Proposed Indoor Sports Hall of Fame, Ibadan, Oyo State, Nigeria.

(Peculiarity of Floor Finishes in an Indoor Sports Hall)

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Being a MSc. Thesis Submitted to the Department of Architecture, Faculty of Environmental. Design and Management, Lead City University, Ibadan, Oyo State, Nigeria.

In Partial Fulfillment for the Requirements of the Award of Master Degree (MSc) in Architecture

2022.

Certification

This is to certify **Sarafa Seun ADEBISI** with matriculation number **LCU/PG/002156** carried out this research work: **The peculiarity of floor finishes in an Indoor Sports Hall of Fame, Ibadan, Nigeria.** in the Department of Architecture, Faculty of Environmental Design and Management, Lead City University, Ibadan, Oyo State.

for the award of Master Degree in Architecture and that this has not been previously submitted

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Dedication

This research is dedicated to the Almighty God.

Acknowledgment

I am grateful to the God of the universe with whose grace, blessings, and mercy I was able to complete this course of study without any problem.

I am indeed grateful to Lead City management, academic and administrative staff of post graduate school of the university for this wonderful opportunity to conduct this research

I appreciate Obafemi Awolowo University, Ile Ife indoor sport complex staff and Odu'a Investment Group management for the access given to carry out my case studies.

I deeply appreciate the faculty of environmental studies, department of architecture teaching non-teaching staffs. Thank you.

I thank my Head of Department **Dr. Arc. F.M. Adedire** for the timely encouragement, worthwhile suggestions, and constructive criticism throughout of the research work.

I immensely owe much more to all my dear lecturers for their never-failing inspiration, sympathy, and benevolence in attitude and teaching methods, I consider it my pleasant duty to express my gratitude to all of you. Dr. (Arc.) Funmi Adediire, Dr. (Arc.) Tosin Ayanleke, Arc.Jumoke Fasehun, Arc. Martin Olaniyan, Arc. Jide Aseyan, Arc. Ademola Adeola, Arc. Kemi Ajijola, Arc Nike Olugbesan, Arc David Oguntunde and my appreciation to all my course mate, thank you all

I specially appreciate my Supervisor **Dr. (Arc.) F.M. Adedire** who put me through this project. Thanks Lizzy, Psalm, Salma, Salem, Ayo, Ibrahim, Funsho, Margaret, and Elizabeth.

Even though the above-mentioned Institution and persons have assisted in the process of this research work, I alone stand responsible for the error, if any, found in the work.

Abstract

Considering the lifespan of Nigerian citizens, it has been observed that more people are having health challenges at a young age than ever before due to a lack of exercise and interest in Sporting activities over some time. Thereby leads to stress and health complications which may lead to untimely death.

Based on these challenges, during the time of Governor Isiaq Abiola Ajimobi, Oyo State government mandated its citizenry to inculcate the habit of exercising their body to improve health. Every Thursday has been mandated by Oyo State to engage in physical activity to improve health and fitness.

To route this course, Odu'a Investment Company Limited OICL took the initiative to take a critical look into the problems and causes of degeneration in health, low performance, and involvement of young people of the western region in both local and international indoor Sporting activities.

The outcome of this meeting was a decision to open a book of remembrance for all the sons and daughters of the region who has contributed both locally and internationally to indoor Sports. thereby a Structure should be designed, built, and finished with appropriate and standard floor finishes and dedicated to the commemoration of those who have brought honor to the region in the areas of indoor Sports also an Olympic standard space should be designed for different indoor Sports for training and hosting of Local and international competition.

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Chapter One:

Introduction

1.1 Background of the Study

Indoor Sports halls of fame are universally useful rooms intended to accommodate a variety of Sports and monuments that celebrate those who have attained distinction or recognition (Peter Ackroyd 1995). the indoor game hall of fame can be a "stand-alone" construction with the minimum amount of support space, or it can be a section of a bigger structure . Regardless, some of these can accommodate a decent games hall, therefore it will be necessary to determine the range of games and levels before determining the required floor space.

Historically, this Sports facility began to emerge at the close of the 20th century. Earlier instances were simple 'games sheds' on school grounds that provided rudimentary climate projection to open-air playing fields, while others were a component of a bigger public Sports complex constructed in the 1970s. During the 1980s, several developmental projects and Sports programmers led to the improvement of reduced-standard and cost-effective designs (Sports hall design and layout February 2012).

In general, indoor Sports hall activity might be for competitive, athletic, or fitness-related goals. The majority of Sports arenas are constructed to accommodate national, international, county, and club competitions. Some of the Sports facilities are enormous structures surrounded by both dry and wet Sports. It is possible to construct a dry, wet, or athletic facility. (Geraint John, 1995). In a multipurpose indoor Sports hall, various games can be played, and each of these games has its court with the proper court markings and surface

finishes. However, the use of lines minimizes the use of space and tends to promote harmony between the various Sporting activities.

Considering the life expectancy of Nigerians, it has been observed that an increasing number of people are dying at a young age due to a lack of exercise over time, resulting in stress and health concerns that may lead to premature death.

In response to these difficulties, during the administration of Governor Isiaq Abiola Ajimobi, the government of Oyo State ordered that its citizens develop the habit of physical activity to enhance their health.

To route this course, Odu'a Investment Company Limited took the initiative and convened a Stakeholder meeting of indoor Sports in southwest Nigeria in November 2021. The purpose of this meeting was to take a critical look at the problems and causes of degeneration in health, low performance, and involvement of young people from the western region in local and international indoor Sporting activities.

This conference resulted in the decision to launch a book of remembrance for all of the region's sons and daughters who have made contributions to indoor Sports on a local and worldwide level. Consequently, a structure should be created, constructed, and dedicated to individuals who have given the honor to the region through indoor Sports, and an Olympic-standard space should be designed for various indoor Sports for training and hosting local and international tournaments.

1.1. Problem Statement

South-Western Nigeria is home to a variety of local, national, and even international Sporting events. However, existing facilities are becoming insufficient to hold these events, and some

of them are overstretched and obsolete. Therefore, it is necessary to construct a contemporary indoor Sports hall of fame.

1.2 Aim and Objectives of the Study

1.2.1 Aim

The aim of this research is to design an ultra-modern indoor Sports hall of fame, that integrates suitable floor finishes that supports the function of the spaces.

1.2.2 Objectives

1. To examine the benefits of floor finishes in enhancing indoor Sports activities
2. To identify standard functional flooring materials suitable for an indoor Sports hall of fame.
3. To explore the application of these floor finishes in the design of the proposed indoor Sports hall of fame.

1.3 Research Questions

1. What are the benefits of floor finishes in enhancing indoor Sports activities?
2. What are the standard functional flooring materials suitable for an indoor Sports hall of fame?
3. How can these floor finishes be applied in the design of the proposed indoor Sports hall of fame?

1.4 Significance of the Study

1.4.1 Architectural Functions

1. To locate each room and building appropriately for its purpose, taking into account the sun's route and the direction of the wind, in order to have an effective design plan.

2 To allow for the prevailing winds, which might affect the structure's thermal condition and the right placement of apertures and open spaces for the structures' thermal comfort

3 The apertures and suitable placement of windows should allow direct sunlight to readily pass through the structure in order to generate ambiance, brightness, and mood that will alter the effects of the sunshine on the structure.

4 In order to minimize traffic and provide a clear path for vehicular and pedestrian circulation within the site, it is necessary to design the entrance and departure point road networks, as well as to improvise ramps and other similar features with respect for users with disabilities.

5 To design each area, amenity, and piece of furniture with the users' comfort in mind.

6 To produce a modern aesthetic that complements the Sports complex.

7 Allow for landscapes that regulate the site's mood while taking its surroundings into account.

8 Design a civic architecture, an iconic structure that is long-lasting, useful, and appealing, has personality, and adds to its surroundings.

9 It must adhere to Nigerian building codes, protect inhabitants from harmful weather conditions (such as summer sun, wind, and rain), and

10 Create systems with minimal life cycle costs and materials that can be maintained.

11 Establish a framework for urban and architectural design that promotes and defines sports.

1.4.2 Economic Functions

1. It will provide the best service possible at a reasonable cost, that creates employment opportunities for the Nigerian populace, creating a relaxing atmosphere and economically generating income for Odu'a Investment group.

1.4.3 Social Functions

1. This will create a means of propaganda and ideology that serve as a way of obtaining political prestige, serving as an instrument in grooving indigenous youth for foreign policy in terms of Sporting activities; serving as a means to resolve (inter-)national conflicts, counteracting increasing criminality and drug problems;
2. It will also encourage cooperation and communication in specific areas of our towns and cities.
3. To offer 'street kids' an alternative; a way of livelihood
4. To counteract poor school performance and truancy via Sports;
5. To improve limited employment opportunities via Sports training;
6. To improve the quality of life in towns and cities;

1.5 Scope of Study: Target Group

The targeted audience includes but is not limited to the following:

- South-West youth have an interest in developing talent in Sporting activities
- Both literate and illiterate young adults can participate in Sports activities.
- Young ones emulate the adult and create awareness for younger generations.

1.5.1 Scope of the Design Project

The following area will be covered in the project: -

- **Special usage:** exhibition hall, concert hall, awards, gallery

- **Multi-purpose hall:** basketball, handball, long tennis
- **Game hall**: tabletop games such as kudo, draft, ayo, Snooker, billiard, table tennis
- **Physical activities game:** boxing, wrestling, weight-lift, fitness, Swimming, karate, taekwondo, gymnastic
- **Administrative section**: reception, inquiries, Concours, I.C.T, sculpture, buffer zone, recreation, patio Seat
- **Ancillaries**: a training room, Sports shops, equipment room, changing room, galleries, ambulance bay, bar and snack, business Center, sick bay)

1.6 Design Limitations

- Funding
- Technical know-how
- Political differences and government policies

1.7 Proposed Design Location

The proposed design is to be located at Mokola hill beside Oba Akinbiyi Grammer School, Mokola-Ibadan, Oyo State.

1.8 The merit of the location of the project

- The land belongs to the government
- Accessibility to the major and popular Road
- The central part of the city
- Very close to the Army Barrack for security reasons
- Very close to the University Teaching Hospital (UCH) in case of any health
- emergencies

- Nearness to many secondary and tertiary Schools
- Water and electricity availability
- Ibadan is the center of western states

1.9 Operational Definition of Terms

1.9.1 Sports

Sports are generally understood to be activities based on physical athleticism or dexterity, with the Olympic Games and other major competitions only accepting Sports that fit this definition. Other organizations, like the Council of Europe, use definitions that exclude activities without a physical component from being categorized as Sports. 2020 (Wikipedia Encyclopedia).

1.9.2 Indoors

Indoors can be defined as things that happen or are used inside a building and not outside. (Collins dictionary, 2022).

1.1.3. Indoor Sports Complex

It is a special location where Sports are played in a confined space. Swimming pools, spas, solariums, saunas, steam rooms, Sports halls, squash courts, fitness centers, aerobics studios, outdoor grass and/or artificial fields for hockey, football (soccer), and other Sports, as well as any associated cafeterias, bars, and other facilities, can all be found in a Sports center (Giovana Martino Feb, 2022).

Chapter Two

Literature review

2.1 Global Perspectives on Sports

Evidence shows that sports have been played for at least three thousand years (Mary Bellis, August, 2019. This explains why so many earliest games included individual battles and the use of weapons like spears, stakes, and rocks.

With the first Olympic Games in 776 B.C., the Ancient Greeks introduced formal Sports to the globe. Events at the games included foot and chariot racing, wrestling, leaping, discus, and javelin throwing. The history and evolution of sports in use today are discussed in this article, although this is by no means an entire list.

Figure 1: Games with Bats & Balls: Cricket, Baseball, and Softball
Source:

An Early SF Baseball Team

Figure 2 SF baseball team, circa early-1900s. Underwood Archives / Getty Images

The game of cricket may trace its roots back to the southeast region of England in the late 16th century. It was the most popular sport in the country by the 18th century, and its popularity continued to grow worldwide in the following decades. The prototype for the modern cricket bat was created in 1853; it had a willow blade and a cane handle that had been covered with strips of rubber and wrapped with another layer of rubber to generate a

grip. In 1939, a cricket match lasted for nine days, setting a new record for the longest game of its kind.

The modern baseball field was designed by New Yorker Alexander Cartwright (1820-1892) around 1845. A consensus on the rules and regulations for the current baseball game may be attributed to Cartwright and the New York Knickerbocker Base Ball Club members.

In 1887, Chicago Board of Trade writer George Hancock created softball as an adaptation of indoor baseball, which had previously been played on a cold winter day in the well-heated Farragut Boat Club.

2.2 Basketball

The first basketball regulations were written down in 1892. At first, everyone dribbled a soccer ball up and down a field of arbitrary dimensions—scoring points by dropping the ball into a peach. A hammock-like basket made of iron hoops was first used in 1893. It remained essential to manually collect the ball from the basket after each goal was scored for another decade until the advent of open-ended nets. The first basketball-specific shoe, the Converse All-Star, emerged in 1917, and by the 1920s, legendary player Chuck Taylor had signed on as the company's first spokesman. Classic American Basketball Partners Captured by Getty Images / Bettmann Archive

The first basketball regulations were written down in 1892. Initial activities were dribbling a soccer ball up and down a field of unspecified length and scoring by placing the ball in a peach basket. A hammock-like basket made of iron hoops was first used in 1893. However, it took another decade for open-ended nets to be invented, eliminating the need to manually collect the ball from the basket after each goal was scored. Converse All Stars were the first

basketball shoes designed specifically for the sport, and they were released in 1917. In the 1920s, legendary player Chuck Taylor became the company's first spokesman.

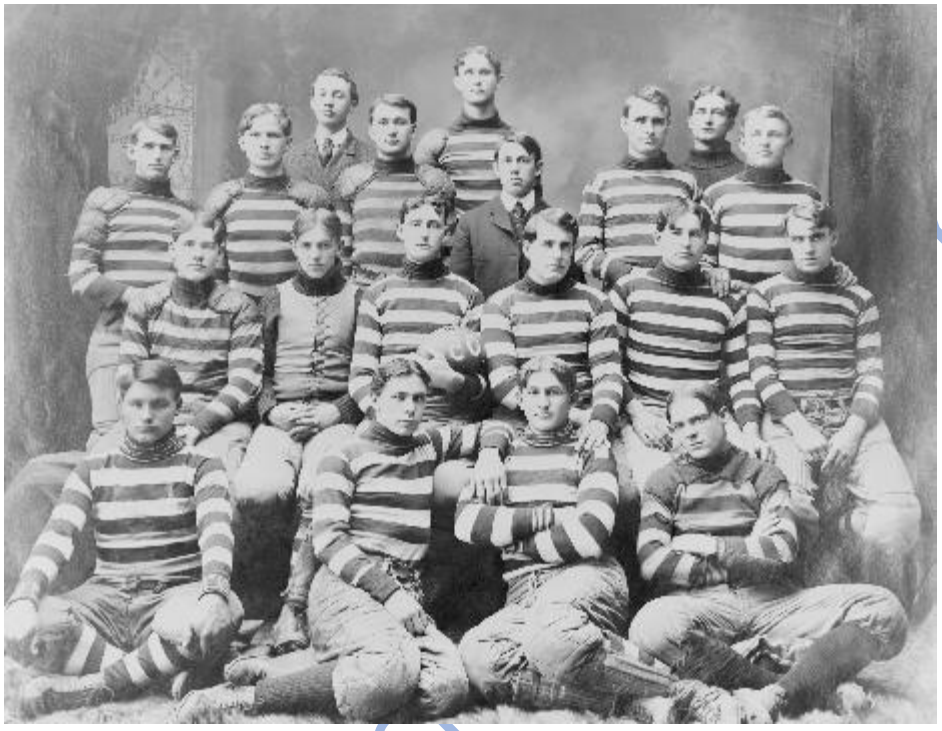

Figure 3Football team in typical team pose of the early 1900s at Oklahoma University. Bettmann Archive / Getty Images

More than two thousand years ago, the Romans played a game called harpastum, which may be the ancestor of modern rugby (from the Greek for "to grab"). In this game, the ball is carried by hand, unlike in soccer, where it mainly was propelled with the foot. In 1749, a brand-new school in Rugby, Warwickshire, England, with "every facility imaginable for the exercise of young gentlemen." introduced the world to the modern game. It all started on a piece of land called "The Close." It was around eight acres in size. Rugby had few rules from its inception in 1749 until 1823, during which time the ball was kicked rather than carried. Games were not uncommon to extend for five days, with 200 kids or more participating. It

was in 1823 that William Webb Ellis took possession of the ball and ran with it. With this, modern sports as we know them today had their start.

When you cross rugby with soccer, you get American football. Rutgers and Princeton played what is widely recognised as the first collegiate football game on November 6, 1869. In 1879, Walter Camp, a player, and coach at Yale University codified the game's rules. William (Pudge) Heffelfinger, a player with the Allegheny Athletic Association, became the first professional football player when he was paid $500 to participate in a game against the Pittsburgh Athletic Club on November 12, 1892.

2.1. Golf

Golfers at St. Andrew's Golf Club in Yonkers

Figure 4St. Andrews Golf Club in Yonkers was founded by Reid in 1888. Bettmann Archive / Getty Images

Golf is an ancient sport with roots in the Kingdom of Fife on Scotland's eastern coast, where it is said to have originated in the 15th century. The game of golf as we know it today was invented in Scotland, but variants of it involving hitting a rock with a club around a set course have been played in other parts of Europe for some time.

There was a low point for golf and soccer in the middle of the 15th century. The growing popularity of the games was blamed for diverting men's attention away from archery and swordsmanship as Scotland braced for an English invasion of her borders. As a result, the Scottish government outlawed golf and soccer in 1457. In 1502, with the signing of the Treaty of Glasgow, the ban was officially overturned.

After golf's first success in England under King Charles I, Mary, Queen of Scots (originally from France), brought it to Scotland. (The French cadets who played with Mary are said to be the inspiration for the term "caddie," which describes those who accompany a golfer). The famous golf course at St. Andrews, Scotland, was first referenced in print in 1552. The clergy opened the golf course to the public the following year.

In 1682, the Duke of York and George Patterson, representing Scotland, beat two English noblemen in the first international golf competition held at the golf course at Leith (near Edinburgh). As a result, St. Andrews Golf Club was established in 1754, and the St. Andrews Society of Golfers was born. Leith is responsible for drafting the yearly rules for the competition. In 1759, the stroke was added to the game of billiards. In 1764, the first 18-hole course was built, which is the current norm. The first women's golf club was established in St. Andrews, Scotland, in 1895.

Hockey

Though its origins are obscure, ice hockey is said to have evolved from the old Northern European sport of field hockey. Canadian James Creighton created the modern rules of ice hockey. The first-ever hockey game was played in 1875 between two nine-member teams at Victoria Skating Rink in Montreal, Canada. The flat, round piece of wood used in that game was the forerunner of the contemporary hockey puck. Counting the goalkeeper, there can be no more than six players on the rink for a team at any time.

The Dominion Hockey Challenge Cup, often known as the Stanley Cup, has been awarded to the most outstanding Canadian ice hockey team annually since 1892, when then-Governor-General Lord Stanley of Preston created it. The Montreal Hockey Club won first place that year, 1893. The rewards were accessible to league teams in the United States and Canada.

2.2. Ice Skating

Pond Skaters

Figure 5A frozen pond in Central Park, New York City, in the 1890s. Museum of the City of New York/Byron Collection / Getty Images

The Dutch first used skates with flat iron runners on the bottom of the board in the 14th century. The skates were fastened to the skater's feet with leather straps. Poles propelled this skater. Skaters no longer needed poles after the Dutch developed a thin, double-edged metal blade for their skates about the year 1500. (Called the "Dutch Roll").

In the Winter Olympics, figure skating has been a competition since 1924. In 1908, it became an official event at the Summer Olympics. The first Olympic competition for men on speed skates was held at the 1924 Winter Games in Chamonix, France. In 1976, ice dance was officially recognized as a medal sport, and in 2014, the sport made its Olympic debut as a team event.

2.3. Competitive Swimming

The 1890s 1900s TURN OF 20TH...

H. Armstrong Roberts/Classic Stock / Getty Images

Swimming pools became popular in the middle of the 19th century. By 1837, London, England, had no less than six indoor pools with diving boards. Swimming sports were among the first events in the modern Olympic Games, which started in Athens, Greece, on April 5, 1896. The popularity of swimming pools and the sports that revolve around them exploded almost soon after that.

Several notable 20th-century swimmers went on to have fruitful acting careers, including three-time gold medalist Johnny Weissmuller (who competed in the 1924 Paris Games), two-time Olympian Buster Crabbe, and Esther Williams (an American competitive swimmer who set numerous national and regional swimming records but did not compete in the Olympics due to the outbreak of World War II).

2.4. Tennis

A family rests after a tennis match, ca. 1900.

Resting after a tennis match, ca. 1900. Corbis via Getty Images / Getty Images

Modern court tennis may be traced back to a game played by French monks in the 11th century called Paume, while there is evidence that ancient Greeks, Romans, and Egyptians played a game similar to tennis (meaning "palm"). Paume was a hand-to-ball game played on a court (hence the name). Paume eventually gave rise to jeu de paume (literally "game of the palm"), played with racquets. By 1500, players used cork, leather balls, and wooden racquets strung with gut. English players used to aim for a netted aperture in the court's ceiling rather than volleying the ball back and forth. Modern outdoor tennis may trace back to 1873 when the Englishman Major Walter Wingfield created Sphairistikè (Greek for "playing ball").

2.5. Volleyball

1920s WOMAN IN BATHING...

Woman holding volleyball on beach, ca. 1920s. H. Armstrong Roberts/Classic Stock / Getty Images

William Morgan, the Director of Physical Education at the YMCA (Young Men's Christian Association) in Holyoke, Massachusetts, in 1895, is widely credited as the game's inventor. Mignonette was nicknamed volleyball because a spectator at a demonstration match remarked that there was a lot of "volleying," in the game.

2.6. Surfing and Windsurfing

Although the precise beginnings of surfing are unclear, the sport was first seen by Europeans in Tahiti in 1767. Therefore, it is safe to assume that it was born in ancient Polynesia. Wood was the material of choice for constructing the first surfboards, which were between 10 and 10 feet in length and weighed between 75 and 200 pounds. The only purpose of solid boards was forward propulsion, and they were never meant to span waves. At the start of the twentieth century, Hawaiian surfer George Freeth was the first to cut down the length of a surfboard to a more manageable eight feet. The fin was initially created by Tom Blake, who designed the first hollow surfboard in 1926. Surfing fanatic and innovator Bob Simmons started playing with curved boards in the late 1940s and early 1950s. He is widely recognized as the "Father of the Modern Surfboard." due to his groundbreaking innovations in the field. Lighter, more nimble boards would be tried in later designs. Boards made from balsa wood, fiberglass, and epoxy glue were all the rage for a while, but as technology advanced, foam core boards supplanted them.

One sport that mixes sailing and surfing is windsurfing, often known as boardsailing. A sailboard's two primary components are the board and the rig. When Newman Darby, then 20 years old, came up with the notion of steering a small catamaran using a handheld sail and rig attached to a universal joint, he revolutionized the world of sailing. Darby is generally credited as the inventor of the modern sailboard, even though he never sought patent protection for his creation.

2.7. Soccer

As reported by FIFA, over 240 million individuals regularly play soccer worldwide. Over two thousand years ago, a group of players kicked a ball made of animal leather in ancient China, and the sport caught on. Soccer, or football as it is known in most countries outside the United States, as we know it today, rose to prominence in England in the middle of the 19th century. The English also codified the first uniform rules for Sports, prohibiting opponents from tripping and touching the ball with their hands. (The penalty kick was officially implemented in 1891.)

2.8. Boxing

Boxing has been documented since ancient Egypt, circa 3000 BCE. When boxing was first included in the ancient Olympic Games in the seventh century B.C., fighters tied their wrists and forearms with flexible leather thongs for protection. The Romans eventually abandoned their leather thongs in favour of the cestus, a kind of glove studded with metal.

After the collapse of the Roman Empire, boxing went into decline and did not make a comeback until the 17th century. Bantam: no more than 54 kilograms (119 pounds); Feather: no more than 57 kilograms (126 pounds); Light: no more than 63.5 kilograms (140 pounds); Middle: no more than 73 kilogrammes (163 pounds); and Heavy: any weight. The English formally organized amateur boxing in 1880, establishing five weight classes.

At the first Olympic Games to feature boxing, held in St. Louis in 1904, the United States was the only nation to enter a team and win every medal. Since the 1912 Stockholm Games, when boxing was banned, every Olympic Games has included sports. Still, Sweden was not

the only nation to outlaw fistfights. Most of the 19th century saw little acceptance of boxing as a legitimate sport in the United States. Bare-knuckle fighting was outlawed and often raided since it was considered a criminal activity.

2.9. Gymnastics

Gymnastics originated in ancient Greece as a kind of exercise that combined physical agility, strength, and coordination with tumbling and acrobatic talents. (The verb "to exercise naked" comes from the Greek for "gymnasium," which is also the literal translation of the word). Early gymnastics training included running, leaping, swimming, throwing, wrestling, and weightlifting. When the Romans conquered Greece, they also formalized gymnastics. Most of the Roman legions' pre-battle preparation took place in gymnasiums. Even if tumbling remained somewhat popular as entertainment, gymnastics and other Sports enjoyed by gladiators and soldiers declined in popularity as the Roman Empire shrunk.

In 1774, modern gymnastics took off in the Germanic nations because prominent German educational reformer Johann Bernhard Basedow integrated physical exercise into the realistic study programmes he pushed at his school in Dessau, Saxony. The German Friedrich Ludwig Jahn, sometimes called the "father of modern gymnastics," created the apparatuses used in the sport, including the parallel bars, horizontal bars, balancing beam, and jumping events, in the late 1700s. Johann Christoph Friedrich GutsMuths, often spelled Guts Muth or Gutsmuths, was a German educator who is considered the "grandfather of gymnastics," for his emphasis on rhythmic movement and the development of a more elegant form of the sport when he established the Jahn's school in Berlin in 1811. The United Kingdom and the rest of Europe quickly sprung to life with the emergence of gymnastics clubs. As gymnastics

developed, it replaced the Greco-Roman Games, which included weightlifting and wrestling. Along with this transition, pursuing formal excellence replaced the simple goal of victory over an opponent.

Dr. Dudley Allen Sargent introduced Sports to the United States. He was a pioneering physical education teacher during the Civil War, an advocate for sports, a speaker, and the creator of more than 30 pieces of gymnastic equipment. During the mass migration from Europe at the end of the 19th century, many new arrivals wanted to continue their passion for sports in their new communities, so a growing number of turnverein (from the German "turned," meaning to practise gymnastic exercises, plus "Verein," meaning club) were formed.

In 1896, men's gymnastics was introduced to the Olympic Games, and since 1924, it has been a permanent fixture. Different events for women and an all-around competition began in 1952 and 1936. Men's gymnastics competitions were first dominated by competitors from Germany, Sweden, Italy, and Switzerland. However, by the 1950s, gymnasts from Japan, the Soviet Union, and other Eastern European nations had started to overcome them. Widespread coverage of Soviet gymnast Olga Korbut's 1972 Olympic performance and Romanian gymnast Nadia Comaneci's 1976 performance helped propel gymnastics to the mainstream. As a result, sports were given a lot more attention, particularly among Chinese and American women.

There are now six events for men and four for women in international competitions: the rings, the parallel bars, the horizontal bar, the side or pommel horse, the long or vaulting horse, and the free exercise (which is performed with musical accompaniment). Trampoline and

tumbling training sessions are standard in American competitions. Rhythmic gymnastics, an exhibition of smooth, synchronised movements using a ball, hoop, rope, or ribbons, has been a part of the Olympic Games since 1984.

2.10. Fencing

The usage of swords dates back to primordial times. Located near Luxor, Egypt's Mednat Habu temple was built by Ramses III in 1190 BC and had the world's first known depiction of swordplay in relief. Likewise, soldiers and gladiators in ancient Rome were trained in the art of coordinated swordplay from a young age.

Following the decline of the Roman Empire and continuing into the Middle Ages, organised swordsmanship was less common as criminals increasingly relied on swords to further their illicit goals. As a consequence, fencing academies began to be banned in many communities. Despite these setbacks, notably King Edward I's 1286 edict that banned sports in London, fencing continued to flourish.

In the 15th century, professional associations for fencing masters spread across Europe. Henry VIII was a pioneer in promoting sports in England. The English tradition of employing a slashing sword and buckler was replaced by continental Europe's more frequent rapier fighting (a tiny shield worn on the free arm). The Italians were the first to use the sword's point rather than its edge. The Italian fencing style, which prioritised speed and agility over brute force, soon gained popularity throughout Europe. Once the lunge was adopted, fencing became an art form.

Like men's attire, fencing was influenced by Louis XIV's court, which led to significant changes by the end of the 17th century. In place of the long rapier, the court sword was used. Compared to prior swords, which were so heavy that only the tip could be utilised for blows, the lighter court sword rapidly proved to be an invaluable weapon for various maneuvers. These developments laid the groundwork for contemporary fencing.

The French method of swordsmanship was based on a strict set of principles that emphasised form and strategy. The foil was a training sword developed to prepare for actual swordplay. Joseph Bologne, Chevalier de Saint-Georges, a feared duelist, and French fencing master La Bossière developed the first fencing masks in the 18th century. In the 1880s, French fencing instructor Camille Prévost codified the sport's foundational principles.

Men's fencing has been an Olympic sport since 1896. In 1913, the Fédération Internationale d'Escrime was founded to serve as the official governing organisation for amateur fencing competitions across the globe, including the Olympics and the World Championships. At the 1924 Olympics, female competitors first used foils. The women's foil team event made its Olympic debut in 1960. The 1996 season saw the women's team's debut and solo épée. With the addition of women's solo sabre for the 2004 Olympics, the sport of sabre fencing for women as a team was officially recognised in 2008.

2.11. Rowing

Although rowing has been done for as long as boats have been used for transportation, it was in the 15th century B.C. Egyptian burial sculpture that the activity was first recorded in writing. Virgil, the Roman poet, included a passage on rowing in his epic poem Aeneid. During the Middle Ages, Italian oarsmen raced around the canals of Venice during Carnevale.

Starting in 1454, London's water taxi drivers battled for monetary prizes and bragging rights on the Thames River. It has been a race between London Bridge and Chelsea Harbor since 1715. The first recorded American rowing competition was held in New York Harbor in 1756. The sport quickly acquired popularity amongst the athletic departments of several of the country's most prestigious institutions.

When the Cambridge University Boat Club and the Oxford University Boat Club first competed against one another in 1929, they were two of the oldest continually active college teams in the nation. This annual event began in 1856 and continues to this day. Similar rowing rivalries sprung up on the opposite side of the pond, primarily between Harvard, Yale, and the American service academies. Yale challenged Harvard to the first intercollegiate boat race in 1852.

The sport of rowing was included in the Olympics for the first time in 1900. Gold medals for the United States were earned in that year and 1904. After the English swept the 1908 and 1912 Olympic gold medals, the United States opted for the best college rowing squad instead of hiring pros to compete in 1920. The United States Naval Academy regained its gold medal after a victory against a team from Britain. The trend continued until 1948 when things started to change in American sports. The overwhelming popularity of college football and basketball dampened my enthusiasm for rowing. While rowing remains a popular sport at many universities, its previously massive fan base is unlikely to return.

Additional Sports include Wiffleball, Ultimate Frisbee, Hacky Sack, Paintball, and Laser Tag. David N. Mullany, a citizen of Shelton, Connecticut, came up with the concept of the Wiffle ball in 1953. Curveballs are easier to hit using the "Wiffle ball" form of baseball.

Ultimate frisbee (or "ultimate") is a sport that was created in 1968 by a group of students at Columbia High School in Maplewood, New Jersey, led by Joel Silver, Jonny Hines, and Buzzy Hearing. Frisbees have been available since 1957.

The modern American sports "hacky sack," also known as "footbag," was created by John Stalberger and Mike Marshall in 1972 in Oregon City, Oregon.

