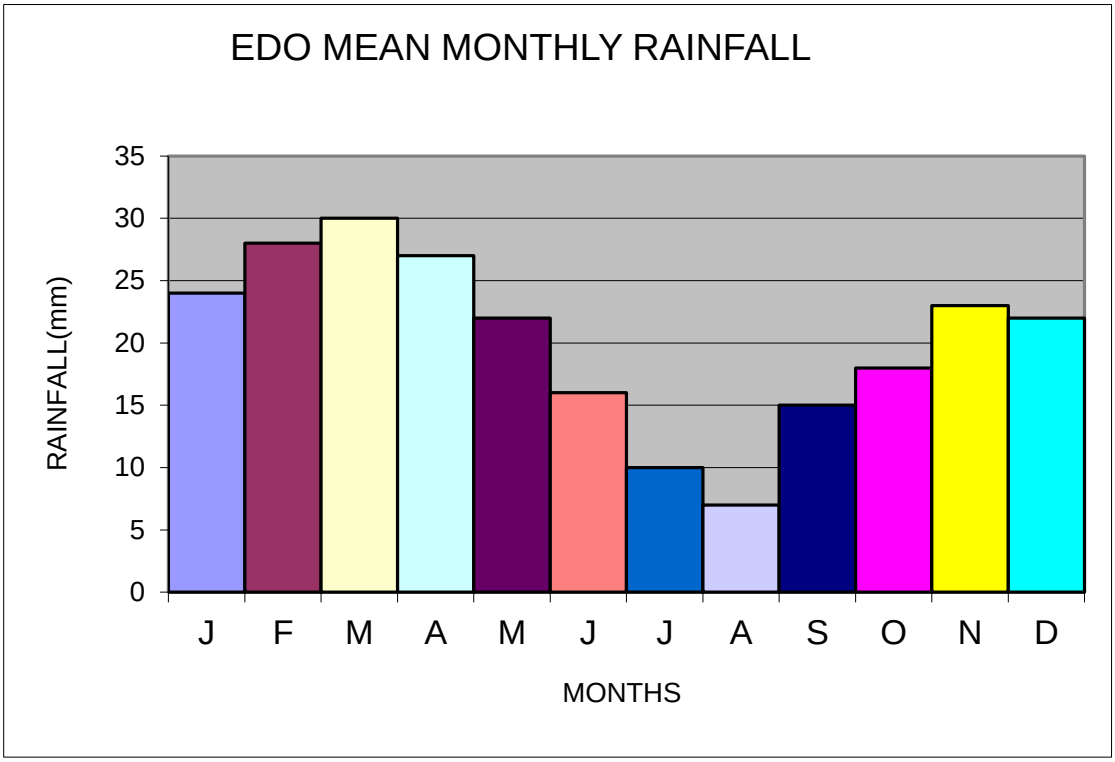

Figure 4.4:Chartshowing Mean Annual Rainfall IN Edo State. Source: Department of Geography and Regional Planning, University of Benin (2006).

3.8 SOCIO – CULTURAL LIFE

3.8.1 ETHNIC CONFIGURATION

Edo State is very homogenous. The main ethnic groups trace their ancestral roots to the ancient Benin kingdom. Its customs, marriage, naming and burial rites, cuisine and dress are largely similar. The sub-ethnic groups are Bini, Esan, Etsako, Owan and Akoko-Edo. They all share the common Benin ancestry.

3.8.2 LANGUAGE

Edo is the main language spoken by the people. The Bini (Oredo-Okha, Uhunuode, Orhionmwon, Ovia North, Esan), the Etsako, the Esan, the Owan, the Akoko-Edo communities are classified as Edo speaking.

Local variants or dialects are several from one place to another. Benin City belongs to the Bini speaking people of the Edo State. Their cultural life is derived from the ancient Benin kingdom. The people are into selling and making of sculpture and also they engage themselves in farming. We also have people in the offices working for the Government and a lot of private establishment.

Their cultural aspect of life is very unique. The Igue festival, which is normally celebrated at about 2-3 days to the New Year, involves people going about dancing and thanking God for making it possible for them to see the New Year. During the festival, they put leaves in the frontage of every house or the forehead of every person they see and they pray for God’s blessing.

3.9 ECONOMY AND COMMERCE

3.9.1 ECONOMY – AGRICULTURE

The main crops are rubber, oil palm, cocoa, yam, cassava, maize, rice and plantain. Sugar cane, cashew, oil palm (and its derivative products), groundnuts, Soya beans, tomatoes, cotton and tobacco are also produced. Fruit like pineapples, coconuts, oranges, avocados, as well as green leafy vegetables, all grow abundantly in the State. There is also a significant animal husbandry industry, with cows, goats, pigs, rabbits and sheep being the main products. Edo State's riverine areas are prime areas for aquaculture projects. Such major research bodies as the Nigerian Institute for Oil Palm Research (NIFOR) are located in the State, and there is a strong agricultural extension programme. Principal industrial raw materials for agro-allied businesses are rubber, timber, maize and cassava. The main soil types in the State are reddish-yellow kind of ferralsols, dish clay, lathyritic clay, and fine hydromorphic soils.

3.9.2 ECONOMY – INDUSTRIES

Edo State is blessed with such industrial mineral resources as quartzite, marble, clay, limestone, chalk, gypsum, gold, petroleum, kaolin and lignite. Benin City is the site for numerous industrial outfits: soft drinks factories, two large breweries (including one of the largest breweries for Guinness Stout outside of Dublin, Ireland), wood and timber processing industries, textile mills, carpet manufacturers, floor tile producers, animal feeds industries, printing and publishing firms, pharmaceutical firms, and so on. A State-owned cement company is located at Okpella (Etsako Local Government Area [LGA]), close to substantial limestone deposits. Freedom Development Company (an indigenous company of more than 30 years' experience) is undertaking marble chip production at Akoko-Edo; and garri mills (a local staple produced from cassava) are a

regular part of the landscape. Petroleum is produced in Ovia and Orhionmwon LGAs, and exploration for "the **black gold**" is being undertaken in Oredo LGA. Associated gas production and proximity to gas pipelines running from the Niger Delta region to other parts of the country create the potential to utilize gas for industrial power generation.

3.10 DEMOGRAPHIC STRUCTURE

The National population census carried out in 1991 revealed that Edo State has a population of 2,159,848 comprising 1,082,718 males and 1,077,130 females. With an overall density of about 70 persons per square kilometre sparsely populated in some part of the state, while some areas are densely populated especially the major local Government areas. Areas with high population include Auchi, Benin City, Ekpoma, Uromi, Igueben.

3.11 TRANSPORTATION AND TRAFFIC FLOW

Benin City, as the State capital, is a major centre of traffic. Routes to Warri and Sapele (both in Delta State; they are major seaports and oil towns); to the eastern cities of Onitsha, Enugu, Calabar and Port Harcourt; and to the western cities of Ibadan, Abeokuta and the former political capital of Lagos, are especially well-travelled. A major federal trunk road runs east-to-west through Benin City, connecting Lagos and the western states, and incorporating the Benin-Shagamu Expressway. The A2 north-south route through Kaduna, Abuja, Lokoja, Auchi, Benin City and Warri, is also well used.

Buses and taxis of the State-owned Edo Transport Service (a.k.a. *Edo Line*) operate on many routes in the main connecting service for all parts of the State. Intra-town services are also provided by the Edo Municipal Transport Service, as well as by the many

private transportation companies in Benin City. Using locally assembled Peugeot J5 buses and "luxurious" (Mercedes-Benz) buses, they cluster around the Iyaro area of the city and around Uselu-Ugbowo road (with the most popular route being Benin to Lagos, a three-hour journey).Benin City has an airport that is serviced by Nigerian Airways, ADC Airlines, EAS Airlines, Kabo Air, and Okada Air (which is privately owned and operated by an indigene of Edo State).

