

**Proposed Akure City Mall
(The Use of Sustainable Energy Sources for The HVAC and Lighting System in A City
Mall Design)**

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Environmental Design and Management, Lead City University, Ibadan, Oyo State,
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Certification

This is to certify that Ibukun E. OLAOLUWA with matriculation number LCU/PG/002162 carried out this research work titled “The Use of Sustainable Energy Sources for The HVAC and Lighting System in A City Mall Design” in the Department of Architecture, Faculty of Environmental Design and Management, Lead City University, Ibadan, Oyo state, for the award of Master Degree (MSc) in Architecture and that this has not been previously submitted.

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Dedication

This thesis is dedicated to the Almighty God and the course of sustainability.

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Acknowledgement

I am grateful to the management of Lead city university for giving me the opportunity to carry out this research and providing an enabling environment to learn.

Special appreciation to my supervisor Dr. Funmi Adedire for her guidance throughout this program and to Dr. Tosin Babalola who has being of tremendous help to me in putting this thesis together. To Arc. Adeola A, Arc. Ajijola K, Arc. Olugbesan N, Arc. Fasheun-Moteshe J, Dr. Arc. Adegoke A, Arc. Aseyan B, Arc. Olaniyan M, Arc. Oguntunde D, lecturers that taught me during the course of this programme, I'm also very grateful. I cannot forget to acknowledge the entire postgraduate members of staff (both academic and non-academic) for making this programme hitch free.

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I also appreciate my parents, Mr. and Mrs. Sunmola and family for the love and support they showed me financial, emotionally and in all aspect of my life from birth up till now. God bless my parents.

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

Abstract

This research focuses on investigating the energy challenges faced in running a city mall and the design approaches that can be adopted to sustainably design and run a city mall in Nigeria. Five case studies were investigated in this study to determine what interventions in design and material have been adopted both locally and internationally to achieve a mall that can be said to be sustainable and the mistakes made on the projects to avoid a repetition. This investigation helped to realise design approaches and materials that can be employed to achieve sustainability in a city mall design. The research concludes with the recommendations that can be adopted to achieve sustainability in a city mall design.

Keywords; *City mall, Sustainability, Sustainable design, Sustainable energy.*

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Chapter One

Introduction

1.1 Background to the Study

The concept of sustainability in architecture is gaining popularity. Several researchers define sustainability in architecture in various ways. Sani (2018) defines sustainable architecture as a blend of aesthetic, environmental, social, political, and moral values. It is the capacity of a civilization, ecology, or any other continuous system to continue operating without interruption indefinitely (without being forced into decline through exhaustion of key resources). While Sassi (2020) sees it as an innovation that fulfils the needs of the here and now without compromising the potential of future generations to fulfil their own wants. It entails addressing a wide range of concerns, some of which appear to be contradictory.

Developing a basic understanding of these topics is the very first step toward establishing or defining personal values and progressing towards a more sustainable future (Sassi, 2020). Sustainable buildings are gaining popularity due to perks such as energy, water, and operating cost reductions, improved air quality, and higher productivity. The aspects of sustainable design (resource economy, life cycle design, and compassionate design) can raise awareness of the environmental impact of architectural consumption, both locally and globally (Marut J. J. ALAEZI J. O. & OBEKA, 2020).

Retail malls or shopping malls are 20th-century adaptations of historical market places, with the inclusion of vehicular parking. One definition of a shopping centre describes it as "an assemblage of distinct retail outlets, services, and a parking space that is controlled by a company as a whole" (ICSC Research, 2009). A shopping mall typically contains a variety of

different types of companies, including eateries, banks, theatres, professional offices, and service stations.

Recent mall designs favour huge amounts of glazing over common spaces, with central voids enabling natural light to filter down to lower levels. This results in excessive day lighting and substantial solar gains, which are usually compensated by mechanical cooling (B.M.Jones, 2016). Controlling these gains can help to reduce cooling demand while also expanding the envelope for natural ventilation and sunlight (B.M.Jones, 2016). According to Rao, F., and Dovey, K. (2021), current projects for shopping centres should be cantered on the creation of a bright indoor environment. This can be accomplished by either incorporating lots of glass to let in a great deal of natural light or by fusing the ideas of internal and external design with schemes that flow seamlessly from the interior to the exterior of the building. This thesis intends to apply sustainable design solutions to address the issue of energy efficiency, which is a challenge in shopping malls.

1.2. Problem Statement

Very few architectural attempts have been made to provide sustainable energy for shopping malls in Nigeria (Sani K. M., 2018). This is partly because the shopping mall is a relatively contemporary typology compared to the traditional market setting in Nigeria. Problems encountered in the realisation of sustainable development of shopping malls in Nigeria can be traced to us trying to replicate western approaches in solving problem peculiar to this region (Sani K. M., 2018). This only leads to bad outcomes due to the lack of understanding of the African environment in which it is used (Sani K. M., 2018).

In contrast to many industrialized countries where regulatory mechanisms for energy consumption in buildings are growing and being enforced, Nigeria lacks adequate energy supply infrastructure, let alone a regulatory system (Larry, 2021). Meanwhile, during the last

few decades, electrical supply has remained insufficient and unpredictable (Larry, 2021). A retail mall consumes a significant quantity of electricity. This is because lighting and thermal comfort is required in a number of a large spaces. The country's low electrical supply and the usage of traditional building materials have increased the expense of operating shopping malls. The majority of electricity in Nigerian shopping malls is generated by the combustion of fossil fuels, which has an impact on the climate and contributes to global warming. This energy source is not sustainable in a nutshell. All these has led to high running cost in effectively lighting and ventilating Nigerian malls, which in turn results in an increase in the price of retail spaces and the goods and services sold in them. With this situation in place, there is an immediate need to focus on feasible sustainable approaches to achieve energy efficiency in shopping malls. This will protect the environment from global warming while also enhancing the country's overall economic growth. Therefore, this study will be designing a city mall with the mind of using strategies that can help in achieving sustainable goals so as to proffer solution to the energy problems currently faced by a city mall in Nigeria.

1.3. Aim and Objectives of Study

Aim

The aim of the study is to investigate strategies that can aid achievement of sustainable lighting and ventilation in the design of a city mall in Nigeria.

Objectives;

1. To investigate the energy challenges faced in the process of lighting and ventilating shopping malls in Nigeria.
2. To identify design principles and strategies to be employed in providing sustainable lighting and ventilation in a shopping mall.

3. To proffer solution by designing a city mall using sustainable lighting and ventilation design strategies identified in the study.

1.4. Research Questions

1. What are the energy challenges faced in lighting and ventilating malls in Nigeria?
2. What design principles and strategies can be employed in providing sustainable lighting and ventilation in a shopping mall?
3. How can the identified strategies be used to provide sustainable lighting and ventilation in a shopping mall?

1.5. Significance of the Study

This study will add to the exiting literature on the use of sustainable and efficient energy source(s) for the design of a city mall in Nigeria as strategies to be used will be cost effective and environmentally friendly.

1.6. Scope and Limitations to Study

This research aims at studying issues concerning selected existing shopping malls in south western Nigeria. This will help to determine areas where improvements are needed. Information was gathered through the study of these existing case studies to determine the energy source(s) used in them and if there are any consideration for energy efficiency and sustainability. The pieces of information obtained were important in coming up with a proposed mall design for Akure city.

1.7. Definition of Terms

1. **HVAC**; Heating, ventilation and Air conditioning system.
2. **City Mall**; is a large retail complex (which belongs to a city) with a verity of stores and often restaurants and various commercial establishments located in a single massive building or a cluster of smaller buildings.

3. **Sustainable Energy;** an energy is sustainable if it provides for the current generation's requirements without jeopardizing their potential to provide for future generations.
4. **Sustainable Design;** is an approach to architecture that aims to improve both the building's efficiency and its influence on the environment. Its primary goals are the conservation of renewable resources, the reduction of waste, and the promotion of settings conducive to health and productivity.
5. **Sustainable Design Strategies;** are design approaches employed achieving a sustainable design.
6. **Sustainable Building Materials;** locally sourced or manufactured materials are examples of sustainable construction materials. In other words, they're products of recycling or industrial by-products. They are thermally friendly and have a low environmental effect.
7. **Gross Leasable Area (GLA);** refers to the entire square footage of a building that is available for lease and exclusive use, including any basements, mezzanines, or upper floors, expressed in square feet and measured from the centreline of joint partitions and from outside wall faces. Because GLA lends itself readily to measurement, the shopping centre industry has adopted it as the standard for statistical comparison.
8. **Gross Leasable Area of a Mall;** The entire floor area that is utilized by tenants of a mall in superregional and regional centres. It does not include the area that is occupied by department store tenants or any other places that are not owned by the business.
9. **Total Floor Space;** this includes any and all portions held by the centre owner in addition to any and all parts that are independently run or owned but are spatially part

of the centre. Inclusion includes not just the GLA but also any other enclosed areas in the shopping centre as well as any outparcels.

10. **Common Area**, or the entire portion of the retail mall that is not available for lease to individual tenants but is available for common use by all tenants or group of tenants, their invitees, and adjacent stores. Parking, sidewalks, landscaped areas, public toilets, truck and service facilities, and the like are included in the common area.
11. **Parking Area**; the area dedicated to carparks, consisting onsite lanes, aisles, stalls, islands, and all other parking-related features.
12. **Parking Area Ratio**; the proportion of parking space to total building area.
13. **The Parking Index**; is the standard comparison that is used to demonstrate the link between the number of parking spaces and the gross leasable area. This comparison is based on the ratio of the number of parking spaces to the total gross area.

Almost all information on rents and cost of operation for shopping centres is based on gross leasable area (GLA).

Chapter Two

Literature Review

2.1 Conceptual Review

A structure that houses multiple retail establishments and provides customers with access to each one via a network of connected circulation is referred to as a shopping mall. They have parking spaces provided within their premises. The shopping mall serves as the equivalent of a traditional market in today's society (Rao, 2020).

When one takes into consideration the following eight qualities of shopping centres, one can see that the fundamental description covers a broader scope (Urban Land Institute, 1999);

- i. Structures that offer living space for renters and are carefully selected and managed for the collective good of all rental properties. A shopping centre is not a haphazard or unplanned collection of diverse or shared-wall buildings. Rather, it is an organized collection of buildings that share walls/partition spaces.
- ii. A position that is conveniently accessible within the trade area, with efficient entry and exit points for automotive traffic, as well as access that is convenient and delightful for pedestrians from neighbouring areas
- iii. A well-suited centralized location is type of centre the market needs. If the trading area as well as other growth factors are anticipated to need the addition of additional buildings, uses, or parking structures, the site may allow for the enlargement of existing buildings as well as the construction of new ones.
- iv. Onsite parking that is sufficient to accommodate the demand that is created by retail uses. It is important that parking be organized so that pedestrian traffic flow is improved to the greatest possible extent in order to maximize the benefits of retail

shopping, and that an acceptable walking distance be provided from parked cars to the entrances of the centre and to all of the stores individually.

- v. Service facilities for the delivery of items (which are separated from customers).
- vi. Site enhancements, such as landscaping, lighting, and signs, that provide a retail experience that is desired, beautiful, and safe.
- vii. A lease mix and arrangement that offers synergistic retailing among stores as well as the largest possible range and depth of merchandise that is appropriate for the style of centre and the type of business that occupies it.
- viii. surroundings that are pleasant for shopping and other activities associated to it, which contribute to the formation of a robust sense of identity and place.

A shopping centre can only be successful with the right kind of planning and management. The proprietor of a shopping centre, the store's tenants, the shopping centre's lenders, and the community at large are all stakeholders in the success of the business. An entrepreneur's duties include acting as a creator, arranger, and coordinator of their endeavours. How successfully the entrepreneur fulfils this function is a critical factor in determining the overall success of the venture.

The maintenance and leasing of the property are equally important to the success of the project over the long term for everyone concerned.

2.2 Historical Review of Shopping Centres

Consumption has evolved into a way of life in today's society, and shopping malls have become the primary centre for this. Shopping malls are contributing to the revitalization of their surrounding urban environments thanks to the myriad of functions they offer, as well as the diverse architectural forms they come in. How do they amass such an incredible amount of power? From prehistoric times right up until the opening of the very first walled shopping mall, the development of retail establishments throughout history will be dissected and

illustrated. The city functions like a complex organism that is always undergoing transformation. A rich illusion of contiguity is created when public structures are connected to the areas where people live, and the places where people dwell are connected to each other. This creates a living mesh (Parham, 2018).

The city introduces a whole new set of environmental concepts to us, such as the city square, the street, the protective wall, and its gates. It crams our debate full of a number of architectural developments, such as the canal and the granary, the palace and the bath, the marketplace, the bakeries, stores, restaurants, and libraries (Ehteshami, 2018).

2.2.1 Ancient Times

When people in prehistoric times first began to speak with one another, they also began trading. They provided one another with goods and services through barter trade. Approximately 150,000 years ago, the history of long-distance commerce began. This trading operations took place in meeting and gathering locations (Rao, 2020).

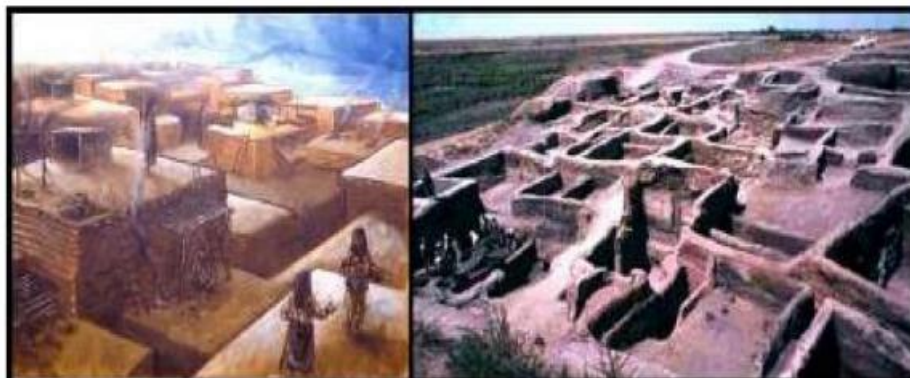


Figure 1; Çatalhöyük 5000 BC and today
Source; www.catalhoyuk.com

7500-5000 B.C. (Figure 1), there are evidence that obsidian tools were traded for commodities like Mediterranean Sea shells and flint from Syria in the city of Çatalhöyük, which was located in southern Anatolia, Turkey. At that time, the Stone Age was in full swing (Gregg, 2018). The trading of goods is often cited as a fundamental motivation for the

establishment and continued existence of cities. Therefore, one of the reasons why people interacted with one another, which ultimately led to the development of urbanization, was trade. Although it is generally accepted that commerce began during the Neolithic period, the first known figurative depiction of a marketplace dates back to 1500 B.C. and was found in Egyptian artwork (Figure 2). There is however no conclusive proof regarding the location or structure in which they conducted their commercial activities. (Rao, 2020).



Figure 2; An illustration of commercial activity at Thebes (Egypt)
Source; Koolhaas, 2001

Trade was the primary means by which states maintained their sovereignty before the creation of money. For instance, in ancient Egypt, the Pharaoh served as the country's absolute king and exercised full authority over the land and all of the riches found within it. Everyone was a member of his workforce. After then, they started engaging in trade in small scales. They engaged in a form of trading known as barter. It was not until the Late Period that the ancient Egyptians conceived of the concept of money. During the 5th century Bc, foreign currencies began to circulate (Jimmy Dunn, 2012).

2.2.2 Greek Agora

No matter which of your servants you instruct to go to the Agora and purchase anything on your behalf, they will do it without a hitch because it will be perfectly clear to all of them exactly where they need to go in order to acquire the specific type of item you require. That

they are kept in their designated locations is the sole explanation for this phenomenon (Underhaug, 2019).