In 1981, twelve friends were playing a "Capture the Flag" game when they decided to spice things up by taking turns shooting each other with the tree-marking guns. After investing in Nelson, a manufacturer of tree-marking pistols, the company began marketing and selling the weapons for use in the new recreational Sports.

In 1986, George A. Carter III became known as the "Capture the Flag" for developing a version of the "creator and inventor of the laser tag industry" in which teams use infrared and visible light-based weapons to tag each other out until one side is victorious.

As anybody who has tried to compile a history of sports can agree, there is an overwhelming amount of information to go through and only so much time. Since sports include such a wide range of topics, an encyclopedia would be necessary to adequately cover them all (with events like horse racing, wrestling, track & field, and mixed martial arts, to name a few). While there are many more Sports out there, the ones on this list should give you a solid overview of the most popular ones that continue to amaze fans all around the globe.

Figure 6:Gymnastics equipment

Figure 7Gymnastics equipment.

Figure 8: Weightlifting

a) **Board/tabletop games:** These are board or table games that can have as few as two players (single game) or as many as four players (double games). Table tennis, chess, monopoly, snooker, and pool fall within this group.

Figure 9 Table tennis: table-top game

b) **Ball games:** Sports that center around the throwing, bouncing, kicking, or striking of a ball.e.g.tennis,squash,basketball,handball,volleyball,five-a-side football.

Figure 10:Five –a- side football: ball game

Source: www.google.com/search ?q=ball+games

Figure 11:Basketball; ball game

c) **Water Sports:** indoor swimming pool.

Figure 12:indoor swimming pool

Combat sports mainly originated in East Asia, including martial arts or other combat techniques (with or without weapons). People practise martial arts for various purposes, including self-defense, physical fitness, mental composure, and sports competition. Considerations in the Design of Athletic Facilities When creating sports facilities, bear into consideration the following:

i. Heating, Ventiatio n, Air Conditioning System

HVAC (heating, ventilation, and air conditioning) systems provide precise temperature regulation inside a facility (HVAC). When constructing a sports facility, it is essential to consider how to make the area favourable to peak performance and comfort. Thermal comfort is determined by the ambient air temperature, surface temperature, relative humidity, and air velocity. American College of Sports Medicine (ACSM) recommends a temperature range of 60-65 degrees Fahrenheit (15.5-18.3 degrees Celsius) for squash courts and 60-68 degrees Fahrenheit (15.5-20 degrees Celsius) for court Sports (with, in each instance, relative humidity of 60 percent or less and 8-12 air exchanges per hour for enclosed courts).

ii. Sustainability

According to International Olympic Committee president Jacques Rogge, all future sporting facilities must comply with sustainable development principles. In 1987, the Brundtland Commission defined *sustainable design* as "development that meets the demands of the present generation without compromising the ability of future generations to meet their own needs" Its design and development must adhere to the most recent economic, social, and environmental requirements. Architects must design structures that preserve the environment and may even improve it in various ways.

Figure 13:Cycle of sustainable architecture 4

Dimensions of Sustainable Architecture

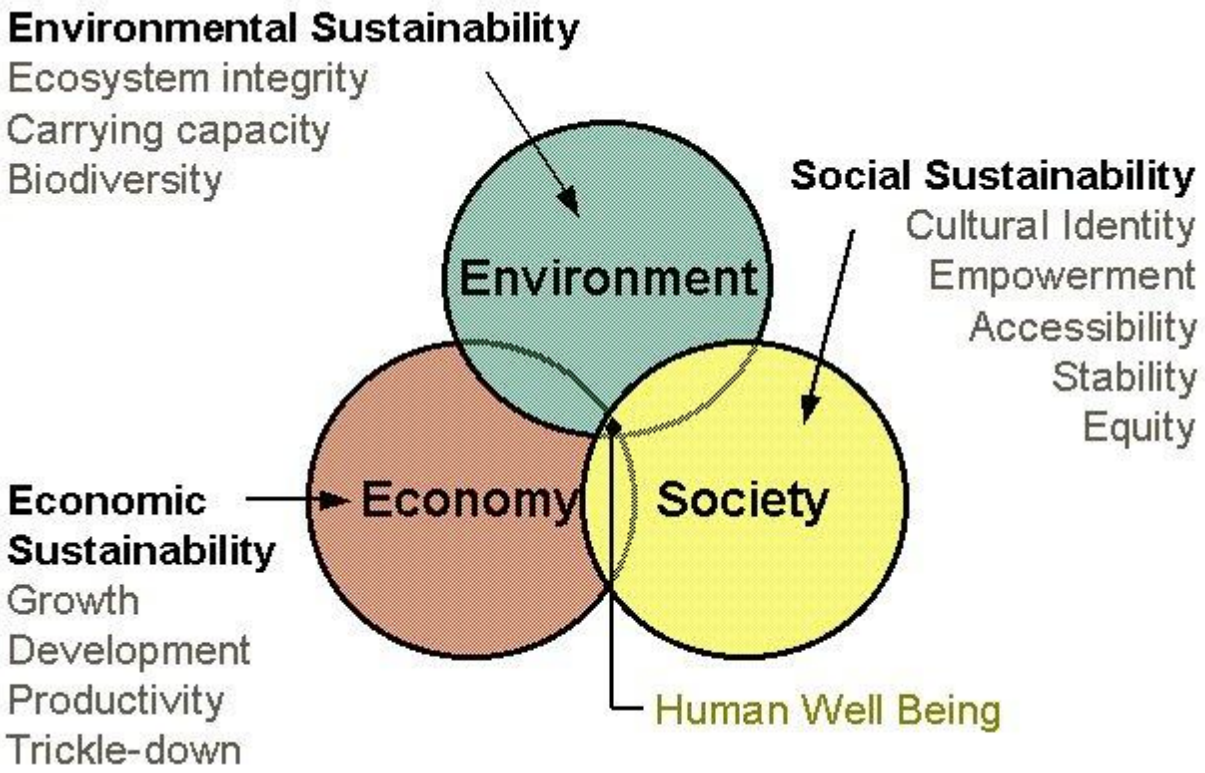

Figure2.3: dimensions of sustainable architecture

Source: www.architecturedecor.com

Table 2.2: Dimensions of sustainable architecture

Economic dimensions of Sustainability	**Environmental dimensions of sustainability**	**Social dimensions of sustainability**
Creation of new markets and opportunities for sales growth	Reduced waste, effluent generation, and emissions to the environment	Worker health and safety
Cost reduction through Efficiency improvements and	Reduced impact on human health	Impacts on local communities, quality of life

reduced energy and raw material inputs	Use of renewable raw materials	
Creation of additional added value	Elimination of toxic substances	Benefits to disadvantaged groups e.g. disabled

Table 1

i. Daylighting

Sports arenas that make use of natural daylight save money and resources. However, in certain instances, it has been stymied by glare, a problem caused by inadequately planned outdoor lighting. In order to avoid harsh sunlight from shining down on the court, transparent fabric panels may be used in sports arenas to dilute the sunshine coming in from the roof lights.

ii. Floor Requirements for Indoor Sports Arenas

The selection of an appropriate Sports floor surface may significantly impact a facility's overall performance, user attractiveness, compliance with the requirements of various Sports, and other objectives that may be stated. The most common flooring materials for sports arenas are semi-sprung hardwood, PVC carpet with chipboard or plywood underlay, PVC with foam backing, and rubbers or plastics in sheet form or placed in situ. British Standard 7044 calls for impact and energy absorption, which may be achieved using semi-sprung beech, beech veneer, and other composition and synthetic surfaces (Part 4). This choice will be heavily affected by the nature of the work. Part 1 of the British Standard (BS) 6399

specifies that sports floors must be able to support a concentrated load of 3.6 N/m2 for a brief period. Floors with a sprung construction

a. Sprung Floor

A sprung floor is equipped to absorb impact, making it ideal for use in dance and indoor sports by increasing agility and decreasing the risk of damage. Using a spring for liftoff or landing is an advantage athletes and acrobats have known for generations. As a result, this kind of flooring construction became standard for indoor sports arenas, beginning with the sports halls built for the 1936 Berlin Olympics.

A sprung floor's top layer is referred to as the "performance surface." In contrast, the other layers are sometimes called the "sub-floor" (although, confusingly, the term sub-floor may also be used to refer to the concrete or other material beneath a sprung floor). Some examples of high-performance flooring include pure vinyl, wood, poured urethane, polypropylene, interlocking tile, solid rubber, and vinyl composition tile (VCT).

Figure 14:Sprung floor

a. Other considerations for the selection of Sports flooring;

Assuming a general-purpose floor surface is suggested, it is important to ensure that the Sporting criteria are not compromised to an unacceptable degree by the presence of social or commercial activities. If the area is to be utilised for sporting events, it must conform to the relevant Sports specification. It is possible that a sports arena will also need to host other events, such as dances and discos, the Concerts, public events, including fairs and festivals, and school-based gatherings like assemblies and exhibits.

b. Sports Performance of floor surface

Sports have different requirements for the floor's performance attributes, and these requirements are usually associated with how the ball and/or the player interact with the floor. Measuring several physical parameters with specialised scientific equipment and comparing the results to established norms is sometimes required for a thorough examination. These points serve as a conclusion to the discussion:

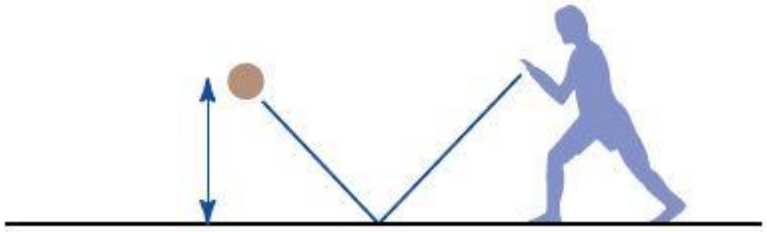

Figure 15: Projected rebound angle

The levels of vertical and angular rebound and spin characteristics must be appropriate for the proposed Sports.

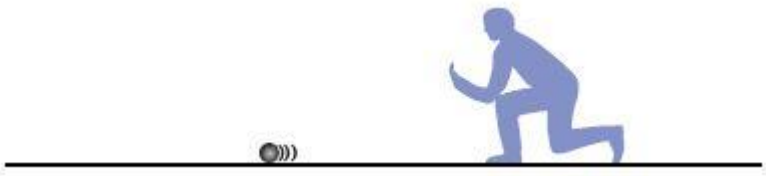

Figure 16: Consistent flat surface

All Sports require the surface to be sufficiently flat, level, and consistent so that play is unaffected by variables on the floor.

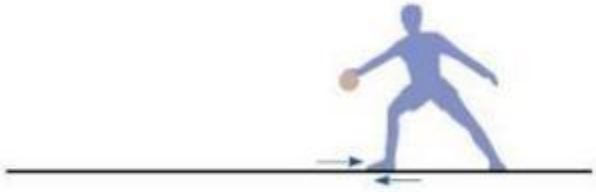

Figure 17: Floor Friction

There has to be enough friction between the player's shoes and the surface to avoid slipping, but not so much that it hinders the player's ability to move their feet in a straight line, make sharp turns, or perform the controlled sliding of the foot that is necessary in particular sports.

Stiffness: Resistance to deflection under load

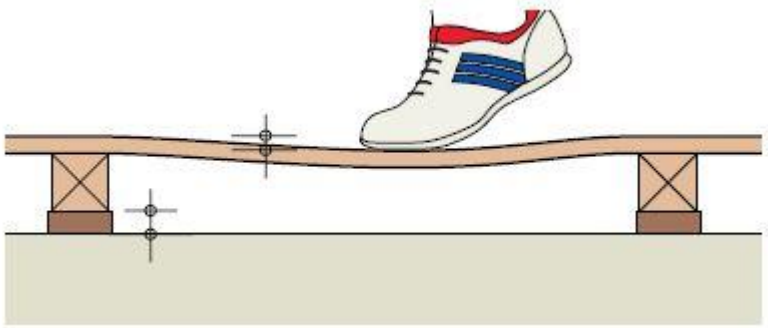

Figure 18:Resistance to deflection under load

The interaction between the surface and the player when running, landing, or falling is complex, involving the stiffness of the surface and its shock absorbency, the force of impact between the player and the floor surface, and the energy returned or lost to the player. For most Sports a moderate level of stiffness is desirable.

Types of elasticity

- Point elastic: deflection of surface concentrated at a point

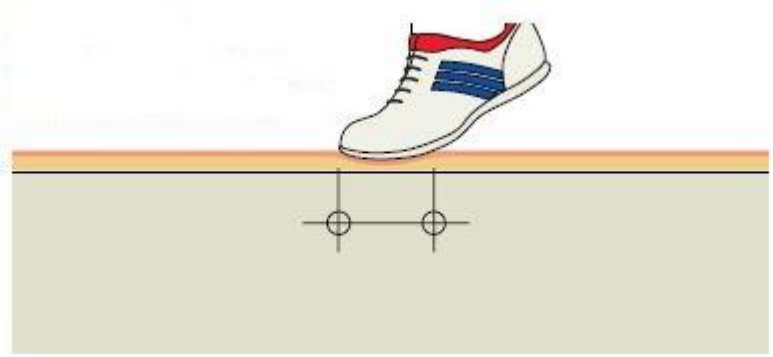

Figure 19: deflection surface

- Area elastic: deflection of the surface over an area.

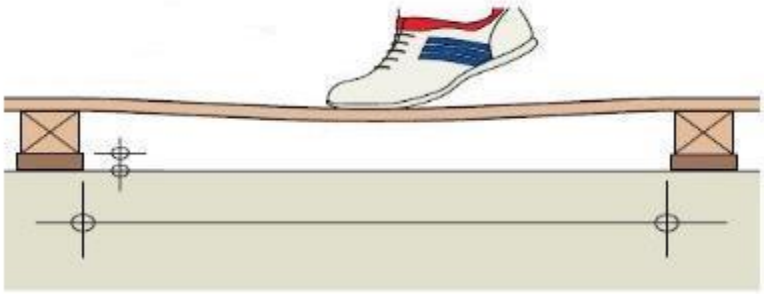

Figure 20:elasticity of the surface material

- Combi-elastic: deflection, both at a point and over an area

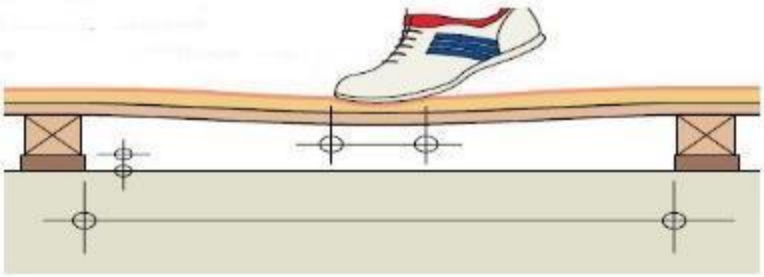

Figure 21: elasticity of the surface material

Performance Standards of Floor surfaces

The selection of Sports floor surfaces can be problematic. There are strong traditions in some Sports favoring particular types or manufacturers of flooring.

Table 2.3: Key requirements for indoor Sports surfaces.

Requirement	Property	Sport	Performance
Ball/surface interaction	Rebound resistance	Basketball	50% to 70%
		Handball	40% to 60%
		Netball	45% to 65%
		Soccer	25% to 50%
	Velocity change of rolling ball	Football	0.10m/s to 0.35m/s
Person/surface interaction	Traction coefficient		1.1 to 2.0
	Slip resistance		Between 60 and 140
	Peak deceleration		Peak g of 200 from drop height of less than 1m or shall be designated 'not impact energy-absorbing'
Durability	Abrasion resistance (wheel)		Loss not greater than 0.3g/1000 revs of abrasion machine and not through surface layer (method 1)
	Abrasion resistance (blade)		Loss not greater than 0.2g/2000 revs of metal abrasion blades (method 2)
	Fatigue resistance		No signs of cracking, tearing or delamination
	Low temperature impact resistance		No signs of cracking or distortion for class 0
	Spike resistance		Grade 2 rating for 6mm, 9mm and 12mm
	Resistance to indentation		3mm max for classes 0 and 1 after 1500 mins
Environmental resistance	Critical flux value		Surface shall have a critical radiation flux of 5kW/m² or be designated 'flammable'

Table 2 Source :(Extracts from BS 7044)

2.6 Types of Sports surface

Timber

Timber is one of the most widely used materials in the construction of Sports floor surfaces and is available in a variety of forms including:

- strips
- blocks
- composite boardings such as plywood or medium-density fibreboard (MDF)
- Composite tiles are made from timber particles and cement.

Floating floors

Hardwood on plywood: Hardwood strips on a two-layer deck of plywood supported on rubber shock pads over a moisture barrier on a concrete subfloor.

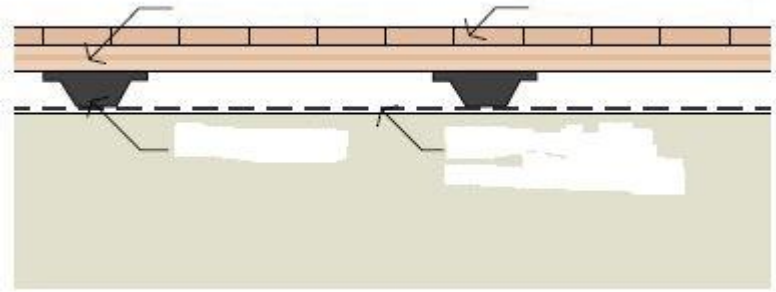

Figure 22: Composite material

Solid hardwood on battens: Hardwood strips supported by softwood battens on rubber strips or pads over a moisture barrier on a concrete subfloor.

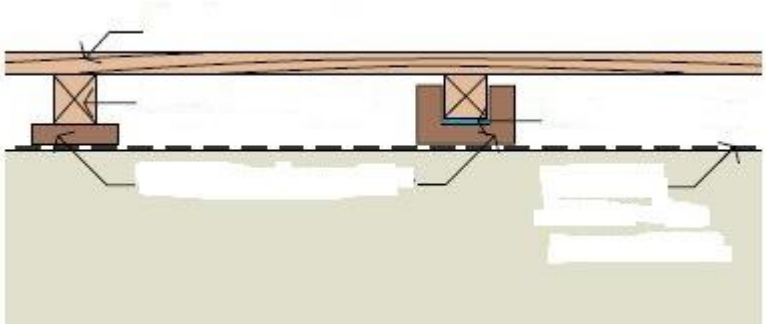

Figure 23:Connection of timber

Hardwood veneer on softwood core: Laminated timber planks with interlocking joints on rubber strips over a moisture barrier on a concrete subfloor.

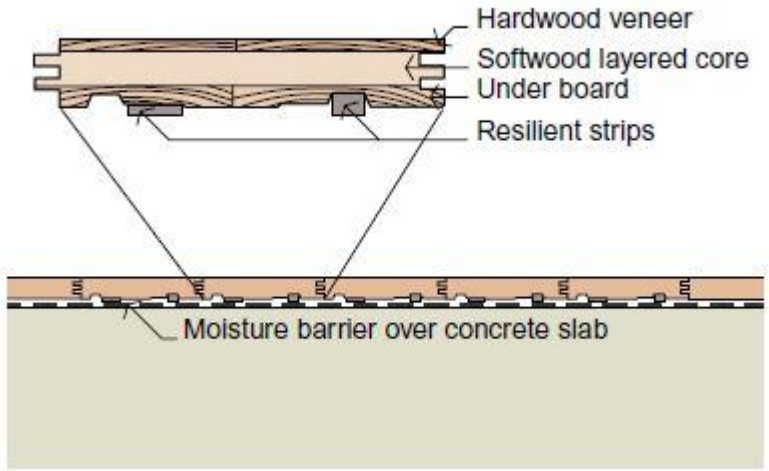

Figure 24:Floating floors

Sheet floors

Vinyl, linoleum, rubber, and composites are often used for sports floor surfaces, and they may be found in either sheets or tiles of varying thicknesses. Due to its absence of a foam backing or supporting structure, more care must be given during installation to hide any faults in the flooring underneath. Thin plastic sheets are offered with or without a 3- to 4-mm cellular plastic or rubber backing.

Skirting details

Most floor systems, particularly those using timber-based materials, need an expansion joint around the perimeter to allow for movement caused by changes in temperature or moisture levels.

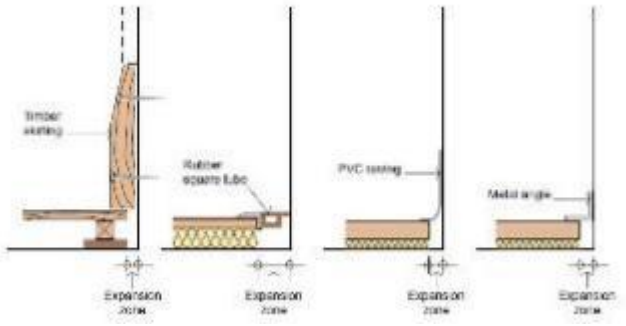

Figure 25: Construction Details

To sum up, an area elastic floor is essential for creating a pleasant and secure environment for sporting events. The finish chosen for a hall has to accommodate a variety of uses, not only sports, therefore it needs to be versatile and aesthetically pleasing.

- Sports facilities must have a surface that can absorb impact energy, as specified by British Standard 7044 (Part 4).
- The requirements of the British Standard may be met by using materials like as semi-sprung beech, beech veneer, and varied composition and synthetic surfaces.
- A reflectivity value of 40%–50% is ideal, and the colour chosen should contrast with the walls.
- Roller skating has unique requirements on floor finish, including the use of support beneath all board joints and the installation of a hardwood surface. The hall is not a place for rollerblades or other street skates.

i. Colour and court markings

It is important to consider the overall design of the space and the necessary lighting when deciding on a colour for the sports floor. Light reflectance should be between 40 and 50%, and there should be a noticeable difference between the wall colour and the court lines.

To prevent chaos in multi-sport arenas, a wide colour palette is essential.

It is important to plan the placement of court markings so that lines do not overlap or go too near to one other. Careful preparation is required to ensure that lines do not overlap while marking the floor.

Table 2.4: Recommended court markings and width

Sport	Line colour	Width
Hockey	Blue or other	50mm
Indoor hockey	Light blue	50mm
Netball	Red	50mm
Volleyball	Green or other	50mm
Five-a-side football	Other	50mm
Basketball	Black	50mm
Tennis	Yellow	50mm
Badminton/ short tennis	White	40mm

Table 3

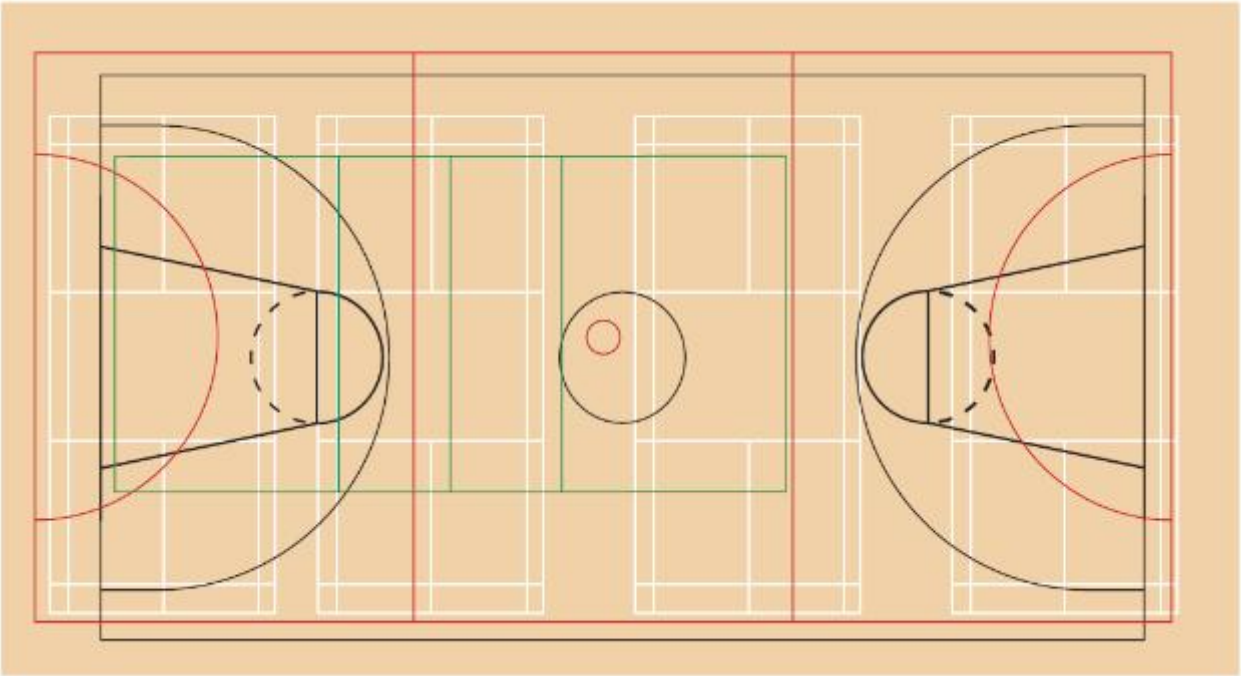

Figure 26:Typical 33 x 18m multi-purpose Sports hall layout

ii. Sports Equipment

The majority of gym equipment is either freestanding or hung from the ceiling or walls. Some devices, however, need for permanently installed floor sockets, which must be covered with a flat non-slip plug while not in use. A few examples include goal posts for hockey, volleyball, tennis, gymnastics, anchors for fencing arenas, goal posts for five-a-side football, etc.

Table 4 Schedule of loose equipment for an indoor hall

Badminton	4 sets posts, 4 nets, 2 spare nets
Bowls	4 short mat carpets, rolled, each 1.83 long x up to 0.5m diameter
Five-a-side football	1 pair portable goals with anchor points, each 5 x 1 x 1.2m
Handball	1 pair goals, each 3 x 2m
Hockey	1 pair goals, each 3 x 2m
Gymnastics	range of apparatus with anchorage points and floor mats
Judo/karate	mats, each 2 x 1m (one 14x14m matted area requires 98 mats)
Trampoline	2 trampolines, folded, each 3.040 long x 2.300 wide x 2.220m high
Netball	1 pair adjustable posts, each 3.05m high
Table tennis	6 tables, folded, each 1.855 x 1.830 x 0.65m, nets and supports
Team benches	2

iii. Equipment storage

Adequate storage space of suitable proportions, sited in the correct location, is essential for the efficient operation of multi-Sports halls. A total of 12.5% of the hall floor area is required as a minimum for Sports equipment. Stores must have easy access from the hall with wide door openings.

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iv. Circulation

Having a well-planned and accessible circulation system is essential for a successful sports centre. Corridor widths must be at least 1.2m (4ft) in length, though 1.5m (5ft) is preferred. There should be handrails along all major walkways.

Turnstiles are the most common type of entry control system, and there are many varieties available. A well-designed turnstile system will help limit access, maintain order, and keep onlookers safe. Turnstiles in modern buildings should have ramps or elevators for the disabled unless there are other entrances specifically marked for them.

Prioritizing individual regulated access and rapid independent circulation from the exterior entry points to each user's final destination inside should be at the forefront of the circulation design process before, during, and after a match.

v. Concourses

Inside the Sports hall, the concourses serve as the walkways for visitors to make their way to their seats. In the case of an emergency, spectators will need to be able to quickly and easily exit the arena, and the concourses must be spacious enough to accommodate this.

vi. Gangways and vomitories

Dormitories are covered stairwells and corridors that connect the indoor bowl to the main concourse.

Stepped walkways called gangways connect the various tiers of spectator seating.

The dormitories and gangways should be laid up to facilitate the smoothest possible traffic flow under normal circumstances, and should also be able to handle larger numbers of people in the event of an emergency. Measurements in these key areas must be precise in order to pass safety inspections.

vii. Seating

The seating is in the form of individual seats organized in rows, and the rows are staggered such that everyone in the stadium has a good view of the field. viii. Measurements for the breadth and depth of each seating row

Comfort, security, and capacity are the three most important criteria in determining the best dimensions for a row. The size of the hall will be determined by the difficulty of finding a happy medium between capacity and comfort.

ix. Count of Individual Seats in a Row

The security and ease of movement of spectators is directly related to the number of seats in a row. It is not uncommon for a row to include anything from 25 to 28 seats. When not in use, they should be able to be tilted up to open up more space in the gangway.

x. Vision clarity (or C-value)

Commonly referred to as a "sightline," the C-value describes how clear it is for a spectator to see the person in front of them. The general rule is that the greater the C-value, the more unobstructed the view will be for spectators. However, if the C-value is raised, the hall's dimensions can change as well.

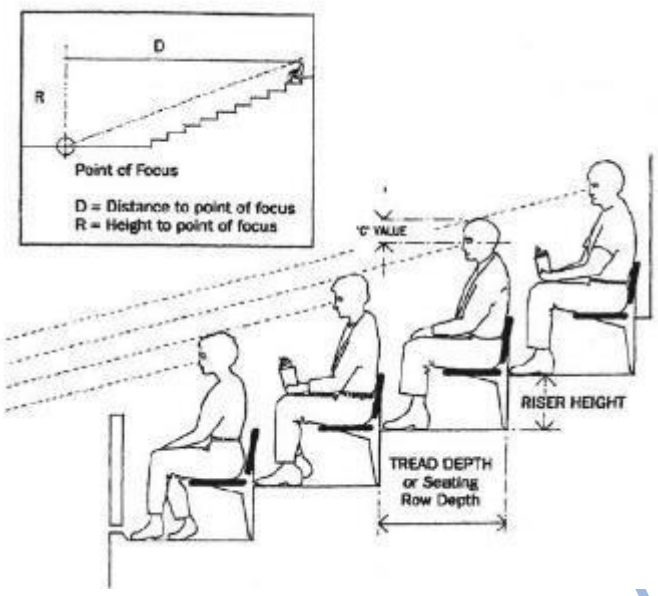


Figure 27: Sightliness

Source: Metric handbook

The calculation to determine the 'C' value for viewing Sports is, therefore:

$$C = \frac{D(N+R)}{D+T} - R$$

Where:

C = viewing standard i.e. the 'C' value

D = horizontal distance from eye to point of focus (typically the near touchline)

N = riser height of each row of seats

R = vertical distance between individual eye level and point of focus

T = tread depth, i.e. depth of seating row.

While this calculation is straightforward, it has to be made for every row of seating and from every variable that the stadium design presents (e.g. rake or angle of stand,

curvature of particular corner or height and depth of concrete treads and risers). To produce a good C-value, the distance from the spectator's eye level to the top of the head of the spectator immediately in front should be between 120mm (ideal) and 90mm (acceptable).

2.7 Examples of Indoor Sports and their benefits

Basketball: One of the most widely played team sports in the world, basketball is second only to soccer in terms of overall participation. There are 10 total players in a basketball game, split evenly between two teams of five.

Figure 28: Basketball game

2. Swimming: Recreational swimming is a wonderful exercise because it allows us to use our limbs to propel us through the water. If you want to maintain a healthy body and improve your fitness, swimming is a great way to do it. It revitalizes stamina, boosts blood flow, and enhances muscular and cardiovascular fitness.

Figure 29:Swimming

3. Boxing: Boxing is one of the most popular and celebrated Sports. It is the act of fighting with fists by using boxing gloves in a boxing ring.

Figure 30:Boxing Match-Mayweather vs Klitschko

4. Volleyball: Volleyball is a game played by two teams of six players each on a rectangular court divided by a high net, in which each team tries to ground the ball on the

other team's court. Our body has many benefits from playing volleyball, a few of which are burning excess fat, improving hand-eye coordination, and providing physical fitness.

Figure 31: Volleyball match

5. Chess: One of the oldest games being played today, chess has achieved legendary status. The aim of the strategy game of chess is to checkmate the opponent's king with one's own set of 16 chess pieces. Chess is employed as a form of therapy for a wide range of conditions due to its positive effect on cognitive growth.