3.12 SITE ANALYSIS

A site can be defined as a geographical location that defines the dimensional limits within which development is to take place. An analysis of the site is vital for the design at the pre-design stage in order to ascertain the advantages and disadvantages of the site regardless of whether natural or artificial, and how to take full advantage of the positive aspects final means of counteracting the negative aspects.

Site analysis as an integral part of the pre-design stage involves physical, ecological, cultural, infra structural, aesthetics, acoustics and climatic site analysis of the chosen site. This involves the preliminary process before various elements of the design are planned on the site. Good site planning reflects researches about the physical features of the area such as existing landscape, topography, utilities (water, sewer, electricity etc), services and traffic flow.

3.13 CRITERIA FOR SITE SELECTION

One of the key factors highly considered in the choice of this site, is the availability of amenities. The site is well serviced with all necessary infrastructures. These include water, electricity, sewage and drainage, telephone and communication services and also a very good road network.

Secondly, the site is not far from the people but withdrawn from the hustle and bustle of the city centre. Its proximity to other functional buildings like hotel, motels, NTA station, and Government buildings encourages its patronage.

Due to the presence of an already existing Museum in Benin City named National Museum Nigeria, which is situated on the Ring road, opposite the Oba's Palace in Benin City. Locating another Museum in that same area would not be logical. This is because it would not be reasonable to have two Museums around the same area. Locating it around the Ikpoba hill area would bring about a fairer and balanced use of the Museum in the City.

And also due to the incapability of the existing National Museum not serving adequately the social, historical and cultural needs of the Benin people, it became paramount to locate the proposed Museum in a place, which is not densely populated and has available spaces for future development. This is one of the reasons why the site along Ikpoba hill was selected.

The heart of Benin City, which is the Ring road, consists of various buildings and structures and this results into a high level of human and vehicular traffic, which could be very annoying most times. So this led to a selection of a site outside that busy area. This is to decongest and divert attention to other areas of Benin City, which are really not so busy. This thereby leads to an even development and growth in all part of Benin City.

3.14 LOCATION OF SITE

The proposed Cultural Museum of Art is to be situated along Ikpoba slope in Benin City, Edo State. This is along the road to Aduwawa from Ramat Park in Ikpoba hill, which is about four kilometres from the popular Benin Ring road. The site is situated off the road directly opposite the Edo State Secretariat complex. It is almost adjacent to the Nigerian Television Authority (NTA) station branch office.

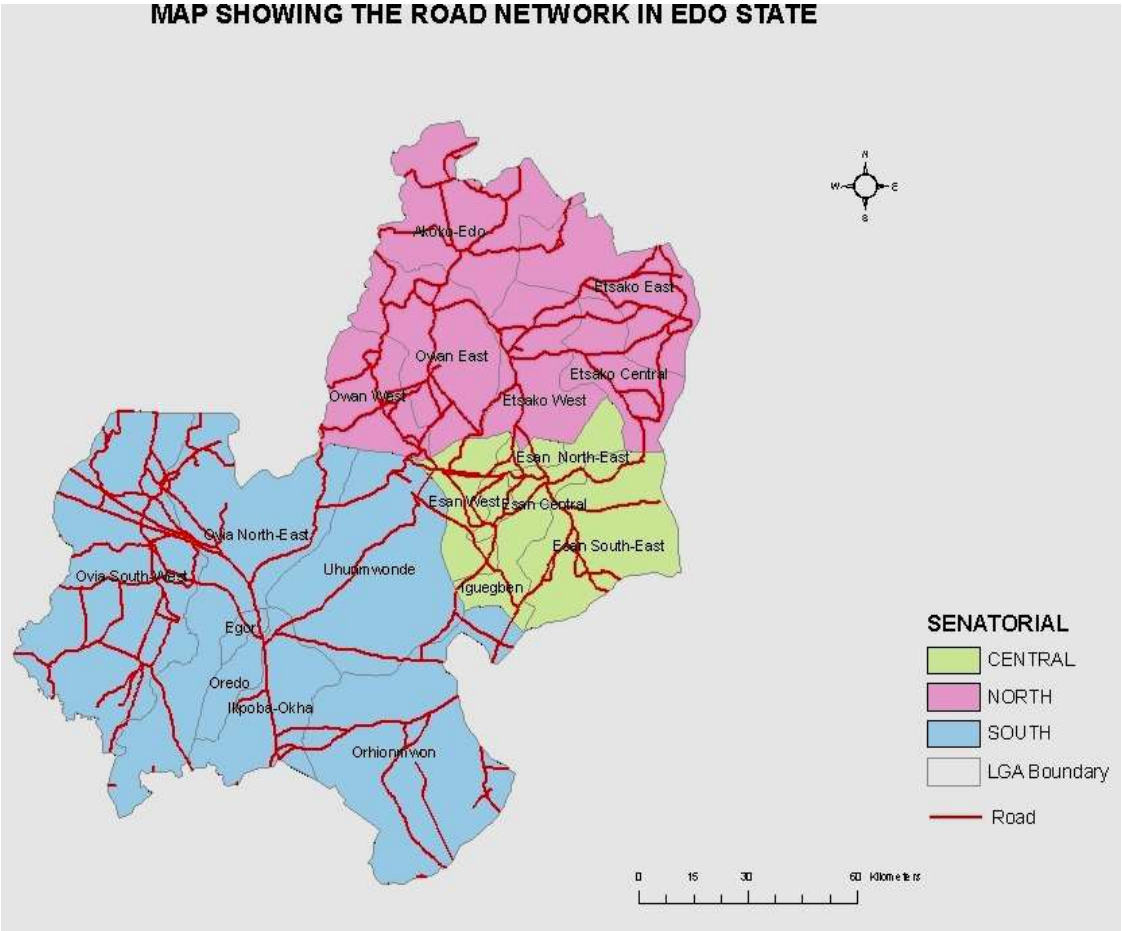

Figure 4.5: Map of Edo State showing Road Network.

(Source; National Bureau of Statistics.), 2008

3.15 SITE INVENTORY (CHARACTERISTICS)

The site characteristics deal with overall description of the site vis-à-vis the physical elements on the site, above the site and below the site. These elements are been discussed under the following:

1. Daylight proficiency: The selected site has its entrance facing the North Pole and has adequate space for the proposed facility. This is because for proper control of natural lighting, buildings have to be properly oriented on site to control the amount of light it lets in.

2. Access and circulation: As previously mentioned, the site selected for the location of the project is easily accessible from the major road across Benin City along Ikpoba slope. Adequate parking spaces, leisure areas, entrances, lobby, and so on required for the functional and efficient use of the Museum shall be provided.

3. Existing features: Scattered vegetation, palm trees, canopy trees; which could serve as a buffer for required sections of the site and also. Going inwards into the site reveals fairly dense vegetation. There also exist grasses of all types and few bamboo trees scattered around the site (see fig. 6.2).

4. Settlement: There are no major settlements present on the site. The only major settlement on the site is an abandoned bungalow, which is about 60m from the access road and has been abandoned for a very long time now.

5. Utilities: Existing PHCN electric poles to aid the supply of the required electricity for the Museum. Other basic utilities that are present on the site include telephone lines, pipe borne water supply, and suitable road network within the site and so on.