In ancient Greek municipality, a "place of assembly" known as the Agora served as a public gathering spot. According to Mumford (2020), the most significant role that the agora played was that of a gathering place for both official and unofficial meetings, as well as a venue for daily conversations. Early on in Greek history, between the years 900 and 700 B.C., the inhabitants would meet in the agora for military service or to hear comments from the reigning king or council. This took place in the commencement of the Greek civilization. In later times, the term "Agora" came to refer to an open-air market that was frequently covered by tents and located in the centre of a city. Here, merchants set up shop and artisans created and sold their wares.

Other activities, such as polling and debate, public exhibitions, sports, and parades, happened on days that were not market days because commodities were spread out on mats or on temporary booths during market days.

The Agora was situated at the intersections of the city's major thoroughfares and was encircled by government structures. The initial commercial transactions were conducted at the centre of the settlement, which led to the development of a synergistic relationship between commercial activity and the core of civilized life in the downtown areas of towns (Rao, 2020).

Under the colonnades of the Stoa, which had been specifically designed for the purpose of the merchants' activities, the ancient Greeks would display and sell their merchandise (Gregg, 2018). There were however no permanent stores that occupied a location that was specifically designated for stores in the Greek Agora. According to Mumford (2020), the Greek towns initially grew in a haphazard and organic manner. At that time, the cities lacked

logical street networks and featured "just the beginnings of arcaded public promenades." Later, beginning in the sixth century B.C., new Greek cities began to appear that were based on a systematic pattern that was known as gridiron. These cities had standardized blocks, long wide avenues, and a rectangular agora that was bordered by colonnaded streets. The Romans pushed on with their scheme. Both the Roman forum and the eastern bazaar may trace their lineage back to the agora and the Stoa due to the planning, organization, and roles of these two public spaces (figure 3).



Figure 3; Today, the reconstructed Stoa of Attalos in Athens and Kapalıçarşı, Istanbul
Source; istanbulwallpapers.com

2.2.3 Roman Forum and Trajan's Market

Many ancient people believed that the Roman Forum was not only the heart of an old city, but also the centre of the world. Rome was the dominant power in most of what we now refer to as the civilized world from the time its empire was established under Augustus in 31 B.C. until it fell into disrepair about 500 years later. The Roman Empire had sovereignty over the whole known world, stretching from Scotland to the Sahara and from Gibraltar to the Euphrates. In addition to this, Rome was the city that gave birth to our alphabet, a pioneer in the organization of cities and the development of their legal systems, and the originator of astonishing new frontiers in architectural design (Ehteshami, 2018). The forum of an ancient Roman city served as the city's public square or market place, as well as the centre of the city's judicial and commercial activities and as a gathering place for the populace. In the same

way that the Agora in ancient Greece was the core of civic life, the main towns of the Roman era constructed open areas designed to be the centre of civic life, which were flanked by temples, basilicas, bathhouses, and other state buildings. One of the activities that was available to attendees both within the buildings and outside in the forum space was shopping (Rao, 2020). The Roman Forum was a courtyard in the shape of a rectangle that was enclosed on all sides by businesses. It was situated on the axis, between the basilica and the capital (Figure 4). This strategy was used across the entirety of the Empire. It is generally agreed that Marcus Vitruvius Pollio, who lived between the years 80 and 70 B.C. and passed away sometime after 15 B.C., was the first known engineer in the world. In his work, he discussed the standardization process as well as the utilization of prefabricated models. As a direct consequence of this, new cities and municipalities became mini Romes beginning in the first century B.C. The importance of architectural creativity had become less important (van Mil Y. & Rutte, 2021).

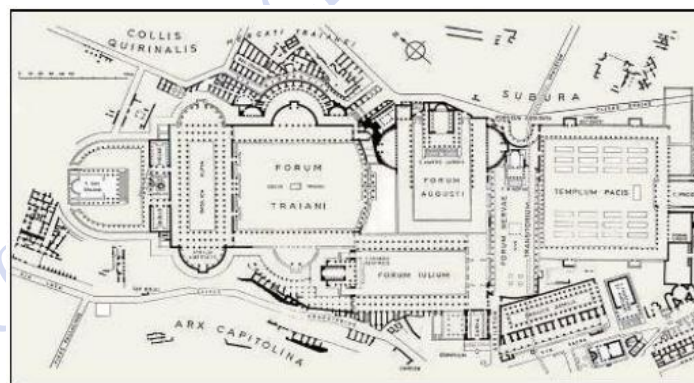


Figure 4; Trajan's Market in Rome today
Source; wikipedia.org/wiki/File:Trajansmarket.jpg

2.2.4 First Generation of Planned Shopping

Before the invention of arcades, collections of shops were either unplanned organic aspects of town centres or happened in mixed-use structures with the stores being subordinate to the other purposes, such as in the city hall or marketplace hall. Neither of these options was ideal. There were, of however, major outliers, such as the covered stores seen in Roman courts and

the bazaars found in the Middle East. These beautiful instances were outliers, like shooting stars, that came and went but left behind nothing in the way of a lasting legacy to influence the following development of collections of stores (Rao, 2020) . During the course of the development of shopping, a new generation of carefully organized collections of shops as well as new sorts of shops came into being. Those buildings evolved into autonomous structures with a primary focus on retail shopping. According to Alexander N., & Doherty, A. M. (2022) many sorts of buildings came into existence around the year 1800 as a product of the capitalist ways of arranging retail trade. These structures included arcades, the bazaar, the magasin de nouveaute, and eventually departmental stores. The arcade, according to Alexander, N., & Doherty, A. M. (2022), is merely an association of stores, while the other types of retail establishments are extended shops, which constitute the concentrated form of organized retailing.

2.2.5 The Beginning of Shopping Malls

By mid-twentieth century in the United States, the population was increasing, and people living in cities were looking for ways to flee the unpleasant circumstances of the cities. Because there was so much land readily available and easy to get to, as well as the fact that cars were owned by a lot of people, people were able to successfully establish themselves in the suburbs (Rao, 2020).

Victor Gruen describes the reasons for and the process behind the birth of the modern suburbia: The contemporary concept of shopping centres can be traced back to the establishment of the first suburban shopping malls. Rao (2020) stated that, in the United States of America there were just 45 suburban malls in the year 1945, but by the year 1958, that number had increased to 2900.

2.2.6 The Enclosed Suburban Shopping Mall

After the German occupation of Austria in 1938, Victor David Gruen, a commercial architect who was conceived in Austria, made his way to the United States. He credited Vienna and other cities in Europe as being the primary sources of inspiration for his approach to the construction of shopping malls. Surprisingly, he was a socialist, but he was the one who came up with the idea for the enclosed shopping centre, the castle of capitalism (Malherek, 2019). He suggested using shopping malls as the fundamental building block of urban planning in the hopes of revitalizing failing city centres. In his socialist approach, he designed a community that would surround the enclosed shopping centre and would have a lake, as well as residences, apartments, schools, and a hospital (Figure 5).

Back in the 1950s, architect Victor Gruen was the one who first brought the enclosed retail mall to the United States. Before Gruen, two distinct kinds of main shopping atmosphere existed in the United States: the historic downtowns and the makeshift shopping strips that bordered highways in urban regions. Even though modern lifestyle centres and other Main street-inspired constructions do not in any way resemble Gruen's designs, this does not mean that they necessarily represent a departure from Gruen's perspective on the world. In the end, shopping was not something that Victor Gruen, who is usually regarded as the man who invented the shopping mall, was interested in doing. Instead, the shopping mall served as a means for him to achieve his true objective, which was to revolutionize the modern metropolis. Gruen saw the shopping centre as the equivalent of a modern city.

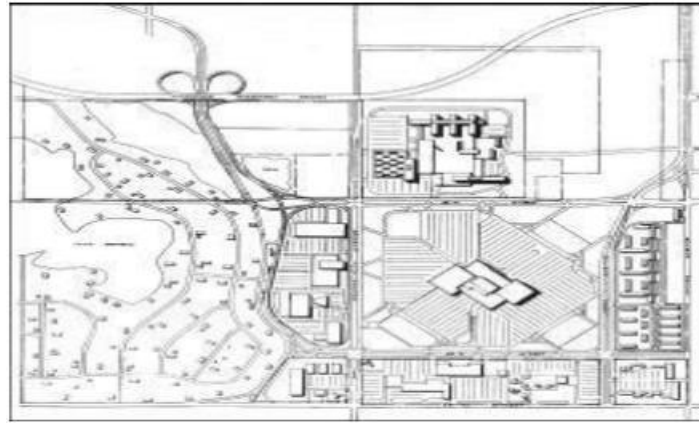


Figure 5; Southdale Centre Master Plan for area surrounding
Source; Gruen, 1964

Sadly, his prototype building has been replicated an uncountable number of times all over the world, but always in the form of an enclosure box constructed in a capitalist fashion (Malherek, 2019). Gruen made an effort to replicate the complexity and vibrancy of the urban experience in the remodelling of the suburban mall. He wanted to accomplish this without the noise, grime, and uncertainty which had come to be associated with popular perceptions of the city.

Gruen argued that retailing would be more effective if commercial activities were connected to cultural enrichment and relaxation and that shopping was a part of a greater web of human activities. Gruen saw shopping as a component of a larger network of human activities. He believed that the design of shopping malls could be used to create new town centres, which he referred to as "shopping towns" (Parham, 2018).

Later in the future, the form of many prosperous regional and super-regional shopping malls all over the world was influenced by the shape of the suburban malls. In the early 1950s, the first suburban malls were built, which led to the development of two distinct types of mall plans: the dumbbell and the cluster. The circulation is directed along linear paths in the dumbbell plan, which partitions the structure into different masses. The cluster design, on the other hand, organizes the building masses into groups, with movement taking place in the

spaces between the masses to create a network of intersections. This plan is more efficient than the traditional model. The majority of today's modern shopping malls have floor plans that include aspects of both of these styles.

The historical development of shopping areas has been a very long trip filled with many amazing innovations, transformations, and impacts over the span of its course. Shopping centres have always been described as a public space and an urban area, not just for the purpose of commerce but also for the purpose of communication. This definition dates back to the ancient open market places.

The emergence of several modes of transportation as separate innovations was another factor that accelerated this evolution. The growing number of urbanites who had cars made it much simpler for them to travel to outlying communities. The opportunities presented by simple access led to the quick development of supermarkets, which were followed by chain stores, strip malls, and finally suburban malls.

By the time urbanization began, ancient civilizations in Asia, Africa, and the Far East had already begun engaging in commercial activity. Between the middle ages and the nineteenth century, the cities of Europe were responsible for the proliferation of a diverse range of retail models. But, and this is where things get really fascinating, the enclosed suburban mall, which is considered to be the forerunner of the modern retail mall, was invented in the United States by a European architect who took inspiration from the arcades.

Eventually, the place where people went shopping evolved into a fully enclosed and environmentally monitored space with the introduction of the suburban mall.

2.3 Types of Shopping Centre

The shopping centre can be categorized according to market area, pattern, and merchandising, respectively. Nonetheless, these categories are not mutually exclusive; rather, one can find a number of combinations of them. The following are some categories:

2.3.1 Market Area Classifications

The size of the market area served by a shopping centre is reflected in the size of the centre itself, this makes classifying shopping centres according to the market area they serve relatively simple. The market is frequently segmented by the developers of shopping centres into primary, secondary or middle, and tertiary or other types of markets. In each of these three markets, there are prospects for further growth that can be pursued. The major market consists of the downtown, inner city, and suburban shopping centre marketplaces of the largest metropolitan areas. The middle market, also known as the secondary market, is typically found in urban areas with a lower population density. The term "tertiary market" or "other type of market" refers to smaller markets in urban areas with fewer inhabitants, possibly located in primarily rural areas, or local urban settings with the market dimensions of a neighbourhood market. A market research of the surrounding area will reveal the demographics of the community within the trading radius, the average family income, the trends of traffic in the area, and the level of competition that exists (Rao F. & Dovey, 2021).

One-Stop Shopping Centres, Neighbourhood Centres, and Community Centres are all examples of different kinds of shopping centres.

1. Commercial Strip Centres

Everyone will likely find something to like about the Commercial Strip Centre. The term "Commercial Strip Centre" may be used to refer to the whole line of convenience, shopping, and speciality products and services provided by a central

business area or to the products and services offered by a neighbourhood shopping centre that specialize in selling convenience items. If the client is able to fulfil more of their shopping requirements in a single trip, they are more likely to do so than they would be if the retail goods and services were supplied at a variety of different sites across a metropolitan region. They typically range in size from 10,000 to 30,000 square feet and contain anywhere from four to ten retail units.

2. Neighbourhood Centre

Small-scale shopping malls that serve the residents of a certain neighbourhood are known as neighbourhood centres. A grocery store or a pharmacy serves as the "anchor" in most of these shopping centres, and they are often laid out in the shape of a strip mall. Neighbourhood centres typically feature a retail space that is between 30,000 and 150,000 sq ft (2,800 and 14,000 m²) in size, and they typically service a major region that is within a three-mile (4.8-kilometer) radius of the centre (ICSC Research, 2012) (ICSC Research, 2012). Convenience stores is another common name for them.

They are geographically closest to you and offer product such as bread, milk, etc. If a person wants anything for their own personal use, regardless of whether it is something that is often bought by brand name or not, it is likely that they will go to the supplier that is the closest to them.

People who live in the surrounding area have the option to drive or walk to the centre.

The regular consumers will either live or work within a radius of less than five minutes' worth of drive time. The shopping centre would only have a few stores, with probably six to eight storerooms in total. The supermarket and the pharmacy will serve as the centre's anchors.

There are some that can be as huge as 100,000 sq. ft, with 15 to 20 stores spread out over three acres of land, and they can attract clients from a radius of 1.5 miles. It's possible that the centre store buildings, customer parking spots, personnel parking areas, truck loading bays, and rear access roads only take up a few acres of property. This kind of small urban complex can be found almost anywhere in an urban area, including downtown, close to high-rise residence and office complexes, in a central city area that is adjacent to densely populated residential neighbourhoods, and in suburban areas that are close to residential and business areas.

The compact centre is designed to be able to fit into corner sites as well as along key arteries, making it convenient for local workers and residents to enter and exit the complex in a timely manner. Small retail centres like these are frequently zoned for commercial use on property next to residential zones by city planners. Land that has been suitably zoned may serve the function of a cutter to divide residential neighbourhoods from heavily used thoroughfares, significant office projects, and industrial neighbourhoods. The land serves as a buffer zone between more tranquil residential neighbourhoods and more active, noisy, and dirty industrial sectors.

In general, this shopping centre requires the assistance of only roughly 1,000 families in order to maintain its operations.

3. Community Centre

Community centres, sometimes known as community malls, are larger than neighbourhood shopping centres and stock a more extensive selection of items. They typically have two anchor stores that are significantly larger compared to those found in a neighbourhood shopping centre, such as a discount department store. They might also be arranged in a strip pattern, or they might take the form of a L or a U.

Community centres typically have a retail space that is 100,000 to 350,000 sq ft (9,300 to 33,000 m²) and cater to a primary area that is between three and six miles (4.8 to 9.7 kilometres) in diameter (ICSC Research, 2009).

The term "community shopping centre" refers to a shopping centre that is centred by a supermarket and or a discount junior chain store or a normal variety store. In addition to this, it is surrounded by a number of additional, smaller commercial establishments. Typically, it covers an area of around 10 acres and has anywhere from 20 to 70 different stores. Customers come from a radius of 5 miles, taking 10 to 15 minutes to go there, and the organization needs the support of at least 5,000 families in order to survive. In most cases, the size of the community centre ranges from 50,000 to 100,000 sq ft. There are not as many community centres as there are neighbourhood centres since this sort of centre requires more acreage than a neighbourhood centre does and serves a greater geographic radius of potential customers. There are some similarities in terms of location, as the developer may choose to situate the complex in the central business district close to large housing developments, or in any city centre close to major residences, or in the suburban areas where the centre is surrounded by residential buildings of all different types, including single-family, two-family, garden, and high-rise apartment blocks. All of these locations are close to major residential communities. Corner positions are very desirable both for the driving ease they provide to customers as well as the advertising value that comes from being visible from two or more important thoroughfares. Since there is a significant volume of customer traffic entering and exiting the community centre, fast-food restaurants and movie theatre companies might be interested in renting supplementary space close by.