Figure 32: Chess game

6. Badminton: The shuttlecock in badminton is volleyed back and forth over a low net using rackets. Badminton is excellent for your heart since it lowers "bad" cholesterol while raising "good" cholesterol when played regularly. The cardiac muscle is fortified, blood pressure is lowered, and hypertension is avoided. Playing badminton is a great way to maintain your drive, fitness, and health.

Figure 33:Badminton

8. Table tennis: Playing table tennis is popular all over the world. Both the physical and mental benefits are numerous. It enhances balance, flexibility, weight loss, motor skill development, focus, and brain function. Due to the strategic difficulties provided by the game, table tennis is frequently referred to as "high-speed Chess."

Figure 34 Table tennis

9. Bowling: In the Sport of bowling, a ball is rolled down a lane toward a row of pins. Nowadays, resin balls are the most often utilized type of balls. Professional bowlers compete at the highest levels. It offers several health advantages, such as encouraging muscular growth, aiding in weight loss, and strengthening and toning muscles.

Figure 35: Bowling arena

10. Squash: Squash is a game played in an enclosed court by two or four players who strike the ball with their rackets and hit onto playable surfaces of the walls of the

court. Squash is an exceptional promoter of cardio-respiratory fitness, muscle endurance, strength and speed, flexibility, and a low percentage of body fat.

Figure 36:Snooker

11. Billiard/Snooker: On a pool table, 15 red balls, 6 other balls of various colors, and a white cue ball are used to pot the other balls in the game of snooker. If you are strong at this game, some of its advantages include developing self-confidence and improving focus and coordination.

Figure 37: Snooker

Source: www.google.com/billiardsgame

12. **Floorball**: Floorball, a variant of floor hockey created in the 1970s in Sweden, is an indoor team sport. Indoors on a basketball court or a hardwood surface or rubber mats.

Figure 38: Floorball match

Source: www.google.com.floorballgame

13. **Gymnastics:** A gymnast's physical endurance, flexibility, power, agility, coordination, elegance, balance, and control are all tested to their limits as they perform complex routines. Traditional events for female gymnasts include the vault, balancing beam, uneven bars, and floor exercises. Gymnastic events for male competitors include the floor exercise, pommel horse, still rings, vault, parallel bars, and high bar.

    Additional forms of gymnastics include trampoline, team Gym, tumbling, rhythmic gymnastics, aerobic gymnastics, and acrobatic gymnastics.

14. **Five' a side**: "five-a-side," football is a variation of association football in which each team consists of five players: four outfielders and a goalkeeper. Also different from football are the shorter games, smaller goals, and tighter field dimensions. Games may be played either inside or outdoors, on AstroTurf or artificial grass fields that may be enclosed behind a barrier or "cage" to prevent the ball from leaving the playing area and maintain the game's tempo.

Figure 39: Five-a-side football game

Space requirements/Anthropometrics

Sizes and technical aspects of services (scale and equipment)

Below are lists of the functional requirements of the various uses of an indoor Sports center for academic institutions of international standards in terms of space, structure, and health and safety regulations, as given by Konya (Konya 1986) and Neuferts (Baiche 2006).

Sports halls

1. multi-purpose halls

British standard: 36.5m x 19m x 9.1m high

German standard: 45m x 21m x 7m high

2.8 Sports types

1. Badminton

- 13.4m x 6.1m court size with a minimum of 1.5m extra space around it for all standards of play
- Minimum ceiling height of 7.6m

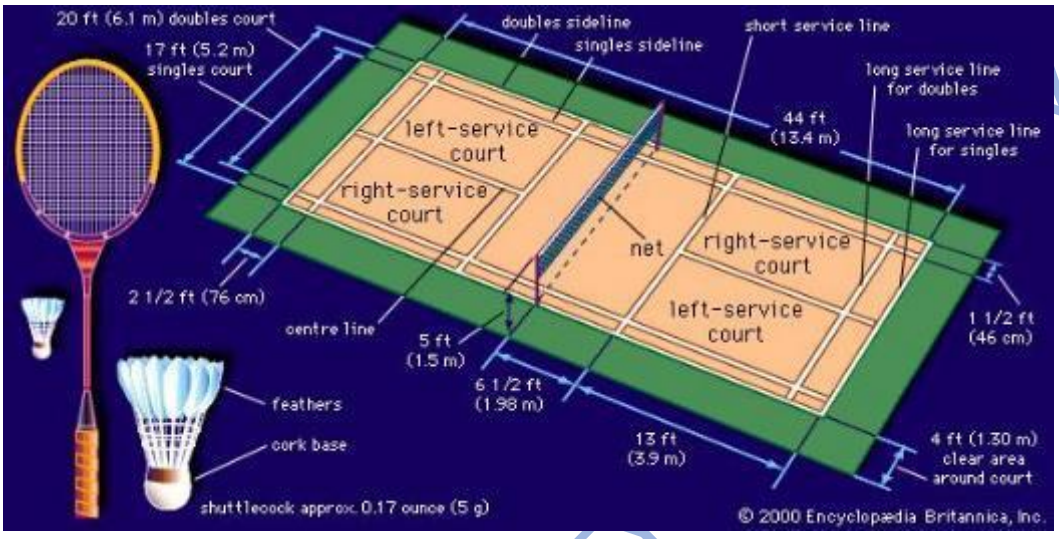


Figure 40:Badminton Court Dimensions

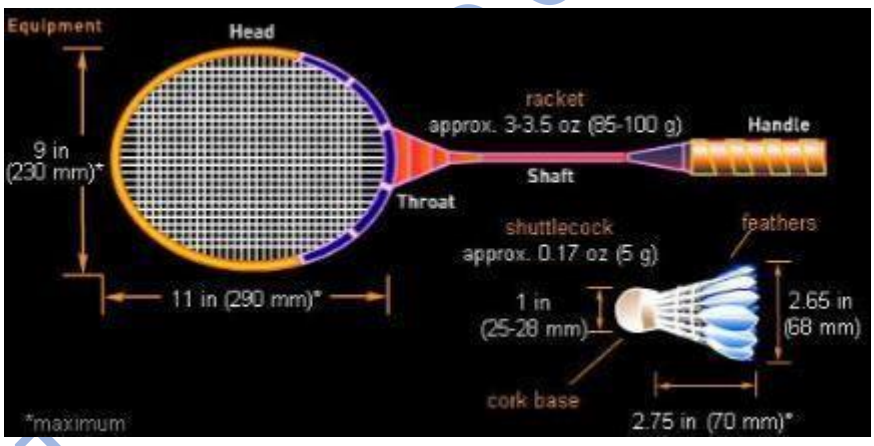


Figure 41: Badminton racket and cork dimensions

2. Basketball

- 26m x 14m court size with 1.5m and 3m at each end if possible.
- Minimum ceiling height of 7m

- The best view for spectators is from the side which should be at least 2m away from the court edge.
- Storage is required for two nets, their backboards, and a stand, which will take up 4.5m x 2.5m x 4m high space.

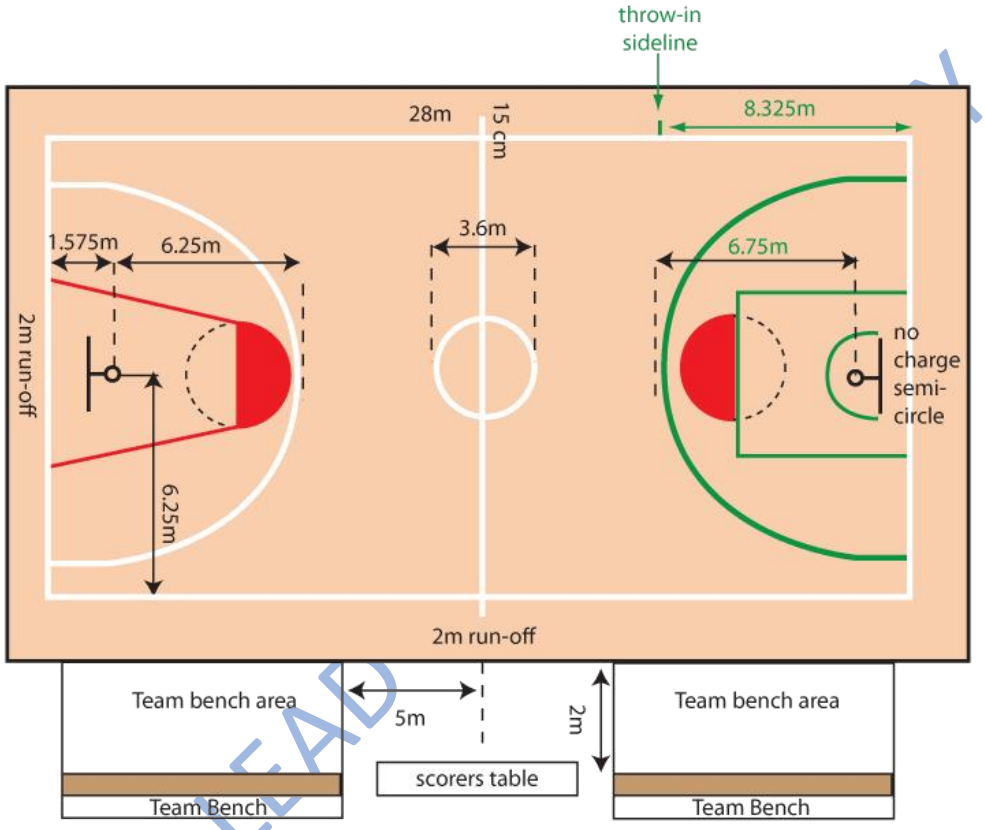


Figure 42:Basketball court dimensions

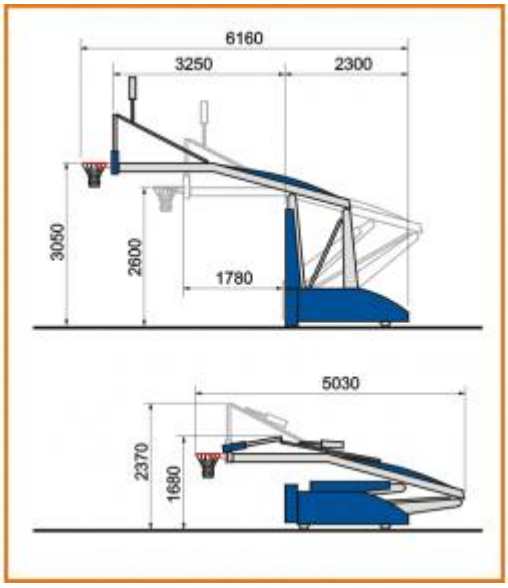


Figure 43:Basketball net dimensions

3. Boxing

- Maximum 6.1m x 6.1m square raised ring for contests with minimum 1.2m circulation space between ring and spectators required.
- 130m² area required with spectators
- Storage necessary for a raised ring or floor mat, corner post, and ropes

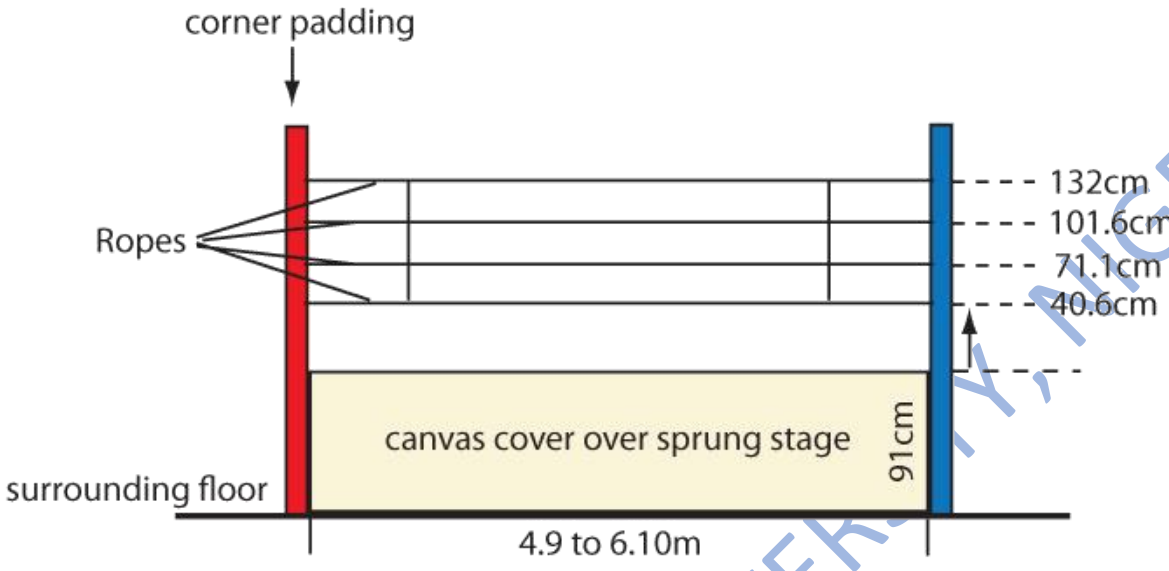


Figure 44: Boxing ring dimensions

Source: www.google.com/boxingringdimensions

4. Gymnastics

- 36.5m x 26m x 7.6m floor space for competitions required
- A permanent area for gymnastic practice is preferable as the equipment is large and cumbersome and time and effort are saved if permanently installed
- A large storage area will be required for the competition hall to store Equipment

5. Five-a-side football

- The minimum area required is 30m x 18.5m with a maximum of 36m x 28m
- The best viewing is from the gallery
- Storage of 6.5m² x 1.2m high for each set of portable goalposts and portable walls

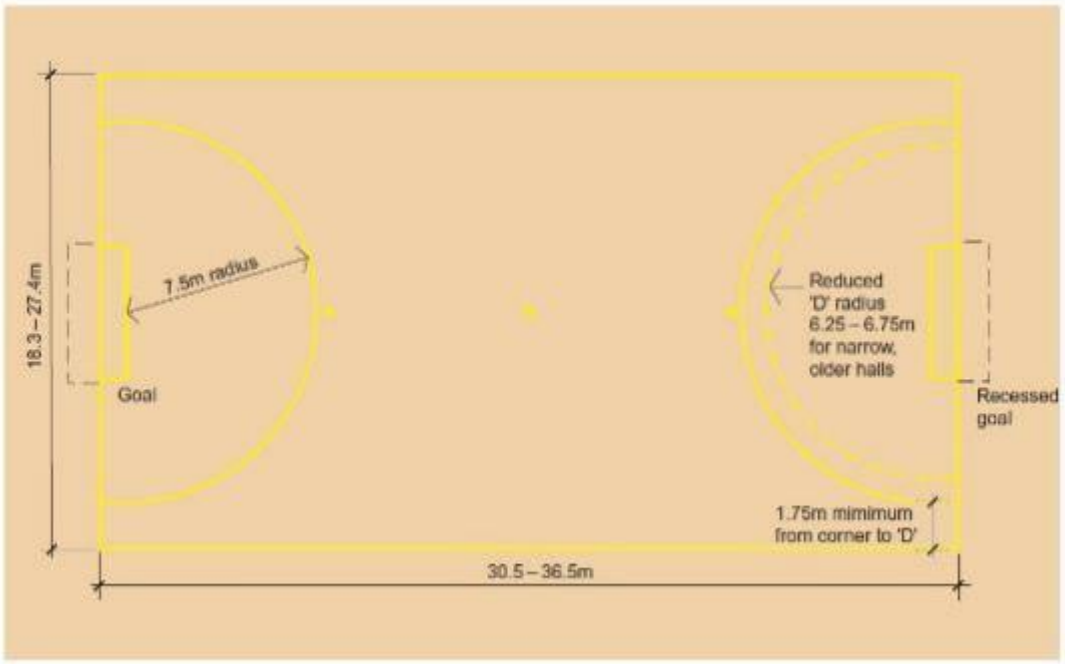


Figure 45:Five-a-side court dimensions

6. Table Tennis

- The table size is 2.74m x 1.52m
- 14m x 7m overall space required for players
- Up to 9 tables to be used for tournaments
- Best viewed from sides
- Storage necessary for tables

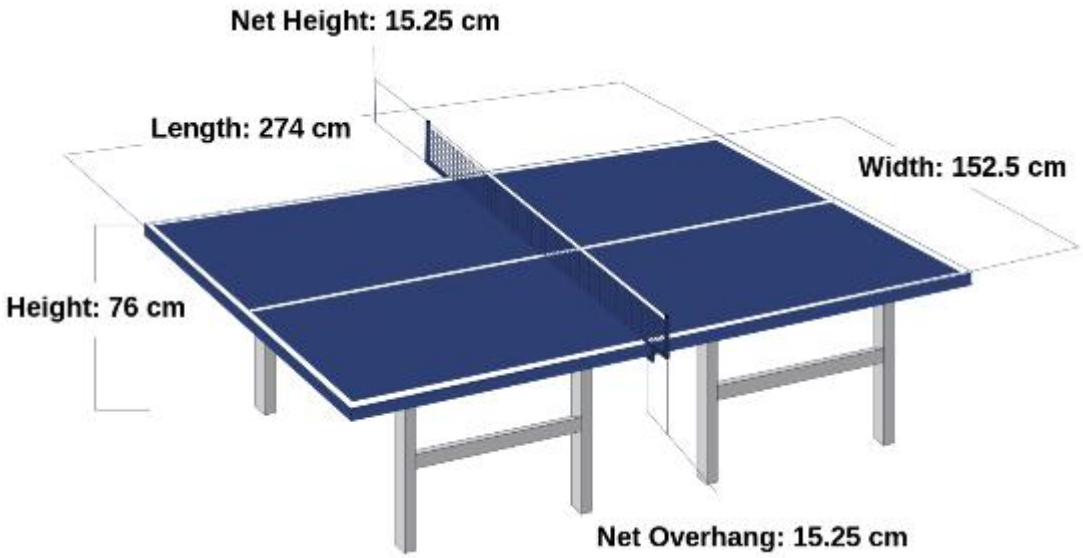


Figure 46:Table tennis table top dimensions

7. Trampoline

- The size of the trampoline is 5.2m x 3.05m with a clear space of 3m on each end and 2m on the sides
- The minimum floor to ceiling height is 7m
- Storage necessary for trampolines on roller stands and safety nets

8. Volleyball

- 18m x 9m court size with a 5m long side and 8m short side obstruction-free zone
- A 12.5m clear ceiling height is required
- Storage is necessary for the net about 1m long by 300mm in diameter when rolled up

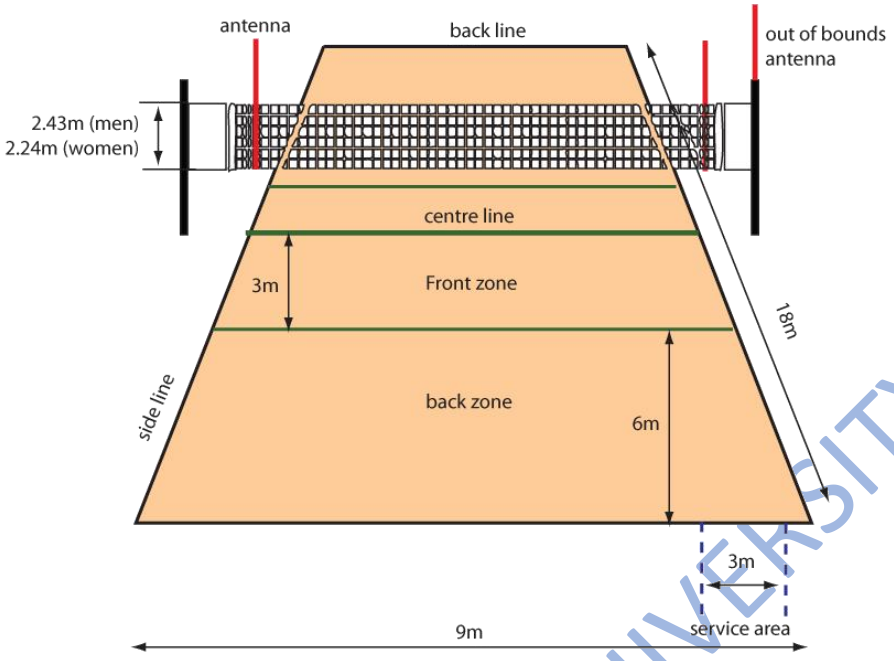


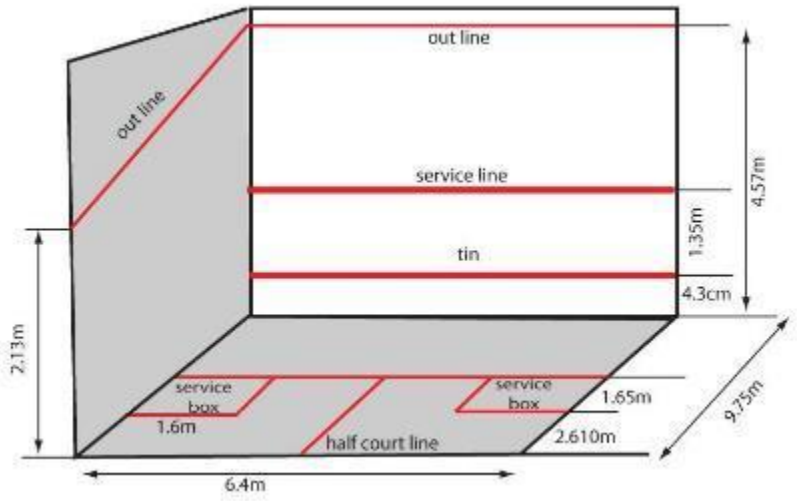
Figure 47: Volleyball court dimensions

Specialist facilities

The following Sports types could be accommodated in the main hall, but due to the nature of the area required, it may rule out concurrent use of the hall:

1. Squash

- 9.754m x 6.4m x 5.8m high court size with additional space for spectators behind the glass back wall or on the gallery.
- There are cost advantages to placing courts side by side with common party walls and a continuous linear gallery for spectators.
- The door to the court must be centrally placed in the back wall and set flush with no protrusions inside.
- For match play, there should be a provision for a referee to stand above the center of the back wall with an unobstructed view of the court.



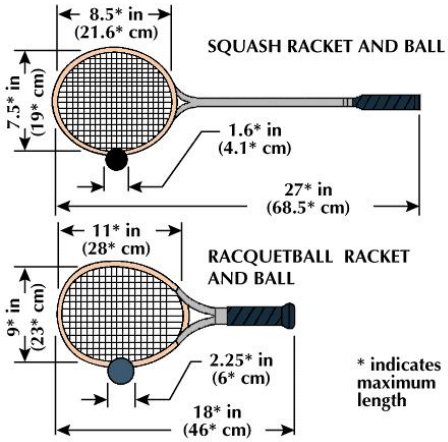


Figure 48:Squash court and racket dimensions

2. Gymnasium

- A dedicated gymnasium is advisable in light of the permanently installed equipment which is impractical to move.
- Aerobics can be accommodated in the same space if there is a separate floor area.
- The gym must be accessible to changing rooms and, if possible, the sauna.

If the gym is to be operated as a private enterprise, an office and reception space are required.

FACTORS TO BE CONSIDERED

WHEN CHOOSING A FLOORING SYSTEM

USAGE

- Basketball
- Handball
- Volleyball
- Soccer
- Hockey fitness
- Squash
- Tennis
- Exhibition, concert
- Mobile grandstands
- Multi-purpose

SITE CONDITION

- New building or renovation
- Current surface
- Current surface sub-floor
- Permissible floor thickness

TOP-LAYER APPEARANCE

- Hardwood
- Synthetic

CARE AND MAINTENANCE

- Easy to maintain
- lifetime/durability
- intensity of usage

SURFACE FINISH

-Depending on the type of Sports

PERFORMANCE

-Building requirement standards

FLOORING SYSTEM

Area elastic flooring

Point elastic flooring

Combi elastic flooring

Figure 49:BOEN Sports flooring system 2009

Chapter 3

Methodology

3. Introduction

This research has employed a qualitative approach in processing the work. It involved both Primary and secondary sources of data collection. Primary sources included field observations and case studies while secondary sources included literature materials from the internet; journals, articles, and books.

3.1.Case Study

Case Study 1

Name Indoor Sports Hall, Obafemi Awolowo University, Ile Ife, Osun State.

Location: Obafemi Awolowo University Ile-ife, Osun State

Capacity: +/_ 300 seating

Features: Training rooms, committee room, equipment storage room, retail shops, Male and female toilets, 2nos staff Changing room, 2nos lecture rooms, Multi-purpose court, spectators seating, exercise physiology laboratory.

Description: OAU indoor Sports hall comprises 3 halls Namely: Main Hall, Squash Court, and Table tennis hall

Merits:

- Harmony between adjoining facilities

Demerits

- The design of the Sports hall does not cater to appropriate indoor Sports flooring for multipurpose Sports.
- Functional but obsolete indoor Sports hall in terms of materials, equipment, and planning arrangements
- Functional spaces are too far apart
- Inappropriate or undesirable performance floor finish is used. It would have been better if a semi-spring wooden floor finish is employed as the floor surface finish
- Functional spaces are not properly located to serve their functions; an example is that the athletes changing rooms are located on the first floor instead on the ground floor.
- The seating capacity is too small such that it will encourage only a few spectators

Figure 50: Site Location map of O.A.U Sports hall

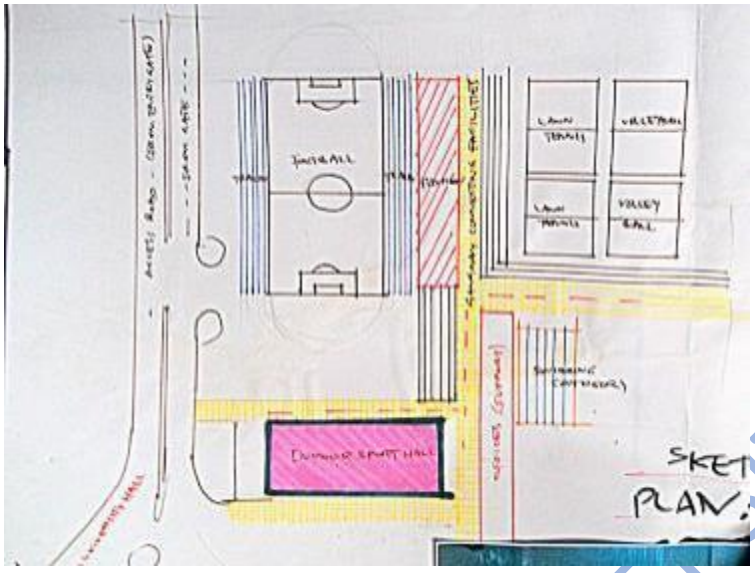


Figure 51:Site plan of O.A.U indoor Sports hall

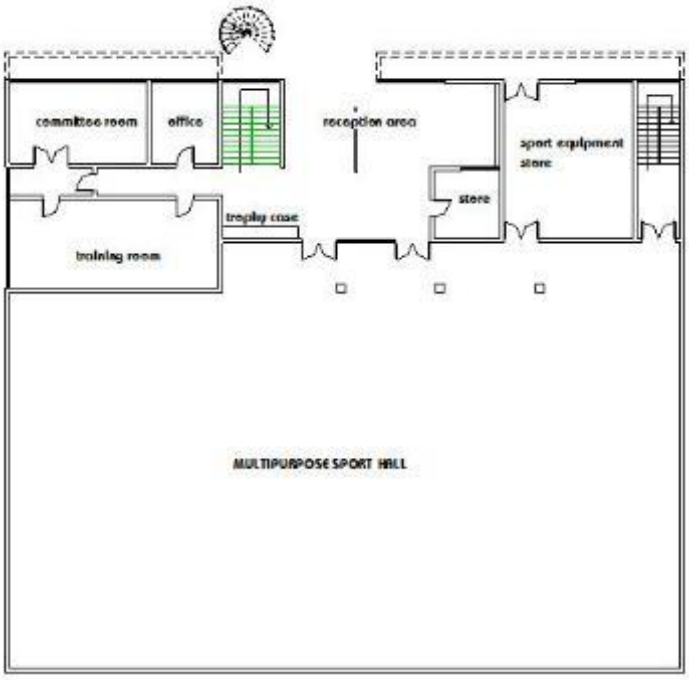


Figure 52:GROUND FLOOR PLAN

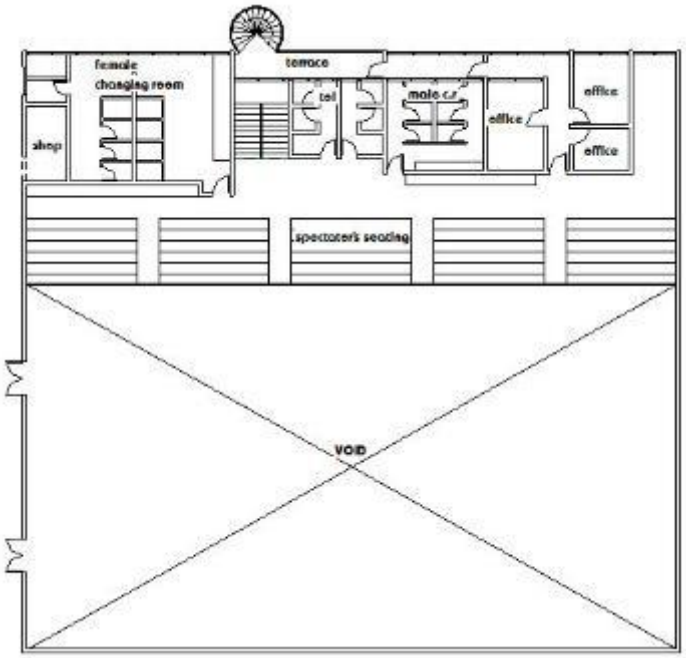


Figure 53:FIRST FLOOR PLAN

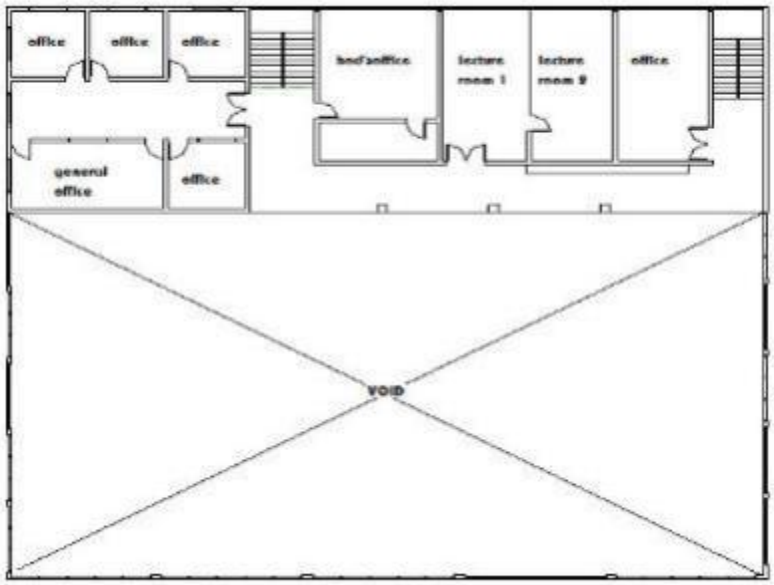


Figure 54: LAST FLOOR PLAN

Figure 55:interior view

Figure 56:OAU Multi-purpose court layout with color markings

Figure 57:Interior view of the multipurpose court, O.A.U Sports Hall *Figure 58: OAU Table tennis court Source: Author's field*

Figure 59: OAU gymnasium façade

Figure 60: Exterior view of approach, O.A.U. Sports hall

Figure 61: Exterior view of the rear, O.A.U Sports Hall. *Figure 62:Interior view of trophy case at entry/reception.*

Case study 2

Name: Campbell Sports Center, Columbia University, New York city

Location: Columbia University

Gross square footage: 48,000 square feet

Architect: Steven Holl Architects, 450 West 31st Street, 11th floor, New York, NY

Features: Training rooms, committee room, equipment storage room, retail shops, Male and female toilets, 2nos staff Changing room, 2nos lecture rooms, Multi-purpose court, spectators seating, exercise physiology laboratory.