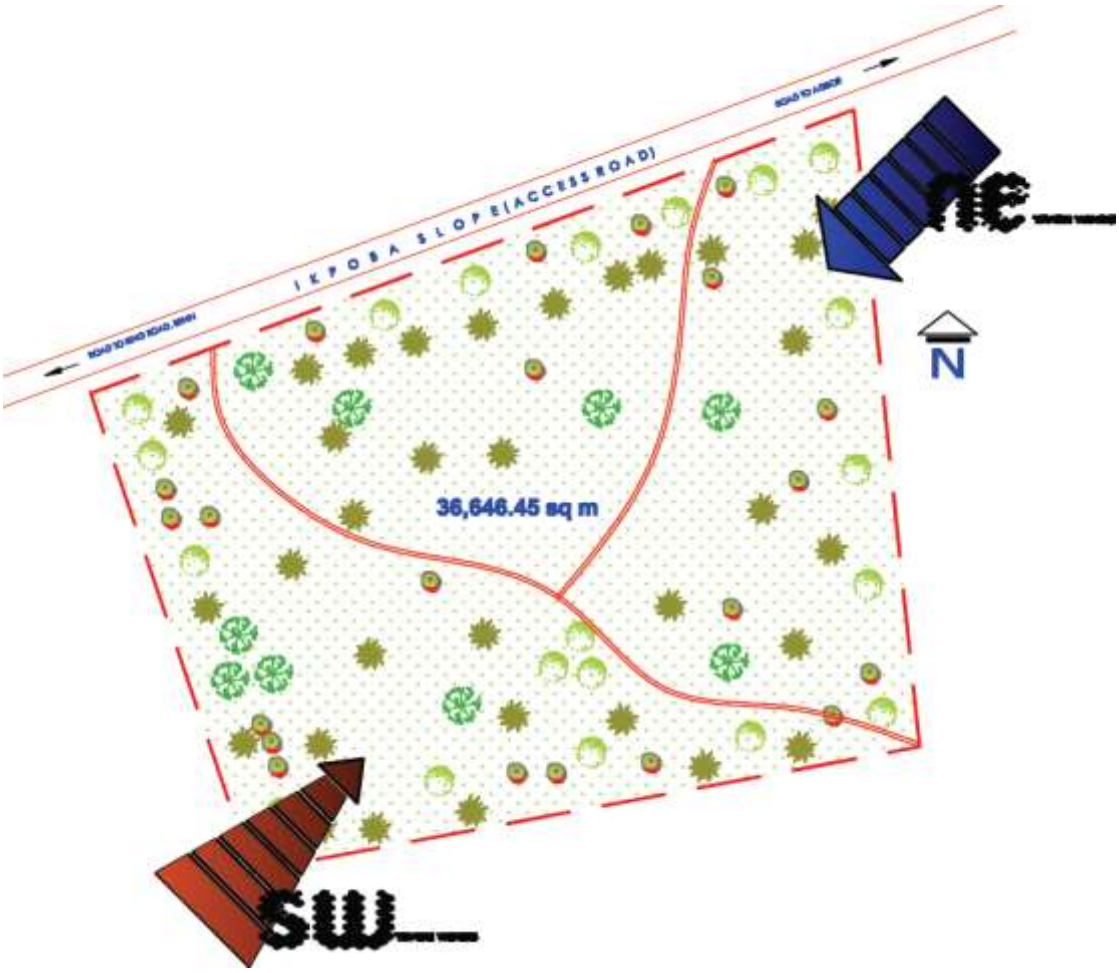

Figure 4.6:Proposed Site (Blow –up), Showing the Nature of the Site.
(Source; Researcher's Field work), 2008.

3.16 DEDUCTIONS

From the case studies of Museums carried out within Nigeria and around Africa, it has been observed that due to the poor lighting schemes used, visual comfort for visitors is a major problem. Sharply contrasting light levels between a bright entry and dark gallery can be very disturbing and potentially even painful to the eyes. Also there is a problem of controlling the amount of lighting entering the museum.

CHAPTER FOUR

RESULTS

4.1 DESIGN REPORT

From the research carried out in the preceding chapters, certain design considerations are been noted. The research reveals fundamental elements about museum lighting for example the nature of light, it sources, behaviour of light etc. Some of the elements to be considered in the design include the following;

a. The classification or exhibition of artefacts having common light exposure susceptibility.

b. Covering all artificial light sources with UV filters and also all daylight openings should be covered with Photo chromatic Glass to reduce UV rays.

c. Light behaves differently when it hits a flat surface and a curved surface (wall).

d. Proper orientation of the museum building is necessary so as to reduce direct entry of daylight into the building.

e. Most openings (daylight openings) would be highly or partially controlled to direct light entry into the museum. The double blind system can be used on window openings.

This chapter seeks to discuss the final but important details that add up to unify and improve the functionality and efficiency of the building. It can be seen as a breakdown of the building components from its inception to completion, and an insight into the mind of the designer.

4.2 SCHEDULE OF ACCOMMODATIONS (SPACE REQUIREMENTS)

Several anthropometrics considerations were put in place to determine the area and form for this work to be done. The overall principle is to create a feeling of lack of excessive enclosure by introducing large volumes. The floor area does not necessary give an idea of the spatial nature of the space.

The facilities available on the site include:

1. Administrative unit.
2. Auditorium
3. Restaurant.
4. Museum.
5. Exhibition halls and Art Galleries.
6. Sculpture Garden.
7. Ancillary Facilities.
8. Recreational and Outdoor services.

CENTRAL MUSEUM BUILDING

Administration

1. Museum Director' office.
2. Deputy Director's office.
3. Curator's office.
4. Head of Education.
5. Head of Protocol and Exhibition.
6. Head of Preservation and Restoration.
7. Head of Archaeology
8. Secretary.

9. Accounting.
10. Computer/Records.
11. Reception.
12. P.R.O.
13. Boardroom.
14. Supervisor.
15. Maintenance.
16. Conveniences.
17. Store.

Exhibition Hall/ Art Gallery

1. Main Gallery.
2. Royal Exhibition rooms.
3. Other Exhibition rooms
4. Art Galleries.
5. Temporal Exhibits.
6. Gift Shops.
7. Store.
8. Offices.
9. Studios.
10. Conveniences.

AUDITORIUM BUILDING

Restaurant

1. Dining.
2. Chef's office.

3. Kitchen.
4. Cold store and Dry store.
5. Changing room.
6. Outdoor cooking area.
7. Servery.
8. Conveniences.

Auditorium

1. Ticket room.
2. Sitting area.
3. Rehearsal room.
4. Male dressing room.
5. Female dressing room.
6. Stage.
7. Conveniences.

Sculpture Garden

1. Fountain.
2. Seating Area.
3. Sculpture Display Area.
4. Green Area.

Ancillary Facilities

1. First Aid.
2. Security Office.
3. Snack/Suya Joint.
4. Generator House.

4.3 DESIGN BRIEF

The design for the Cultural Museum of Art, Benin would be an avenue for display of arts and culture. The site is made up of several structures such as the Central Museum Building, Auditorium Building, Restaurant, Traditional Architecture display, and Sculpture Garden.

The concept of the building is analogical in nature and is borne out of the fact that the people of Edo State are very cultural in nature. The Oba being the head and the leader of the Edo people is always seen with a ceremonial sceptre called the *eben.* The Oba and also some of his Chiefs usually carry this sceptre during cultural or festive periods. It serves as a symbol of royalty and authority. It is an icon used to depict the unique Benin culture. An analogical combination or fusion of this sceptre is been used in arriving at some of the forms for the design, for example; the Museum Building and the Auditorium.