4. Regional Centre

The regional shopping centre may have as many as six big department shops, in addition to food stores, satellite stores providing a variety of general products, restaurants, and financial institutions, depending on the size of the centre. It ranges from 70 to 225 stores, has a service area of 5 to 15 miles, and is sustained by 50,000 to 150,000 families. It spans in size from 300,000 to 800,000 sq. ft, has at least two anchor stores (ICSC, Research, 2004) , and features a greater variety of retail outlets than other shopping centres. There is a good chance that these malls will include discount department stores, despite the fact that they serve a greater service area. This is because higher-end stores typically require a larger region in order for their services to be viable. In many vacation spots, shopping malls and other regional malls serve as tourist attractions (ICSC, Research, 2004).

5. Super Regional Centre

The most expansive variety is referred to as a super-regional shopping centre. It may contain 1.5 million sq. ft or more of shops with three or more anchors. It serves as the main shopping centre for the region (25 miles) in which it is situated (ICSC, Research, 2004) and adjoining areas. It is typically constructed with a weather-controlled enclosed mall and is located either in the central business district or in a newly developed neighbouring suburban area at the crossing point of at least two main highways. It is possible that the development of the super-regional centre will take place in stages, because the construction and eventual occupancy of the locations by the main department stores takes place gradually. It could be a single-level or multi-level shopping centre with integrated parking buildings as well as open-air parking lots on the bottom level.

2.3.2 Pattern Classifications

- ❖ Throughout the development of the shopping mall, several distinct fundamental architectural designs have surfaced (ICSC Research, 2009) (ICSC Research, 2009).

The following are some examples of this basic design patterns:

- ❖ L-Shaped Centre - This type of centre evolved from the straight strip centre. The anchor renters are typically placed at both ends of the L.
- ❖ The U-Shaped Centre is another spin-off from the Straight Strip Centre. It is made by a line of retailers that is perpendicular to each end of the strip, creating the shape of a U. U-shaped shopping centres typically service the entirety of the community and can have as many as three main tenants, one at each end of the U, with the big anchor store located in the middle of the strip. This is due to the larger size of U-shaped shopping centres.
- ❖ Cluster - Design - shape into a rectangle that is surrounded on all sides by parking lots and garages. The anchor store will often take up one side of the rectangle, and its footprint will typically reach all the way into the heart of the shopping centre. Depending on their size, cluster design centres can be open or enclosed, and they can provide services to either a local community or an entire region.
- ❖ The T-Design, also known as the Triangle-Design, shopping centre have the capacity to house three anchor stores. Both layouts allow for parking to be provided on all sides, and the spaces provided can either be open or sheltered. They could provide services to a single neighbourhood or to an entire region.
- ❖ The term "Dumbbell" or "Double Dumbbell" refers to a pattern that can be found in local commercial centres. This pattern is characterized by two parallel strips of retailers that face each other throughout the length of a mall. There is also an anchor tenant located at either end of the mall, and parking is provided on all four sides. Four

important tenants occupy the double dumbbell centre. One of the dumbbells runs in a longitudinal direction, while the other goes in a latitudinal direction. A central court is formed when the shopping centres for all of the dumbbell segments come together. One level or multiple levels, open or closed, are the three possible configurations for dumbbell centres.

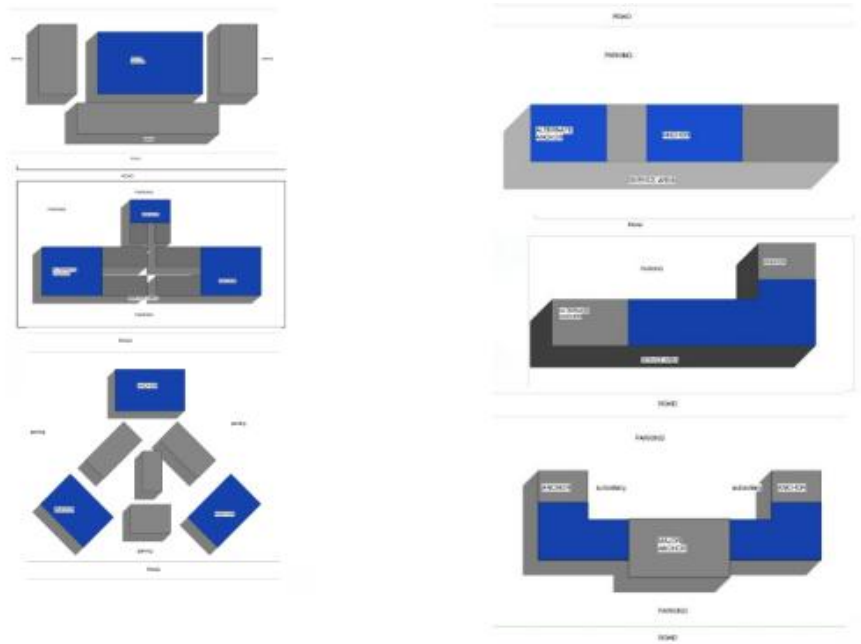


Figure 6; Showing different pattern classification of Shopping Centre
Source; ICSC

2.3.3 Merchandising Classifications

The application of a particular merchandising strategy has resulted in the development of a number of distinct types of shopping centres.

- i. Fashion/Specialized Centre is more focused on convenience and shopping goods and services than on specialty goods and services (ICSC Research, 2009). The ultimate consumer is willing to travel significant distances in order to buy the goods and services that are provided by the businesses located in speciality shopping centres. These items are typically of a higher quality than other similar products.

- ii. Outlets/Off-Price Shopping Centres; The off-price shopping centre, which is now more generally known as an outlet, is a variation on the concept of discounts and has found ready acceptance. Recent years have seen a rise in the popularity of outlet store and discount malls, which can typically be found just off major freeways outside of smaller to medium-sized cities (ICSC Research, 2009) (ICSC Research, 2009). In most cases, the tenants are national or international companies who offer reduced, "seconds," or irregular products. Discount department store, which makes use of a variety of different merchandising tactics, was historically the first of these types of stores to develop. In the beginning, many bargain stores started out as factory outlets selling overstock or bankrupt supplies of various goods. Others include the closed-door discount house, which is only accessible to customers who qualify on the basis of their employment, like those who work for the government, or their status, like those who are members of a labour union.
- iii. Power Centres; Power centres are a subcategory of speciality shopping malls that have recently gained popularity in the field of retailing. They are distinguished by a number of distinguishing qualities. They are often enormous retail centres, ranging in size from 300,000 sq ft to over one million sq. ft, and the majority of the stores that can be found within them are massive national chain outlets that, in a traditional shopping centre, would be referred to as anchors. The few small stores that remain are almost exclusively national credit types. Every retailer at a power centre is the industry leader in their respective fields of expertise. The phrase "category killer" is used to refer to these types of retailers since it is logically possible for each complex to include only a single instance of each classification of items.
- The power centres advertise significantly as separate enterprises, utilizing mass marketing and mass retailing for their whole assortment of goods as opposed to

highlighting only specific things as loss leaders in their display cases and advertisements. Power centres are not mall developments; rather, they are planned in such a way that customers may park close to the stores they intend to shop in. There is a parking space in front of the main entrance of each anchor, and this parking space will have a high parking ratio - maybe as high as six spaces per 1,000 square feet of GLA (Gross Leasable Area). Because the national credit position of the bulk of tenants in power centres considerably boosts financing, these types of developments are quite popular among developers (ICSC Research, 2009).

- iv. Mixed-Use Developments (MXD): MXD is a word that came out of planned unit developments and is used to indicate a combination of uses that can be found on a single piece of property. In most cases, it is a mixture of commercial and office space, as well as residential neighbourhoods. The goal of an MXD is to provide employees who work in the development the ability to live, dine, shop, conduct financial transactions, and sometimes enjoy health and fitness facilities without having to leave the property. The majority of MXDs prohibit the predominance of a single form of use; however, if the MXD is primarily constructed as a shopping centre or around a large office building development, then one of these types of uses will be the primary focus of the development. As an illustration of how adaptable this idea is, real estate developers have started incorporating hotels into their mixed-use developments, and they have had a lot of success doing so.

- v. Theme/Festival Centres are a combination park and centre that caters to tourists. The different stores within a theme or festival centre, as well as the centre's architecture, all adhere to the same overarching theme that gives the complex its name.

They typically serve tourists and can be found in urban areas. They typically offer a retail space that is between 7,400 and 23,000 square feet (2,500 and 8,000 sq.m) in

total area (ICSC Research, 2009) (ICSC Research, 2009). Among other examples, there is the Epcot Centre at Disney World, which features shopping areas organized around various themes based on the nations of the world. One instance of a theme park is the Bristol Renaissance Faire, which recreates the visit of Queen Elizabeth I to the coastal city of Bristol in the year 1574 and features a number of themed shops based on the historical event. The shopping centres share a common architectural motif, which is also, to some extent, mirrored in the retailing of the individual centres. It's possible that dining establishments and entertainment venues may anchor them. As may be observed in Galena, Illinois and St. Augustine, Florida, many make use of refurbished old structures that are situated in historic districts.

- vi. Lifestyle Centres; The International Council of Shopping Centres (ICSC) describes lifestyle centres as an open-air retail model that is situated next to affluent residential neighbourhoods. The characteristics listed below are also included in the characteristics that define a lifestyle centre: an upscale orientation, 150,000 square feet to 500,000 square feet of gross leasable area (GLA), and at least 50,000 square feet of national specialty chain retail. It offers a variety of recreational amenities geared toward upper-class customers. They are also referred to as "boutique malls" since the stores within them are unique, and they are typically situated in affluent suburban regions. Typically, they are open-air centres that provide the appearance of a downtown area, complete with streets and parking lots. They have both large-scale shopping and areas to browse and enjoy a cup of coffee, among other amenities.

Key Differences Between Different Types of Malls

Type	GLA (sft)	No. of Anchors	Type of Anchors	Anchor Area	Primary Trade Area (kms)
Neighbourhood Centre	42,000 to 210,000	1	Supermarket	30-50%	2 to 3 km
Community Centre	140,000 to 490,000	2 or more	Discount Dept Store, Supermarket, Home, Large Speciality, Discount Apparel	40-60%	3 to 5 km
Regional Mall	500,000 to 1,120,000	2 or more	Full/Jr. Dept Store, Discount Dept Store, Hypermarket, Fashion Apparel	50-70%	4 to 12 km
Super Mall	1,120,000+	3 or more	Full/Jr. Dept Store, Discount Dept Store, Hypermarket, Fashion Apparel	50-70%	6 to 25 km
Fashion/ Speciality Mall	110,000 to 350,000	N/A	N/A	N/A	6 to 15 km
Power Centre	350,000 to 840,000	3 or more	Category Killer, Home Improvement, Hypermarket, Discount Dept Store, Off Price Superstores	75-90%	6 to 10 km
Outlet Mall	70,000 to 560,000	N/A	N/A	N/A	15 to 50 km

Figure 7; Key difference between types of shopping malls
Source; (ICSC Research, 2012)

2.4 Spatial Definition for Shopping Centre Analysis

The following definitions and ideas are widely recognized in their respective industries and have been endorsed by the Urban Land Institute and the International Council of Shopping Centres (ULI's Dollar and Cents of shopping centres). In order to collect relevant data for analysis from published sources and through interviews with shopping centre developers and management, shopping centre analysts and appraisers need to have a solid understanding of the definitions presented here.

Gross Leasable Area (GLA); refers to the entire square footage of a building that is available for lease and exclusive use, including any basements, mezzanines, or upper floors, expressed in square feet and measured from the centreline of joint partitions and from outside

wall faces. Because GLA lends itself readily to measurement, the shopping centre industry has adopted it as the standard for statistical comparison.

Gross Leasable Area of a Mall; The entire floor area that is utilized by tenants of a mall in superregional and regional centres. It does not include the area that is occupied by department store tenants or any other places that are not owned by the business.

Total Floor Space; this includes any and all portions held by the centre owner in addition to any and all parts that are independently run or owned but are spatially part of the centre. Inclusion includes not just the GLA but also any other enclosed areas in the shopping centre as well as any outparcels.

Common Area, or the entire portion of the retail mall that is not available for lease to individual tenants but is available for common use by all tenants or group of tenants, their invitees, and adjacent stores. Parking, sidewalks, landscaped areas, public toilets, truck and service facilities, and the like are included in the common area.

Parking Area; the area dedicated to car parks, consisting onsite lanes, aisles, stalls, islands, and all other parking-related features.

Parking Area Ratio; the proportion of parking space to total building area.

The parking index is the standard comparison that is used to demonstrate the link between the number of parking spaces and the gross leasable area. This comparison is based on the ratio of the number of parking spaces to the total gross area.

The gross leasable area is the primary factor on which almost all statistics on shopping centre rents and operating costs are based (GLA).

2.5 Philosophy of Shopping

2.5.1 Shopping Behaviour

Shopping is a distinct activity that falls under the category of consumer behaviour (Akgun, V. O., & Diktas, M., 2017), and shopping behaviour is a unique type of consumer behaviour. "People's motives for shopping are a result of many factors, many of which are unconnected to the actual buying of things," says Akgun, V. O., & Diktas, M. (2017). This is according to the research that he conducted in 1972. It is suggested that in order to have a knowledge of the reasons people shop, it is necessary to take into account both the satisfactions that can be gained from participating in shopping activities and the benefits that can be attained from the products that can be acquired. People may go to a store because they have wants that aren't necessarily met by the things that are sold there; if this is the case, the retailer ought to factor this knowledge into his marketing plan. Akgun, V. O., & Diktas, M. 's research proposed eleven different explanations for different shopping behaviours. He categorized them as either being personal or social in nature: Personal reasons

- Role playing. It is possible for shopping to be a task that is learned and anticipated as part of a certain function or place in society, such as being a mother, housewife, or spouse.
- Diversion. The act of shopping in and of itself can be considered a type of recreation, allowing shoppers to break away from the monotony of their normal lives.
- Educating themselves on emerging fashions. People can keep up with the most recent developments in product advances, fashion trends, and styling by going shopping.
- Physical activity; People who live in urban areas or living spaces that are congested may find that going shopping might serve as a form of physical exercise.
- Self-gratification. Shopping is an activity that can be used by shoppers as a way to motivate themselves by purchasing something that is both pleasant and fascinating.

- Stimulation of the senses. People will be exposed to an excessive number of potential sensory benefits supplied by the shopping mall while they are shopping there. Customers wander about a store gazing at the wares, enjoying touching and playing with the wares while also taking in the background music and smelling the products.

Social reasons

- Opportunities to interact with people outside the home. People have the opportunity to see their friends and catch up with them while they are out shopping.
- Communication with others whose interests are comparable to your own. When people go shopping for things relevant to their hobbies, they often run across and strike up conversations with other customers who share their interests.
- Peer-group attraction. The consumers' desire to be associated with the reference group is sparked by their attractiveness to the peer group.
- Status and authority. An individual has the potential to command attention and respect in a variety of settings, including during their shopping experiences.
- The excitement of striking a deal; Hagglng over a price is seen as a demeaning practice by many consumers since it gives the impression that one is "cheap."

The research on consumer purchasing behaviour that Tauber (1972) did was extended by Akgun, V. O., & Diktas, M (2017), and they recommended seven dimensions of shopping behaviours. The purchasing behaviours include things like anticipated utility, role enactment, negotiation, decision optimization, affiliation, authority and power, and stimulation, as stated by Akgun, V. O., & Diktas, M (2017). According to Paul (2017), shopping behaviours are dependent on the context in which they occur. In today's society, shopping has evolved into more of a hobby than a straightforward activity for making purchases, such as shopping for groceries, home items, apparel, and gifts. Therefore, a consumer's motivations and

behaviours that are visible while the consumer is buying groceries are not like those that are evident when the consumer is buying gifts. And the reasons that people shop and their views on shopping can sometimes be quite different from one another.