Description: Few universities in America are as urban as Columbia University's; even its athletic facilities are located in Manhattan, huddled together in the claustrophobic Baker Athletics Complex near the northern tip of the island. According to William V. Campbell, a former Columbia football captain and head coach who is now an entrepreneur and trustee of the university, the rinky-dink facility "was not a welcome place" for many years. The facility was demoralizing for both its users—varsity athletes and coaches who had to travel five miles south to the main campus—and the neighborhood because it overlooked cinder-block equipment shed at Broadway and 218th Street.

A 48,000-square-foot structure named for Campbell and created by Steven Holl Architects for athletes and their coaches now occupies the corner, making it much livelier. The $30 million project was designed by Chris McVoy, a Columbia graduate and partner of Holl, who has taught architecture at Columbia since 1981 but has never before constructed for the institution. Together, they created a succession of gangly shapes that rise from the sloped site like a scissor lift.

The architects have constructed a gateway to the bigger complex by raising the west side of the building on shaky legs, providing vistas and access. The building's bulky forms also reference other elements of the city's rugged infrastructure that have fascinated Holl since he first moved to New York in the 1970s, including the Broadway Bridge, which spans the Spuyten Duyvil Creek from Manhattan to the Bronx, the elevated subway tracks, and other

structures. The structure is like "a train that jumped the tracks," according to McVoy. That train is covered in sandblasted aluminum in many places to simulate the industrial buildings to the east. The prewar brick flats to the south are reflected in the glass of the remaining portion. The zigzag stairs hanging off the front facade and their laser-cut aluminum balustrades, which represent a particularly challenging play, are another embodiment of the football coaches' diagrams, according to McVoy. Along with these features, the architects added terraces and nooks to the building to extend it out to the fields and the community.

A focus point inside is a strength and conditioning room that is surrounded by offices on the mezzanine level. A lecture hall with seats big enough for the strongest football players is located above, along with a hospitality suite for visiting alumni, a student lounge, and a study room (according to McVoy, there is only one firm that makes them this size). The Baker complex's "back of house" function is communicated by the building's muscular, exposed structural elements and utilitarian finishes throughout the interiors. Ample daylighting and framed views animate the rooms, which evoke capsules suspended over playing fields and the rough edges of the borough's periphery.

And how about creating views? The industrial style and the awkward shape of the building may take some getting used to for the middle-class residents of Inwood. However, the building exhibits a sense of context and community. The nearby public waterfront park, Boathouse Marsh, created by James Corner Field Operations for the school, will shortly be unveiled. That level of public access won't ever be provided by Campbell. But it is as hospitable as a farmhouse can be with its jovial stature and a hazy indication of open arms. In addition to providing for the demands of varsity athletes, Holl and Columbia have raised the architectural profile of a frequently ignored building type and area of New York City.

Figure 63 Road View

Figure 64 Road View

Figure 65: Interior part of the center

Figure 66: Training Area

Figure 67: Bird Eye View area

Figure 68: Stair case

Figure 69 wall panel

Figure 70: wall panel finishes

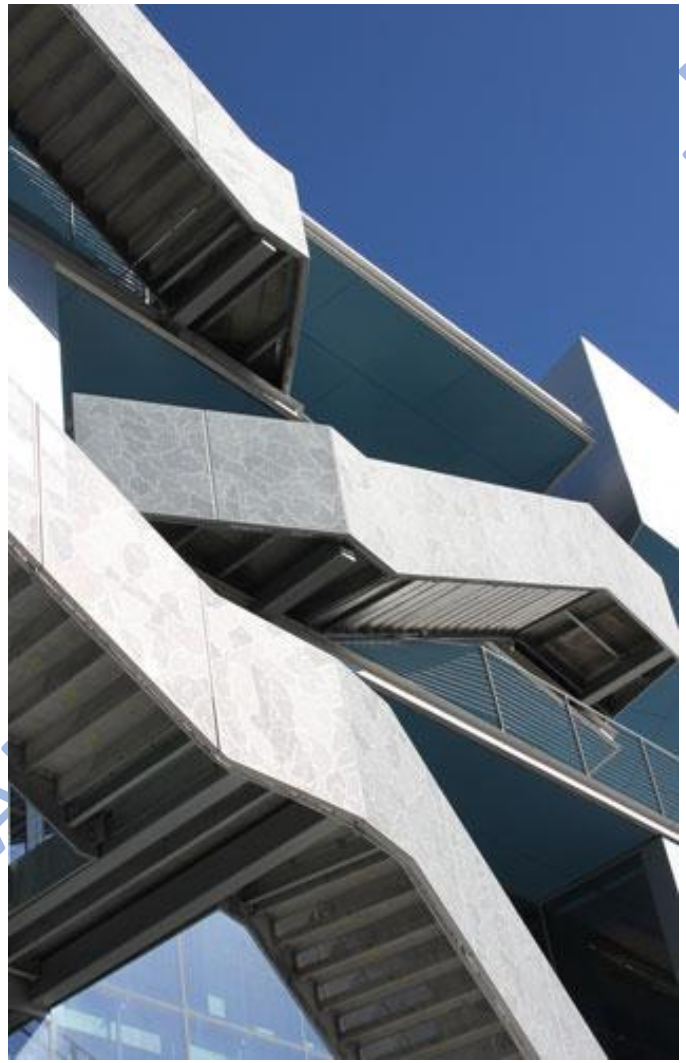
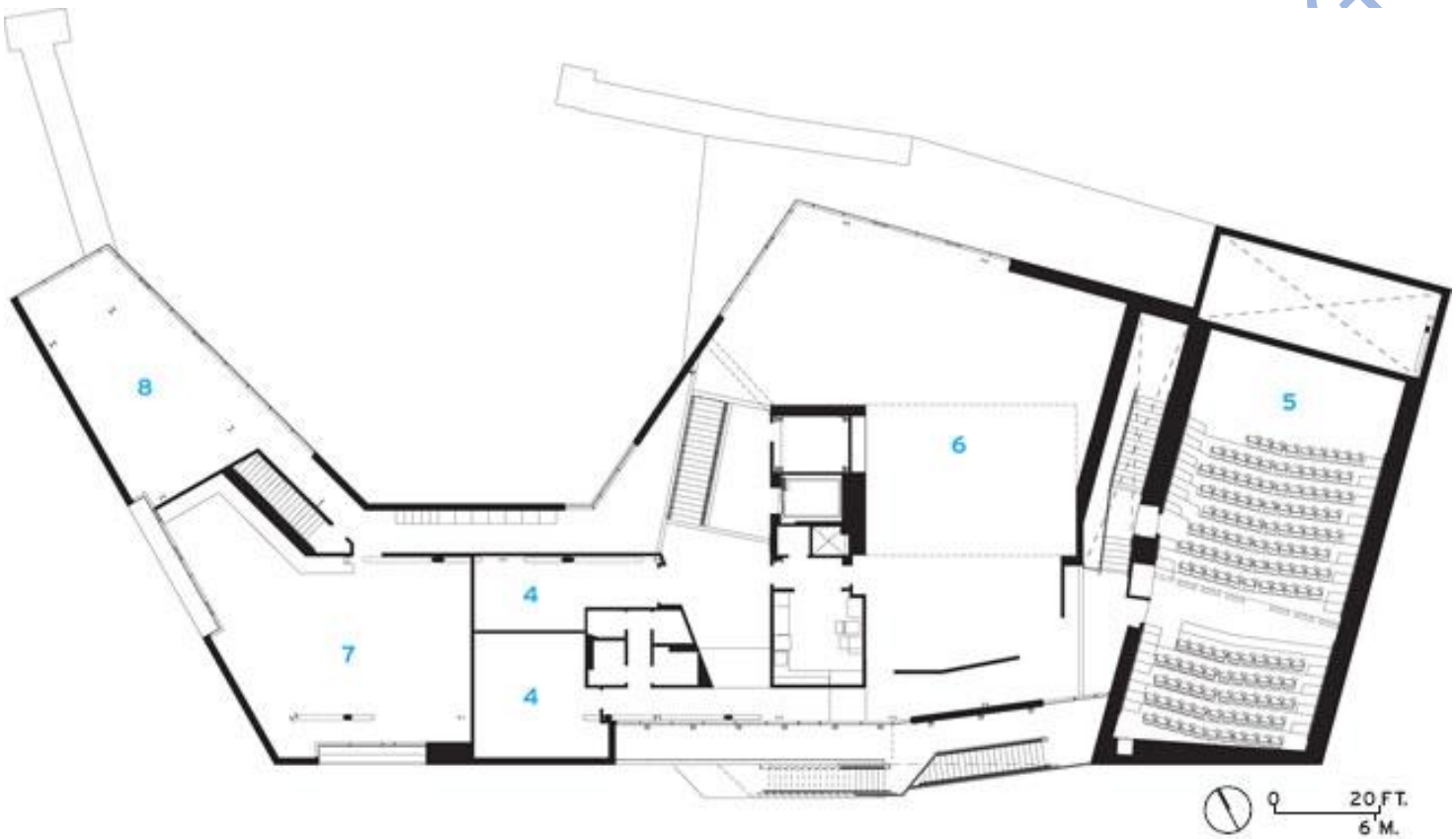


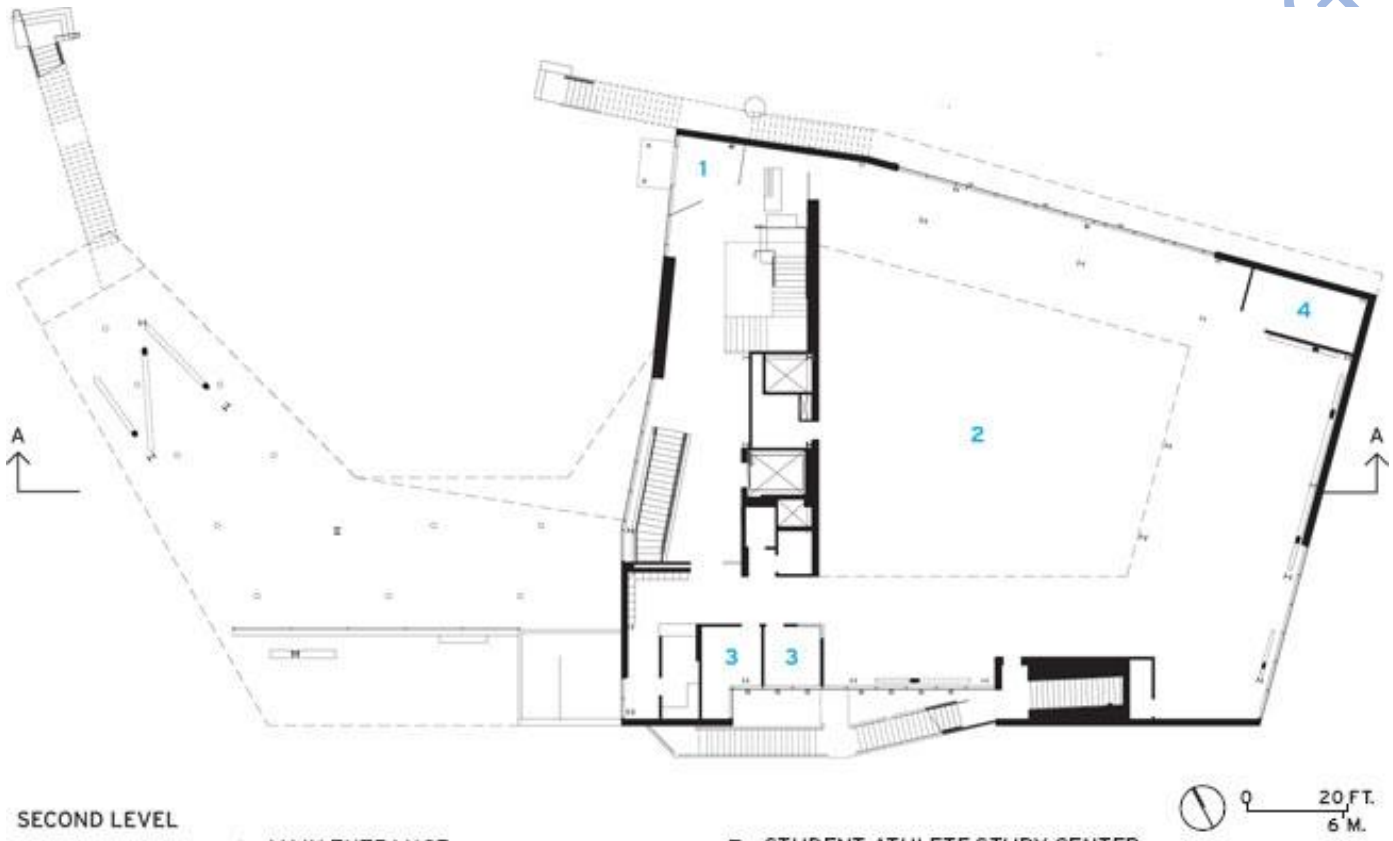
Figure 71: Stair View



TOP LEVEL

1 MAIN ENTRANCE
2 STRENGTH AND CONDITIONING
3 OFFICE
4 STORAGE/MECHANICAL
5 AUDITORIUM
6 HOSPITALITY SUITE
7 STUDENT-ATHLETE STUDY CENTER
8 STUDENT-ATHLETE LOUNGE
9 FOOTBALL SUITE
10 VARSITY COACHES' SUITE
11 FIELD MAINTENANCE

Figure 72: Ground Floor Plan



SECOND LEVEL

1 MAIN ENTRANCE
2 STRENGTH AND CONDITIONING
3 OFFICE
4 STORAGE/MECHANICAL
5 AUDITORIUM
6 HOSPITALITY SUITE
7 STUDENT-ATHLETE STUDY CENTER
8 STUDENT-ATHLETE LOUNGE
9 FOOTBALL SUITE
10 VARSITY COACHES' SUITE
11 FIELD MAINTENANCE

Figure 73: First Floor Plan

1 MAIN ENTRANCE
2 STRENGTH AND CONDITIONING
3 OFFICE
4 STORAGE/MECHANICAL
5 AUDITORIUM
6 HOSPITALITY SUITE
7 STUDENT-ATHLETE STUDY CENTER
8 STUDENT-ATHLETE LOUNGE
9 FOOTBALL SUITE
10 VARSITY COACHES' SUITE
11 FIELD MAINTENANCE

Figure 74 Section

Case Study 3

Name:	Rudong Sports Center / TJAD
Location	Rudong County, Nantong, Jiangsu Province
Architects	TJAD
Location	Rudong, Nantong city, Jiangsu province, China
Category	Gymnasium
Manufacturers	DAIKIN, AACER

Description

The Rudong Sports Center is situated in Rudong County, Nantong, Jiangsu Province. A stadium, a fitness center, and a gym are all part of the proposal. Together with the cultural center group on the south side, it makes up the new district's cultural core and serves as the district's symbol. It will also play a significant role in the growth of the new district. The first part of the project was finished in 2018 after the TJAD design group won the design competition in 2012. Open space and community involvement are highlighted in the design. As a result, the entire planning strategy centers on a public Sports Park rather than architecture.

The open park has reduced the distance between residents and Sports and has created a lively

landscape area for the city. An overpass links the stadium and the gym. The structures are formed with curves and streamlined to reflect the force and beauty of sports, in contrast to traditional Sports facilities, which are always shaped like a bowl or a box. People's perceptions of space and the surrounding surroundings are altered by the white wave-like structure. The structures are covered in white metal plates, and the rooms are made bright and colorful by sunlight entering through the perforations in the skin and the skylight. Rudong Sports Center constantly adheres to the design principle of "shared and compact," rather than pursuing the complete range of functions mindlessly. We recommend combining the indoor arena and swimming pool into one structure to share the competition and training rooms and reduce the size of the building to avoid the repetitive construction of expensive Sports facilities. The 20,000 square-meter stadium has a 4000-seat indoor arena, a training hall, a 50-meter standard swimming pool (with 200 spectator seats), a 25-meter training pool, and a kiddie pool. A moon shape with high central and low sides is also utilized to closely wrap all the areas together to

prevent wasteful space, taking into account the varying scales of each space. The typical tendency in sports facility development is toward multifunctionality. Light & Sound's universal area and all-inclusive facilities are particularly practical for cultural and business activities. We appreciate the effective use of the available space and welcome any improvements in the future. On the ground floor, sliding doors divide the training room from the gym. When they are both open, the two spaces merge into one that can be utilized for exhibitions. We also offer a summer mode and a winter mode for swimming users; during the summer, all three pools are available simultaneously. While in the winter, when there are fewer visitors, the pool area can be divided into two sections using partition walls and glass doors to ensure that the smaller pool can be opened and to lessen the demand for floor heating and air conditioning at the same time. The fitness center's indoor atrium is also available for business and cultural events like exhibits. In the future, the fitness center's rooms can all be decorated to serve a variety of

purposes.

Figure 75: Bird eye View

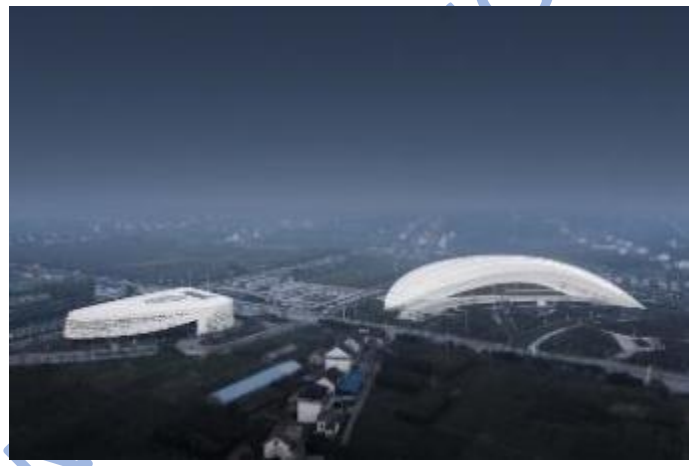


Figure 76: Aerial View

Figure 77: Aerial View

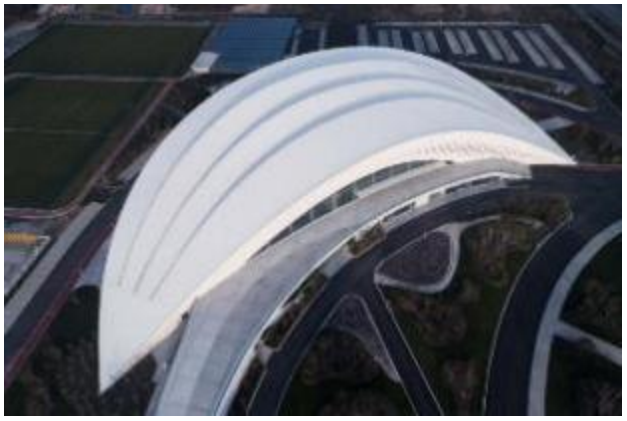


Figure 78: Aerial View

Figure 79: Roofing Materials

Figure 80: Roofing Materials

Figure 81 Aerial View

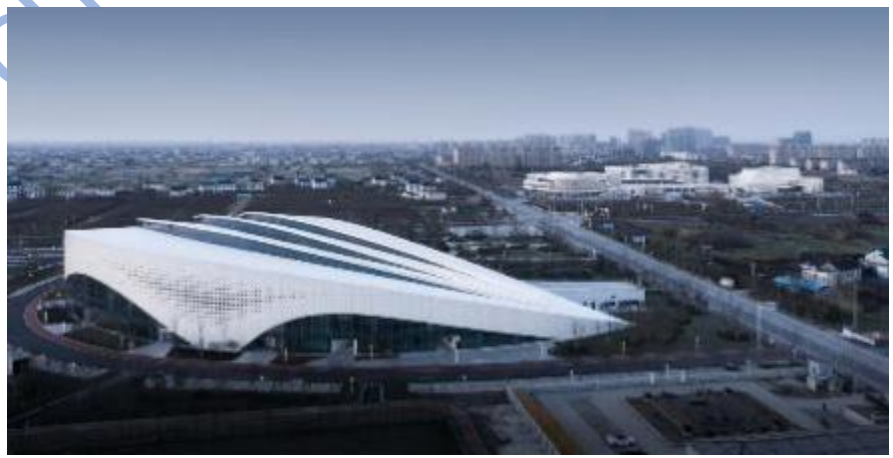


Figure 82; Aerial View

Figure 83: 3d view

Figure 84: 3d view

Figure 85: 3d view

Figure 86: 3d view

Figure 87: Interior part of the center

Figure 88: Swimming Pool

Figure 89: Swimming pool area

Figure 90: Swimming pool area

Figure 91: Swimming pool area

Figure 92: External area

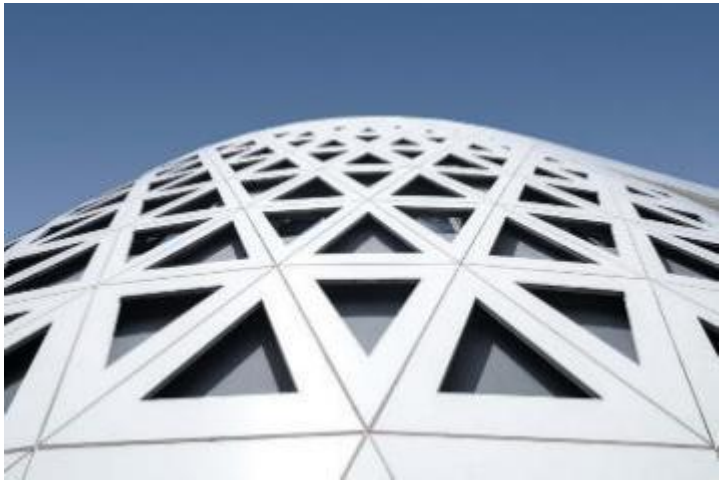


Figure 93: wall Panel

Figure 94: Lobby Area

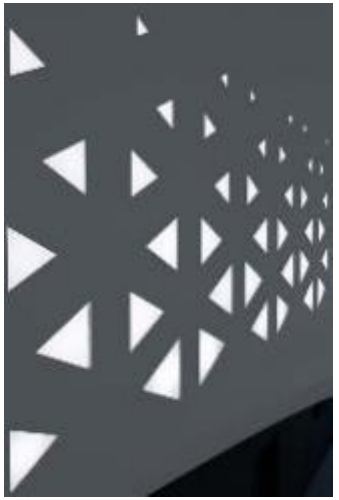
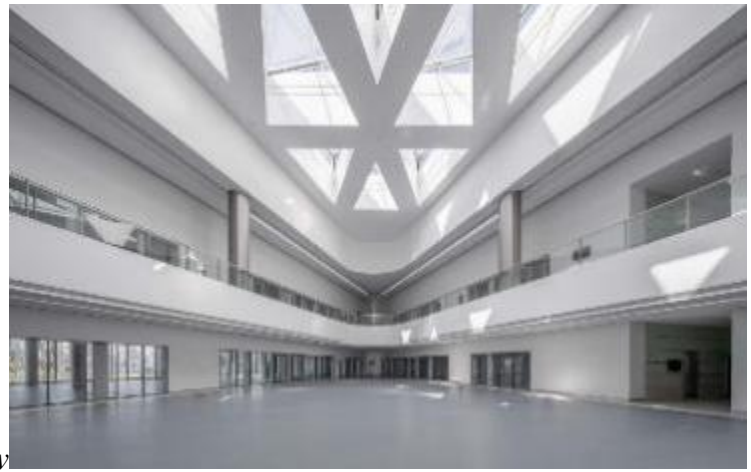