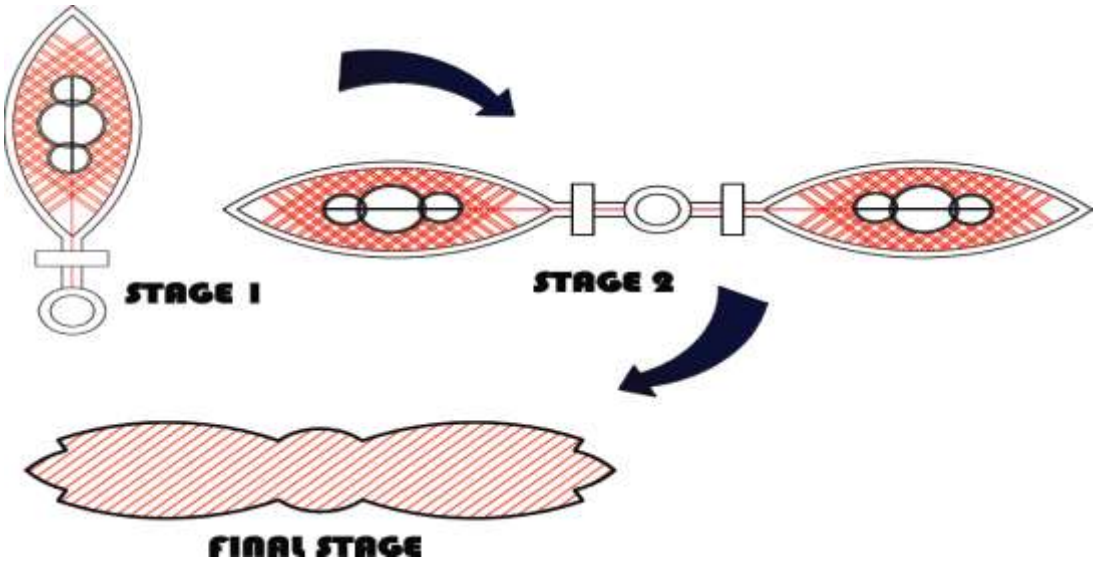

Figure 5.1: The design concept employed in the design of the Museum building. Stage 1 shows the ceremonial sceptre used by Benin monarchs. The final stage shows the outline of the building.

4.4 MATERIALS AND CONSTRUCTION

In line with the design, the components of the design for the Cultural Museum would consist of several facilities which all make up the Museum complex. For the Museum building, it would be such that the entire structure would be a frame of reinforced concrete columns and beams and floor slabs, having curved walls, while the internal layout would be partitioned by walls having windows made of aluminium frame and photo-chromatic glass. The main Museum Building has an atrium where temporal exhibits are kept, this part is been lightened by roof lights. The roof over the museum building is made of light-weight flat metal sheets. The windows of the museum building are also made of photo-chromatic glass to control the entrance of light and also reduce ultra-violet rays. The wall façade of the museum building is covered with fluted brick facing which is synonymous to the traditional Edo buildings with fluted walls especially the houses of that of the Oba and some chiefs. Some part of the auditorium is been decked with reinforced concrete. Around the auditorium are various art works such as paintings, bronze and brass works, sculptures of past Obas, chiefs and great warriors of the Benin kingdom.

The other buildings present on site aside the Central Museum building is the Auditorium Building. Setting out of such building involves the use of a tough rope placed at points, which serves as centers of such curves or circles.

Wood as an abundant building material available in large quantities in Edo State is also been employed for use in the design. Wood is been used in some part of the building as balustrades, stair threads, partition panels, outdoor seats and so on. The finishing materials are to be of the finest quality to first of all, enhance the aesthetic quality of the design, lend to the lifespan of the structure owing to their durability and finally to give

the building a sort of personality and characteristic of its own and thereby making the building a symbol of cultural identity for the Edo people. Such material selection includes the use of granite floor tiles, fluted wall bricks, plaster of Paris ceilings and parallel bar steel frame stair balustrades. Finally, the construction firm that wins the bid must be of high repute to ensure paramount levels of construction.

4.5 DESIGN SERVICES

4.5.1 ELECTRICITY AND LIGHTING

The electrical system to be installed would be sourced from Power Holding Company of Nigeria (PHCN), although, the problem of power generation and supply is a well-known and peculiar problem in that region. The incessant power outages and low voltage supply would be disruptive to cultural activities and should be guarded against so as not to loose money from power related issues.

Electrical wiring for the buildings in the site is done by through conduit pipe installed in walls ceiling and floors. The lighting systems are designed specially to suit the various kinds of activities, especially for display of artefacts in the museum. Natural lighting also formed a major part of the lighting scheme especially for the, exhibition areas, offices and public areas. Daylight has been used in a logical form to lighten spaces within the museum; this would be used in case of power outages.

4.5.2 HEATING, COOLING AND VENTILATION

Heating, Ventilating, and Air Conditioning are all related processes designed to regulate ambient conditions within buildings for comfort or for industrial purposes. When considering these factors, the climatic condition of the region must come to play. As

noted in chapter five, the Benin region is warm and humid thus necessitating the systems to tend towards cooling and ventilation. When the atmosphere is saturated with water, the level of discomfort is high because the evaporation of moisture from the body as perspiration, with its attendant cooling effect, is impossible.

Natural ventilation, in combination with the air-conditioning system, would be used to control both the supply and exhaust of air within given areas in order to provide sufficient oxygen to the occupants and to eliminate odours. The air-conditioning system for the museum building, consisting of centralized equipment would be used to provide an atmosphere with controlled temperature, humidity, and purity at all times, regardless of weather conditions to the enclosed interior partitioned spaces via a ducting system. The design of the air-conditioning system would be based on the type of structure in which the system is to be placed, the amount of space to be cooled, the number of occupants, and also the nature of their activities.

4.5.3 WATER SUPPLY

The water supply to the building would be from two main sources. The primary source would be the city mains water supply, while the secondary source would be a borehole to be sunk on the site to take advantage of the high water table and also boost the self-sustainability of the proposal. The water supplied would serve a range of functions which include drinking, cooking and for the operation of the plumbing fixtures and appliances. Also included is the supply to the standpipe system installed in case of fire emergencies. Both water supply and drainage systems must be carefully designed to prevent serious contamination of the water and to stop sewer gas from entering the building. All water connections to fixtures and appliances must be provided with devices that prevent contaminants from being siphoned or forced back into the water

piping, a condition known as backflow or back siphonage. Temperature and pressure-relief valves must be installed on all water heaters to prevent an explosion in the event of malfunctioning controls.

4.5.4 DRAINAGE AND SEWAGE DISPOSAL

Drainage systems installed would be of two basic types: sanitary and storm water. The sanitary drainage systems would carry bodily and other wastes from the plumbing fixtures and appliances by gravity to a sewage treatment/septic tank facility outside the buildings. Sanitary drainage piping inside the buildings must be linked to a system of vent piping, to keep the pressures in all sections of the drainage piping equal. This prevents the siphoning or blowing of water in the traps (U-shaped dips in the piping), which in turn prevents the harmful sewer gases, which form as sewage material decomposes, from entering the building. Storm-water drainage systems carry rainwater from the roof by gravity to a body of water soak away. Basement drainage usually needs to be collected in a sealed and vented pit or tank and pumped out of the basement.

The sewage disposal system is involved with the treatment, and sanitary disposal of liquid and water-carried wastes collected by the drainage system. The issue of sewage disposal assumed increasing importance in the design of structures to prevent the wider problem of pollution of the human environment, the contamination of the atmosphere, river and groundwater by the functions of the building.

A sewage treatment process commonly used to treat domestic wastes, the type generated here, is the septic tank: a concrete, cinder block, or metal tank where the solids settle and the floatable materials rise. The partly clarified liquid stream flows from a submerged outlet into subsurface rock-filled trenches through which the

wastewater can flow and percolate into the soil where it is oxidized aerobically. The floating matter and settled solids can be held from six months to several years, during which they are decomposed anaerobically. The size of the septic tanks will be specified by the mechanical engineer.