Also, according to Dholakia (1999), costumers may shop at the same stores for exactly the same reasons, such as comfort, courteous help, nice décor, etc. However, one buyer may find shopping a stressful, something to be performed quickly with a minimum amount of effort, while another buyer may love shopping, participating in it for fun by attaining the enjoyment of purchasing a desired product at a bargained price. The second category of customers are those who are willing to spend some time investigating their available alternatives.

The ability to see and walk are only two of several skills required for shopping. According to what was stated in Sorensen, H., and co (2017) "Shopping is... the kind of activity that involves experiencing a certain part of the world that has been considered for sale, utilizing our senses – sight, touch, smell, taste, and hearing – as the grounds for selecting this or rejecting that..." "Almost all unintended purchases, as well as many intended ones, are carried out as a direct consequence of the consumer seeing, touching, smelling, or tasting something which offers pleasure, if not complete gratification." It is obvious that individuals go shopping for a host of different reasons in addition to the purchase of a product. Some of these non-purchasing motives include the pursuit of social connection, the stimulation of the senses, the acquisition of new information, and even physical activity. That is to say, a consumer can go shopping for pragmatic reasons connected to accomplishing particular buying objectives. They also have the option of shopping for hedonistic motives that are associated with having fun. Arnold and Reynolds (2003) identified six different hedonic shopping motivating factors. These included adventure shopping (to shop for stimulation, exploration, and the feeling of being in a different world), social shopping (to enjoy shopping with pals, family, making friends while shopping, and connecting with others while

shopping), gratification shopping (to relieve tension, to alleviate a depressing emotion, and to shop as a special treat to oneself), idea shopping (to keep up with trending ideas), value shopping (refer to shopping for sales, looking for discounts, and to bargain) and role shopping (for enjoyment of shopping for others).

2.5.2 Shopping Malls As Recreation Centres

If not quite a commercial item, public space is the key marketing draw for the retail areas that it supports, as stated by Barry Maitland in shopping malls: Planning and Design. It's possible that people don't actually travel to shopping malls to shop there; rather, they go there to "hang out." As a result, the shopping mall provides an area in which people can unwind in addition to the shopping opportunities it provides. The level of satisfaction that a customer derives from their time spent shopping at a particular mall is one of the most important factors in determining whether or not they will return to that mall. In the edition dated June 1, 2009, the opinion pages of The New York Times feature a piece written by Allison Arieff titled "Rethinking the Mall." He makes the observation that the retail operation's accessibility to the general public is of utmost significance to the shopping mall's overall performance. The shopping mall is a social space that is not one's home or office; rather, it is a "third place" in which one can socialize, work, or just hang out and do nothing in particular. It is not enough for a café in a shopping mall to simply be a place to chill out and/or work from a laptop; rather, it should be an integral component of a self-sufficient scenario of distributed purchasing experiences. Alfred Taubman the developer of some of the most prosperous shopping malls in the United States (Aderemi, B. D., Olonade, O. Y., & Femi, A. F, 2019), discusses the success of shopping malls and the factors that affect the success of shopping malls in an interview that was carried out by the Henry Ford Foundation. The interview focuses on the factors that influence the success of shopping malls. He comes to the conclusion that, in the end, the key to the prosperity of a shopping mall is a profound level of

knowledge into the experience that customers have there. He contends that the common desire of people is to feel a stronger connection to one another. In the same way that a person does not want to see a movie by themselves at home on their television, but rather chooses to go to a movie theatre to pay for the same movie. People are said to be "entertained" by simply watching the actions of other people as they go about their daily lives.

In a similar fashion, several shopping malls have even gone to the extent of providing fairs, exhibitions, and other activities that are directly tied to the purpose of attracting people into the malls. This, of course, entails the requirement that locations for such things be made available.

Olonade & co (2021) conducted research on shopping centres for his undergraduate thesis. He makes the observation that the inner pedestrian space is both the primary attraction and the organizer of the space, which gives these areas a public identity and a cultural function. As a result, the public space serves as the primary attraction and/or the component that holds the consumer for a period of time that is sufficient for them to look and observe everything else that the shopping mall has to offer. Additionally, the environment that is present there is of utmost significance. For this reason, prosperous shopping malls provide a climate-controlled atmosphere within their buildings. Customers are able to go about their shopping in an environment that is conducive to the successful completion of such activities because this contributes to the creation of a cozy interior. Because of this, ventilation and lighting end up being major concerns during the planning and design stages of a shopping mall.

In conclusion, shopping malls can be thought of as theatres in which the main show consists of witnessing the events that are unfolding within the mall itself. This is made possible by the lively atmosphere of the interior spaces, which also makes them more accepting and appealing on a social level. The idea that the activities that take place in the shopping mall are

"screened off and restricted to particular appropriate commercial/cultural fora" is disproved as a result of this.

2.5.3 Circulation in Shopping Malls

The average number of individuals found in a shopping mall is staggeringly high. They need to be able to move freely in any direction, both horizontally and vertically, as well as inside and outside the shopping center. It is essential to have this in place so that shoppers may go about their business inside of a shopping mall with a greater sense of ease and the assurance that they are safe. Activities like window shopping inside the malls makes it necessary to take extra precautions which ensures window shoppers do not obstruct the movements of individuals who utilize the circulation spaces as linkages to get from one part of the mall to another. If this is not done, the person who is window shopping in a cramped place will not feel comfortable, and the one who is just passing by will have the impression that the pathway is too congested. These are some of the deterrents that may cause customers to avoid going to some shopping malls, whereas other shopping malls may be able to keep them coming back again and again.

Baltaci, A., & Zeliha, E. S. E. R. (2022), looked at the consequences of shopping behaviour in store design. They suggest five considerations that should be given top priority throughout the planning and design of each retail location. Three of these five factors relate to circulation within the shopping mall. They are as follows: - • Transition Zone – This is the area when the customers slow down in order to look at the stuff that is displayed within the store. It is the point at which they move from being outside the store to being inside. According to Sorensen, H., and co. (2017), it is “the shopper’s landing strip.” The size of the transition space is determined according to the dimensions of the store. It is not necessary for a major store, such as a shopping mall, to worry too much about this region. The display in this area, which is typically not seen by the shoppers, is more likely to be wasted than not. This space,

on the other hand, ought to take up as little as possible in a shop of this size. One implementation of this idea is the installation of a horizontal barrier that doubles as a display space. This is only one example. This causes the customer to go at a more leisurely pace, and they are able to examine the goods that are being displayed before picking where in the store to go next.

- The Butt-Brush Effect — Each shopper has personal space, which when invaded causes the shopper to feel uncomfortable. When one gets bumped or jostled, they grow upset and might leave without purchasing what they came for. Sorensen, H., and co (2017) adds that, “annoyed shoppers do not stay; in fact, they typically depart before obtaining what they came for”. In light of this, there must to be sufficient room for customers to manoeuvre. This eliminates or significantly lessens the butt-brush effect, making the customers feel more at ease and increasing the likelihood that they will make purchases. This is accomplished mostly through the utilization of spacious corridors and alleys.
- Chevroning: Sorensen, H., and co (2017) suggests that a store designer should work at maximizing the customer's views of the item that is on display. He proposes doing something called "chevroning," which entails tilting the display racks and shelves at an inclination so that they are not at the standard 900-degree angle. This makes sure that more of what is on the shelf can be seen by whoever is looking. The only disadvantage of this mode 24 of display is that it uses up more space. Only at most 80% of what can be displayed traditionally using the 900 methods can be displayed when chevroning is done.

The other two, though not part of circulation are also important in the success of any retail space. Circulation to and from them should also be clear. They should be easy to find within the store, and this makes them more or less part of this analysis on circulation. They are: -

- a) Seating Area –Seating in a store makes the customers feel that the store cares for them.

In fact, according to Sorensen, H., and co (2017) “a chair says: we care”. Seating should be strategically available for shoppers to relax while they wait for whoever they came with, and observe the different people and activities going on around. This makes shopping a social activity.

- b) Dressing Rooms – Enough thought should be put into the design and location of these facilities. They should be well furnished with mirrors and hooks for shopper’s clothes and also easy to find. The longer a customer takes before finding a changing room, the lesser the possibility they will make a purchase. These facilities should also be placed in areas where they do not infringe on other shoppers’ privacy e.g., near women lingerie. All in all, signage, display, store layout, or other fixtures, for example, requires adequate consideration. Because of this, the area inside is more pleasant, which encourages customers to remain inside for longer periods of time, which ultimately results in higher sales for the store owners.

2.5.4 Circulation Design for The Physically Challenged in Shopping Malls

Access for people who are physically challenged is something that needs to be included in all public settings. When people with disabilities are included in any public setting, it demonstrates that there is an acceptance of, and appreciation for, the diversity that exists among humans. Access to the public areas that are offered should be made as simple as possible for disabled individuals. As had been mentioned earlier, shopping malls are privately owned public spaces. As such, they should strive to achieve inclusion of persons with disabilities accessibility in their designs. According to Afacan (2011), everyone needs to be part of social life through the use of public buildings. This is because it is also hard for them to navigate around the shopping malls together with these friends/relatives and so these trips to the shopping malls become cumbersome and less fun. People will thus go to the shopping

malls that are fully accessible to avoid this, and this comes at a loss to the inaccessible shopping malls.

The following recommendations were included on a checklist for the elimination of obstacles in public places that was compiled in 1995 by the Adaptive Environment Centre and the Barrier free Environment.

- a) An accessible approach and entrance — Individuals with disabilities must be able to freely arrive at the location, approach the building, and access it in the same manner as everyone else. At least one path of travel needs to be risk-free and easily navigable for all persons, including those who have physical impairments. This path must be uninterrupted by steps; it must be firm, sturdy, and slip-resistant; its width must be at least 1m.; and it must be at least 1 m long. One or more of the following should be made available: a ramp, a lift, or an alternative accessible entrance. At each entry that is inaccessible to people with disabilities, there should be a sign pointing people in the direction of the nearest entrance that is accessible. Handles on doors leading to accessible entrances ought to be positioned at reachable heights (not higher than 1m) and should be operable with closed fists. The doors should also be able to be opened without requiring an excessive amount of effort or difficulty.
- b) Access to goods and services - The layout of a facility should be designed in such a way that it enables people with disabilities to get products and services without the need for assistance. The rooms and spaces ought to have adequate width, and any furniture and fixtures ought to be organized in such a way that they clear aisles and allow more room within the spaces. In addition, the rooms and spaces ought to be adequately furnished. It is important to have obvious signage for the products and services being offered. All controls intended for use by members of the general public, whether electrical, mechanical, cabinet, gaming, or self-service, should be positioned

at a height that is comfortable for them to reach. Everyone on each and every public level ought to have access to the vertical circulation. In the event that there are stairs, they ought to have non-slip surfaces and railings that are continuous. The elevators must to be equipped with door opening and shutting floor indicators that are both audible and easily visible.

- c) The accessibility of restrooms; People who have physical disabilities should be able to use restrooms that are located in public places. There should be at least one restroom for each sex, or there should be one that is shared by both sexes and is easily accessible to all. At each and every restroom that is inaccessible, there must to be a sign that points in the direction of the closest restroom that is accessible.
- d) Additional access — An adequate proportion of the public amenities provided should be designed to accommodate people with disabilities. The same accessibility standards (as regards height) that apply to public telephones should also apply to drinking fountains.

2.5.5 Servicing in Shopping Centre

Providing service entails not only the delivery of goods to the numerous retail locations but also the collection of trash and waste. An alley typically runs along the back of a strip shopping centre's individual storefronts to provide access for delivery and service vehicles. It is preferable to hide the alley from the neighbouring parts of the neighbourhood by erecting a wall or planting vegetation. In the one-story shopping centre servicing is typically provided by one of the following:

- i. Underground service tunnel: this is typically located beneath the mall and connects directly to tenant-leased basements. These basements, in turn, link to the stores that are located above them. Because of this approach, all unsightly garbage is avoided, and parked vehicles continue to receive maintenance. In addition to this, it relocates functions

that do not involve sales to the basement, so leaving the main level for sales-related activities. The tunnel will however add at least 3% to the overall cost of the building, and it will almost certainly require the addition of basements. If these basement sections are going to be able to sustain their own financial needs, then they will need to be leased and financed in a practical manner.

- ii. Service courts on the building complex's periphery: these are typically partially hidden from the public by masonry walls that are 6 to 10 ft or more. Even though they don't cost very much, they take up valuable space that, should be reserved for prime parking. This is an expensive bargain if land cost in that area is high. The insides of the courts are available for rental. In most cases, there is no basement area in these types of projects.
- iii. Over-the-curb and sidewalk directly from the street: this is the cheapest solution and utilizes the least amount of land; however, it requires stringent enforcements of neatness by the project management, shipment of goods and removal of trash usually before or after business hours, and the compulsory inclusion of garbage rooms in each store.
- iv. In general, supermarkets, department stores, restaurants, and retail establishments selling drugs and a wide variety of goods have the highest demand for adequate service facilities. Most of the time, the main shopping lanes and the service trucking lanes on the site are kept completely distinct from one another.

2.6 Characteristics and Function of Shopping Centre

A retail center can be on one or more levels that are stacked on top of each other. However, each level ought to avoid having slopes or steps inside its own pathways. This is to ensure that shopping is not impeded and that accidents are not caused. The shopping center may be open, with the only protection from the elements being a continuous canopy along the storefronts; it may also be totally covered but exposed to the air; or it may be completely enclosed, in which case climate control will be required.

Enclosed shopping malls have been increasingly popular in recent years, with the exception of situations in which open malls are preferable due to favourable weather or other circumstances. Enclosed malls can have the shape of a large court, can be wide or narrow, can be straight or circuitous, can be vacant or filled with amenities, can have one level or multiple levels, and can be lit by natural light or purely by artificial means. There has been a recent shift away from wide shopping malls, and court-style malls with a width of thirty to forty feet are becoming more common than those with a width of fifty feet or more. In order to avoid having a desolate environment, larger malls require additional landscaping and other elements. In addition, they call for a greater amount of maintenance, and as a result, they have a lower economic value, despite the prospect of high rents being collected by kiosks and other such elements that are located along their lengths.

Additionally, and most importantly, narrow malls make it easier for customers to go from one side of the mall to the other in order to make comparison purchases, which considerably helps the customer's exposure to the merchandise. A local pattern is toward stretches of narrow malls, which are typically devoid of facilities, punctuated by moderately sized courts next to department stores or somewhere else, which become customer magnets. These courts have greater lighting intensity, greater height, and stunning features such as fountains, beautiful green landscaping, and spectacular sculpture.

Between department shops or other key features, the length of malls should not be more than 800 ft (ideally less), but if there are more than two department stores, the total length of the mall might be significantly longer.

Malls with three stories or more are becoming more prevalent as a standard solution due to the high costs of land in central areas and the rising costs of property in the suburbs, as well as the scarcity of sites with appropriate area for two-level malls, which are the normal answer.

Because of the multiple levels, the shopping district is more condensed, and the distances between stores are reduced. If a shopping centre has two or more levels, it is imperative that each level be given the same amount of significance as the other levels. If this is not the case, then one level will emerge as the "prime" level, and all of the stores will compete to be located on that level. Meanwhile, the other level will be considered a less desirable location, and its rents will be lower. As a result, the developers may not be able to economically justify its construction. In order to achieve this equality of desirability, of customer attraction, and of rent balance, it is essential that both (or all) levels have:

- Equally convenient access from parking areas by means of two or more levels of directly adjacent parking area, either on grade or on decks or through other devices to equalize the parking conveniences.
- There should be no dead ends in the mall on any level that do not lead to a department store; typically, there should be one or more sets of escalators as well as several convenient sets of stairs.
- There should be visual interconnection between levels through the optimum use of open wells that allows full visibility of one level's store and customer from the other.