Figure 95: Interior View



View

Figure 96: Interior

Figure 97: Interior View

Figure 98: Interior View

Figure 99: Interior area

Figure 100: : Interior area

Figure 101: : Interior area

Figure 102: : Interior area

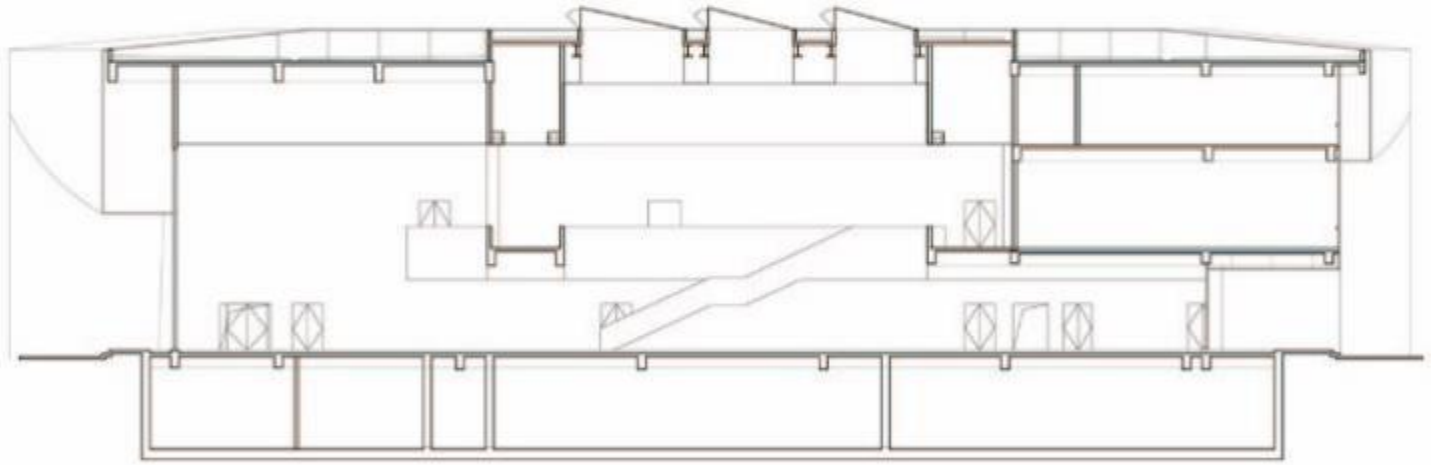


Figure 103: Section

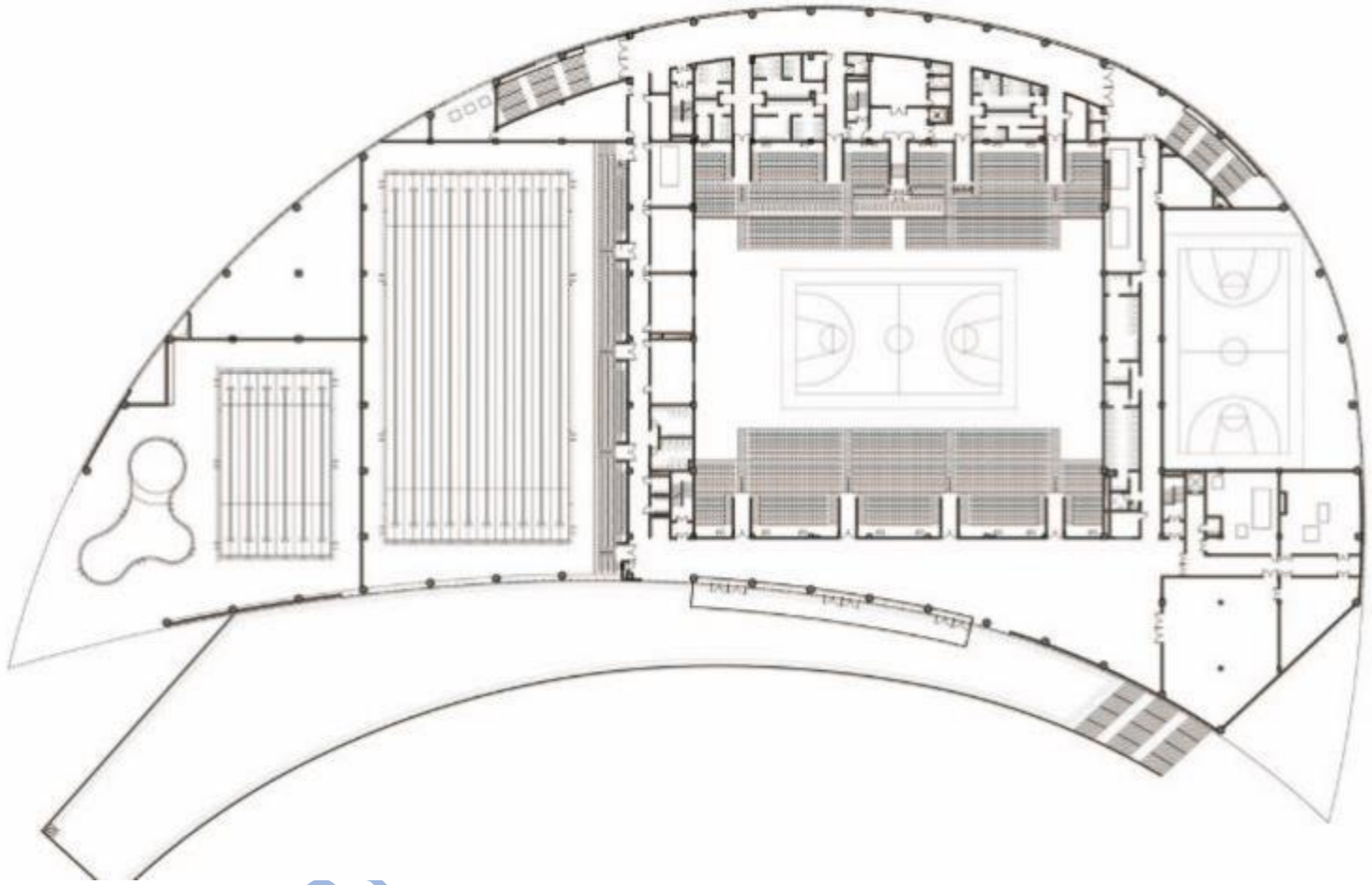


Figure 104: Ground floor Plan

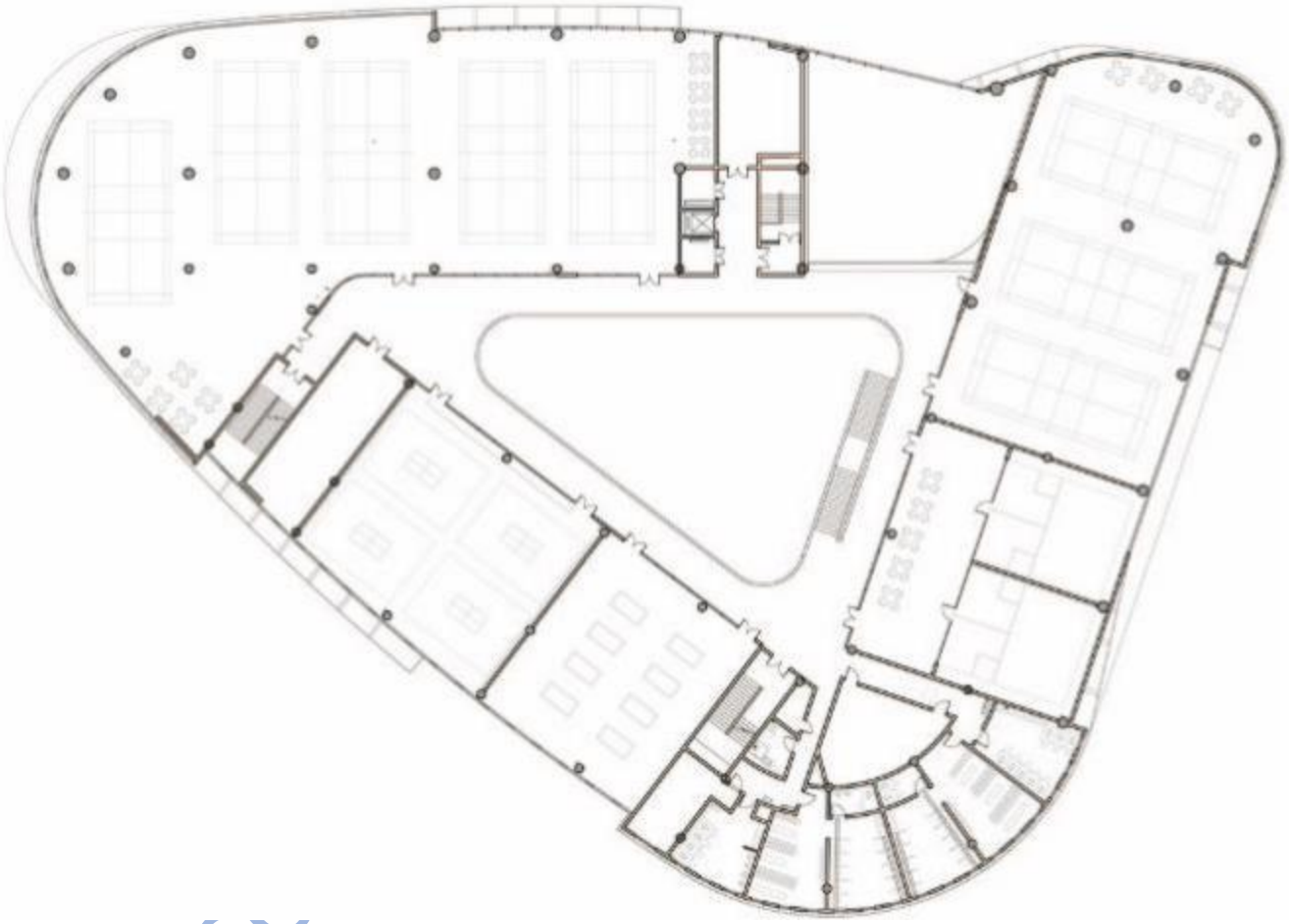


Figure 105 First floor Plan

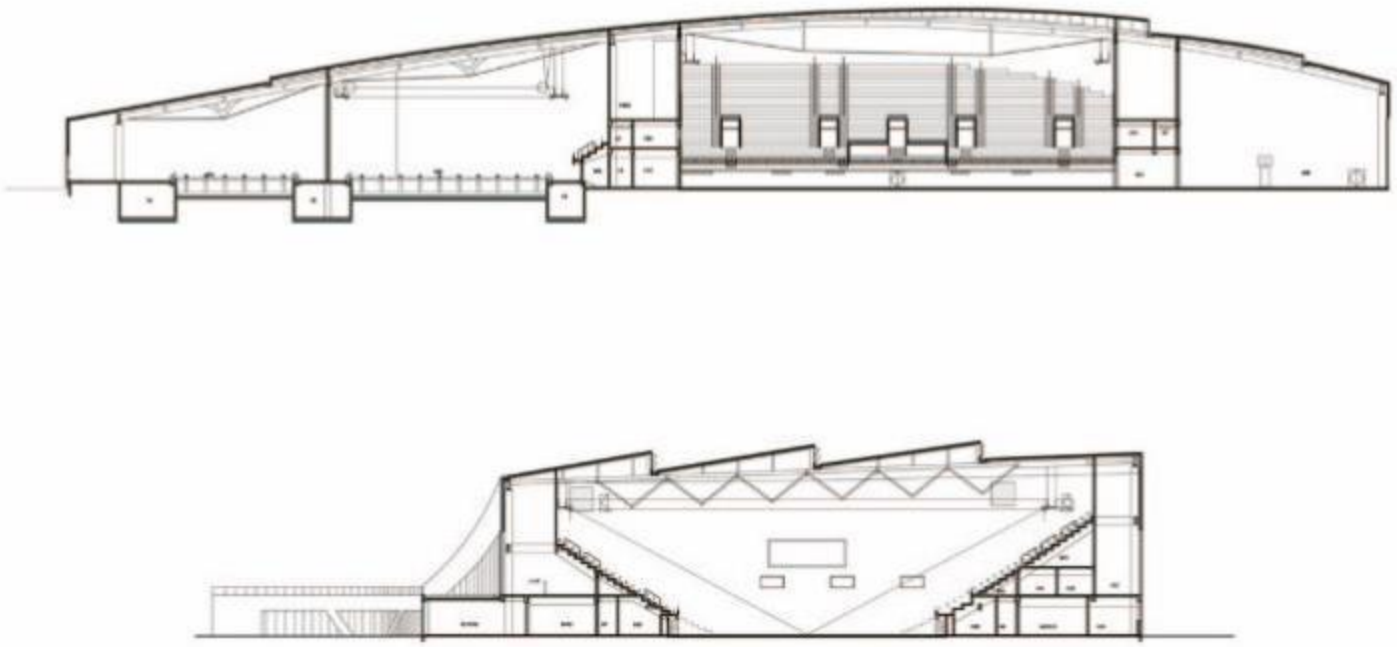


Figure 106: Sections

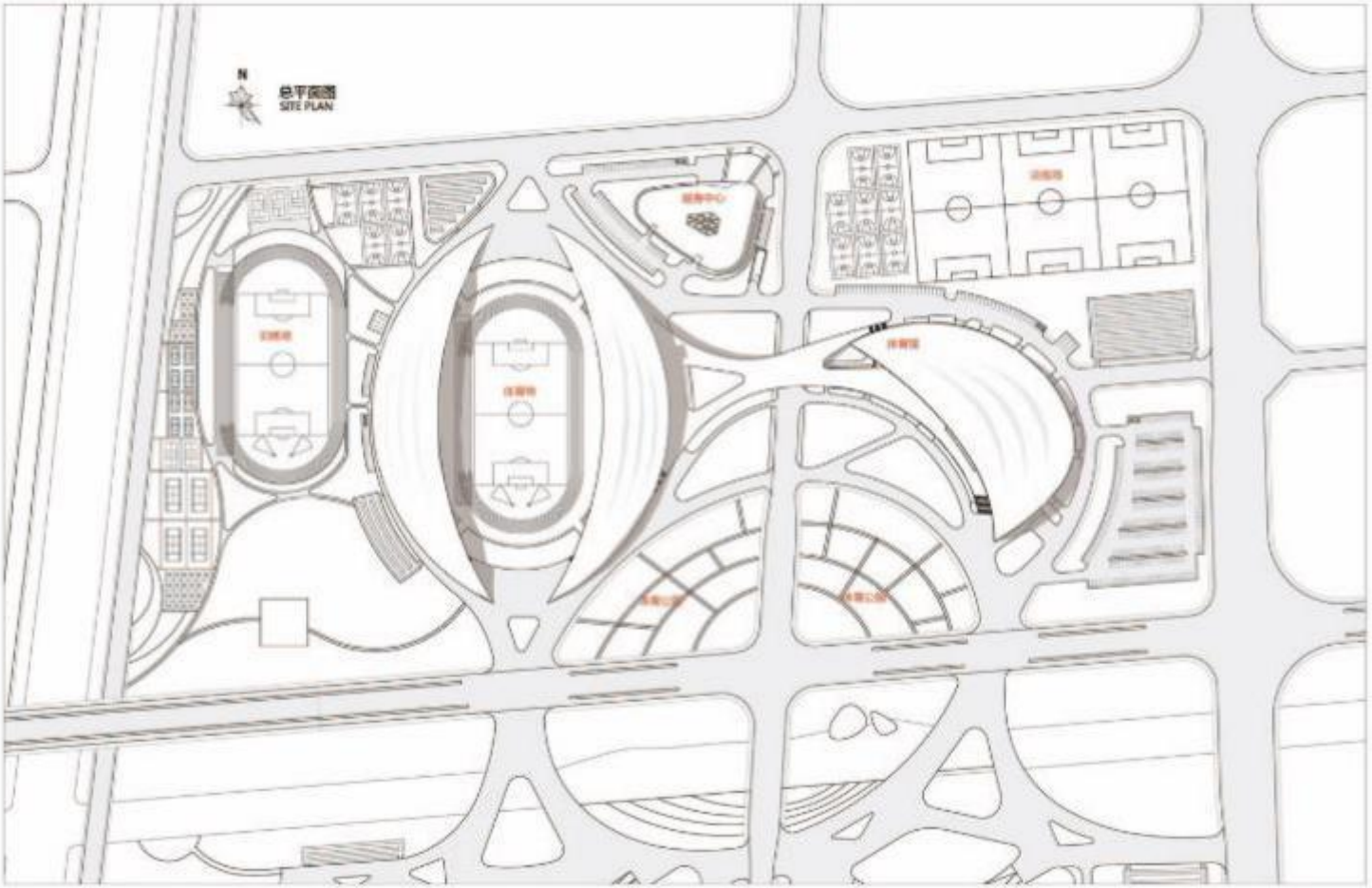


Figure 107: Site Plan

Chapter 4:

Site Analysis and Design Synthesis

4. Site Analysis

4.1.1. Historical Background

The state of Oyo in western Nigeria. Oyo's size was cut in half in 1991 when the state's eastern half was split off to become Osun. Oyo is bordered on the north by Kwara State, on the south by Osun State, and on the east by Ogun State. To the west is the Republic of Benin. Northern Oyo state is home to the Yoruba Hills. While the southern section of the state, close to the city of Ibadan, is covered in tropical rainforest, the majority of the state is covered in a "derived" savanna, which was mostly generated by clearing and burning the former forest cover to make place for farming. The Ogun River is the most important one. The Yoruba people make up the vast bulk of Oyo state's population.

Oyo's economy is mostly based on agriculture and handicrafts. Farmers harvest a wide variety of crops, including yams, corn, cassava, beans, millet, plantains, tobacco, cocoa, palm oil, palm kernels, cotton, kola nuts, indigo, and fruits. Famous cottage industries in the state include: cotton spinning, weaving, dying, leatherworking (using sheep and goat skins), woodcarving, and mat manufacture. Ibadan, Nigeria's second-largest city, is home to a variety of businesses including a cannery, brewery, publishing company, tobacco processing plant, wood and steel furniture producer, and automobile assembly line. In addition to the Federal Agricultural Research Institute and the International Institute of Tropical Agriculture, the Cocoa Research Institute of Nigeria is also located in Ibadan. Attractions in the state include the Ibadan University Zoo, the Agodi Zoological Garden, and the palaces of the

Yoruba monarchs at Oyo and Ogbomosho. In addition to a university, Ibadan is home to a number of institutions dedicated to teaching future educators. The Lagos-Ibadan expressway links the two southern and northern extremities of the state. Pop. (2006) 5,591,589.

4.1.1.1. Population and Demographics Ibadan (Site Location Area)

To the best of our knowledge, Ibadan remained the largest city in Sub-Saharan Africa until the year 1970. In 1952, the total area of the city was calculated to be 103.80 km2. However, only 36.2% of the land was built upon. The remaining 67 km2 served as agricultural land, river floodplains, forest reserves, and natural bodies of water, among other non-urban uses. These "non-urban land uses" vanished in the 1960s, and an aerial photograph taken in 1973 revealed that an area of around 100 km2 had been completely reclaimed by the urban environment. The total land area increased from 136 km2 in 1981 to 210-240 km2 in 1988-89. (Areola, 1994: 101). In the year 2000, it was expected that Ibadan will cover 400 square kilometres. [14] The expansion of the city's built-up area in the second half of the twentieth century demonstrates that the true scale of the city's expansion has been grossly underestimated (from 40 km2 in the 1950s to 250 km2 in the 1990s). The 1980s saw the largest urban development to the east and north of the city, along the Ibadan-Lagos expressway and the Eleyele highway (west of the city). Ibadan city has grown considerably since then, especially into the neighboring Akinyele and Egbeda local governments.

4.1.1.2. Physical settings

Numerous issues affect Ibadan as a result of population and city expansion, national economic trends, regional environmental shifts, and municipal ineptitude in overseeing growth.

4.1.2. Site Location

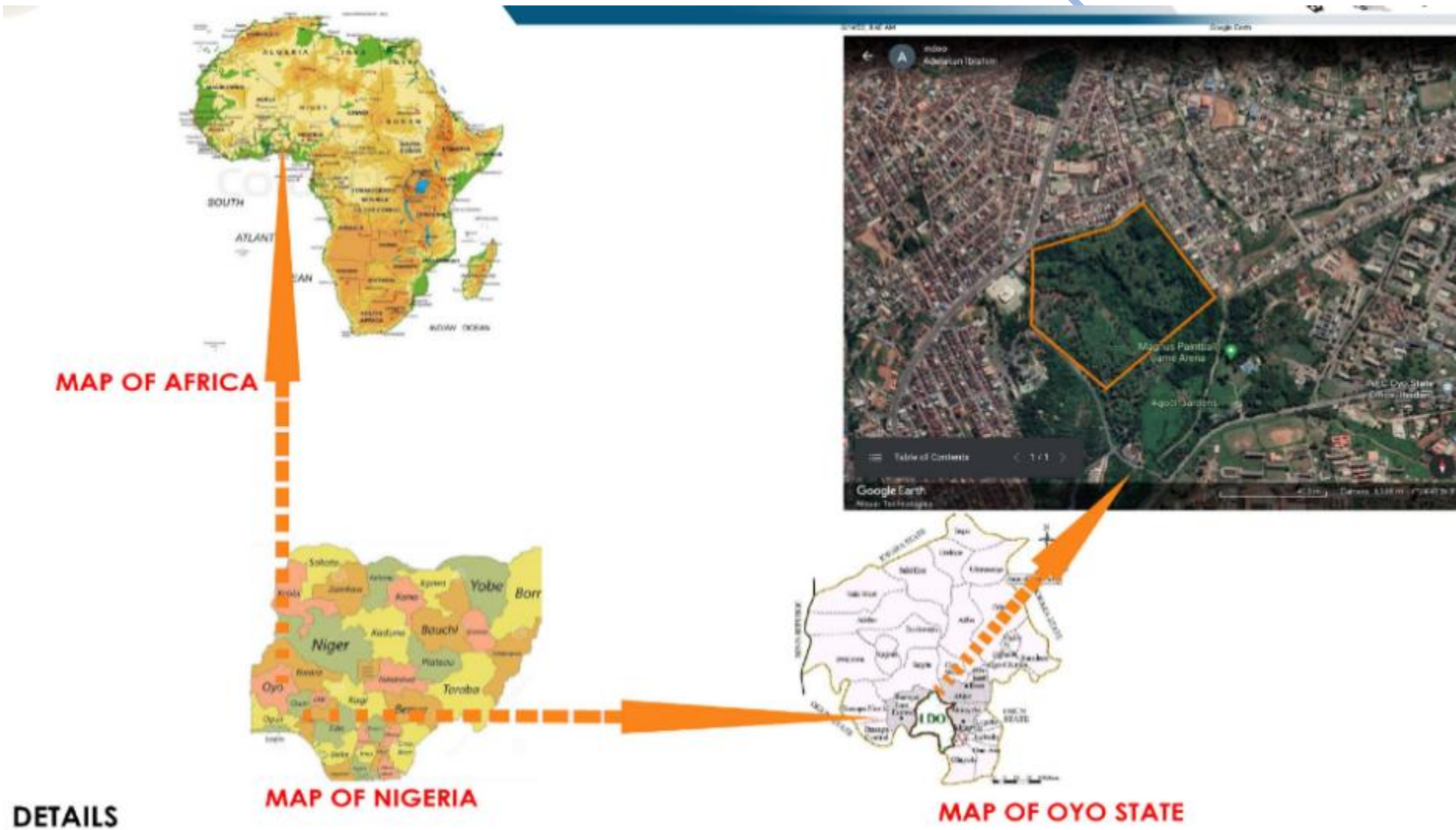


Figure 108Site Location Map

4.1.3. Weather and Climate

Ibadan is located in a tropical wet and dry climate (Köppen climatic classification Aw), characterized by a long rainy season and consistently warm temperatures. Between March and October, Ibadan has its rainy season, while there is a little dry spell around August.

There is much less precipitation in the winter than in the summer. Temperatures in Oyo average 25.9 degrees Celsius per year. Annual precipitation averages about 1190 millimetres.

4.1.3.1. Pressure

The pressure in Oyo state varies from time to time as shown in the below chart

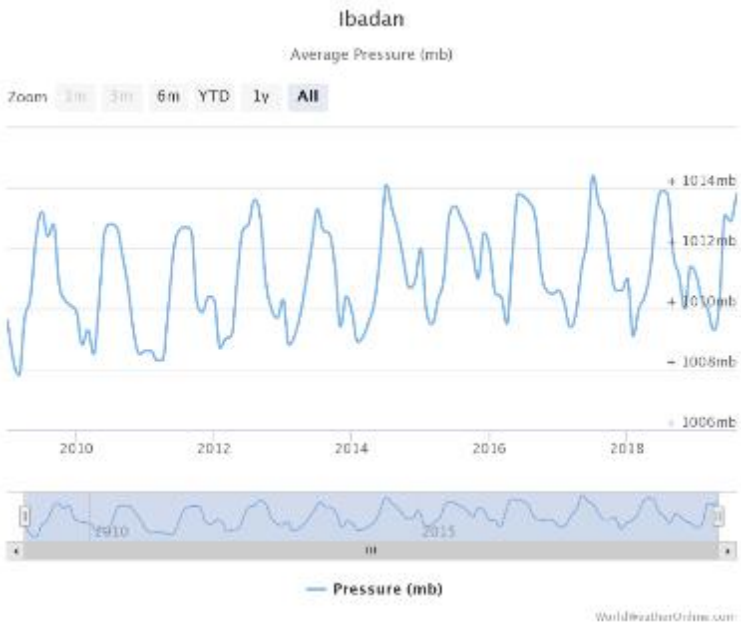


Figure 109: Pressure

4.1.3.2. Humidity and Cloud cover

This is the amount of humidity in the air. It is impossible to see water vapour since it is in its gaseous condition. Precipitation, dew, or fog is likely if the humidity is high enough. As the temperature rises, so does the quantity of water vapour required to reach saturation.

The average humidity in Oyo State is shown below

Figure 110: Humidity

The ultraviolet index, also known as the UV Index, is a globally recognized indicator of the amount of UV light that can cause sunburns at a specific location and time. It is generally employed in daily forecasts for the general public; however, hourly forecasts are becoming more common. Using this information, we may create a building that will effectively lower

the danger of skin cancer and the intensity of solar radiation on the

structure.

Figure 111: UV index

4.1.3.3. Average Sun Shine

A climatological indicator known as sunshine duration measures how long it is sunny for a specific period (generally a day or a year) at a specific location on Earth. The measurement is commonly expressed as an averaged value over several years. It distinguishes itself from insolation, which measures the total energy provided by sunshine over a specific time, by acting as a generic indicator of cloudiness in an area.

The amount of sunshine is often measured in hours per year or (on average) hours per day. The former enables for comparison of sunshine in multiple seasons at the same site, while the latter illustrates how generally sunny an area is in contrast to other locations. The percentage

ratio of observed bright sunshine duration to observed daylight length is another often used metric.

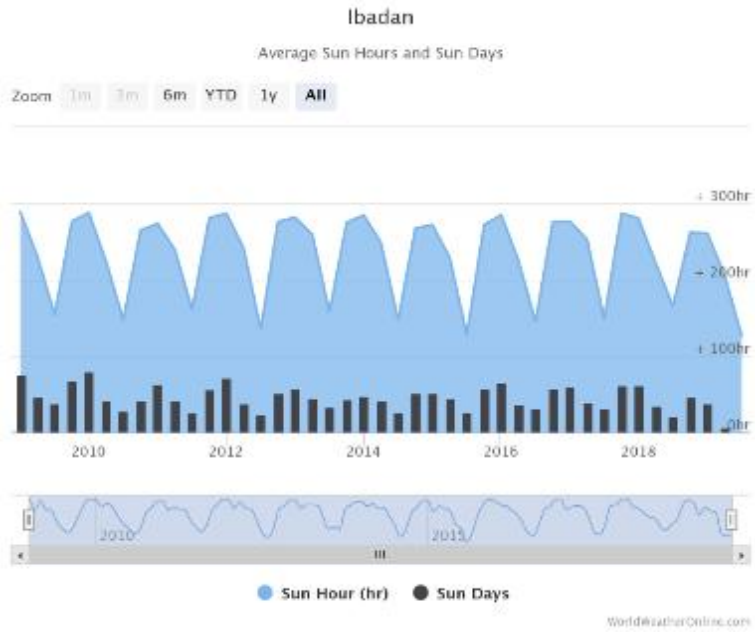
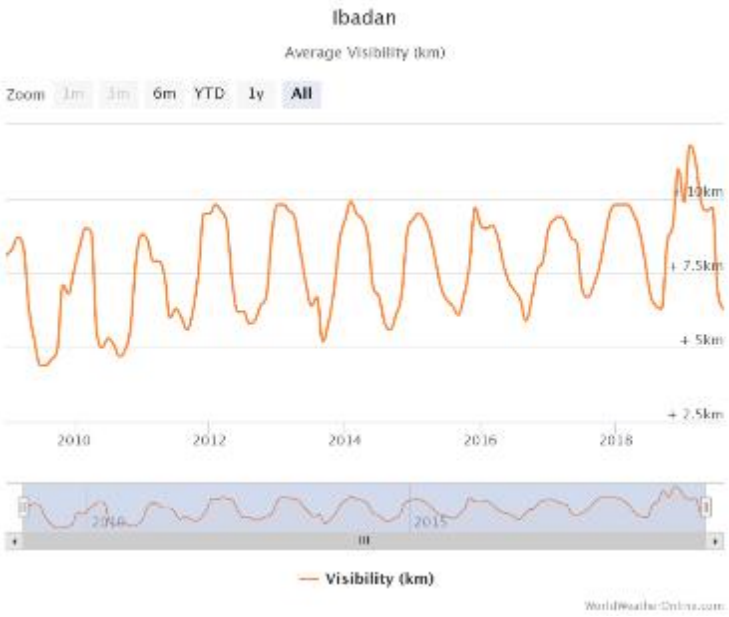


Figure 112: Average sunshine

4.1.3.4. Average Visibility

It is a measurement of the distance something or some light source must be in order to be seen clearly. Different countries use different units of measurement for their surface weather observations and METAR code, with some using statute miles and others metres. Visibility affects all modes of transport, including land, sea, and air. Visibility in meteorology is a measure of how well one can see through the air, which is the same in the dark as it is in the day if the air is transparent.



v

Figure 113: Average Visibility

4.1.3.5. Average Temperature

The average temperature of the air is indicated by a properly exposed thermometer during a given period, usually a day, a month, or a year.

The average temperature of Ibadan is 27°C, with a range of 4°C;

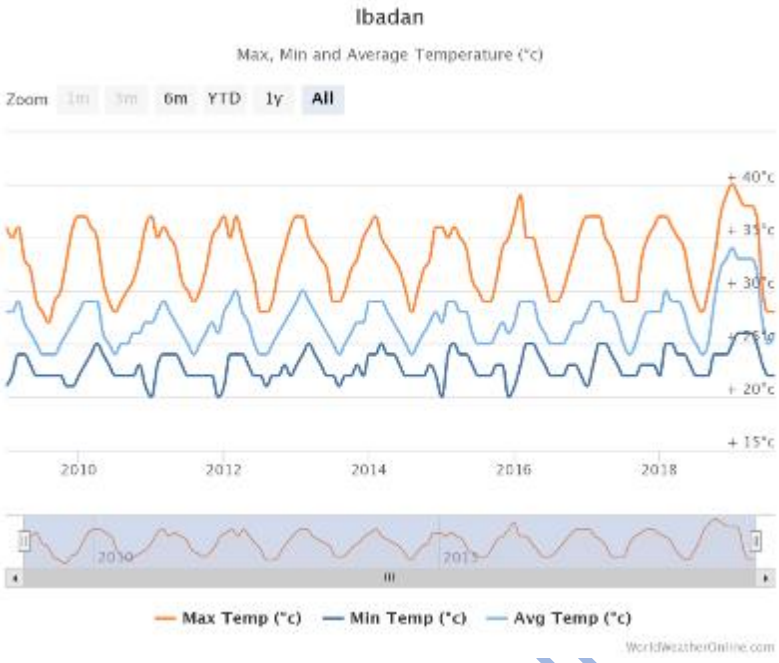


Figure 114: Average Temperature

4.1.3.6. Rainfall

the mean annual rainfall is above 1,505mm while the relative humidity is between 60% and 80%.

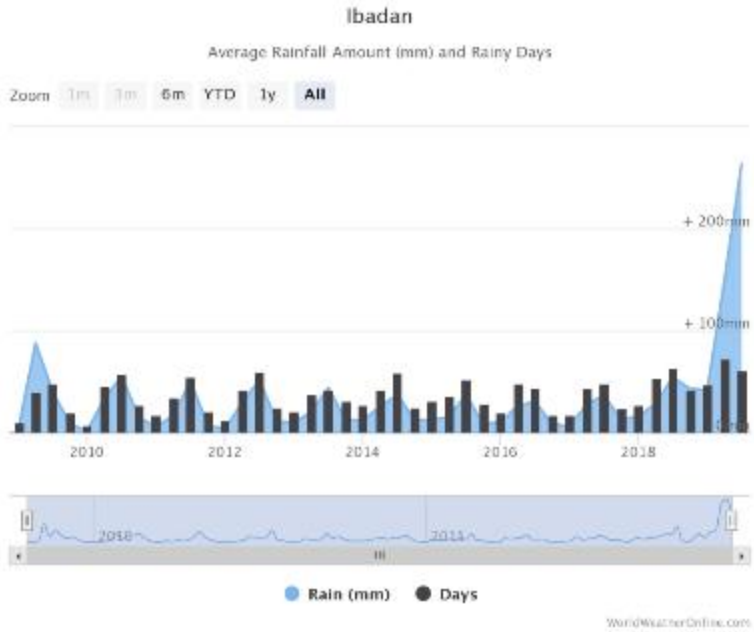


Figure 115: Average Rainfall

Figure 116: Max wind and Average Gust

4.1.3.7. Climatic Condition

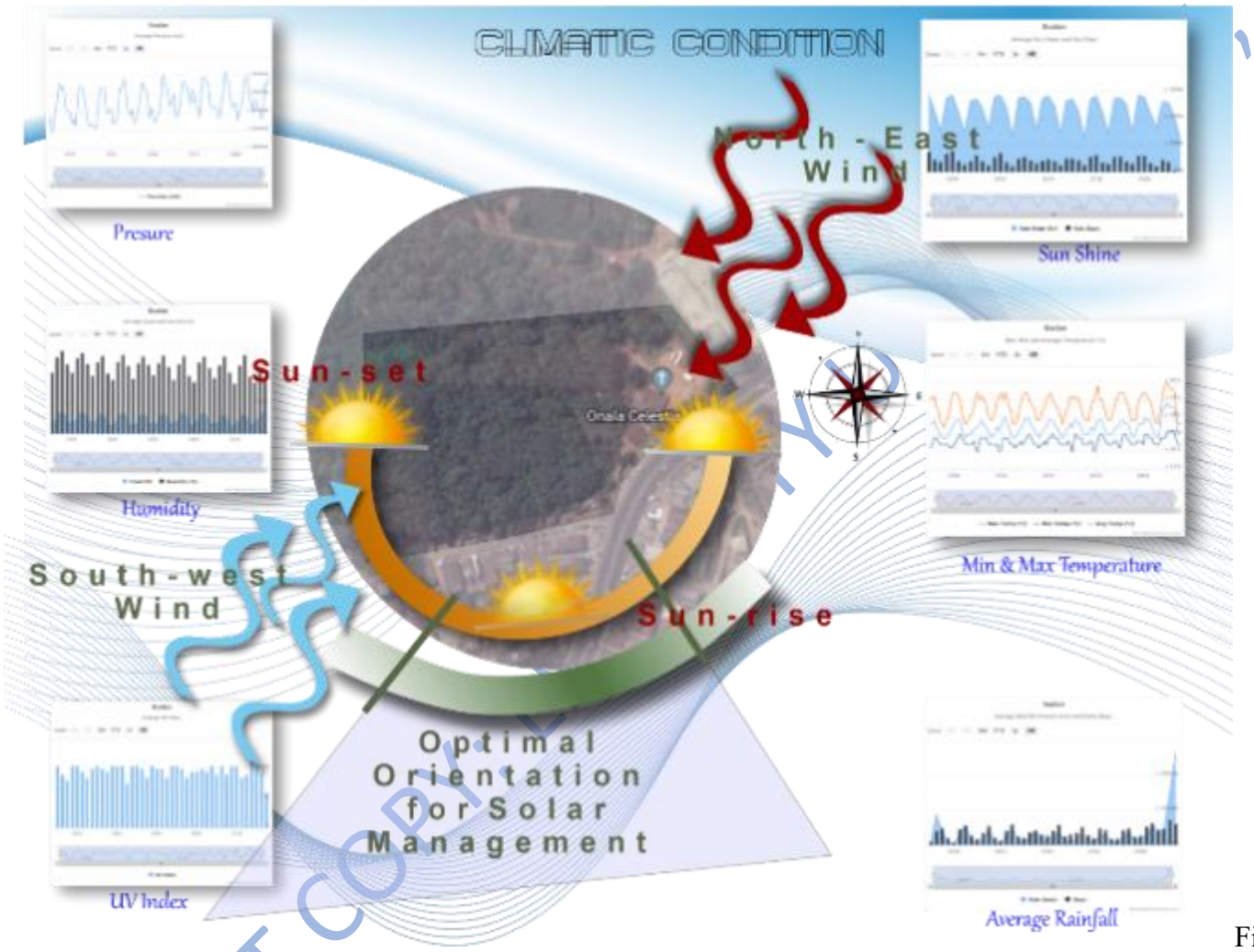


Figure 117: Site Analysis

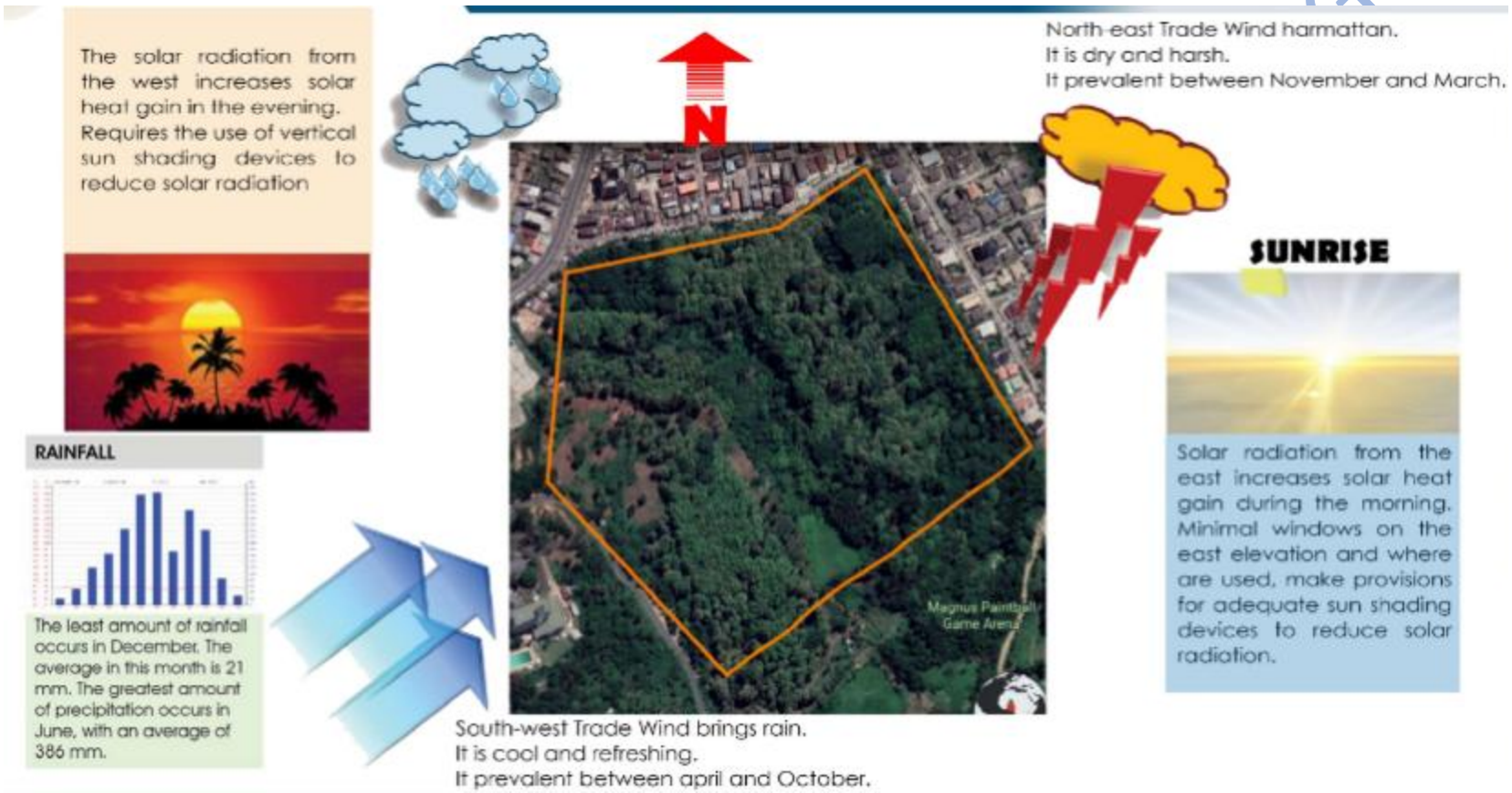


Figure 117b: Site Analysis

4.1.3.8. Vegetation: Tropical Savannah

4.1.3.8.1. Soil Type

Generally, the site was filled with clay soil while the road surface is covered with stone dust as well as asphalt of a great appreciable layer. The surrounding is covered with loam soil and the end of the site is filled with retaining stones