4.5.5 REFUSE DISPOSAL

Refuse disposal is simply the disposal of normally solid or semi-solid materials, resulting from human activities around and about the site, which are useless, unwanted, or hazardous. Solid wastes expected to be generated here typically may be classified as follows:

1. Garbage: decomposable wastes from food
2. Rubbish: non-decomposable wastes, either combustible (such as paper, wood, and cloth) or non-combustible (such as metal, glass, and ceramics)
3. Ashes: residues of the combustion of solid fuels
4. Sewage-treatment solids: material retained on sewage-treatment screens, settled solids, and biomass sludge

Disposal of solid wastes by incineration is by far the most common method in the Nigeria and probably accounts for most of the nation's municipal refuse. Land filling accounts for most of the remainder, whereas composting and recycling of solid wastes accounts for only an insignificant amount. Selecting a disposal method depends almost entirely on costs, which in turn are likely to reflect local circumstances. The options available include:

1. Landfill.
2. Incinerators.
3. Recycling.

4.5.6 ACOUSTICS

The subject of acoustics deals with the science of sound in general. It is more commonly used for the special branch of that science, architectural acoustics, which deals with the construction of enclosed areas so as to enhance the hearing of speech or prevent the building interior from being too noisy. Sound behaves very differently in an enclosed space and outdoors. In a gymnasium, for example, the benches, walls, and ceilings cause sound waves to bounce back, or reverberate. Outside, sound seems quieter because there are fewer obstacles to reflect the sound waves back towards the listener.

The walls of space requiring special acoustic conditions are treated with wooden panels mounted on shock absorbent materials, the walls are fanned, most especially the theatre (main auditorium). The floor of the Museum building would be treated with acoustic materials dense foam and carpets are piled on the floor to absorb original sound and echoes as well as reduce reflection of sound.

Another important aspect of room acoustics is insulation from unwanted sound. This will be obtained by carefully sealing even the smallest openings that can leak sound, by using rubber door and window sealants for the interior partitioned spaces and by building several unconnected walls separated by dead spaces.

4.5.7 FIRE SAFETY

Fire is basically heat and light resulting from the rapid combination of oxygen with other materials. The light is in the form of a flame, which is composed of glowing particles of the burning material and certain gaseous products that are luminous at the temperature of the burning material. The conditions necessary for the existence of fire

are the presence of a combustible substance, a temperature high enough to cause combustion (called the ignition temperature) and the presence of enough oxygen (usually provided by the air) or chlorine to enable rapid combustion to continue. Techniques used to extinguish fires and limit the damage caused by them involves the removal of one or more of the three elements essential to combustion—fuel, heat, and oxygen—or of interrupting the combustion chain reaction.

Fire, and the potential losses in life and property that will ensue on the event of its occurrence, is an undesirable element in this proposal. Great care has to be taken to avoid it at all costs. The building, due to its cultural nature, constitutes a huge investment and adequate concern must be shown for the protection of the structure as well as the lives and property of the occupants from fire hazards. Unfortunately the structure has been long since rebuilt but still hasn't provided for automated systems to prevent a reoccurrence. Building standards in Nigeria unfortunately have not been very strict with regards to fire protection and prevention and in light of the observed problems this proposal aims to tackle the problem thoroughly to avoid such problems. Granted, this represents a significant increase in construction costs but better such an initial expenditure than the costs accompanied by pain and grief in compensating for a fire outbreak.

The design tackles this quandary from two different angles:

1. Fire prevention, which involves input during the design stages to prevent the actual breakout of a fire. Amongst these is the use of early warning systems such as automated smoke and fire detectors connected to alarm systems to notify and locate the fire occurrence and also trigger fire protection devices put in place. Buildings may also be equipped with detection systems that will transmit an alarm so that the occupants of a

building may safely escape. Some detectors are designed to respond to smoke and others to heat. They detect smoke and sometimes heat in a variety of ways, in this case by using a detection chamber filled with ionized air. Rays from a radioactive source ionize the atoms of air in the chamber. The charged particles carry current between the top and bottom plates of the detection chamber, which act as electrodes. Smoke entering the chamber attracts the charged particles so that the amount of current passing between the electrodes is reduced (shown on right). When a drop in current is recorded, a message is sent to the control unit, which activates the alarm

2. Fire protection is the other method to be employed in tackling the menace of losses to fire outbreaks. This involves the systems setup that will be activated or initiated in the event of the occurrence of the fire already. These are the use of fire extinguishers, installation of a standpipe and sprinkler system.

a. Fire Extinguisher is a portable device used to put out fires of limited size. Such fires are grouped into four classes, according to the type of material that is burning. Class A fires include those in which ordinary combustibles such as wood, cloth, and paper are burning. Class B fires are those in which flammable liquids, oils, and grease are burning. Class C fires are those involving live electrical equipment. Class D fires involve combustible metals such as magnesium, potassium, and sodium. Each class of fire requires its own type of fire extinguisher. Although class D fires are highly unlikely in this environment, they may be given a slight consideration. Fire extinguishers may go unused for many years, but they must be maintained in a state of readiness. For this reason, periodic inspection and servicing are required, and that responsibility rests with the owner. Fire department inspectors check at periodic intervals to see that extinguishers are present where required by law and that they have been serviced within the specified time period.

b. A sprinkler system is an integrated system of underground and overhead piping, designed in accordance with fire protection engineering standards, and connected to one or more automatic water supplies. The system is usually activated by heat from a fire, and the sprinkler heads then discharge water over the fire area. Sprinkler systems are nearly 100 per cent effective. Many sprinkler systems are supervised electrically from a central station, and alarms are transmitted to a fire department whenever the sprinklers operate or when a valve in the sprinkler system closes for any reason. If a fire-fighting unit arriving at a fire finds that the sprinkler system is not receiving sufficient water and pressure, a pump is connected to the sprinkler system to supply additional water although the installation of a bore hole as specified would solve that problem.

4.5.8 SECURITY

In terms of security several steps would be taken to ensure the safety and security of everybody who would be carrying one activity or the other in the centre.The entrances to the Museum complex are to be manned by security operatives to prevent possible escape in the event of theft of Museum artefacts, while other operatives will be at strategic points around the site to buttress as deterrence as well as countermeasures against any possible incursion by robbers.

4.5.9 MAINTENANCE

It is a well-known fact that the Nigerian building industry, up till recent years, did not pay adequate attention to building maintenance. This was particularly notorious in multi-storey buildings and it resulted in these structures not reaching optimum utility and lifespan before huge amounts have to be paid out to renovate or restore the buildings. A simple and regular maintenance schedule ensures that the building lifespan

is maximized and the materials specified for the finishing should also be durable so as to reduce the amount of maintenance necessary.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

From the study, it can be gathered that a Museum is an institution dedicated to helping people understand and appreciate the natural world, the history of civilizations, and the record of humanity's artistic, scientific, and technological achievements. Museums collect objects of scientific, aesthetic, or historical importance; care for them; and study, interpret, and exhibit them for the purposes of public education and the advancement of knowledge. There are museums in almost every major city in the world and in many smaller communities as well.

Museums offer many benefits to their visitors, their communities, and society as a whole. As educational institutions, they offer unparalleled opportunities for self-directed learning and exploration by people of diverse ages, interests, backgrounds, and abilities. They are public gathering places where visitors can be entertained, inspired, and introduced to new ideas. Museums enrich local cultural life and make communities more appealing places to live and to visit.

Museum lighting is an integral part of the story-telling process of museums. Today, more than ever, there are a greater variety of museum types, each one distinct in its own 'story,' mission, collection and method of representation. Traditionally, museums have addressed the presentation of collections as the most important criteria in exhibition design. The visual environment surrounding these works of art and specimens usually plays an important yet supporting role, with the collections as the 'stars' of the show, so to speak. In addition to these more traditional institutions, there are other types of exhibition spaces where the visual environment may be as much a part of the viewer's

experience as the objects on display. New methods of presentation by architects and exhibition designers are increasing the variety of gallery space typologies, which in turn, challenge the lighting designer to find solutions that go beyond the traditional body of museum lighting approaches and techniques.

5.2 CONCLUSION

A structure or a building conceived, designed and built should and must meet the need for which it was being designed. The proposed Cultural Museum of Art would serve as point where culture and tourism are being enhanced. It would provide a venue for, exhibition of arts and crafts, centre for research of historic importance festive activities, relaxation.