Chapter Three

Methodology (Case Study)

Research methodologies are the tools employed in any research work to gather data, investigate and analyse them. The case study approach was employed for this research work.

An action, event, or problem that involves a real or hypothetical circumstance and includes the intricacies you would meet in real life is called a case study. It can also be a record of building's problem and how they were solved. It entails a scrutiny of buildings, to note their type, background, facilities provided, functionality, materials used, management, services and maintenance etc (Xie, 2017).

Case studies are a useful tool for illuminating the intricacies of real-world decision-making. While investigating a case study, you will analyze and apply knowledge, and reasoning to draw a conclusion" (Xie, 2017).

An appraisal was done on 5 shopping centres for the purpose of this research, two Nigerian shopping malls and three foreign shopping malls. They are;

- Green Pea, Torino, Italy
- Sitari Village Mall, Western Cape, South Africa
- Asmacati Shopping Centre, Izmir, Turkey
- Jabi lake mall, Abuja, Nigeria
- Palms Mall, Ring Road Ibadan, Nigeria

3.1 Case Study One

3.1.1 Green Pea, Torino, Italy

The building is said to be the world first green retail park. It is certified as a class A3 NZEB (Nearly Zero Energy Building). The GreenPea establishment and the architect adopted an wholistic sustainable approach to the design, construction and eventual use of these building. Careful considerations were taken to make sure sustainable materials were selected for construction, that the building runs on more than 80% sustainable energy generated on site and that the products to be sold to consumers are also sustainable from production to use. The franchise focuses on

- Life; move, energy & connect (on floor level 1)
- Home; living & design (on floor level 2)
- Fashion; dress & style (on floor level 3)
- Beauty; taste, read & beauty (on floor level 4)
- Rooftop relaxation, lounge bar, pool & spa (rooftop)

LEGENDA

- ① Hall / Ingresso
- ② Info point
- ③ Discovery museum
- ④ Green Plot
- ⑤ Lavanderia
- ⑥ Negozio mobilità sostenibile
- ⑦ Sala conferenze
- ⑧ Control room
- ⑨ Magazzino
- ⑩ Area carico/scarico
- ⑪ Locale rifiuti
- ⑫ Locale tecnico

LIVELLO 1 / QUOTA +0.00 (Piano Terra)



Figure 8: Level 1 floor plan
Source; Greenpea.com

LEGENDA

- ① Hall / Ingresso
- ② Negozio abbigliamento sostenibile
- ③ Ristorante formale
- ④ Ristorante informale
- ⑤ Cura della persona
- ⑥ Serra solare
- ⑦ Cucina
- ⑧ Servizi

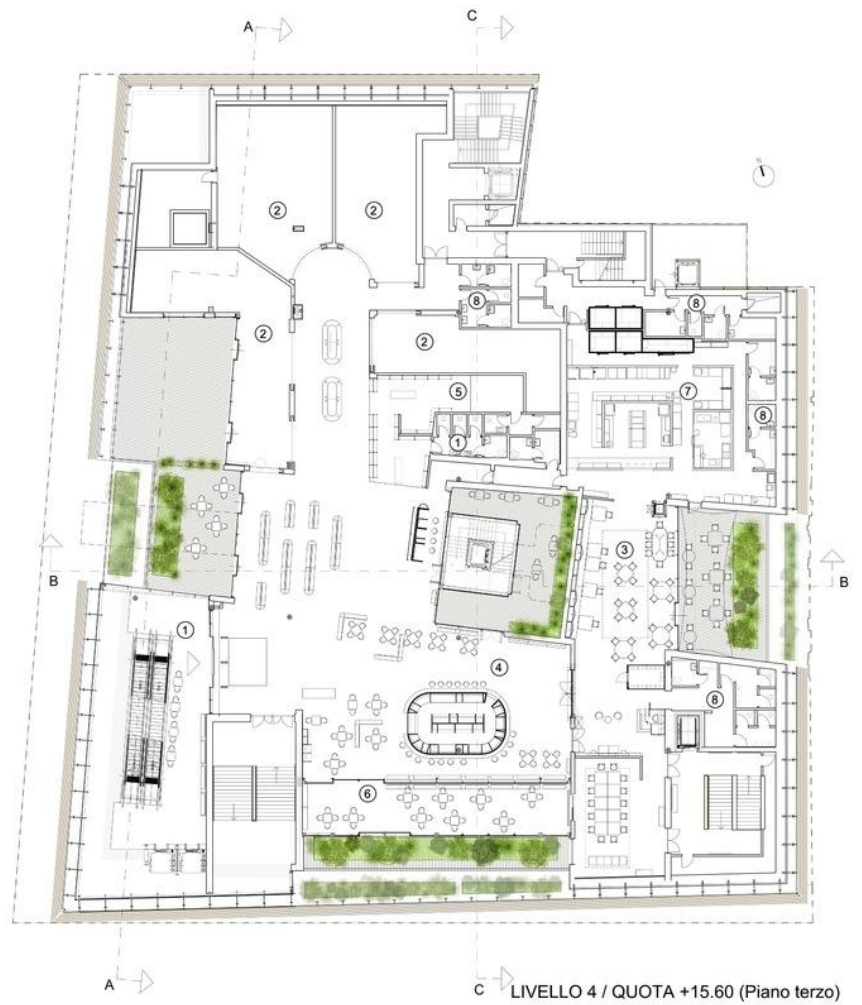


Figure 9: Level 2 floor plan
Source; Greenpea.com

LEGENDA

- ① Hall / Ingresso
- ② Negozio abbigliamento sostenibile
- ③ Uffici
- ④ Magazzino
- ⑤ Spogliatoi
- ⑥ Servizi
- ⑦ Terrazzo tecnico

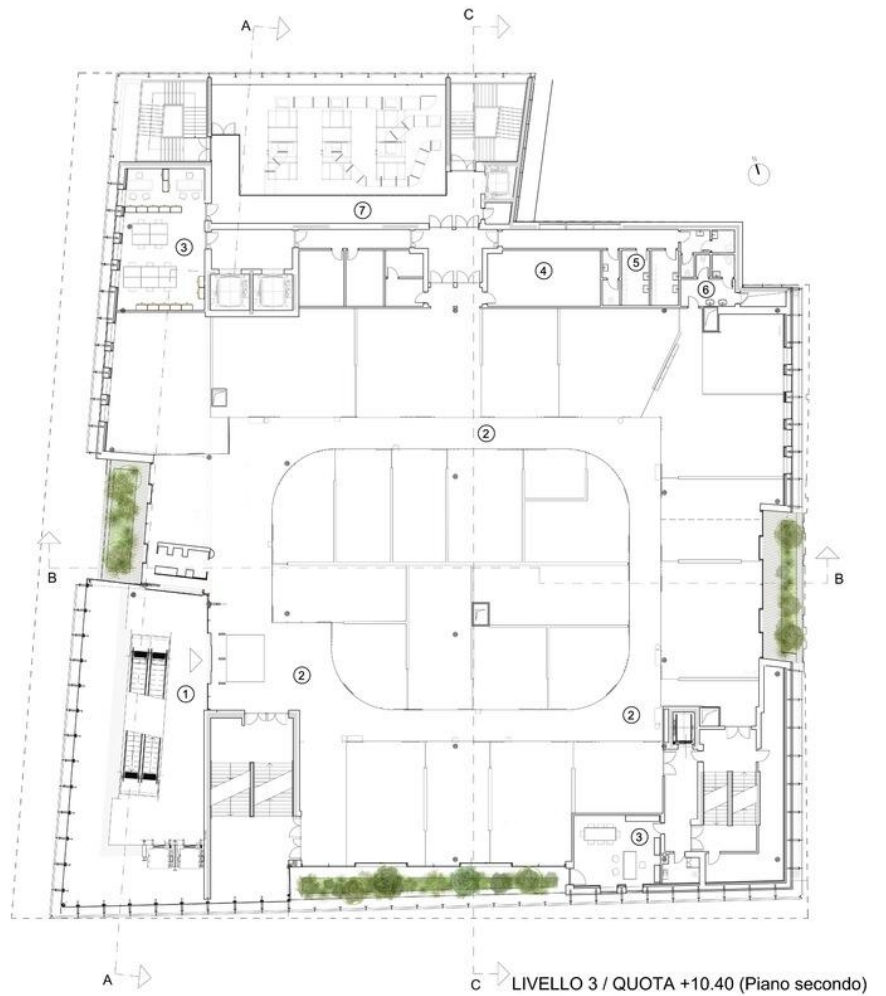


Figure 10: Level 2 floor plan
Source; Greenpea.com

LEGENDA

- ① Hall / Ingresso
- ② Negozio arredamento sostenibile
- ③ Spogliatoi
- ④ Servizi
- ⑤ Locali tecnici

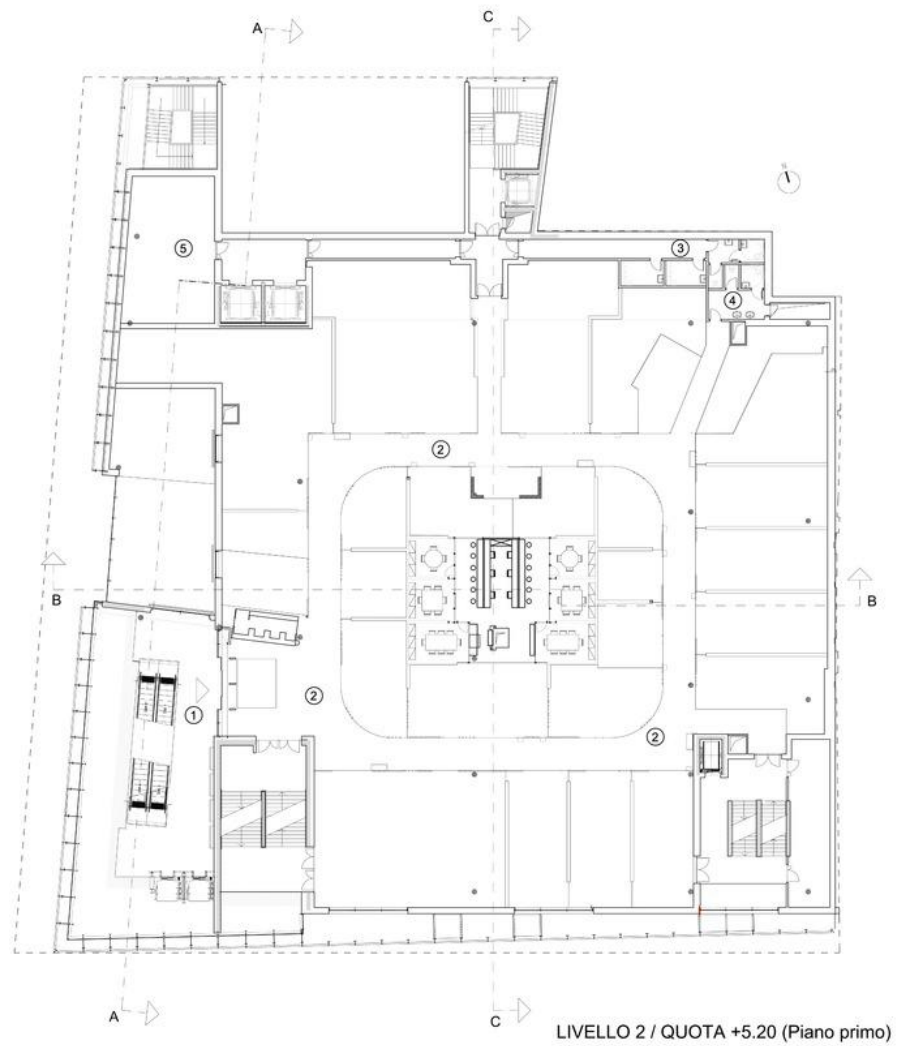
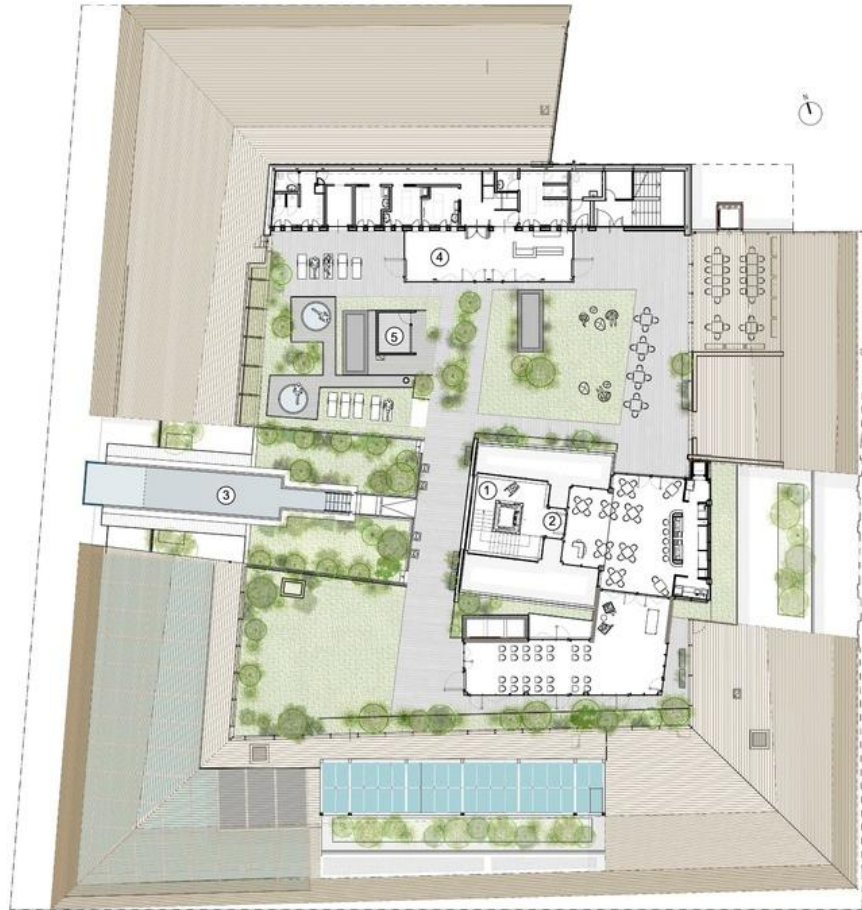


Figure 11; Level 3 floor plan
Source; Greenpea.com

LEGENDA

- ① Scala Accesso alla Copertura
- ② Bar
- ③ Piscina
- ④ Centro Benessere
- ⑤ Sauna



LIVELLO COPERTURA / QUOTA +21.72 (Piano Quarto)

Figure 12; Level 4 floor plan
Source; Greenpea.com

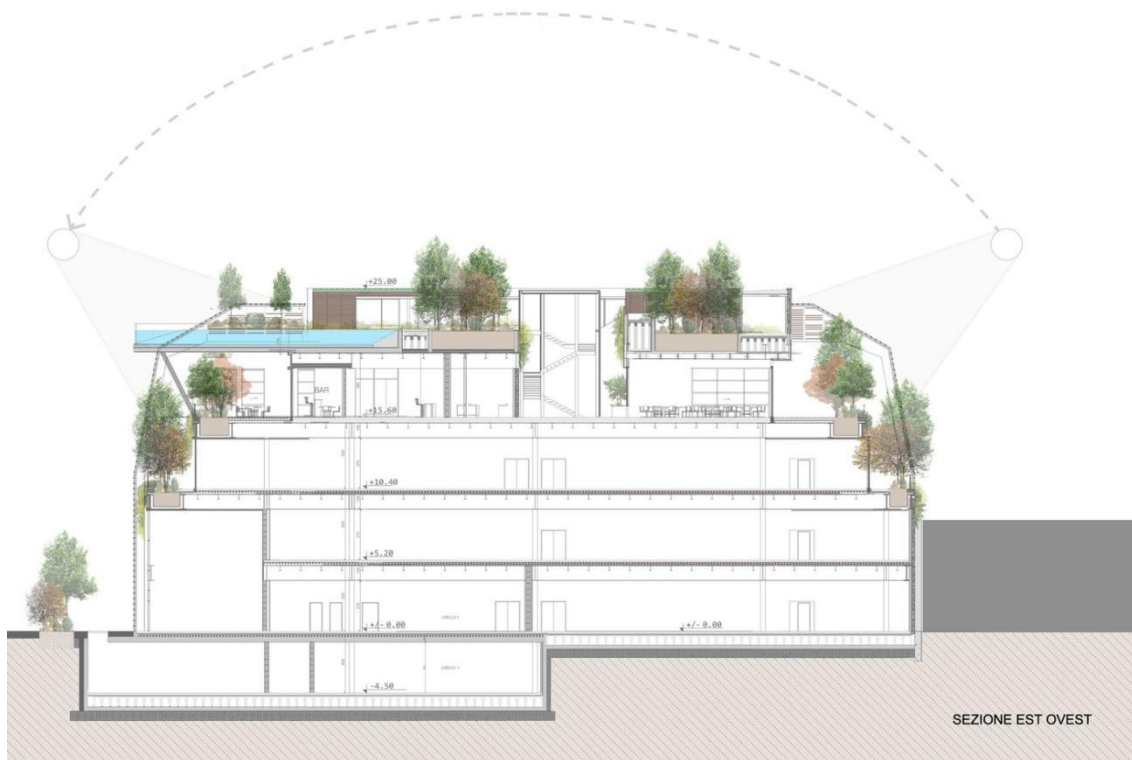


Figure 13; A section through the building
Source; Greenpea.com



Figure 14; A section through the building
Source; Greenpea.com

The design theme is Respect for Earth, Air, Water and People. It has five floors (4 floors of Shops & 1 floor for creative idleness), a total of 15, 000 sqm of retail space. Spaces in the building include; 1 bookshop, 24 home furnishing shops, 1 bank, 1 sustainable laundry shop, 1 connectivity provider, 1 electric car dealership, 32 clothing shops, 1 museum, 2 energy & services providers, 3 catering establishments.