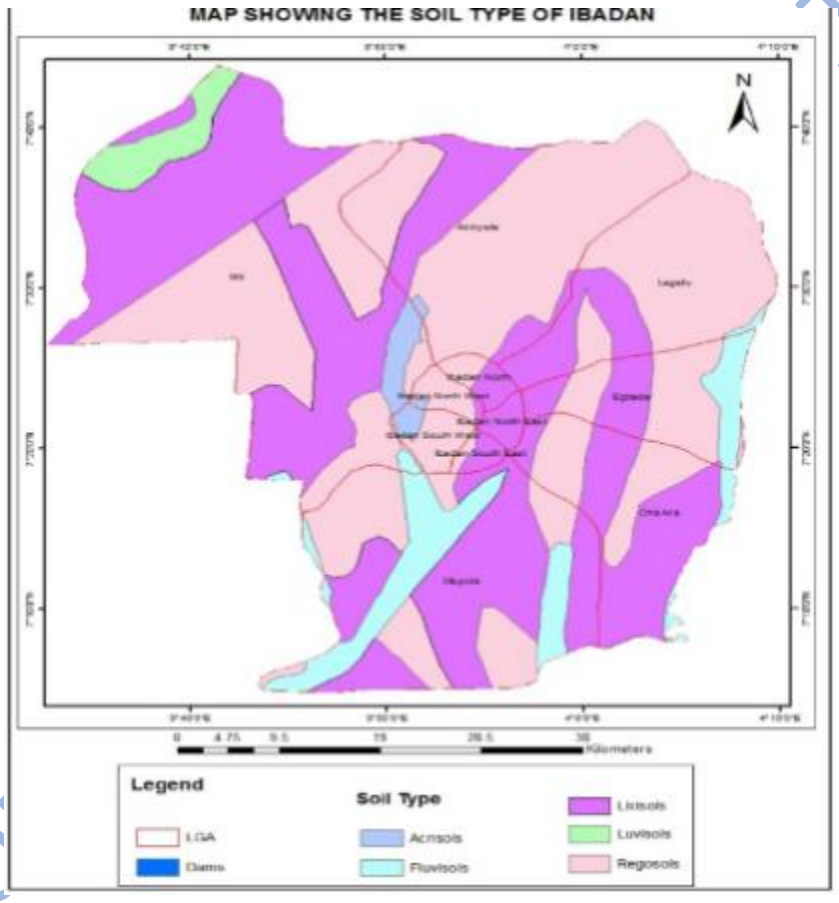


Figure 118: Soil Type

4.1.3.9. Existing zoning

Figure 119: Existing Zoning

4.1.3.10. Neighborhood Context

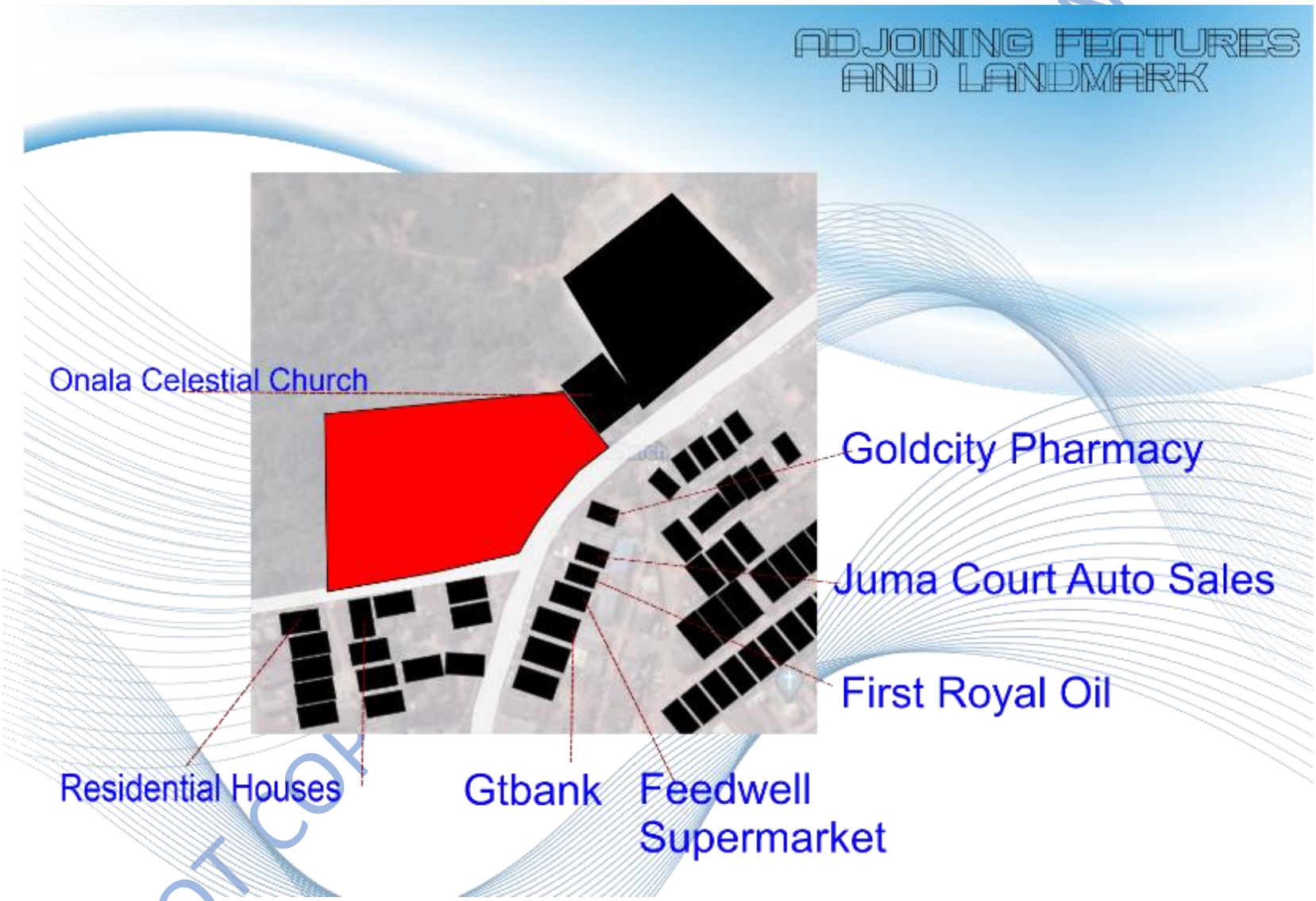


Figure 120: Neighborhood context

4.1.3.11. Site Views

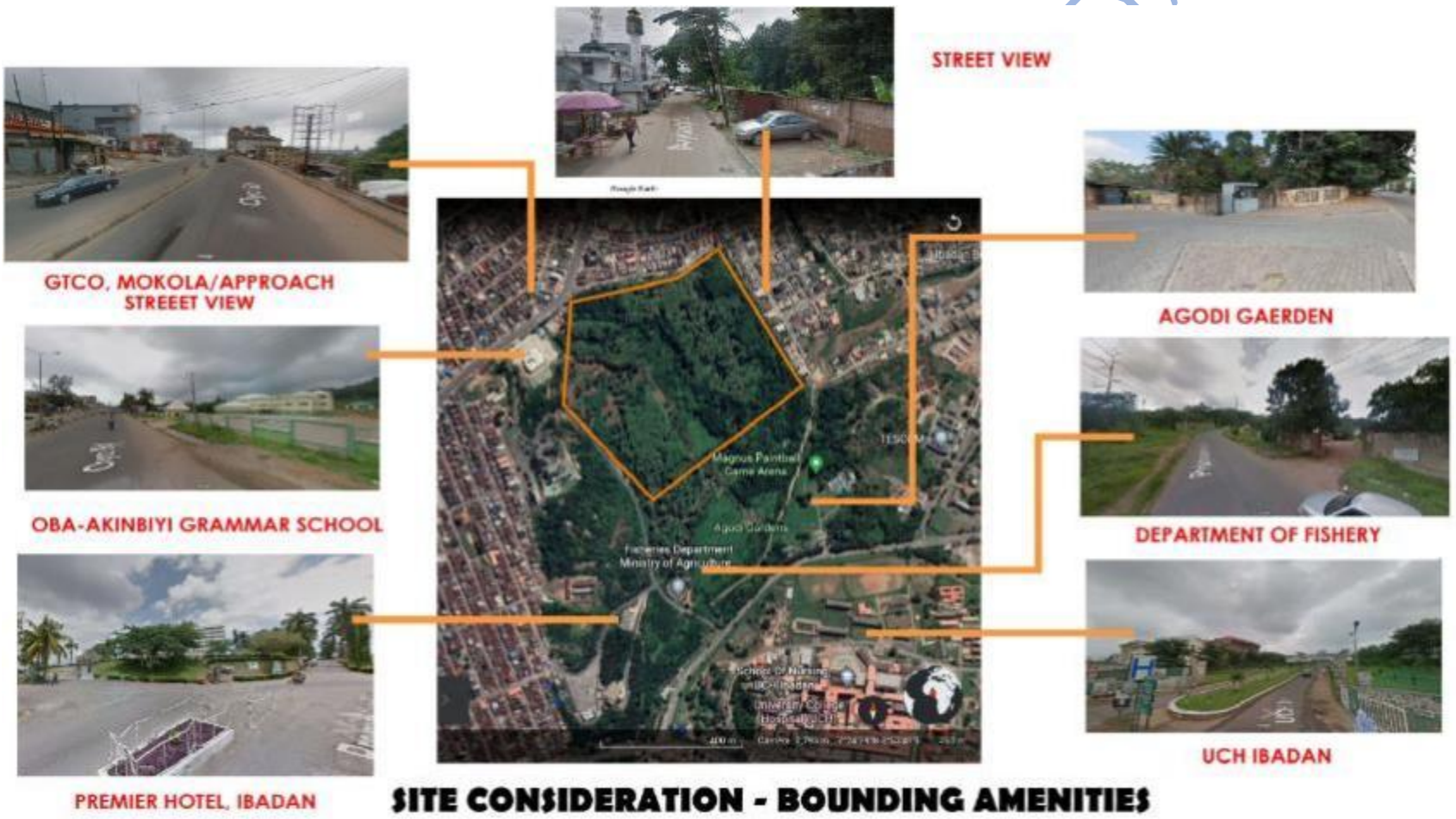


Figure 121: Site Views

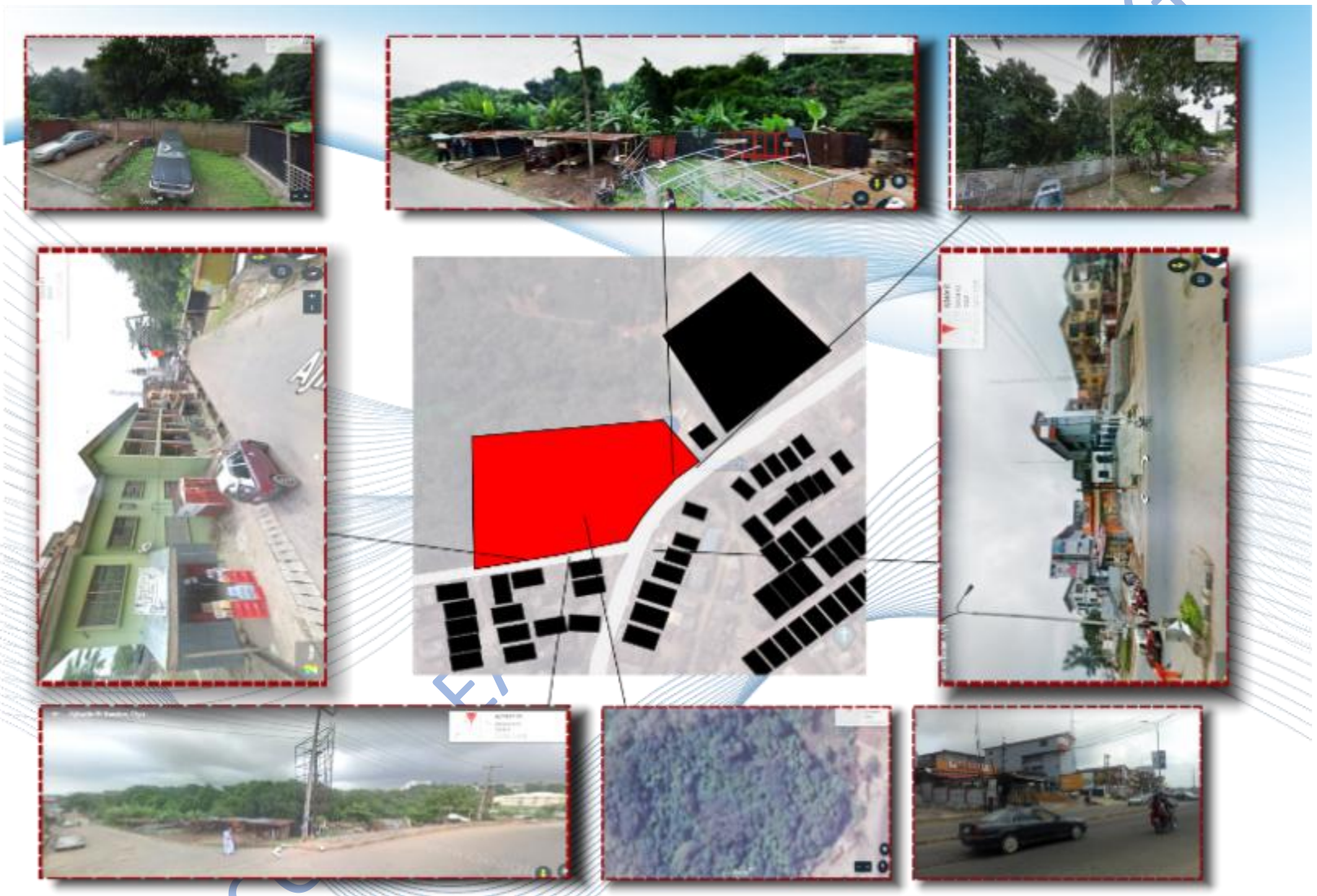


Figure 122: Site Views 2

4.1.3.12. Amenities

These are basic amenities provided on-site. These include electricity, water supply, refuse removal telephony and the wire connection, security, fire, and safety guide

4.1.3.13. Electricity

Electricity is one of the most important things to consider; although if the location is undeveloped, it is still possible to quickly get electricity provided by the Power Holding Corporation (PHCN). A separate transformer that can feed the proposed Indoor Sports Complex must be provided. Additionally, a backup generator needs to be set up in case of a power loss.

4.1.3.14. Water Supply

The majority of the Ibadan Metropolis is typically supplied with water by Ibadan Water Works, which is located in Ibadan. The stadium can be easily connected because the water mains pass right through it. As an alternative, a borehole will be offered to accommodate the rate of consumption.

4.1.3.15. Refuse or Waste removal

The site states that no plans have been made to recycle the waste material generated from the facility, however, Oyo State waste management is tasked with collecting all of the refuse waste that is strewn throughout the city of Ibadan. The site's whole collection of trash will be hauled away.

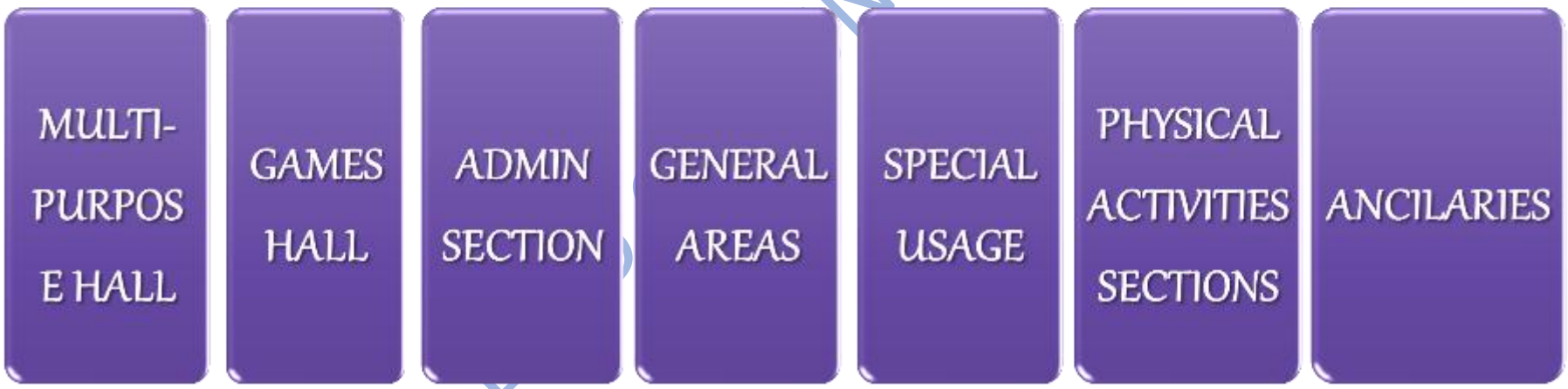
4.2. Project Analysis and Design Synthesis

4.2.1. Design Brief Analysis and Statement

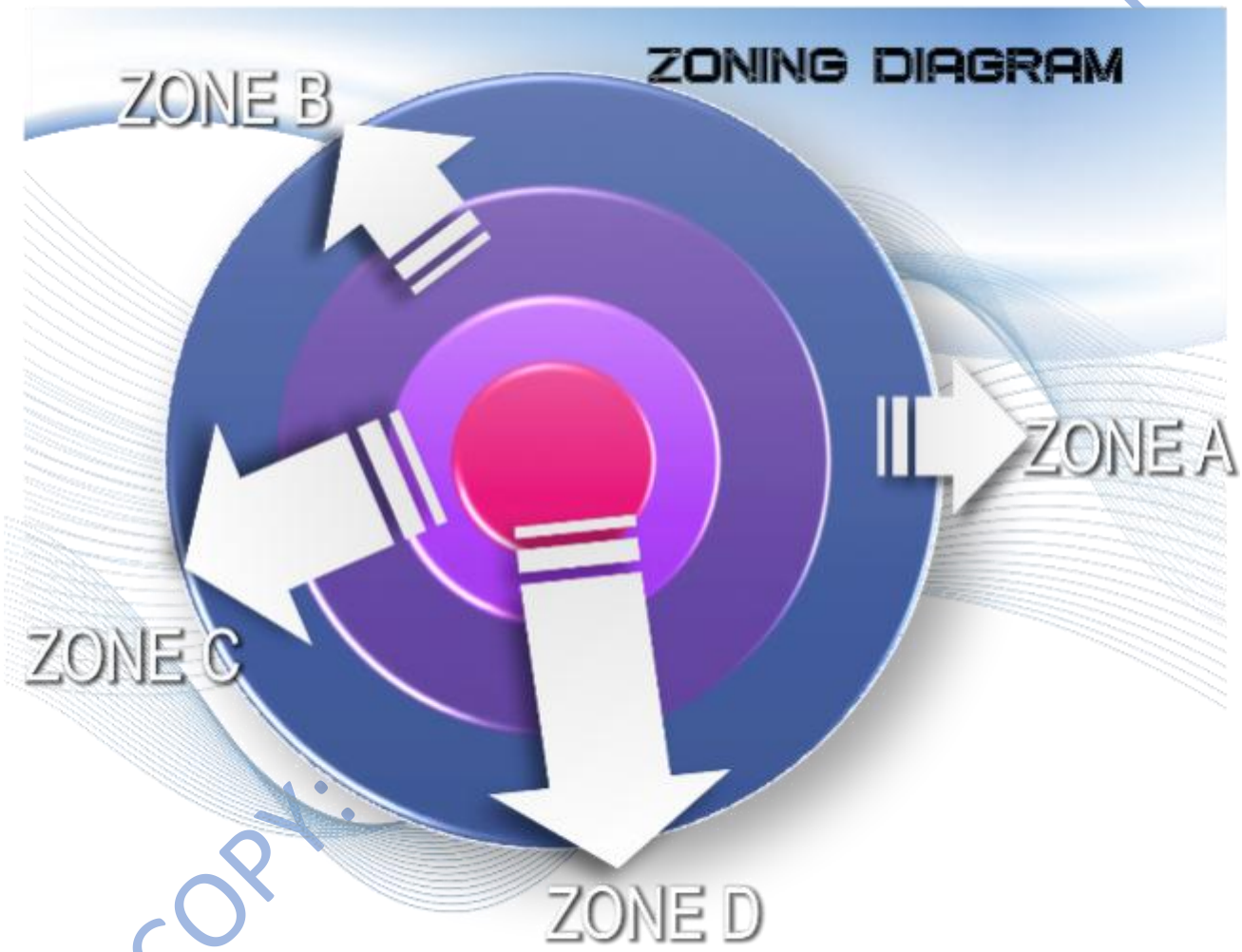
As part of the activities of Odudu'a investment Group to reduce untimely death and unemployment rate among the youth in the state. I was commissioned as a consultant Architect to design an Ionic Indoor Sports of Fame Center that can develop the youth in the state for future Sporting activities.

The Project is based on the design of befitting ionic Architectural design of an Indoor Sports Hall of Fame that can house various Sporting activities. As a consultant Architect, a functional, structural, economic, and aesthetically pleasing sustainable design to meet client's demands and Aspirations.

BRIEF ANALYSIS



4.2.2. Brief Development



ADMINISTRATIVE AREAS

-Reception
-Ticketting
-Enquiry
-Records
-I.C.T
-Coach room
-Conference room
-Tearoom
-Security
-Secretary office
-Maintenance room
-Consulting room
-Facilities
-Nurse post

MULTI-PURPOSE HALL

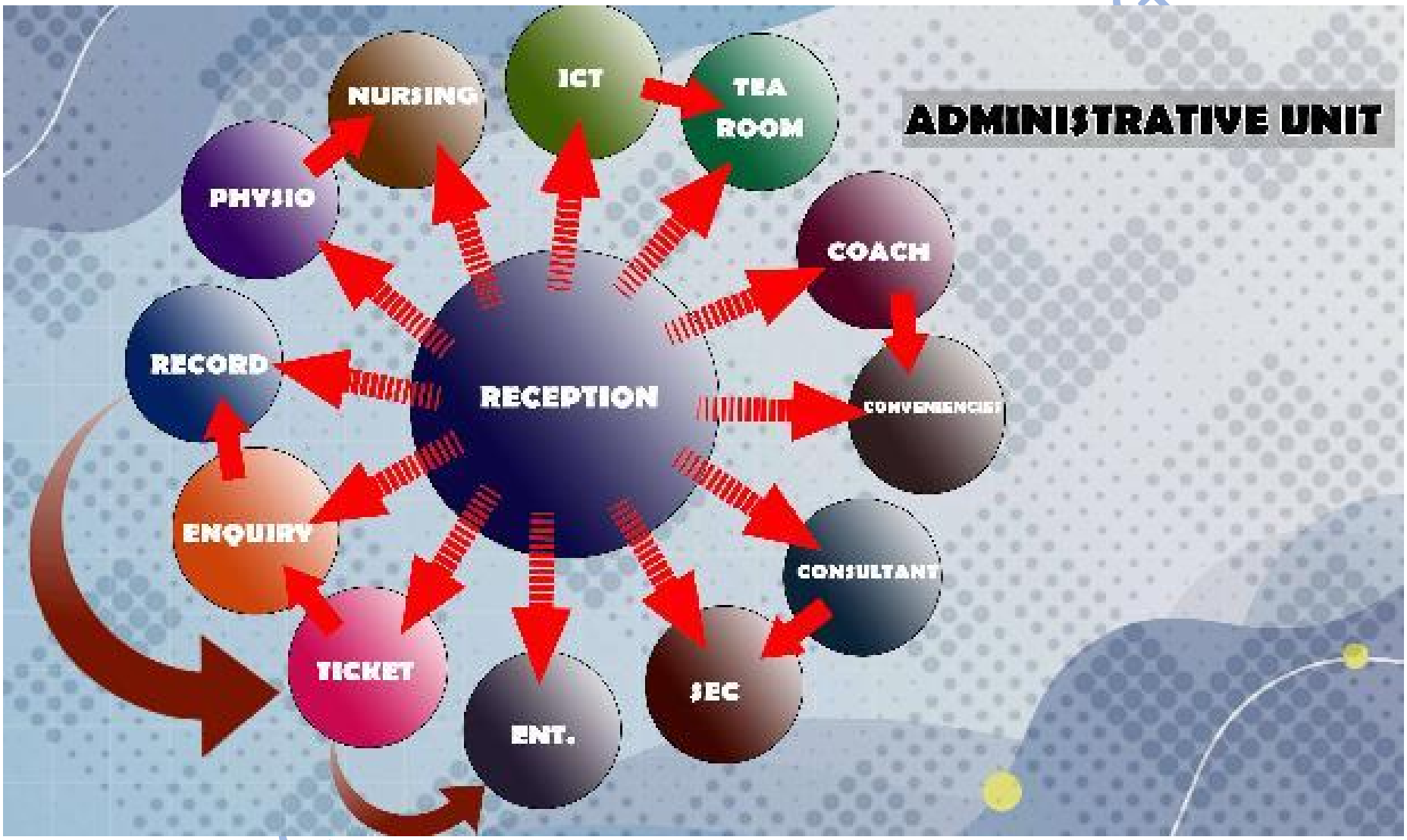
-Basketball
-Handball
-Volleyball
-Five-a-side football
-Tennis

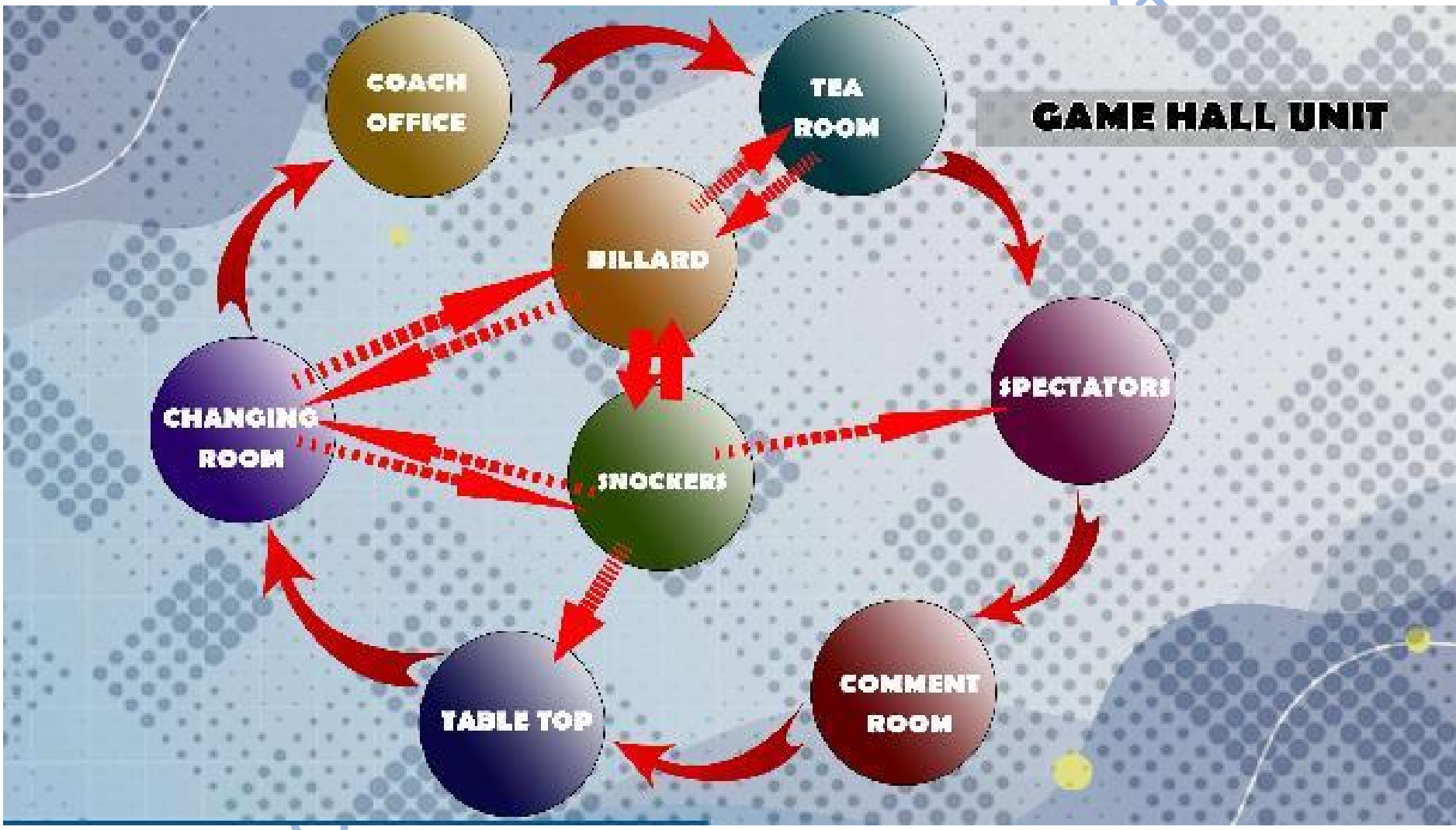
GENERAL AREA

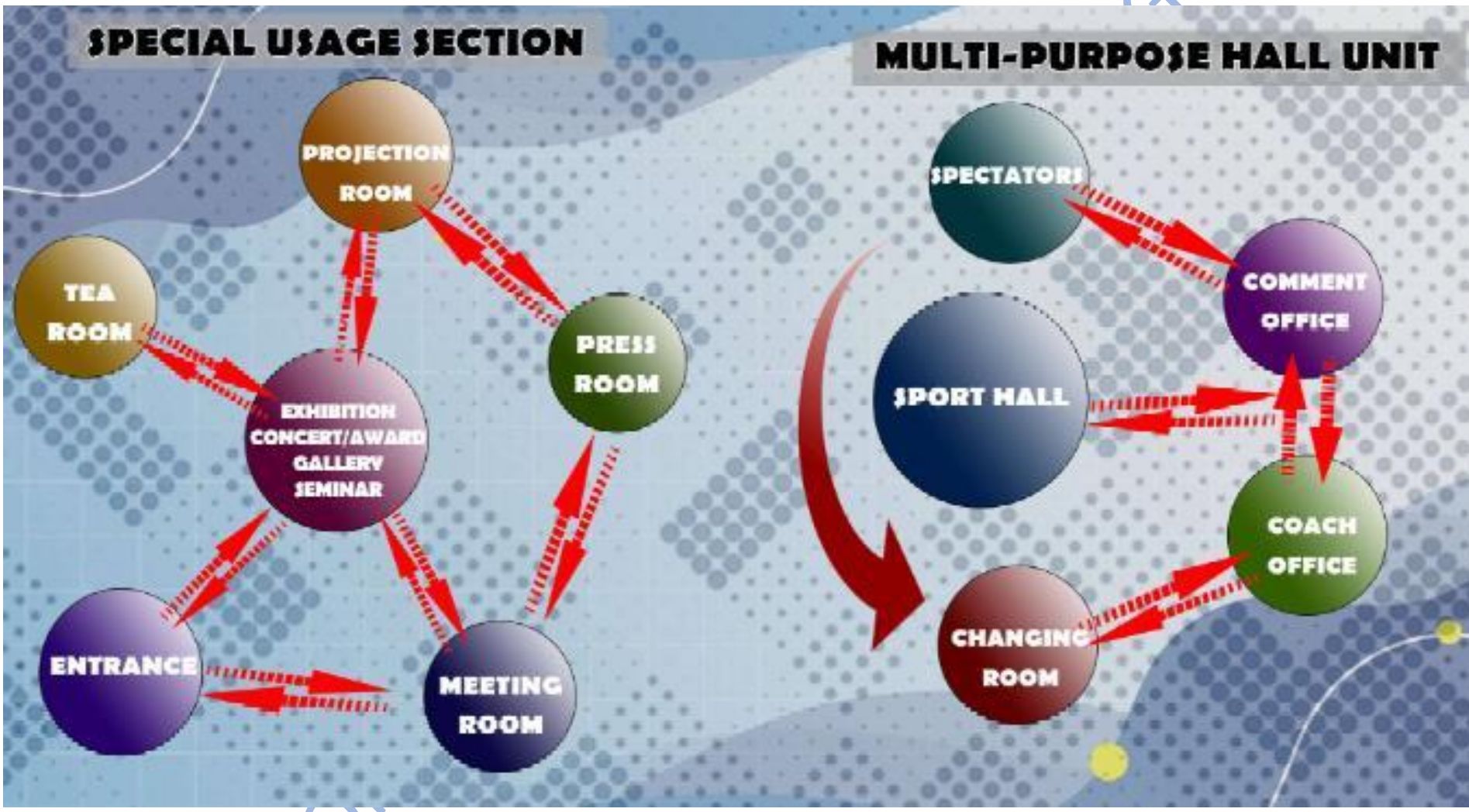
-Entrance
-Passage
-Stair hall
-Conveniences
-Lawn
-Buffer zone
-Micro-clinic
-Patio seat
-Recreation area