The research covered areas of lighting in the Museum, which involved the use of various lighting schemes to lighten interior spaces. Future researcher into such projects should look into more ways of controlling light in Museums and also enhancing visitor's visual comfort.The research has revealed that light is not only a functional requirement but also a creative medium for use in museum exhibitions. And museum designers should consider how best to use it in their museum designs in a positive way rather than take the apparently easy option of excluding it. If this can be done well then the two most important aim of a museum would be successfully achieved with very little problems.

For society as a whole, museums provide valuable intangible benefits as sources of national, regional, and local identity. They have the singular capacity to reflect both continuity and change, to preserve and protect cultural and natural heritage while vividly illustrating the progression of the human imagination and the natural world.

5.2 RECOMMENDATIONS

More extensive investigations are recommended, particularly focused on the results presented and significant areas identified in this study. Quantitative data from more recent Museum projects is needed. Case studies should also be put in progress to study the development of lighting schemes in different Museums around the world. The methodology and basic terminology developed in this study may provide a useful framework for benchmarking and comparing scenarios in other contractual regimes.

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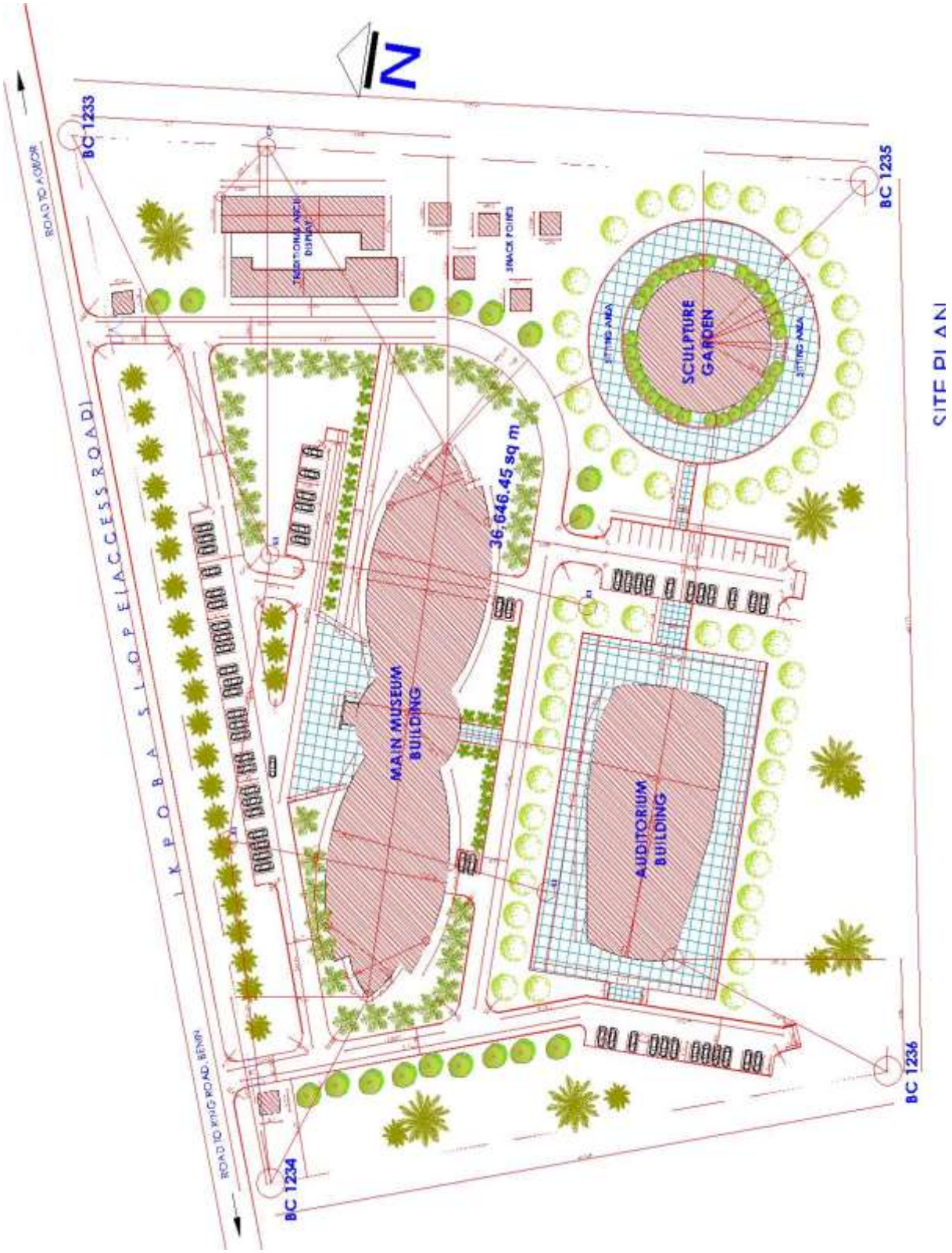
APPENDICES

APPENDIX 1.1



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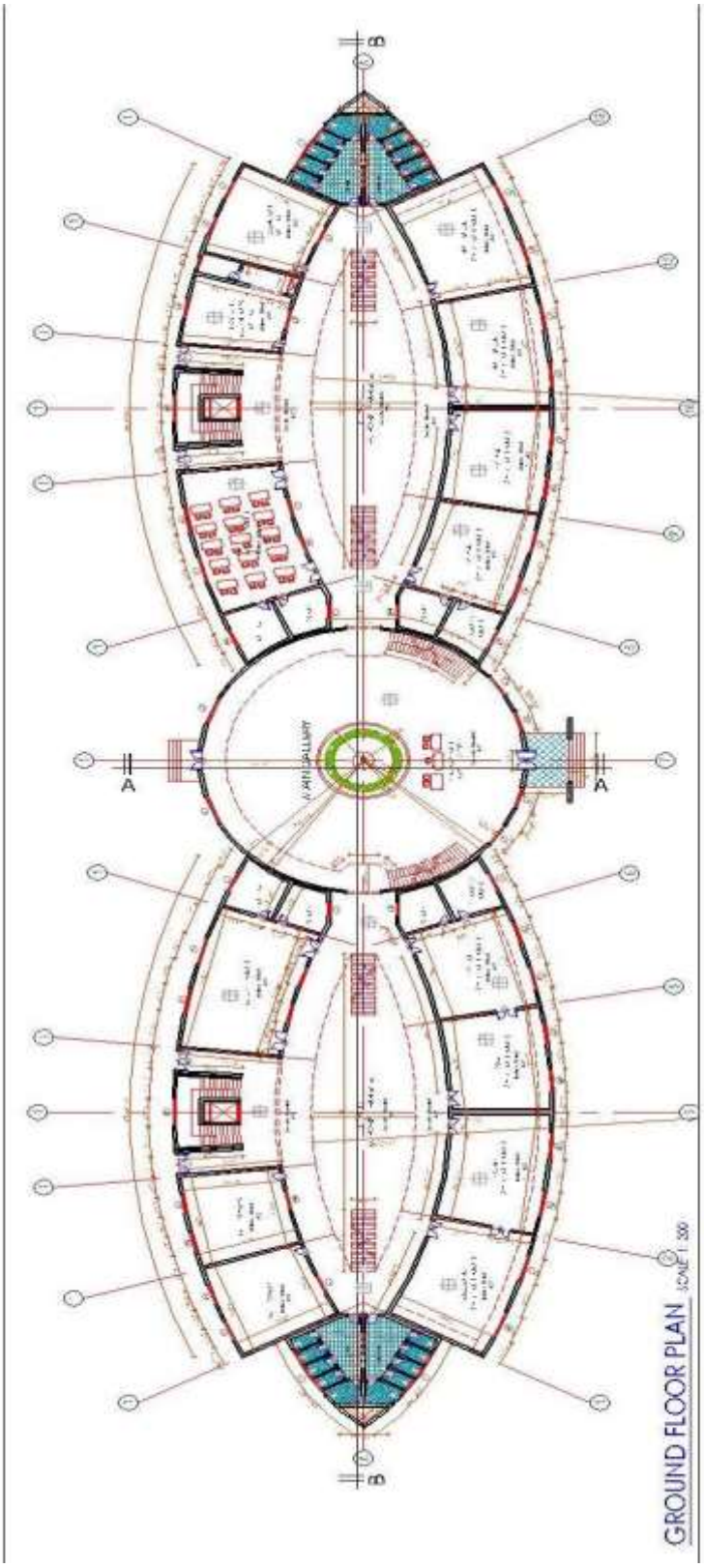