Location;

51

Material and Construction;

The building is meant to seem like a giant mound of green earth. Shrubs and trees are planted in large containers on the terrace while smaller plants exist throughout the building to give a natural feel and absorb CO².

A technical "treillage" formed by an exterior shell made of wooden sunshade slats, which are reinforced by a steel rib, acts as a filter between the interior and exterior of the building.

The interior was painted using a compound called Airlite paint, which neutralizes pollutants, stops the formation of mold and microorganisms, and kills germs.

Green Pea provides a comprehensive overview of the many various ways that energy can be produced using renewable sources. The edifice is powered by renewable energy such as geothermal wells, photovoltaic panels, solar panels, smart flowers, and piezoelectric flooring, which capture kinetic energy caused by the movement of people walking through the building.



Figure 16; Electric car shop
Source; Greenpea.com



Figure 17; Furniture shop
Source; Greenpea.com



Figure 18; A restaurant in the building
Source; Greenpea.com

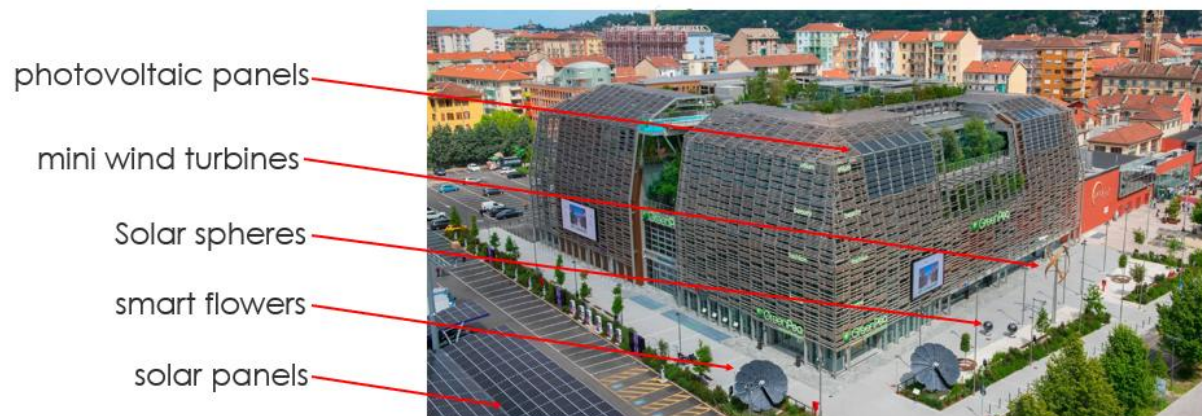


Figure 19; Roof top relaxation area
Source; Greenpea.com

3.1.2 Appraisal

Merits

1. Use of sustainable energy



2. Proper zoning
3. Well laid out circulation
4. Provision for shading against elements of weather



5. Nature was introduced into the design to eliminate toxic air and germs



6. Provision for the physically challenged

Demerit

- ❖ Absence of accessible egress plan from the building in terms of an emergency

3.2 Case Study Two

3.2.1 Sitari Village Mall

Designed by SLT, this is South Africa's first premium retail centre powered by sustainable energy from wind and solar sources. It has a retail leasable size of 12 000m². It was opened to the public in March, 2022.

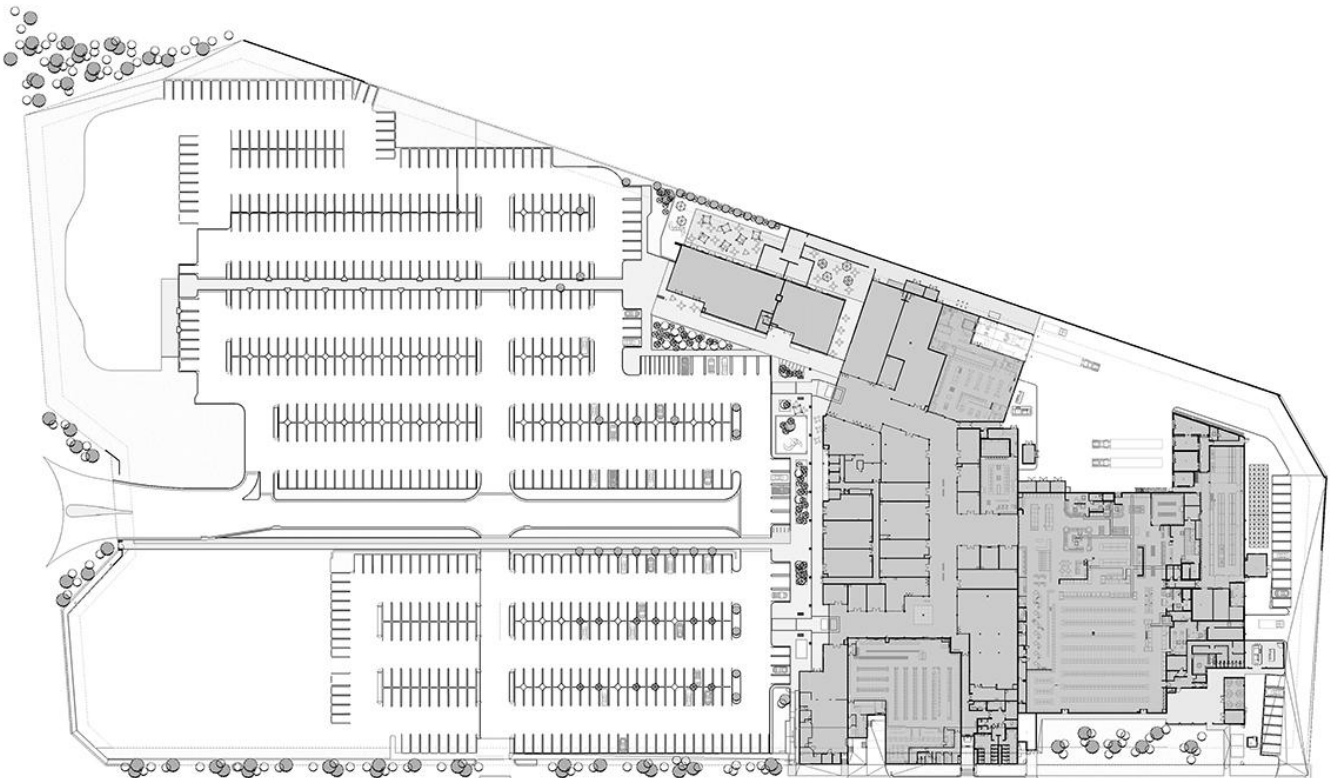


Figure 20; Building floor plan
Source; SitariVillage.com

Location; The shopping mall is located in Western Cape, South Africa.



Figure 21; Approach view
Source; SitariVillage.com

It gets 35% of its power from its rooftop solar photovoltaic system, while the other 65% (1,752 MWh) of its sustainable power comes from a wind facility owned by Eskom.



Figure 22; Bird eye view of the building
Source; SitariVillage.com

Shoprite Group, the owner of the mall as shown its commitment to environmental sustainability by;

- Using recycled material in packaging, reducing waste from food and plastic
- Sourcing goods using ingredients supplied in a sustainable manner; and
- Increasing usage of renewable energy
- Recycling tons of cardboard and plastic in the mall.



Figure 23; Natural lighting allowed into circulation space
Source; SitariVillage.com



Figure 24; An atrium allowing natural lighting
Source; SitariVillage.com

3.2.2 Appraisal

Merits

1. Adequate parking spaces



2. Allowance of natural light



3. Properly laid out circulation
4. Use of sustainable energy sources



Figure 25; A café in the building
Source; SitariVillage.com



Figure 26; Grocery area
Source; SitariVillage.com

3.3 Case Study Three

3.3.1 Asmacati Shopping Centre

The shopping centre was designed by Tabanlıoğlu Architects and opened to the public in 2009. The centre incorporates the lifestyle of İzmir where people love to spend time outdoors due to the warm climate.



Figure 27; Approach view
Source; SitariVillage.com

The partially open layout of the shopping centre lends itself to the development of natural gathering spaces in between the stores. Patios in the open air offer a sense of relaxation thanks to the shade and sparkles provided by a bower constructed of modern materials. The shape of the bower mimics the grape leaves that are seen in the surrounding area.