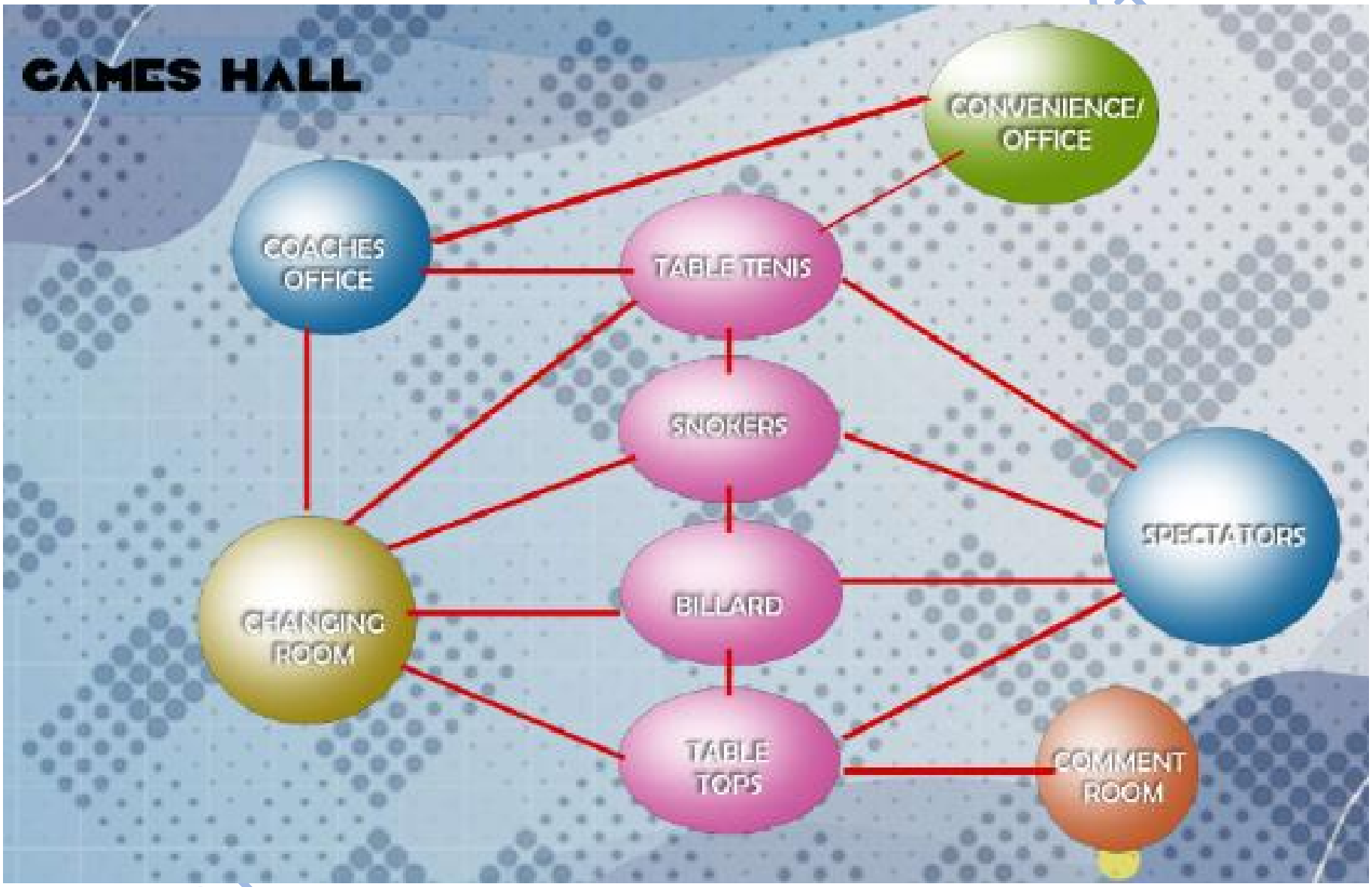
ANCILLARIES

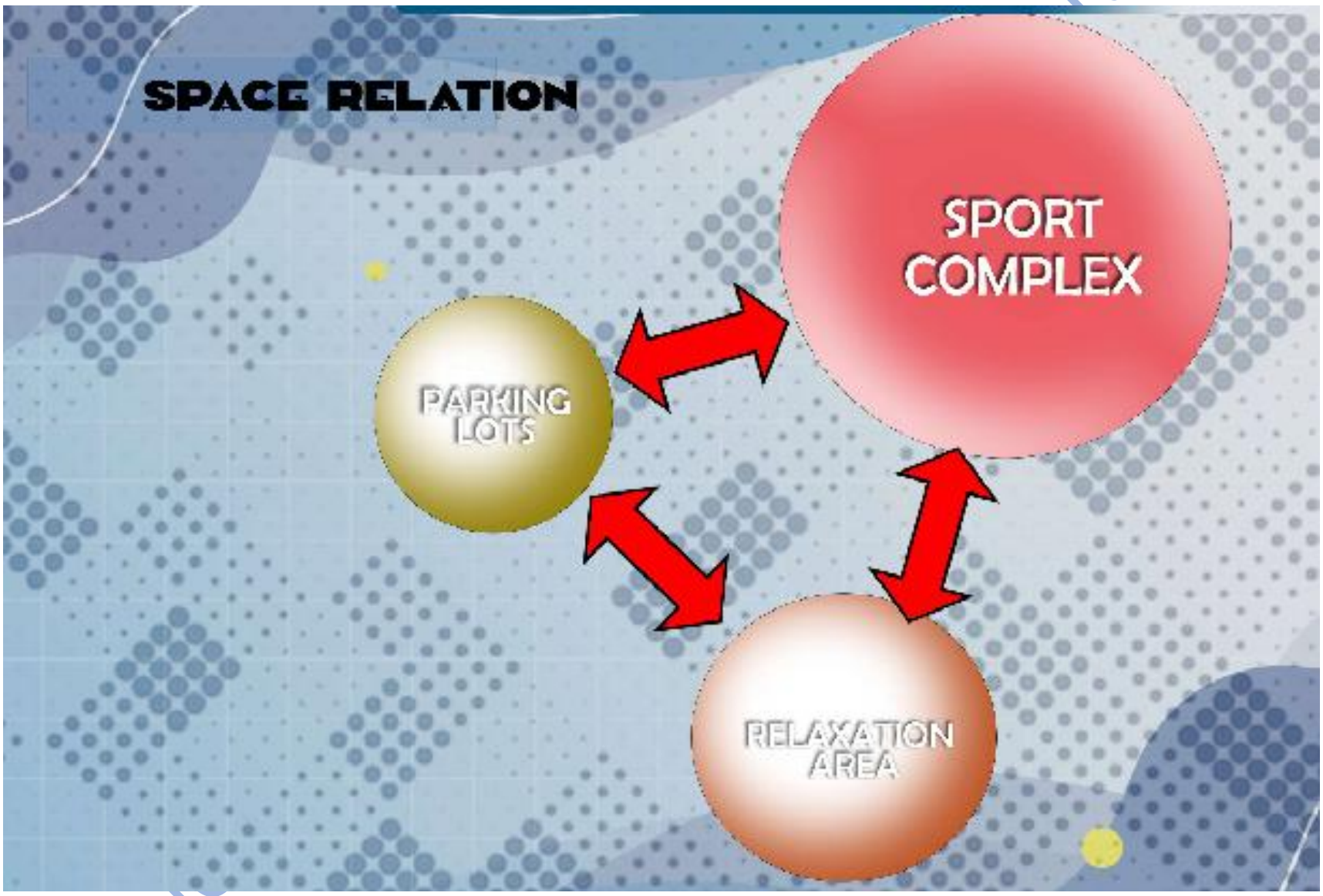
-Traning room
-Equipment store
-Changing room
-Locker
-Sport shops
-Saloon
-ATM Gallery
-Ambulance bay
-First Aid
-Business center
-Bar
-Resturant
-Aparatus room

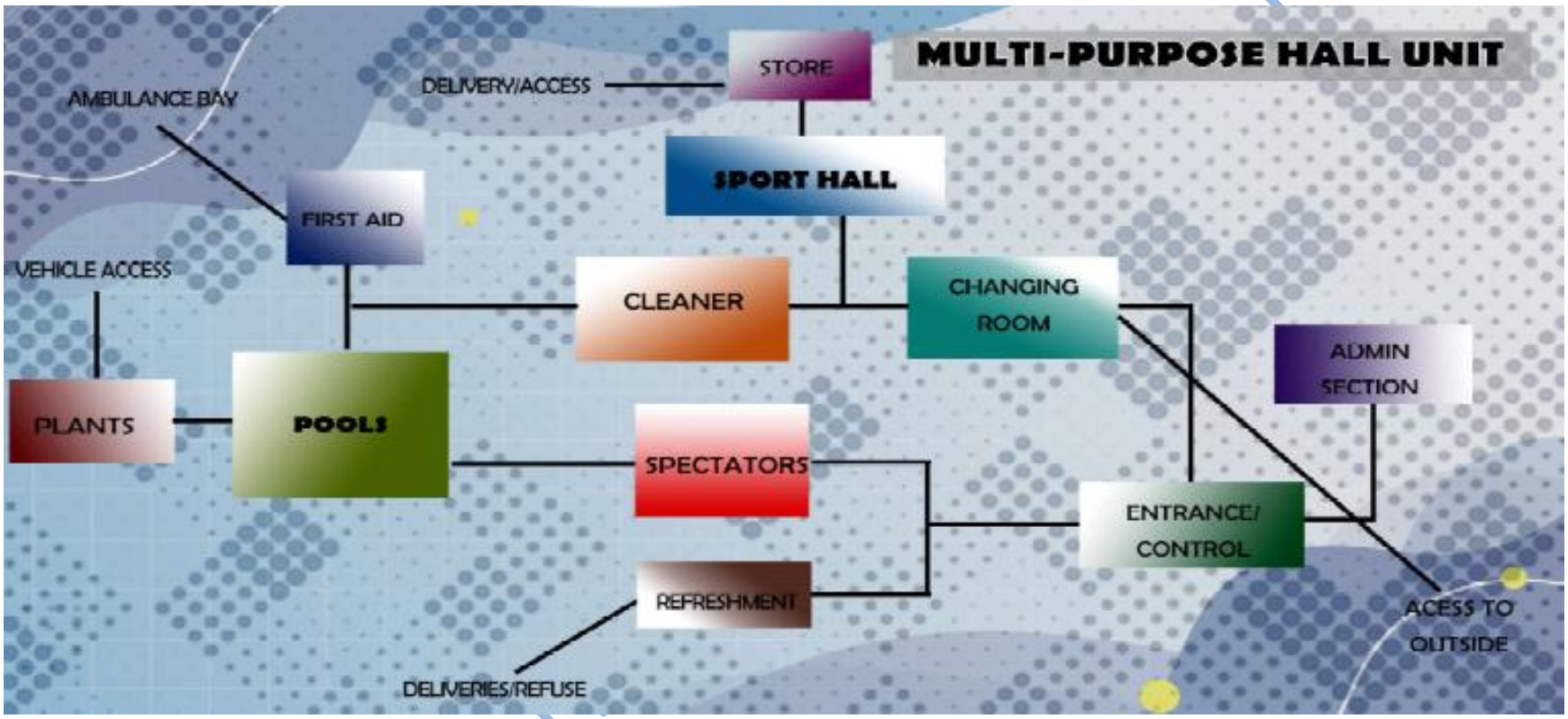







GAMES HALL
CONVENIENCE/ OFFICE
COACHES OFFICE
TABLE TENIS
SNOKERS
SPECTATORS
CHANGING ROOM
BILLARD
TABLE TOPS
COMMENT ROOM





4.2.3. Design Criteria

4.2.3.1. Spaces

Spaces in Indoor Sports complexes are determined through the use of anthropometric data, and spatial analysis. The spaces cover the Multipurpose Hall, Swimming Pool Area, Wrestling, Squash, Snockers, restaurant, reception, toilet, administrative and maintenance section, waiting area, parking lots e.t.c.

4.2.3.2. Lighting

This is one of the basic fundamental architectural principles of design architecture, it is the various processes, systems, forms, or equipment used to produce light and illumination to the design.

Lighting can be of two types: natural and artificial lighting.

4.2.3.2.1. Natural lighting

These speak of solar power or the light that God has provided. In terms of this design, there will be adequate illumination that may be used in conjunction with other types of lighting as necessary. There will be planning done for it. Natural lighting can be used to light up the interior of the Indoor Sports Complex, including the hallways, walkways, tunnels, waiting area, restaurant, etc.

4.2.3.2.2. Artificial Lighting

This refers to artificial illumination, such as electrical or mechanical means, used to illuminate a specific region. Although the center will have a standby uninterrupted power supply. With this type of design, it is impossible to achieve the maximum amount of natural lighting for the scheme, but it can help to a certain extent. This includes the interior of the

multipurpose hall. Adequate provisions will be made to take care of these areas. The center's core area will also be covered. By using roof lights, arched or semi-domed roofs, etc., an adequate provision will be made for natural light to enter the core area.

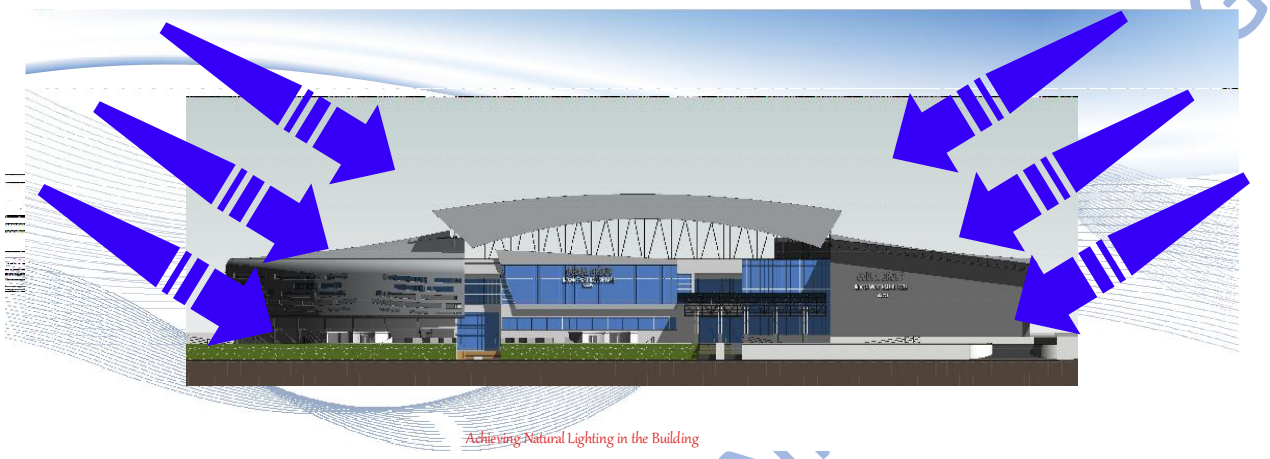


Figure 123a: Lighting analysis

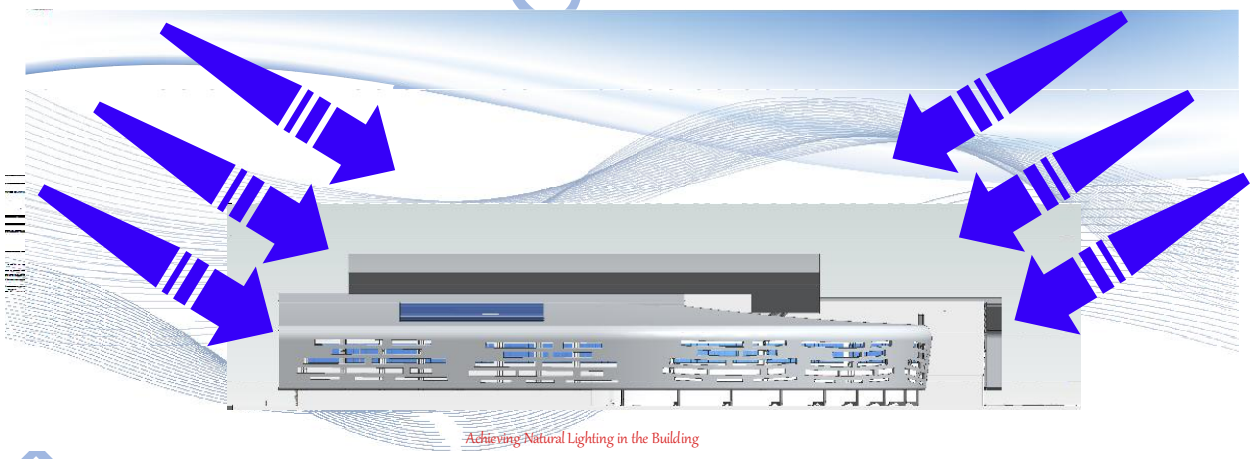


Figure 124b: Lighting analysis

4.2.3.3. Ventilation

This is the movement of clean air around a structure. This also refers to the process of delivering or removing air from space via mechanical or natural means, even if the air is not necessarily air-conditioned. Due to the nature of the design, it is crucial that there is an adequate supply of oxygen and that used air, or carbon iii oxide, be removed from the Complex. The stack effect will be used to maintain a smooth airflow.

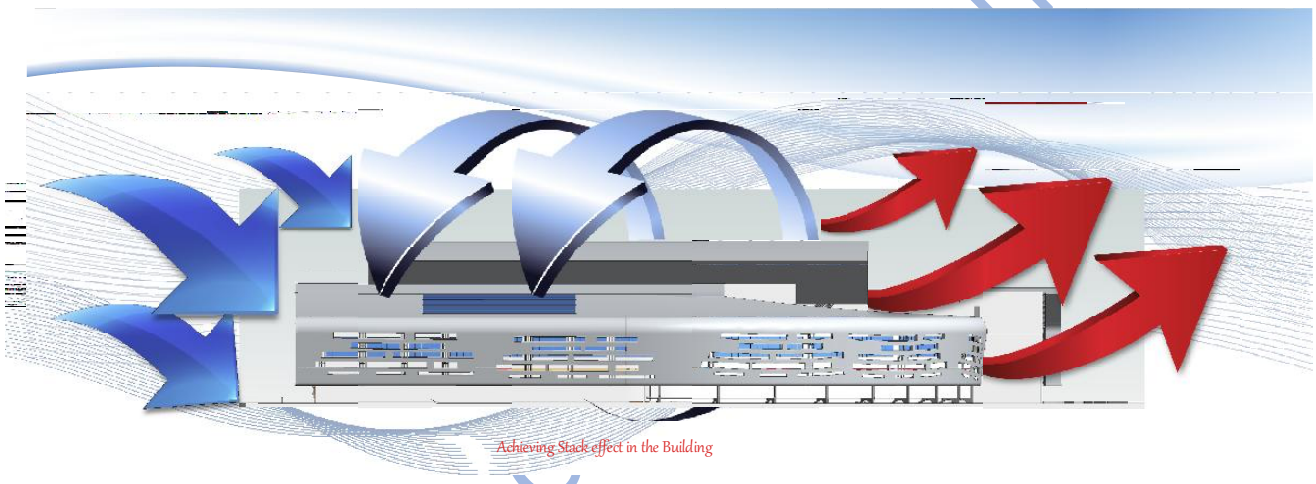


Figure 125: Ventilation Analysis

4.2.3.4. Circulation

One of the most crucial components or design factors for an indoor Sports complex is circulation. It also refers to ways of getting about a building, such as doors, corridors, staircases, and elevators. This is the traffic pattern through an area or a building, with enough provisions for a smooth, economical, and effective flow of traffic.

This can be separated into two categories: automotive circulation and pedestrian circulation.

4.2.3.4.1. Pedestrian circulation

This involves people moving about a building. Using anthropometric data and spatial analysis, adequate space will be offered to address the required space for the complete project. The architectural plan will stimulate both vertical and horizontal movement. Additionally, using a ramp to address accessibility issues will be taken into account.

4.2.3.4.2. Vehicular circulation

This involves the use of vehicles around the premises of the Indoor Sports Complex. As far as this design is concerned, only the parking lots and the lay bye area will be given priority. Vehicular circulation is restricted to the rest of the area.

Figure 126: Circulation Analysis

4.2.3.5. Landscape

This is the ability to enhance the appearance of land by altering its contours and planting trees and shrubs for aesthetic effect. The property will be beautifully landscaped.

Landscaping is of various types namely interior landscape and exterior landscape.

4.2.3.5.1. Interior landscape

This entails enhancing the Indoor Sports Complex's interior or central section. The Indoor Sports Complex will have extensive pedestrian traffic; thus it needs to be landscaped and designed to draw patrons, well-wishers from all across Ibadan, residents of Oyo State, and people from all over Nigeria. The usage of landscaping elements like trees, plants, interlocking pavement, etc., will be considered.

4.2.3.5.2. Exterior landscape

This also entails improving the Indoor Sports Complex's surroundings outside. The Indoor Sports Complex will have a landscaped entrance that is simple to use. The finishing and facade will also be given consideration. No trees or shrubs will be released; instead, finishes made of diverse materials will be used for a variety of reasons.

To improve parking lot surveillance and security, landscaping that complies with local jurisdiction regulations must either have low ground cover or trees without low limbs.

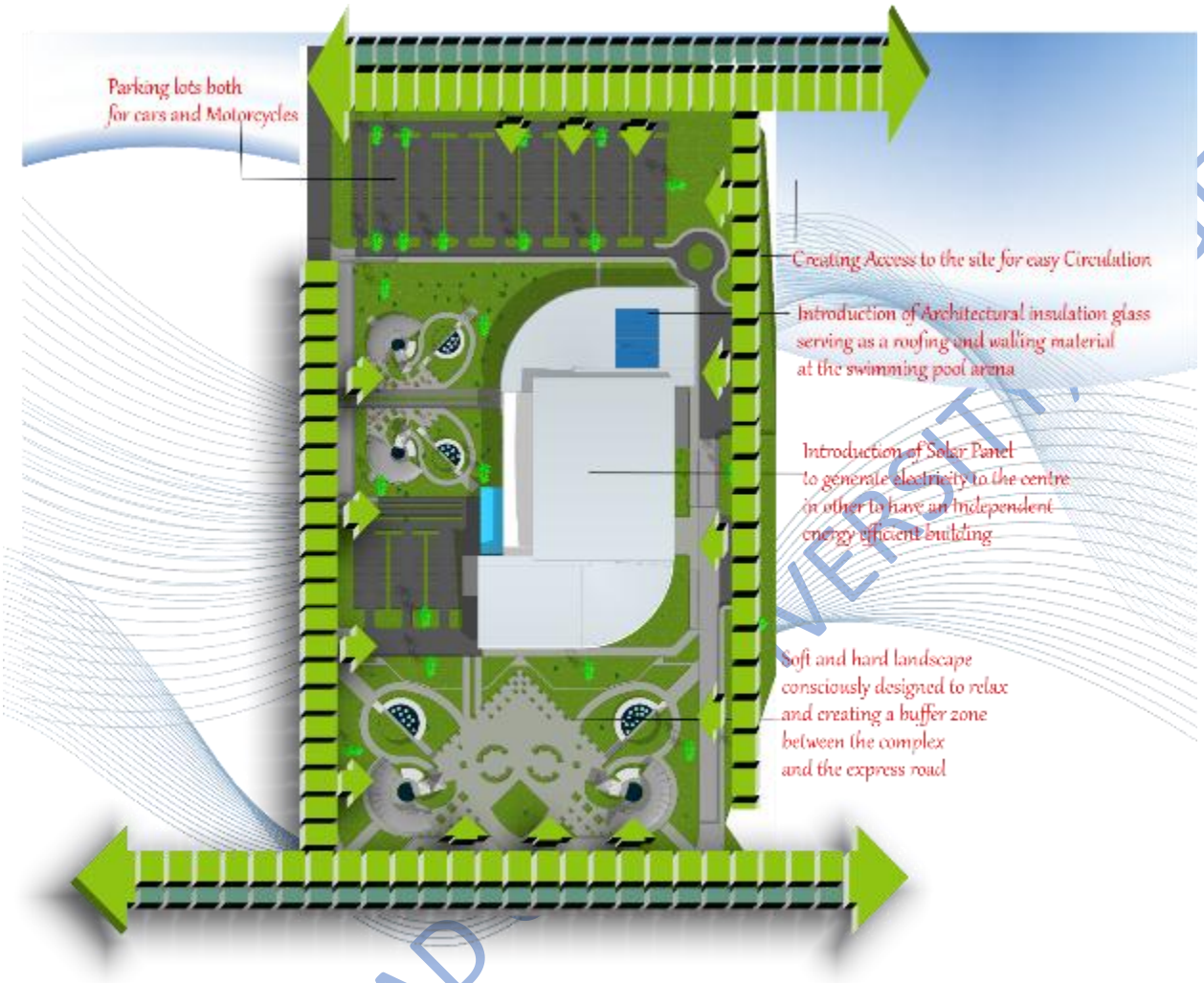


Figure 127: Landscape, solar panel position, and access to the site

4.2.3.6. Signing

Signing to give direction and information is one of the most important elements in the smooth functioning of the Indoor Sports Complex. However, whenever possible, the architecture itself should simplify and direct the customer's movement. The type and style of signs, graphics, system maps, and other directional instructions shall be uniform throughout the Indoor Sports Complex for easy identification.

4.2.3.7. Infrastructure

This refers to the extensive public infrastructure, such as roads, telephones, and water and power supply, that a town needs to support economic activity. The federal, state and local governments provide clean piping water and well-maintained roadways as the foundational infrastructure (that is passing through the extreme area of the site). Telecommunications and electricity, both of which are in good condition and are easily connected to the center (which is provided by private investors like MTN, GLOBACOM, and AIRTEL others are Zoom Mobile or Smile, and Etisalat). A plan will be put in place to stop the epileptic power supply. These entail the utilization of solar panels. There will be a standby generator accessible and used.

the provision of a sizable reservoir large enough to support the entire Indoor Sports Complex.

4.2.3.8. Basic Amenities

Nobody on this planet can manipulate nature; instead, they can only check it or deal with it. Toilets and other amenities will be adequately provided for in this indoor Sports complex. The maintenance department will take care of the restroom. The only way to use the restroom is to pay a significant sum of money each time. The need is that you be in the Indoor Sports Complex setting, which does not necessarily mean that you need to have a shop before using it.

4.2.3.9. Indoor Sports Complex Amenities

4.2.3.9.1. Shading and Climate Protection

According to the Urban Design Guidelines, the most crucial component of the Indoor Sports Complex's design is the provision of shade and cooling equipment. Because of the local environment, horizontal canopies are not sufficient for providing the desired shade and

temperature protection. Shading from the summer low-angle sun provided by vertical shade elements, particularly during evening peak hours, is more important than the shading provided by horizontal canopies between the hours of ten and two on the design criterion day, August 21.

To offer shade for visitors visiting the center, pedestrian paths and parking lots should have a cover. To transportation destinations, there should be direct, covered pedestrian links. To lessen the likelihood of blow-down, multi-trunk trees should be encouraged to be used in parking spaces. 75 percent of the pathway space should be shaded as a design objective, either by architectural or natural shade.

4.2.3.9.2. Restrooms

Public restrooms shall be provided at Indoor Sports Complex. Restrooms complying with building standards shall be provided at center facilities. the following shall be incorporated into the design;

- One unisex restroom
- Separate (from Indoor Sports Complex) electrical and water metering,
- Natural and mechanical ventilation

4.2.3.9.3. Advertising

There shall be digital advertising in the Indoor Sports Complex but hawking is seriously prohibited

4.2.3.10. Trash Receptacles

In addition to garbage cans placed strategically along the path, the main area, parking spots, and kiss-and-ride zones should also have their own receptacles.

Each fare selling location must have at least one trash can, and each station must have at least three. Garbage cans need to be secured with bolts so that people can not just take them. Trash cans on the platform of the Indoor Sports Complex must be bomb-proof or made of wire mesh covered with a transparent plastic bag. The first row will use wire mesh baskets. Colors and materials used on the outside design must be consistent with those used in the construction of the Indoor Sports Complex.

4.2.3.11. Hose Bibs

Standard flush hose bibs (quick-couplers) should be placed such that a 75-foot hose filled with fresh water may completely cover the platform, fare vending area(s), and circulation components, as shown on the Indoor Sports Complex Finishes Standard Drawings. A fresh water pipe of at least 150 feet in length must be able to reach the outlying locations.

4.2.3.12. Electrical Convenience Outlets

A 75-foot electrical wire shall be installed to provide complete coverage of the platform and circulation components, and a 25-foot chord shall be installed in the fare vending area, as shown in the Indoor Sports Complex Finishes Standard Drawings (s).

You should provide a 220V-1 Phase special purpose outlet with a lockable weather cover. There is no requirement for plugs in the main building or any outlying parts of the Indoor Sports Complex site. Coverage for mechanical and electrical rooms is required by code, manufacturer and designer specifications.

4.2.3.13. Closed Circuit Television Cameras (CCTVs)

In order to deter vandalism and theft, closed-circuit television cameras must be installed at least 9 feet above the finished floor in every room. CCTV cameras should be placed in easily accessible locations and should cover the following areas:

4.2.3.14. Public Address System (PA)/Variable Message Boards (VMBs)

The PA system (speakers) has to be able to reach every part of the venue. To accommodate those who are deaf or hard of hearing, the system must also make use of VMBs (Variable Message Boards) to display the same or similar information.

4.2.3.15. Art

The center's early design phase must include considerations for artwork. In Nigeria, it is required that artwork be installed in accordance with local building regulations. All public art in the facility will be funded in accordance with local legislation.

4.2.3.16. Accessibility for Individuals with Disabilities

The construction and design of all indoor sports facilities used by the public transportation system must adhere to the minimal criteria for Accessible Transportation Facilities. In terms of height, the target is a clear passageway of 4 feet, 0 inches.

4.2.3.17. Lighting

The integrated structural parts of the center must have electrical light fixtures for stage illumination. Walkways and pedestrian crossings, as well as driveways and parking spaces, must also be lit in indoor Sports complexes.