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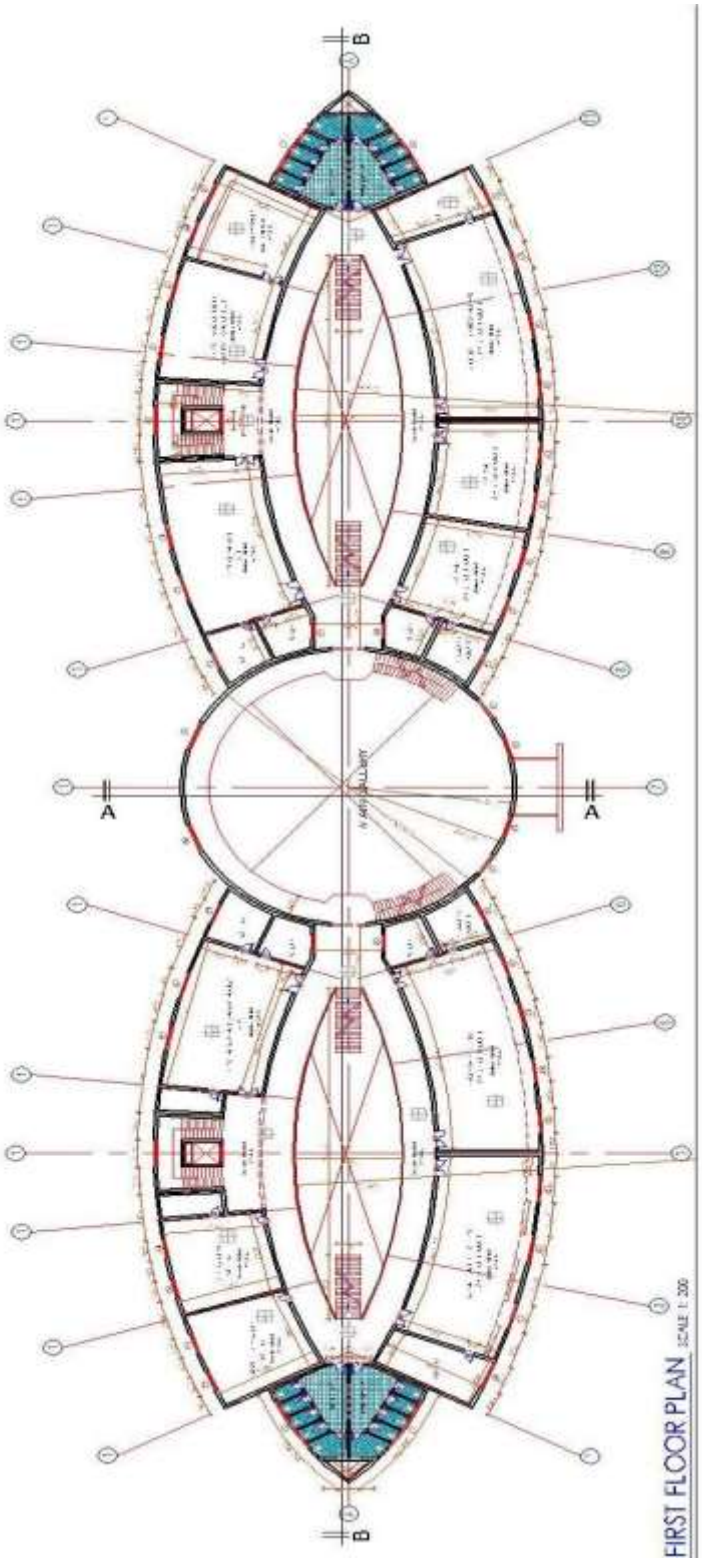

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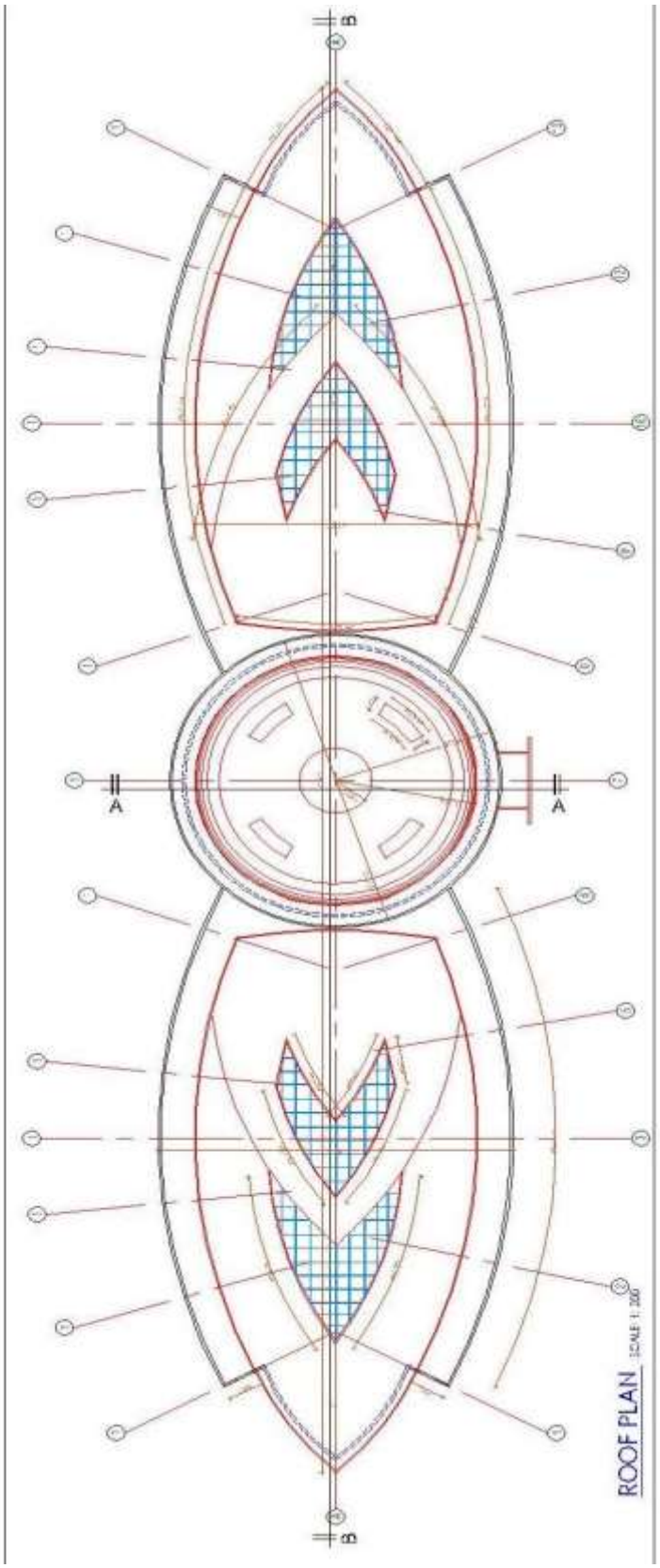