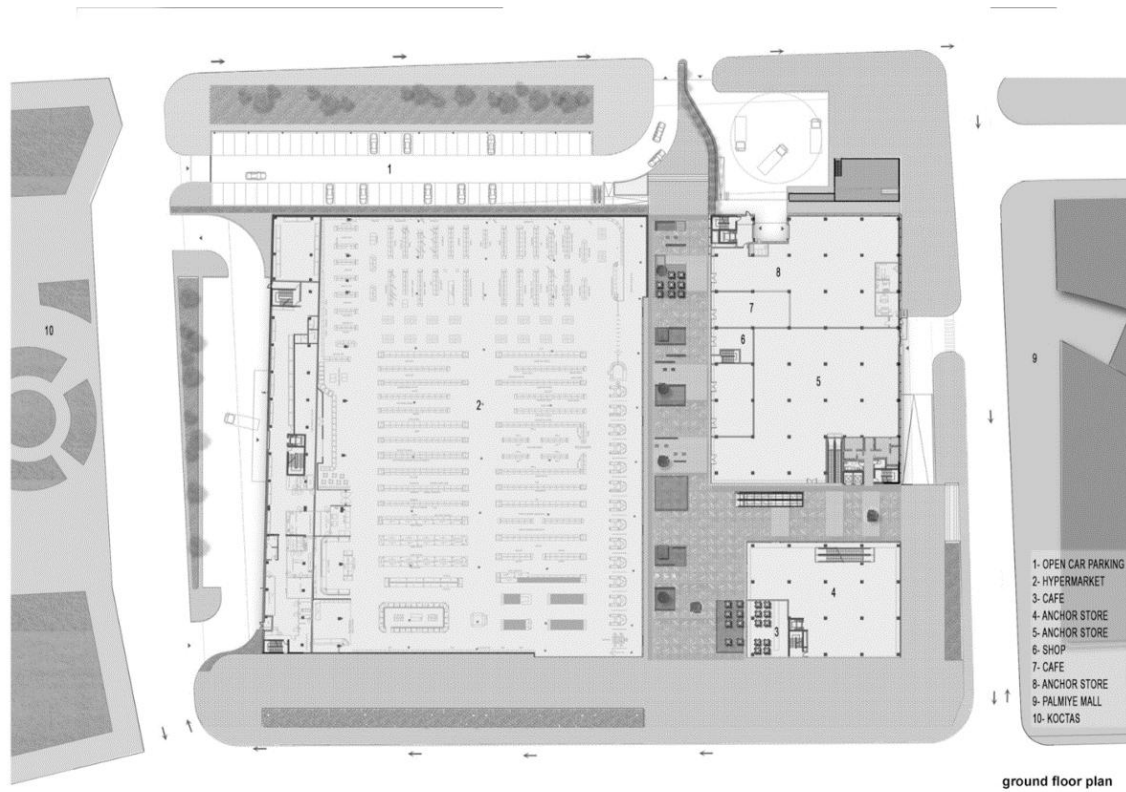


Figure 28; Ground floor plan
Source; SitariVillage.com

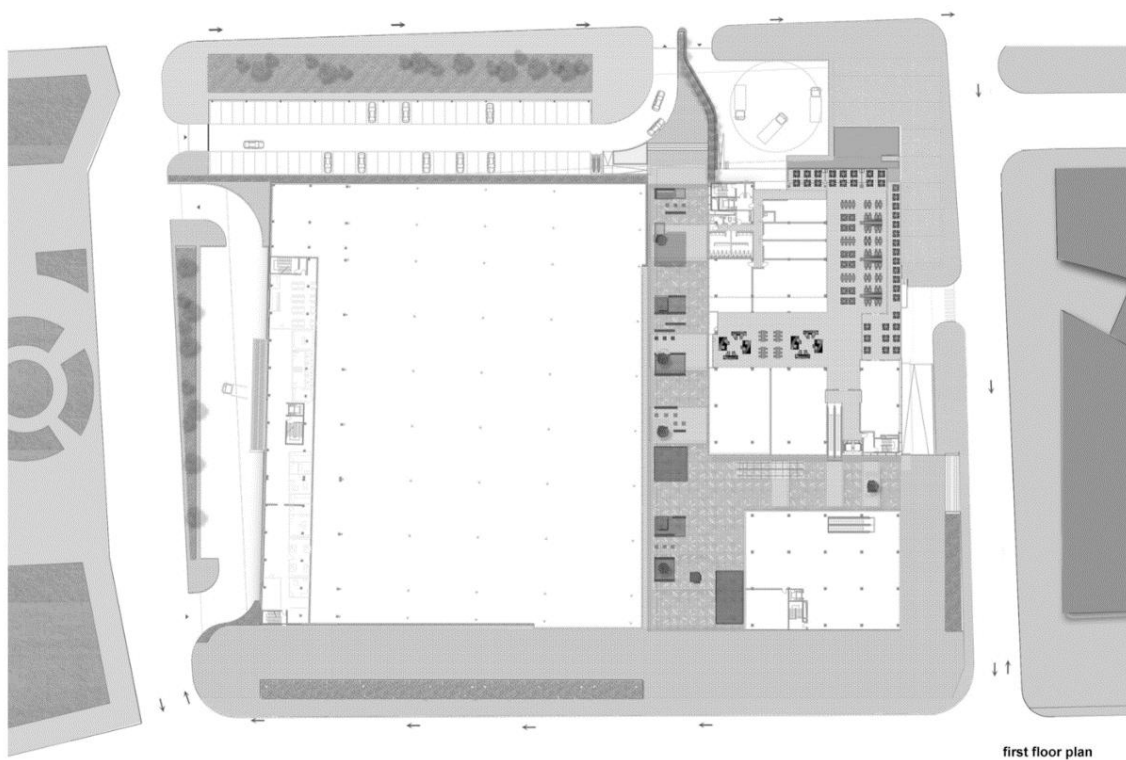


Figure 29; First floor plan

Source; SitariVillage.com

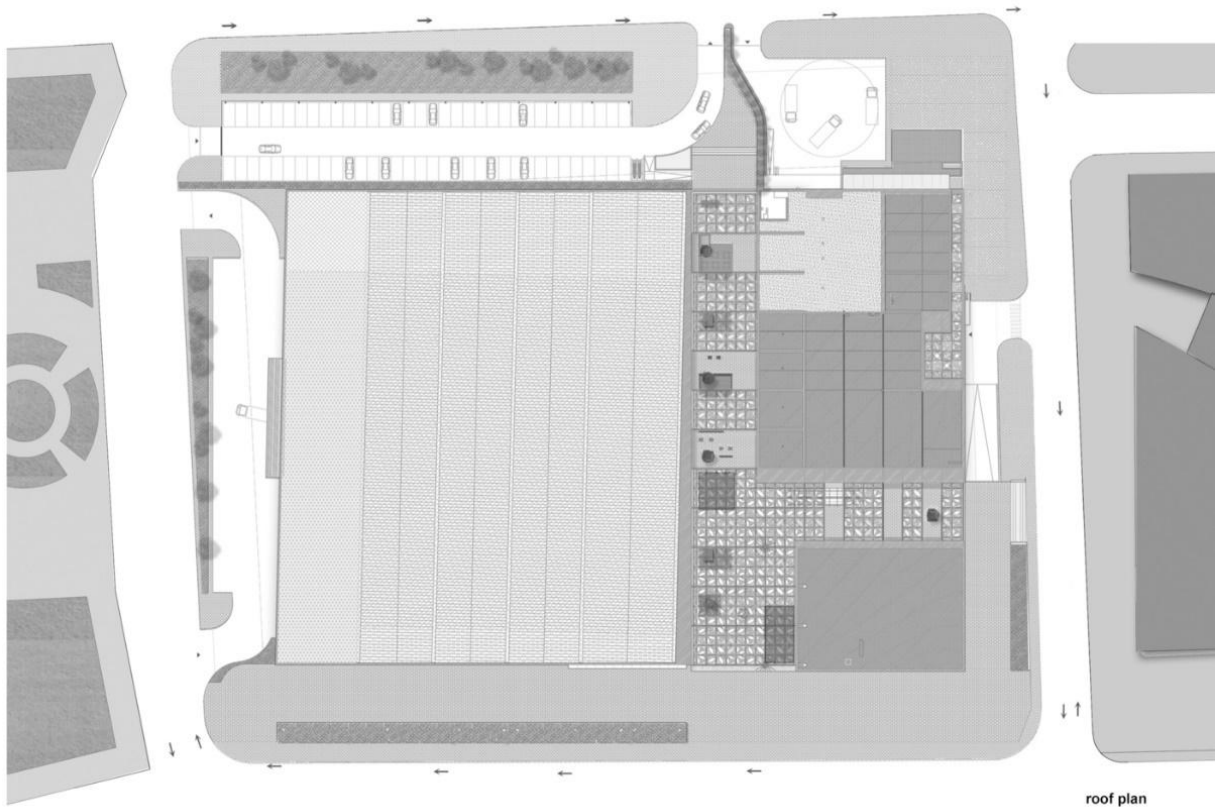


Figure 30; Roof plan
Source; SitariVillage.com

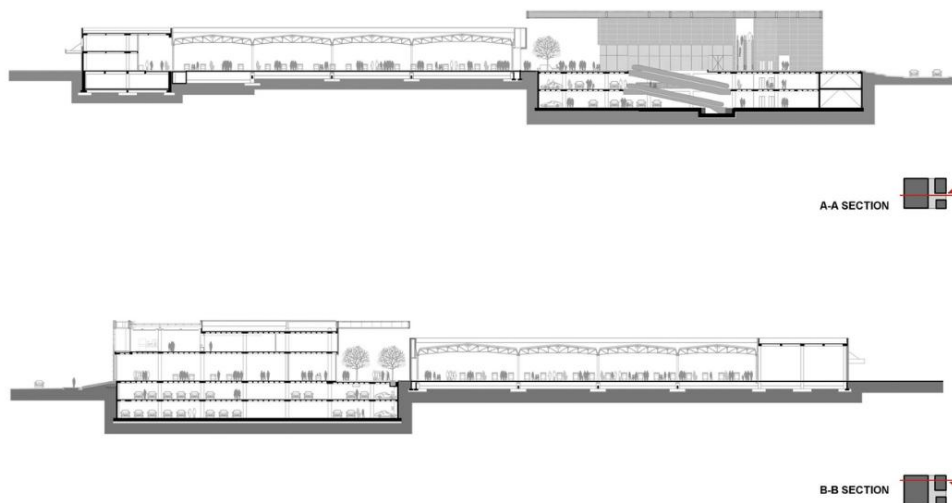


Figure 31; Sections through the building

Source; SitariVillage.com

Location; Asmacati Shopping and relaxation point can be found in the city of Izmir, Turkey.

3.3.2 Appraisal

Merit

1. Simple layout, wide and properly laid-out circulation spaces
2. Introduction of Shading to cater protect against hot afternoon sun



3. The use of Open-air patios, semi-open shopping facilities to cater for the warm climate in particular to the site
4. Sit-outs are provided under the shaded courtyard for shopper to relax



Figure 32; The shaded courtyard
Source; SitariVillage.com
Demerit

Figure 33; Open-air patio
Source; SitariVillage.com

1. Heavy reliance on un-sustainable energy source for indoor ventilation
2. Green area can be increased

3.4 Case Study Four

3.4.1 Jabi Lake Mall

The Jabi Lake mall was designed by MDS Architecture and opened to the public in 2016. It has over 100 shops and services and an outdoor recreation area with a water front view. The design has two floors with a total leasable retail area of 27,000 sqm on 5 hectares of land.



Figure 34; View from the Lake
Source; Google

It was built to be 25% more energy efficient than buildings around and recently in 2021, a 609kwp solar Hybrid project was introduced to supply 30% of the energy needed in the mall. This energy is provided by the 1,848 solar panels placed on the building's roof.

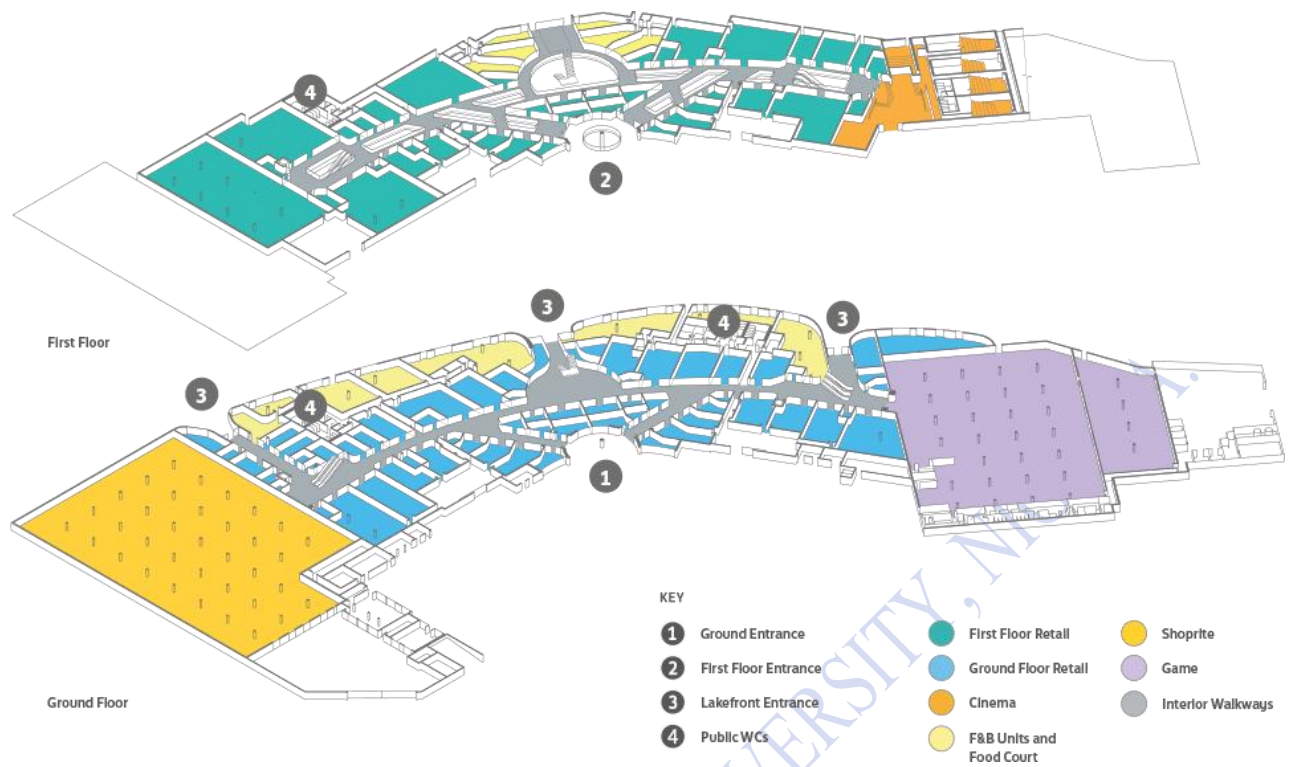


Figure 35; Isometric view of the floor plans
Source; Google

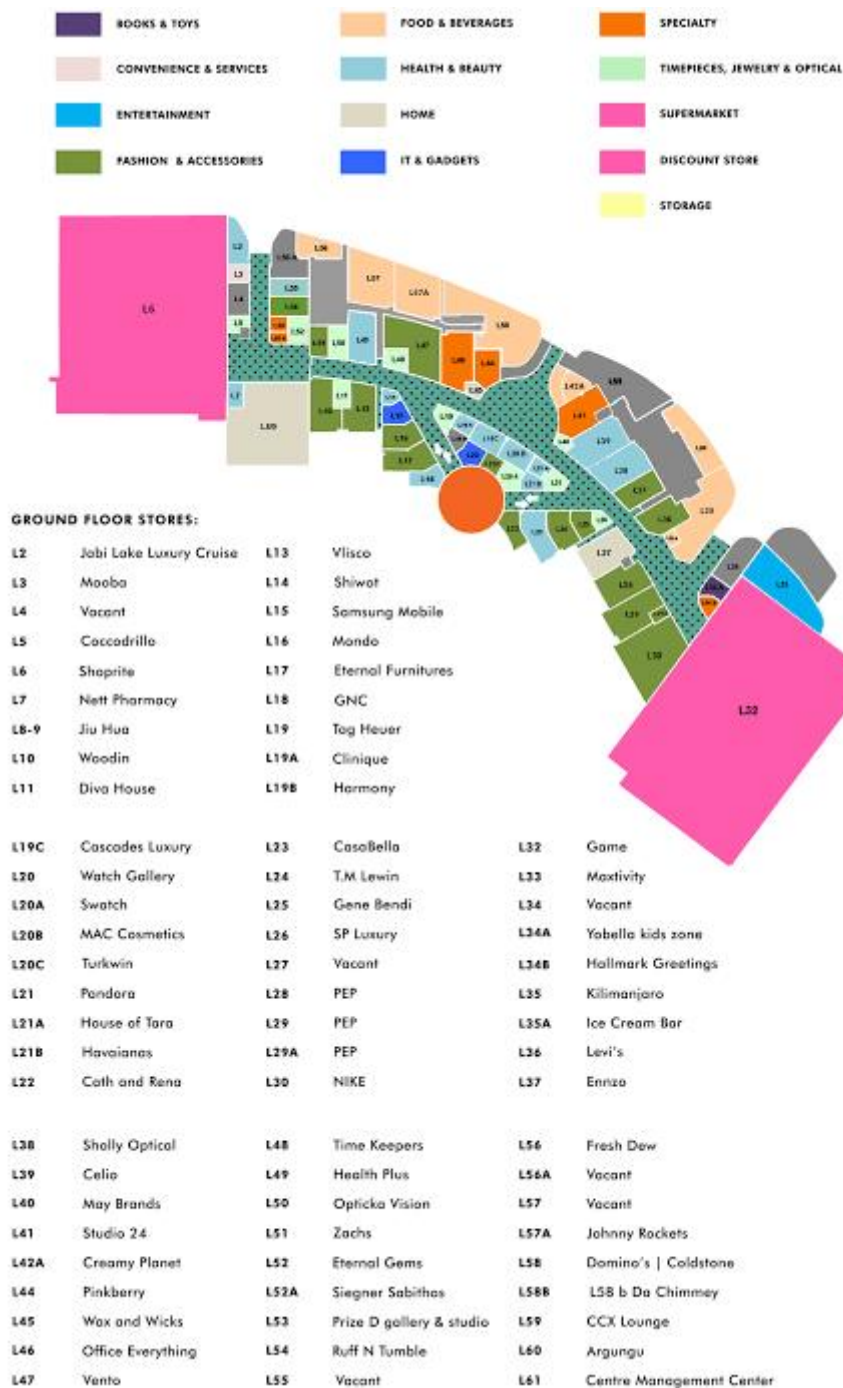


Figure 36; Ground floor plan
Source; Google

Location

The mall is located beside Jabi Lake, Abuja, Nigeria. It was designed to overlook the lake.



Figure 37; First floor plans
Source; Google

3.4.2 Appraisal

Merits

1. Wide, centralised and clearly defined circulation connecting spaces
2. Energy efficiency; introduction of sustainable energy



Figure 38; Solar panels covering the roof
Source; Google

3. Provision of adequate parking area



Demerits

- ❖ Absence of soft landscape on the site

3.5 Case Study Five

3.5.1 Ikeja City Mall

Ikeja City Mall (ICM) was designed by Argoles Dukes & Smith and James Cubit Architects and commissioned in December of 2011. It has 22,645m² of retail and entertainment space on 5.14 hectares of land & an expected 800 000 visitors per month.

The store currently has 94 tenants with facilities to include cafes, bars, restaurants, hairdressing/beauty salon, retail stores etc. The mall is set to add new sections which will include the children section and a cinema hall. The new sections will also include food courts.



Design, materials and construction

Small shops are located at the entrance and close to anchor shops to attract customers while anchor shops are located at the back of the shop so they will be reached last.

Staircase located at the entrance of the mall so shoppers can easily access the first floor. Concrete and brick walls are primarily used in construction of the mall. Stone facing is used on some of the walls. The use of atriums is employed in order to allow for natural lighting and ventilation.

Location

Ikeja city mall (ICM) is Located along Obafemi Awolowo Way, Alausa, Ikeja, Lagos, right at the heart of the city.

3.5.2 Appraisal

Merits

- ❖ Ease of accessing every facility within the mall by customers.
- ❖ Wide central lobbies promote good circulation network.