The design of the lighting system must make sure that no unwelcome stray light or glare reaches neighboring areas. When planning and implementing the lighting system, maintenance, bulb replacement, light distribution, and vandalism must all be taken into

account. Avoid building or designing anything that needs backlighting, uncommon or special lamps, or makes it difficult to get spare parts.

4.2.3.18. Indoor Sports Complex Site

The layout of center access shall accommodate the following modes: pedestrian access, bus, kiss-and-ride, and park-and-ride.

4.2.3.19. Pedestrian Access

Ensure easy and secure pedestrian access. This is crucial because, regardless of how they arrive at the Indoor Sports Complex site, center visitors always walk to the Indoor Sports Complex itself. Additional sidewalk width must be taken into account for the convenience and safety of users. Based on actual or desired pedestrian movement, pedestrian routes must be placed. The Indoor Sports Complex platforms should be easily accessible by sidewalks that are situated where people want to go and are large enough to accommodate efficient access. It should be a pleasant experience to access the center. The area around the center should be developed with relaxation in mind and with pedestrian access to the center integrated. Ensure easy and secure pedestrian access. This is crucial because, regardless of how they arrive at the Indoor Sports Complex site, center visitors always walk to the Indoor Sports Complex itself. Additional sidewalk width must be taken into account for the convenience and safety of users. Based on actual or desired pedestrian movement, pedestrian routes must be placed. The Indoor Sports Complex platforms should be easily accessible by sidewalks that are situated where people want to go and are large enough to accommodate efficient access. It should be a pleasant experience to access the center. The area around the center should be developed with relaxation in mind and with pedestrian access to the center integrated.

4.2.3.20. Park-and-Ride

Parking lots for cars will be placed in close proximity to some indoor sports facilities. The following are some broad recommendations for various indoor sports venues:

- Accessible and prioritized disability parking next to the bus stop.
- Parking for vanpools and carpools in the vicinity of the bus stop must be done in accordance with all applicable municipal ordinances and planning/zoning regulations.
- There has to be some kind of video surveillance set up.
- Safety Precautions Structure and Equipment

4.2.3.21. Parking for Individuals with Disabilities

The number of parking spaces and type shall be per city codes whichever is greater.

4.2.3.22. Emergency Access

Access for emergency response by Fire Department and paramedic equipment and personnel shall be provided at Indoor Sports Complex areas and Park-and-Ride facilities.

4.2.4. Site Layout

The layout of the park-and-ride lots should meet these standards while also taking into account the physical limitations of the sites. o Dead-end parking aisles are not desired. Allow for room to turn around if required.

- High-occupancy cars should be given priority when it comes to parking spots and driveway entrances
- Parking payments are to be collected by automated gates when entering and leaving the lot. If such charges are imposed, they would be collected in some other manner.

4.2.5. Wheel Stops

To prevent damage to artwork, trees, fences, light poles, and other fixtures in parking areas when regular curbs are insufficient, wheel stops must be installed. Parking spaces with wheel stops are available for people with disabilities if the ramp or curb height requires them.

4.2.6. Security

Security is one of the most crucial components of design. The certainty that anything of worth won't be taken away, as well as the state or emotion of being safe and protected. To maintain strong security at this center, appropriate precautions are being taken. The Indoor Sports Complex's input and outlet numbers are constrained by the functions and activities that can be performed there.

4.2.7. Fire Protection

Since the fire truck cannot access the Indoor Sports Complex in case there is a fire outbreak, adequate provisions will be made in case there is any fire outbreak. These are:

4.2.7.1. Fire Hydrant

This is an upright pipe, usually located in a part of the center, connected to a water main with a valve to which a hose can be attached, that can be used fire department to quench the fire. Adequate provision will be made to place the hydrant in different areas of need in the center.

3.1.1. Fire Extinguisher

This is a device for putting out the fire, a cylindrical metal container holding a substance such as foam or vaporizing a liquid that can be sprayed onto a fire to put it out. This will be located at intervals of 10metres. This will prevent the spread of fire for some minutes.

4.2.7.2. Smoke detector

This is a device that sets off an alarm when it becomes aware of smoke. A smoke detector is very necessary and important in this design scheme. This detects the smoke that can eventually result in a fire outbreak. It will be placed at every store, space or room, and toilets in the center.

4.2.8. Walling material

As far as walling materials are concerned, the wall only is made of 225mm sandcrete, reinforced concrete wall and column in some areas, 150mm sandcrete hollow block wall, and 100mm drywall partition may be used as a partition wall. In other words, all walls will be finished accordingly, depending on the uses of spaces, plywood or veneer will also be put into consideration.

4.2.8.1. . **Translucent wood as construction material**

Translucent wood can be used to develop windows and solar panels. As a very cheap resource, it can benefit projects by reducing the cost of resources, readily available and renewable resources.

4.2.8.2. Styrofoam

The closed-cell extruded polystyrene foam (XPS) product known as "Blue Board" is manufactured under the Styrofoam trademark. It is used in foundations, walls, and roofs as a water barrier and thermal insulator.

3. Martian paving. Mars-compatible concrete for building purposes. Additionally, water is not needed to create the new concrete.

4.2.8.3. Light-generating cement

Light-reflecting and -absorbing cement. One of the most prominent shifts in the building industry is the adoption of methods that minimize waste of both materials and energy. There are, then, far-reaching consequences to cement's "light bulb" function.

4.2.8.4. The CABKOMA strand rod

The strand is the most visually appealing and lightweight seismic reinforcing option. CABKOMA Strand Rod is 5 times lighter than a metal rod, and a single strand is just 12 kg in weight while being 160 metres in length.

4.2.8.5. Pollution absorbing bricks

The Breath Brick acts as a pollution vacuum, sucking up airborne contaminants and expelling clean air. This cutting-edge material is meant to function in tandem with a building's existing ventilation infrastructure. Using specialized bricks on the outside and regular insulation on the inside, it features a two-layer facade system.

4.2.8.6. Steel

Steel, the strongest and longest-lasting construction material, can withstand the test of time.

Features that make steel appealing include:

- Fewer breakdowns and repairs
- Simple to build as a green or energy-efficient building; Can be recycled without compromising durability

Steel's malleability means it may be used to create a wide variety of sports venues.

center that can accommodate a wide range of Sports and athletic activities.

The steel building design includes the flexibility to conform to any function, including creating multiple smaller areas or wide open, column-free spaces.

4.2.9. Finishes

Finishes are of various types.

4.2.9.1. Wall finishes

The entire wall will be painted in a way that either encourages or discourages clients and well-wishers from purchasing the displayed object for sale, depending on the purpose the space is performing. For instance, finishing a certain section with fiberglass will require different materials. It will be encouraged to use insulation as a roof covering material, etc. Complete finishes that are different from those for interior functions are required for the exterior. such as bricks, face paint, mosaic tiles, etc.

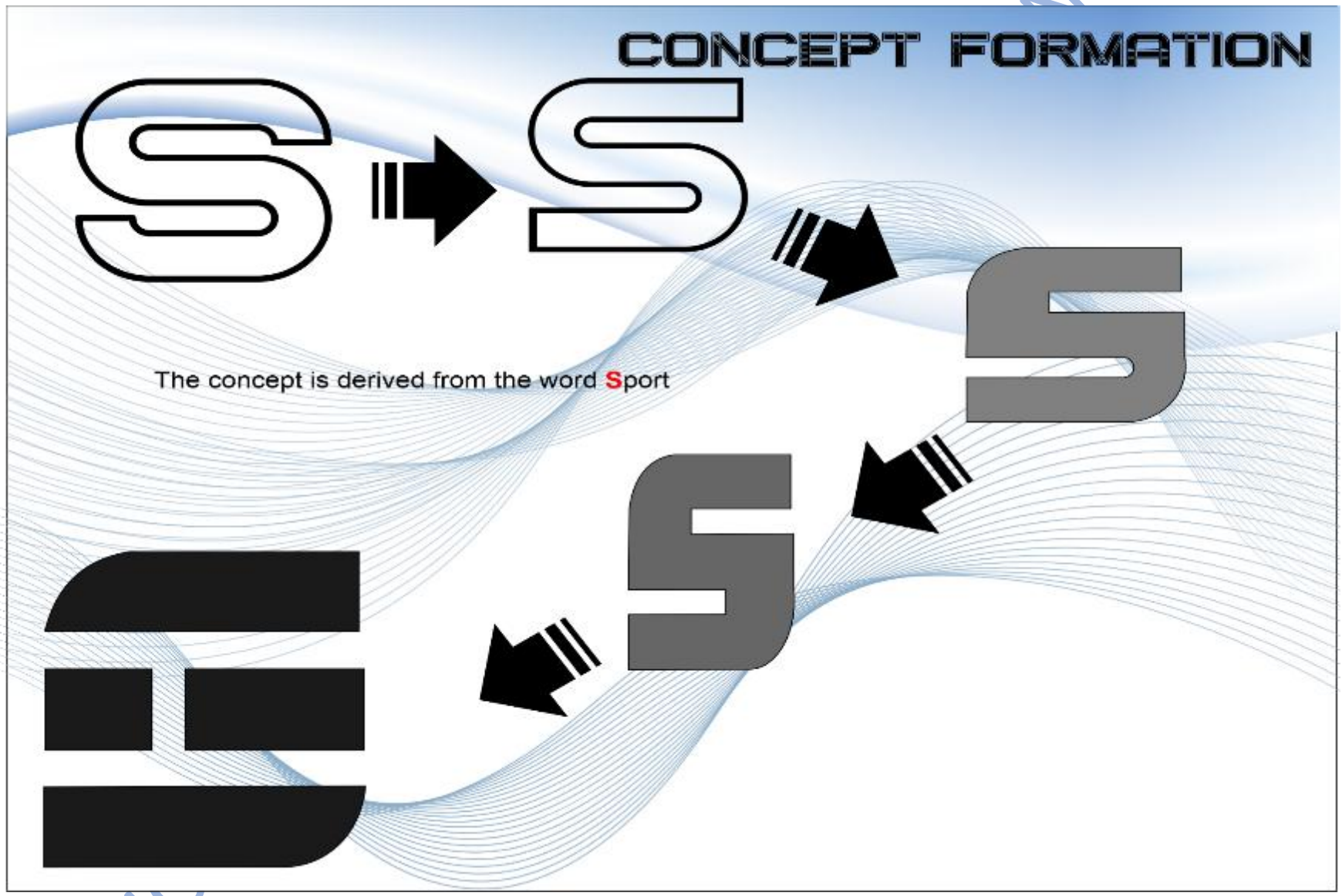
4.2.9.2. Ceiling finishes

Although there is specific specified material to reduce noise from the hall, acoustic materials for the ceiling finishes but Celotex ceiling board may be adopted for the entire center except the lighting area which is using poly-fiber material as the roof lighting materials.

4.2.9.3. Floor finishes

The entire Indoor Sports Complex will have different floor finishes depending on the location, and taste of the occupant, but the specified flooring material to be used is ceramic floor tiles while the platform is covered with marble floor finishes.

4.3. Concept Development



4.3.1. Space Standard/Requirement/Allocation/Analysis

S/N	DEPARTMENT	SPACES	FIXTURES	DIMENSION		NO REQUIRED	AREA	70% CIRCULATION	100% TOTAL AREA REQUIRED
	SWIMMING POOL AREA	SWIMMING POOL	SEATING AREA	0.4	0.4	200	32.00	74.67	106.67
			POOL A 40m	40	24	1	960.00	2,240.00	3,200.00
			POOL B 32m	32	10	1	320.00	746.67	1,066.67
			POOL C 25m	25	10	1	250.00	583.33	833.33
		CHANGING ROOM	SHOWER ROOM	0.51	0.621	2	0.63	1.48	2.11
			W.C	0.538	0.358	1	0.19	0.45	0.64
			WASHAND BASIN	0.45	0.6	1	0.27	0.63	0.90
		AREA REQUIRED							5,210.32
	WRESTLING								
		RING OR COURT	RING	12	12	1	144.00	336.00	480.00
			SEATING AREA	0.4	0.4	100	16.00	37.33	53.33
			COACH AREA	1.8	1.2	2	4.32	10.08	14.40
		CHANGING ROOM	SHOWER ROOM	0.51	0.621	2	0.63	1.48	2.11
			W.C	0.538	0.358	1	0.19	0.45	0.64
			WASHAND BASIN	0.45	0.6	1	0.27	0.63	0.90
		AREA REQUIRED							547.73

Table 5: Spatial Analysis

	BOXING								
		RING OR COURT	RING	12	12	1	144.00	336.00	480.00
			SEATING AREA	0.4	0.4	100	16.00	37.33	53.33
			COACH AREA	1.8	1.2	2	4.32	10.08	14.40
		CHANGING ROOM	SHOWER ROOM	0.51	0.621	2	0.63	1.48	2.11
			W.C	0.538	0.358	1	0.19	0.45	0.64
			WASHAND BASIN	0.45	0.6	1	0.27	0.63	0.90
		AREA REQUIRED							547.73
	ADMINSTRATIVE AREA								
		OFFICES	CHAIR	0.45	0.45	36	7.29	17.01	24.30
			TABLE	0.45	1.2	12	6.48	15.12	21.60
			OFFICE CABINET	0.65	0.9	12	7.02	16.38	23.40
		AREA REQUIRED							69.30
		TOILET	W.C	0.6	0.35	6	1.26	2.94	4.20
			WASHAND BASIN	0.45	0.45	6	1.22	2.84	4.05
			URINALS	0.55	0.35	6	1.16	2.70	3.85
		AREA REQUIRED							12.10

Table 6: Spatial Analysis

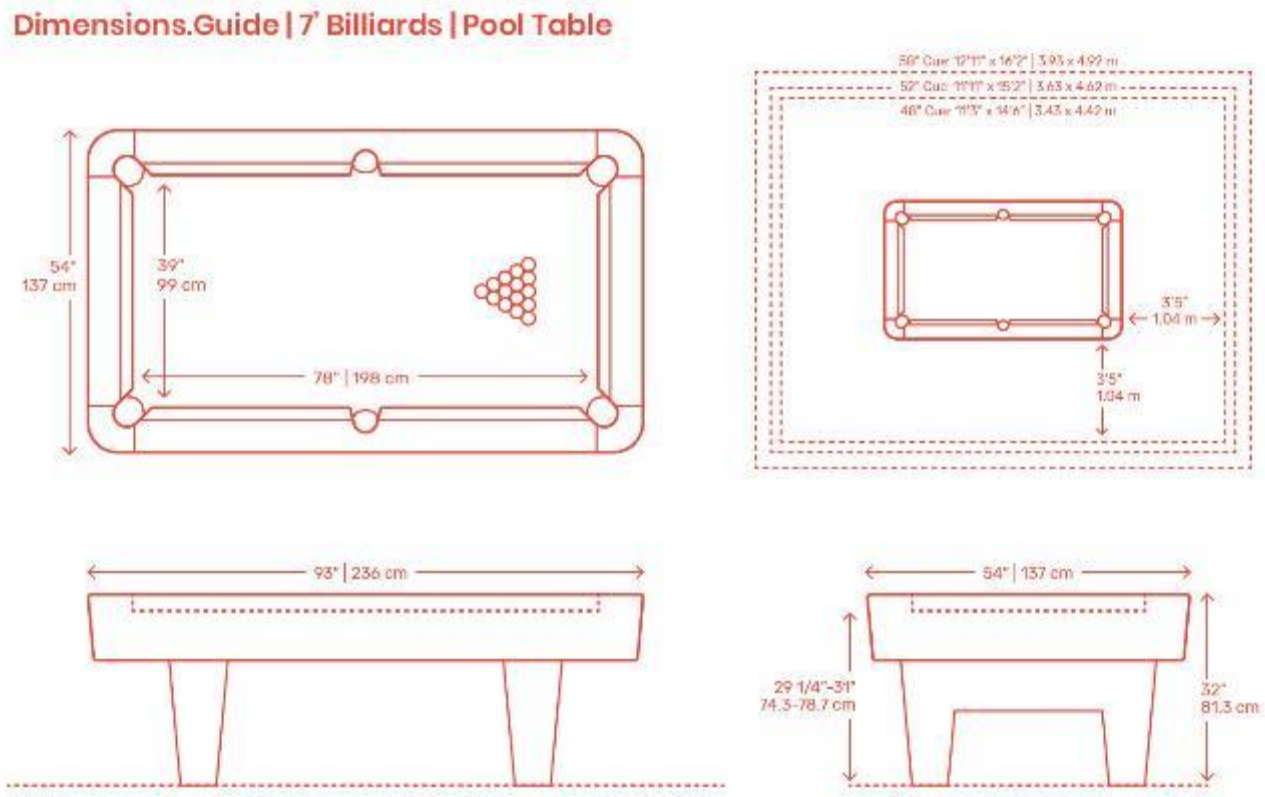
	SICK BAY								
		CONSULTING ROOM	CHAIR	0.35	0.35	6	0.74	1.72	2.45
			TABLE	1.5	2.4	3	10.80	25.20	36.00
		AREA REQUIRED							38.45
		ROOM	CHAIR	0.45	0.45	9	1.82	4.25	6.08
			TABLE	0.6	1.2	3	2.16	5.04	7.20
			BED REST	0.65	1.8	6	7.02	16.38	23.40
	SANITARY CONVENIENCES	AREA REQUIRED							36.68
		TOILET	W.C	0.6	0.35	5	1.05	2.45	3.50
			WASHAND BASIN	0.45	0.45	5	1.01	2.36	3.38
			URINALS	0.55	0.35	5	0.96	2.25	3.21
		AREA REQUIRED							10.08

Table 7:Spatial Analysis

	MULTI PURPOSE HALL								
		RING OR COURT	RING	12	12	1	144.00	336.00	480.00
			SEATING AREA	0.4	0.4	1000	160.00	373.33	533.33
			COACH AREA	1.8	1.2	2	4.32	10.08	14.40
		CHANGING ROOM	SHOWER ROOM	0.51	0.621	2	0.63	1.48	2.11
			W.C	0.538	0.358	1	0.19	0.45	0.64
			WASHAND BASIN	0.45	0.6	1	0.27	0.63	0.90
		AREA REQUIRED							1,027.73

Table 8: Spatial Analysis

4.3.1.1. **Billiard**



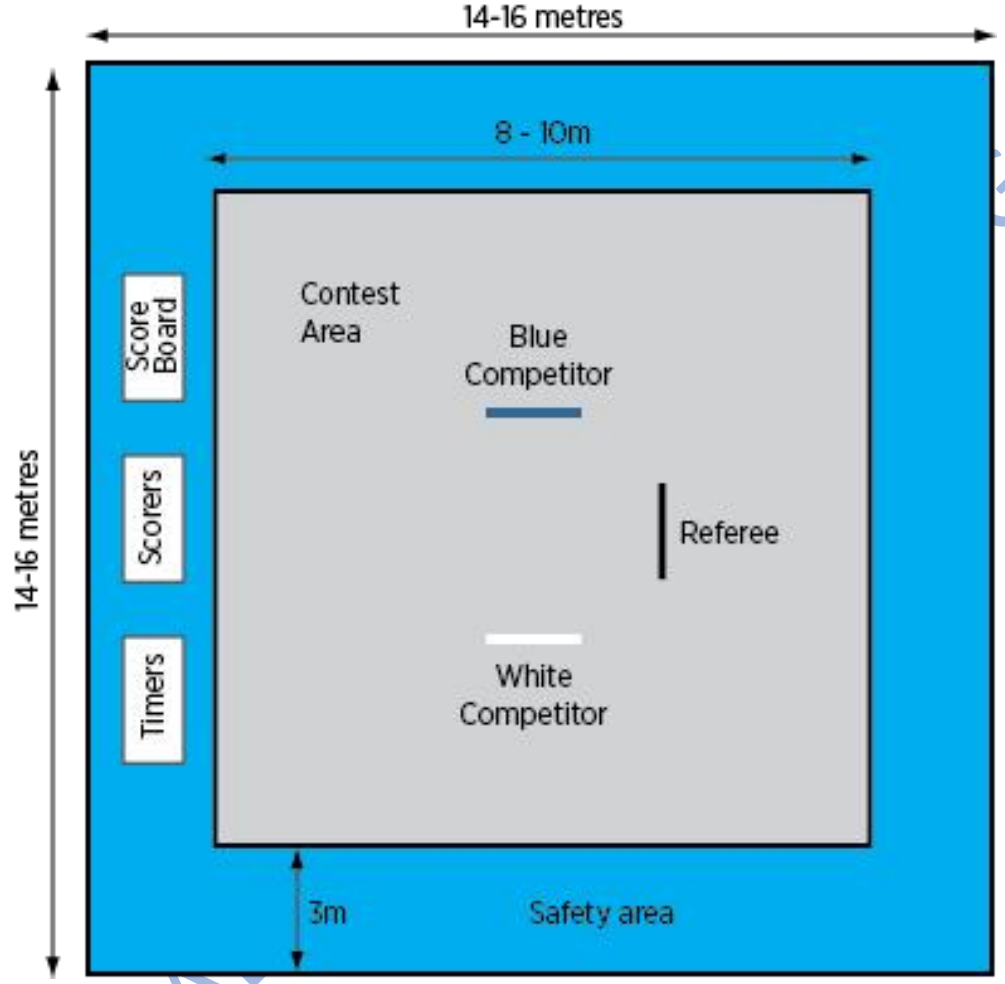


Figure 128: Billard

4.3.1.2. Judo

Platform

Figure 129: Judo Platform

4.3.1.3. Table Tennis

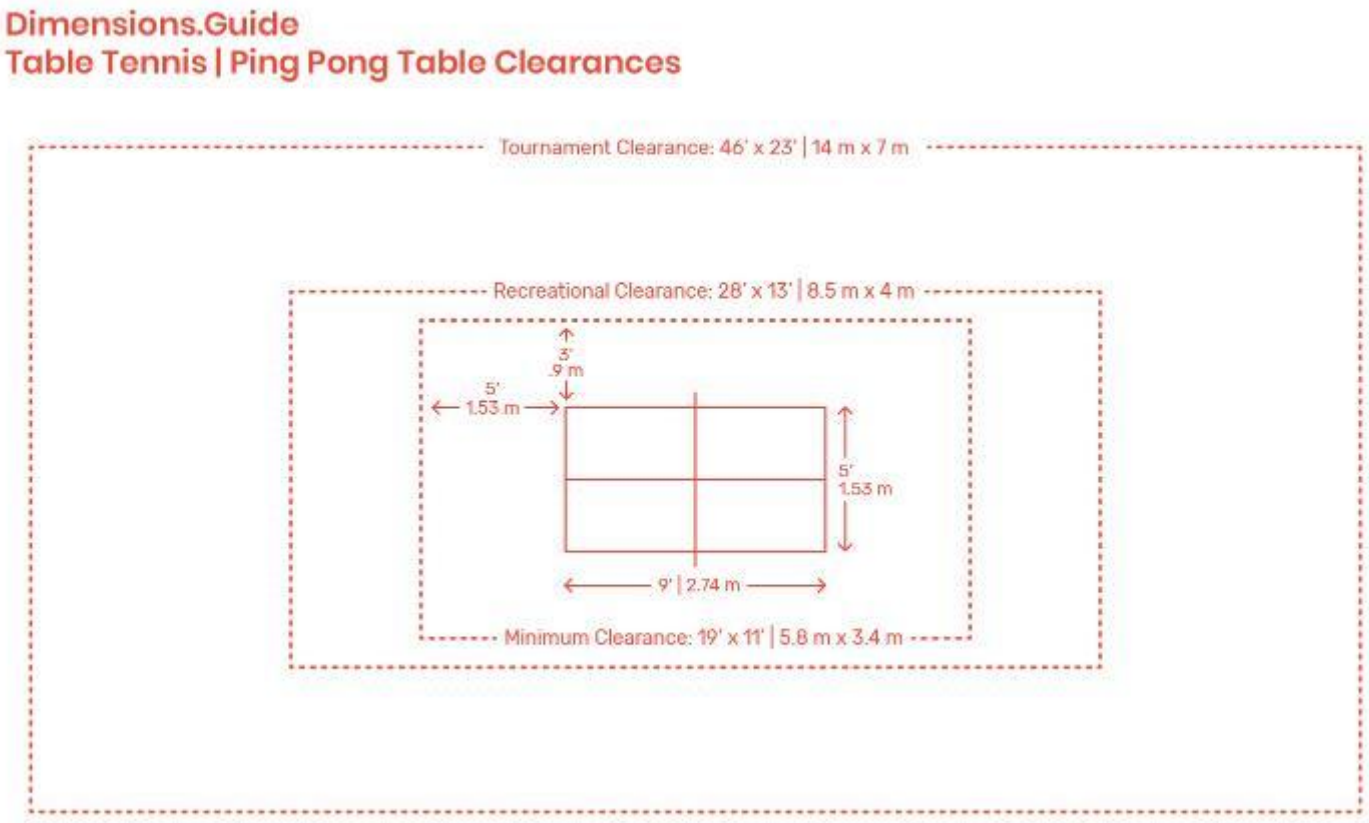


Figure 130: Table Tennis Area

4.3.1.4. Wrestling Platform

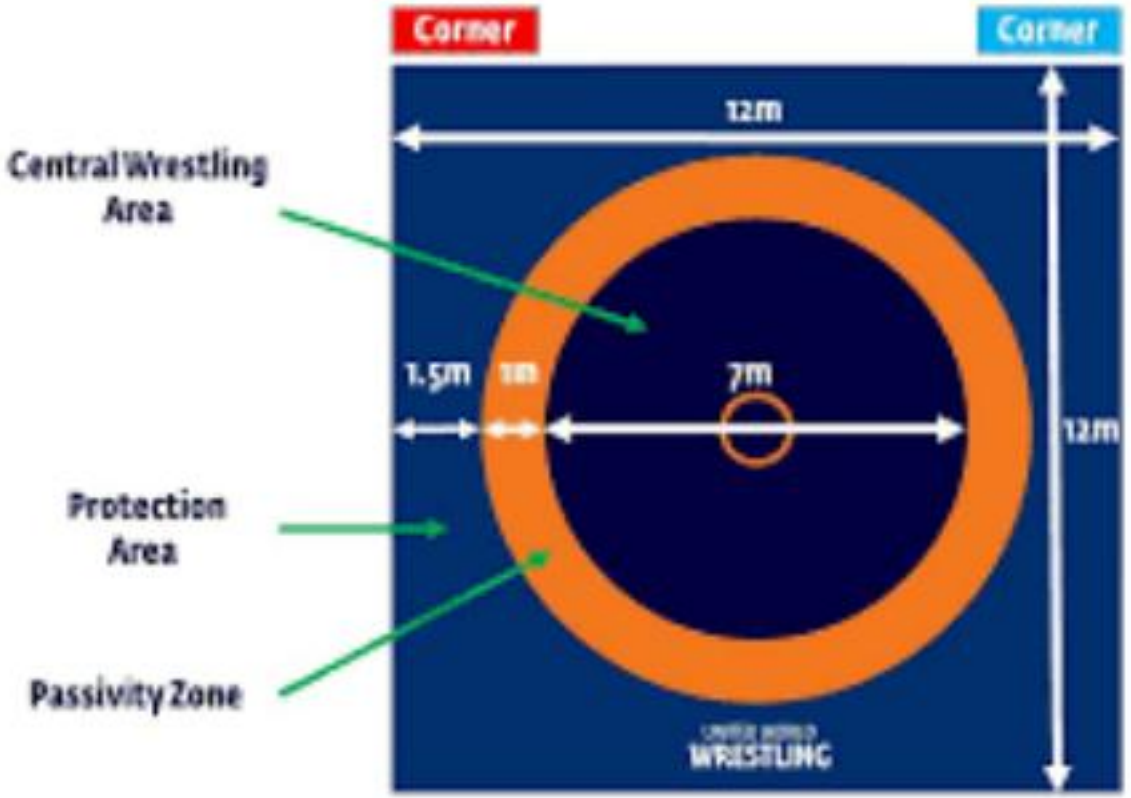
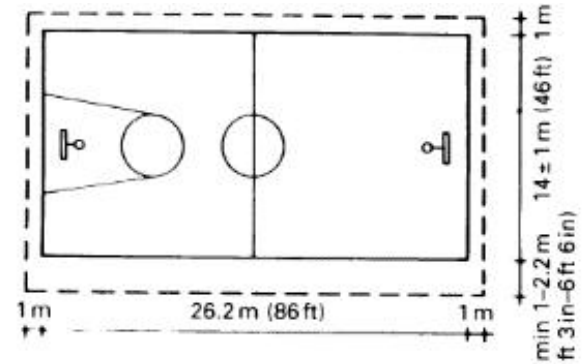


Figure 131: Wrestling Platform

4.3.1.5.

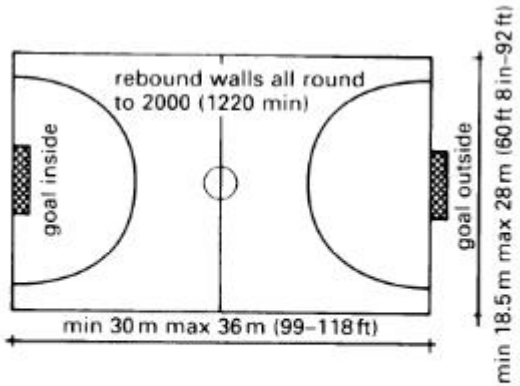
4.3.1.6. Volleyball Platform



(2) **Basketball: minimum height 7.0 m (see also previous page)**

Figure 132: Volleyball Platform

Five A- Side Platform



(3) **Five-a-side football**

Figure 133

Chapter Five

Conclusion

5.1.Project Appraisal

The proposal if executed will economically generate revenue for the Odu'a Investment Group and reduce the recurrent expenditure in terms of power and water supply. The building is an independent building that can be sustained with little or no additional services input if properly executed. The solar panel generates power to create light during the day while the inverter will back up the power consumption rate in the evening.

Secondly, the stack effect in place to tackle the ventilation problem will reduce the power consumption to a minimum

the major demerit I observe is the ability to maintain the whole site. It is capital intensive and should be done every day, especially in the relaxation area to avoid crawling animals.

5.2.Advantage of the forms, structures e.t.c

- The structures have the potential for great visual elegance.
- Aerodynamic shape
- Self-supporting
- creates a vibrant Image for the state
- Allows for good ventilation and lighting

5.3.Conclusions and Recommendations

Firstly, the Indoor Sports of fame center is a facility used in Nigeria used for Sporting activities, meetings, conventions, or display of merchandise by a wide variety of industry groups, in other to provide effective and efficient health; an Indoor Sports Center needs to be put in place and in other to achieve these objectives (fulfill the basic Architectural fundamental values in Building. These include Ventilation, Circulation; Air, vehicular and pedestrian, Orientation of the Building, Functionality, Landscaping, Aesthetics, e.t.c, to achieve an effective and efficient Building. achieve sustainability and green architectural building, reduce leasing center cost, and provide jobs opportunity thereby improving the economy of Ibadan Territory, (have good and efficient utilization of resources available on site.), relevant case studies were conducted, and important features were highlighted, and detailed.

Secondly, the site was critically analyzed and all the detail involved were noted to have a detailed view of the scheme. The design was zoned, which leads to concept formation. Spatial analyses were carried out to ascertain the circulation, spaces, and fixtures required for the scheme.

Finally, the detailed design was to tackle the defect of the case study to help improve the quality of the center. Security issues and maintenance culture were also taken into consideration.

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University Compliance Form

This to certify that this thesis by Sarafa Seun ADEBISI with Matriculation Number LCU/PG/002156 in the Department of Architecture, Faculty of Environmental Studies, Lead City University, Ibadan is in full compliance with the approval of the University's format and style.

Signature _____ Date _____

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Department**: Architecture**

Supervisor**: Dr. (Arc.) F.M. Adediire**

Nature of the programme: **Master Degree**

Research topic: **Proposed Indoor Sports Hall of Fame, Ibadan, Oyo State, Nigeria.**

(Peculiarity of Floor Finishes in an Indoor Sports Hall)