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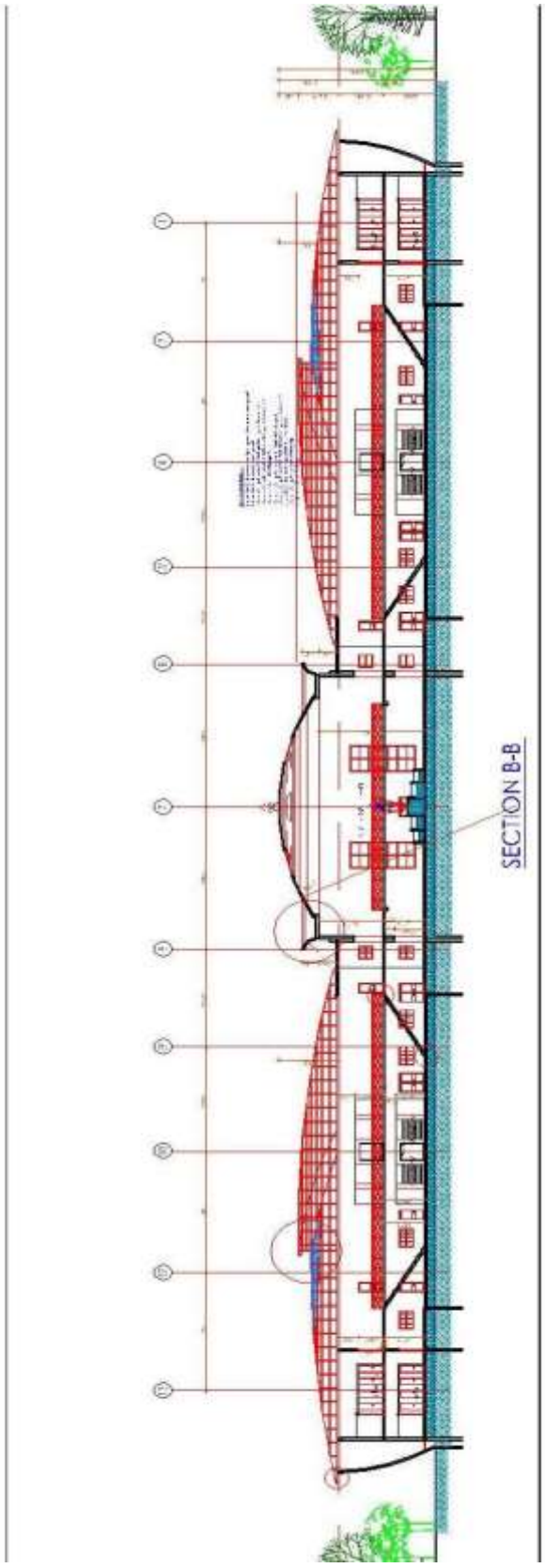

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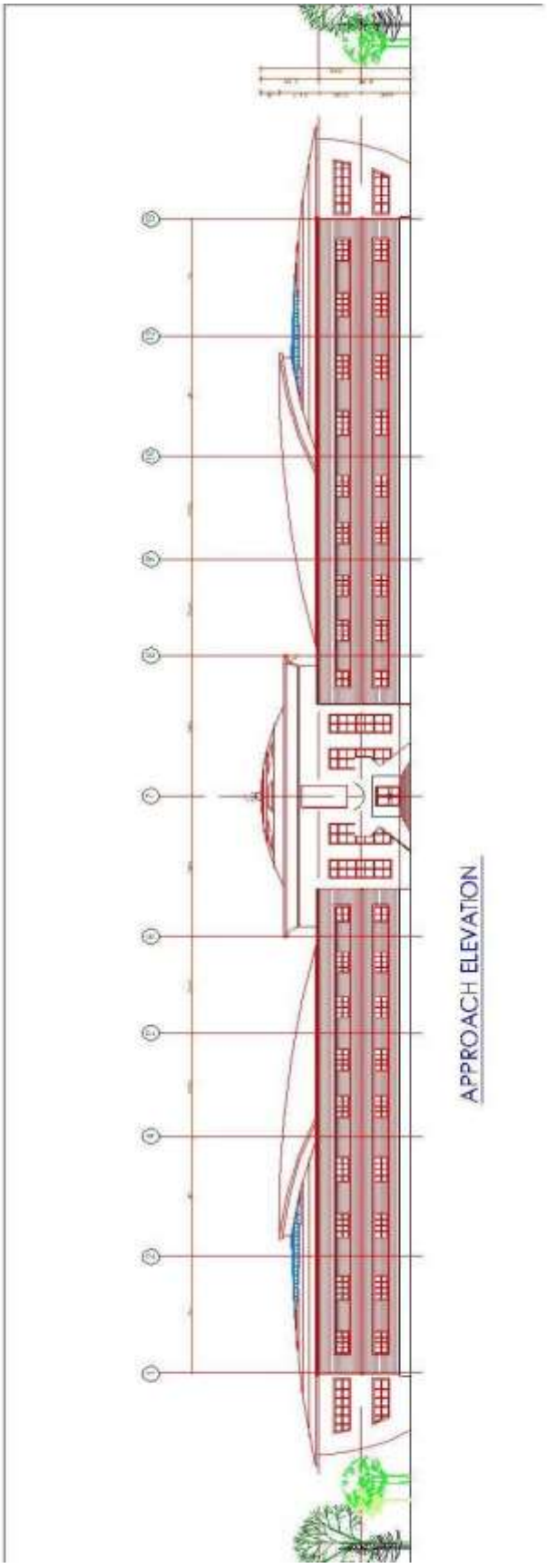

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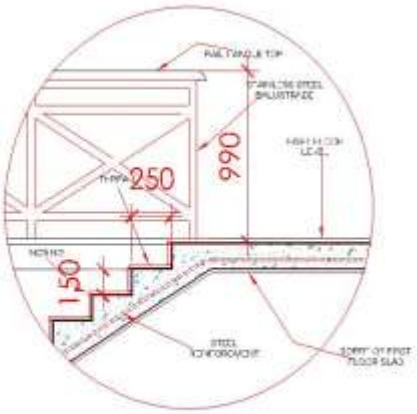

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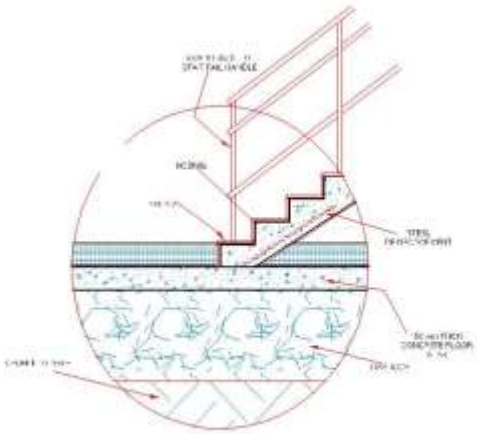

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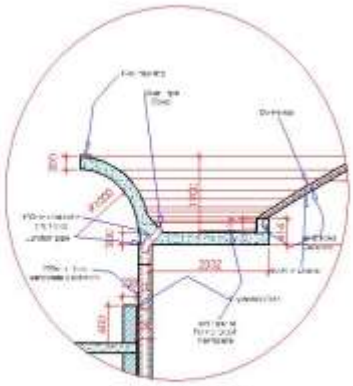

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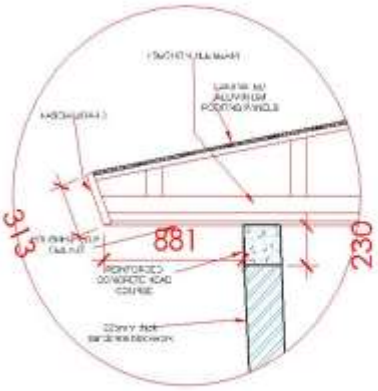

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