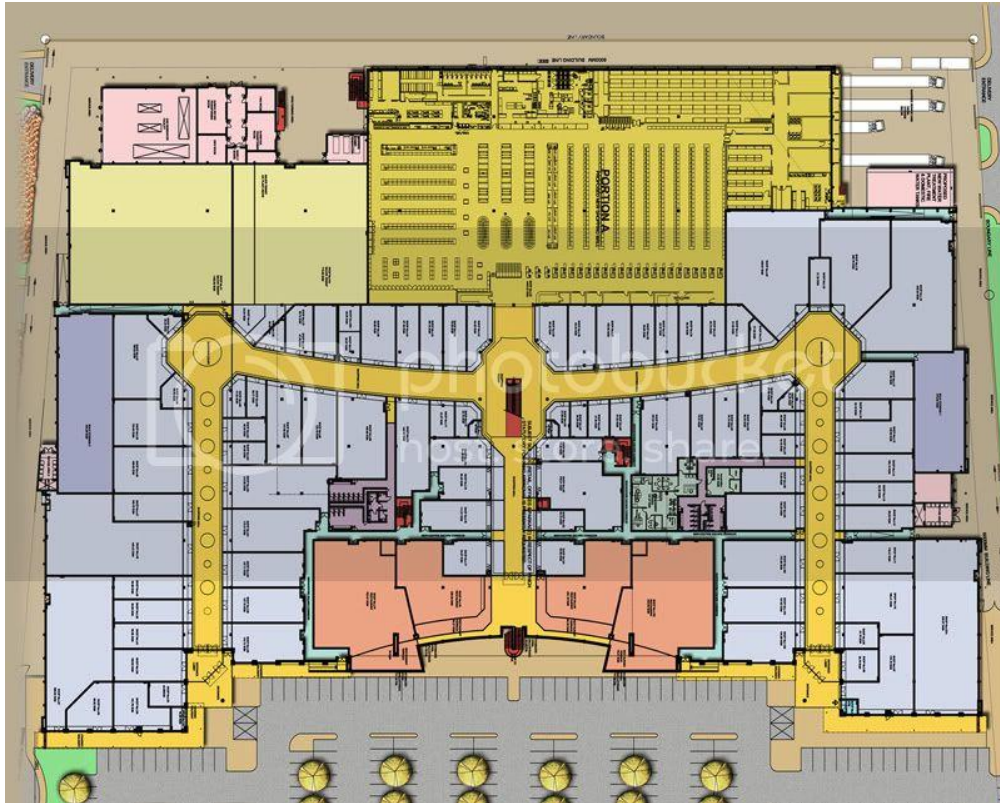


Figure 39; First floor plan showing central and wide circulation.
Source; Photobucket

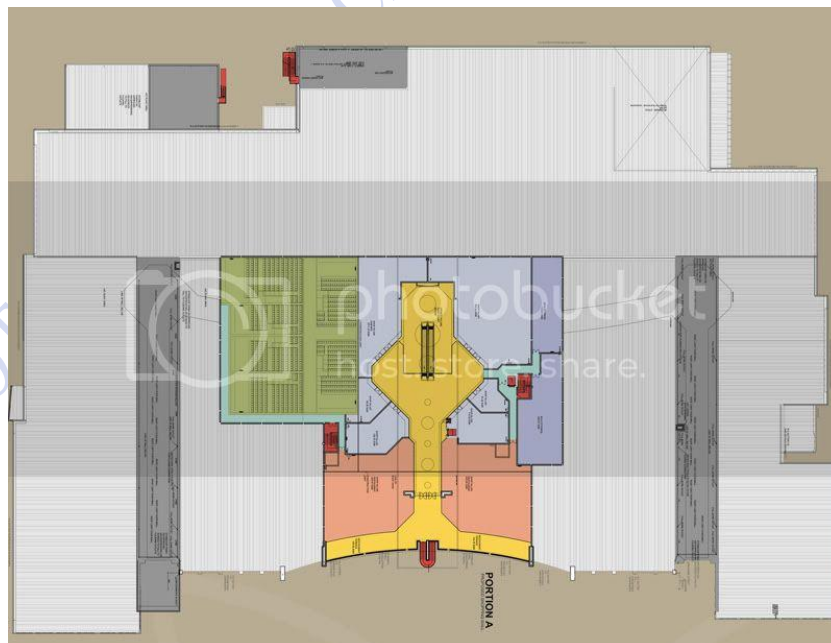


Figure 40; First floor plan
Source; Photobucket

- ❖ Use of both natural and artificial lighting method is adopted.



Atrium to through in light

Demerits

1. Poor landscaping. Predominance of hard surface with little attention given to nature features such as trees, shrubs, grasses etc.



Figure 41; Bird eye view of the site showing little presence of green areas
Source; Google

2. Can get congested and shoppers having to queue to use the escalator.

3.6 Findings and Discussions

Spaces common to all the case studies include;

- Outdoor parking
- Convenience
- Anchor store
- Retail shops
- Warehouse
- Large circulation
- Delivery/loading bays

The sustainable energy sources and energy solutions seen in most of the malls in the case study will be employed in this design. They include; Photovoltaics/solar panels on the roof top, east elevation & over parking spaces, Led/energy saving light fixtures for spaces that need artificial lighting, Piezoelectric floors at all entrances, lobbies and anchor malls.

Green areas and potted plants will be placed around circulation and lobbies to create a feel of connection to nature while they help absorb toxic air and CO₂ present in the environment. These will help create a cool natural feel within the mall.

Natural lighting will be allowed into circulation spaces in this design. Atriums and curtain walls will be used to achieve this.

Wide and properly defined circulation that connect spaces within the mall is a must. Consideration should be made for the physically challenged too. Also, Signages should be strategically placed around the building to indicate what spaces are where.

Circulation on site is of upmost importance, both services and shoppers. It should flow seamlessly with the entrances and exit that leads into or goes out of the building. It shouldn't be clumsy too. Pedestrian walkways should be such that they don't cross vehicular path to avoid accidents. Spaces like children outdoor area on the site should be should be shielded from vehicular path too. Green areas should be sufficiently designed around all these spaces.

Materials seen in the case studies that will be used in this design include

- Curtain walls
- Steel

Steel is one of the most commonly used materials as reinforcement for construction due to its high strength, durability and relatively low cost. Steel has an almost endless life cycle to its ease of recover and 100% practical recyclability without any substantial loss of quality.

- The paint finish (Airlite paint) material will be used in the interior to neutralize pollutants, disallow the growth of mold and microbes, and ensure the absence of germs.

Chapter Four

Site Analysis and Design Synthesis

4.1 Brief Analysis

4.1.1 Design Brief

There is a general scarcity of family friendly recreational spaces in Akure city, both indoor and outdoor spaces either privately owned or government owned. There is in fact no notable recreational centre along the major road axis that runs through the city talk less of a sustainably designed one.

The third objective of this thesis is to design an environmentally sustainable city mall for Akure. Sustainable design approaches as well as energy sources will be employed in the

project design. Locally sourced sustainable materials will also be employed for this design. The design can be categorised as a regional centre as it is this typology that can cater for the deficiency in the proposed location.

4.1.2 Design Brief Development

A number of spaces were found to be common to all the five case studies examined in this study. These spaces were studied critically to determine the standard required, the number of units per people, their capacity and exact function they perform in a mall design. These spaces are;

- Outdoor parking
- Convenience
- Anchor store
- Retail shops
- Warehouse
- Large circulation
- Delivery/loading bays
- Service parking
- Staff area
- Service circulation
- Security post
- Maintenance, electrical and IT department

4.2 Study Area

4.2.1 Site Location

The site of the proposed Akure GreenLife mall is located along Ilesha garage road, after Akure South Local government secretariat, beside Ade super Hotel, Akure, Ondo state Nigeria.



SITE LOCATION PLAN

Figure 42; Site location map
Source; Researcher's field work

4.2.2 Site Location Criteria

Site analysis to determine the existing features on site that will in anyway affect a proposed design is very important and should be done at the commencement of the design process. A number of characteristics peculiar to the proposed site influenced its selection. They include;

1. The location of the site is a big contributing factor to this design. It is easily accessible and has a relatively flat topography which makes construction easy.

2. The access roads are also well defined as it just loops off the major road that connects the city of Akure. In fact, the building when constructed can easily be seen as passers-by drive or walk along this road.
3. Another contributing factor to selection is the almost perfectly centralised location of the proposed site in Akure city.
4. There is also a lack of a public family friendly facility in that vicinity and the presence of this building will help fill that gap.
5. The site is also zoned to accommodate this building typology.

4.2.3 Site Analysis

The site is a very important aspect of a design proposal being the point at which the tangible percentage of a development emerges or starts making an impact. The site chosen for any project hence goes a long way in determining the final resultant composition of the solution-in-all aspects. The site and its environment determine the solution in terms of contextual appropriateness measured by geographers, geologists, and geometrics. The specific aspect of the site, its micro-climate are thus a complex interaction of any factor, orientation, scope, topography, temperature patterns, humidity, precipitation, vegetation, presence or absence of water, seasonal availability of sunlight especially in urban areas, the influence of other buildings etc. The success of any design in this case to a large extent depends on a wise and informed site selection. The layout of the building on site will greatly be determined by the topography and physical features (such as water bodies, access, trees, local climate, utility lines) seen on site. The existing features in close proximity to the site will greatly influence the character of the building to be built in terms of forms, beauty and economy of the design. A thorough analysis of the project site that enhances an in-depth understanding of its suitability to the intended purpose is necessary. The reason is to achieve the aim of the design. Site analysis helps in the functional development of the relationship that exists between the

site and the structure. Every design solution should aspire to be a function of the site and also a direct reflection and adaptation of its environment.

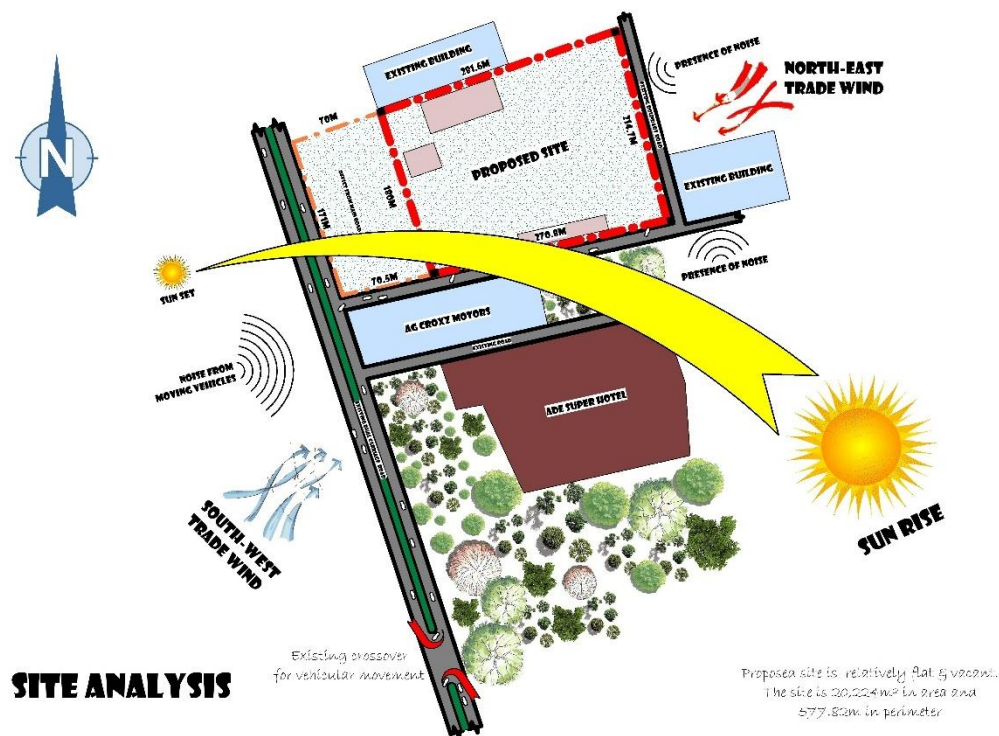


Figure 43; Site analysis
Source; Researcher's field work

Site Accessibility

The site has easy and convenient access for both vehicular and pedestrian. The site is accessible from the major road that runs through the city of Akure.

Nearness to Public Utilities

The site has adequate access to basic infrastructures e.g., Good Roads, Electricity, Water, Telecommunications, Security etc.

Drainage and Topography

The site has a gentle slope spread evenly throughout. It is however necessary to create a slope that encourages rainwater flow towards a part of the site for collection.

Vegetation

Akure is located within the tropics, hence it enjoys two distinct season which are the cold and dry seasons. This enables a wide range of vegetation ranging from thick undergrowth, short grasses to evergreen trees in the site's immediate vicinity. Soil is loamy, and it is presumed to have adequate bearing capacity. The Site has relatively good and firm grounds with good load bearing capacity suitable for the construction of the proposed mall. There are no landforms on the project site save for trees and shrubs. The site is covered with shrubs, thick grass, and vegetable leaves and trees. All the vegetables and shrubs are to be removed. The site displays a relatively thick vegetation cover that is; there are tall grasses, shrubs as well as big trees.

Soil Condition

It has a firm laterite soil with good sub-surface condition for construction and landscaping. It gives satisfactory geological and soil condition with no rock crops. Also, soil with clay (sticky) properties can be gathered on site to make Hydraform, the hydraulic compressed brick used on site.

Wind Direction

The north-east trade wind brings cold, dust, harmattan and these cause discomfort. The south west trade wind brings cold humidity which gives comforting effect to the people. Proper ventilation is considered as part of the building effective arrangement. Natural inlet of air is one of the bedrock of this design therefore, the building's long sides (east and west) elevations are positioned such that they receive the maximum amount of air. The shorter sides of the proposed mall face the direction of the north-east trade wind

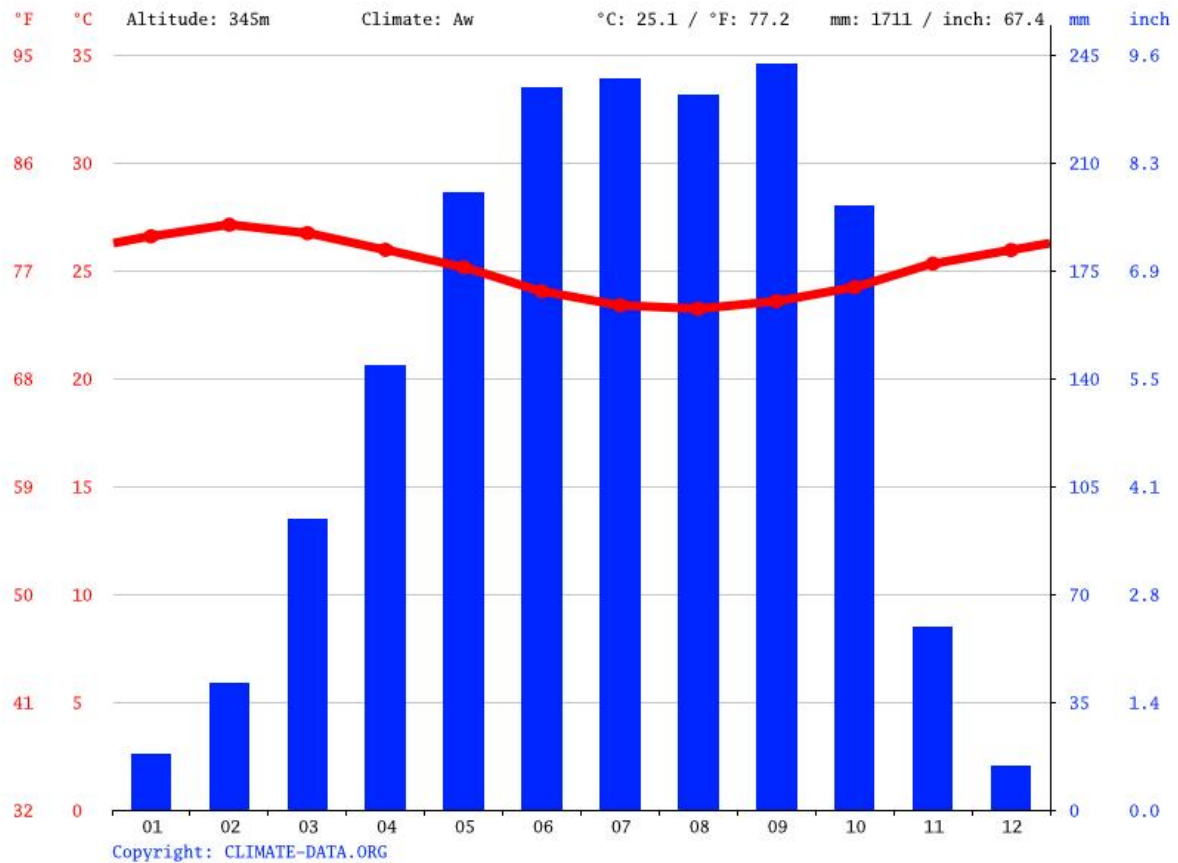


Figure 44; Climate graph/weather by month
Source; Climate-data.org

Sunlight and Temperature

Akure is termed the sunshine state because of how bright the sun is throughout the year. Solar gain and temperature are an important factor as solar energy is needed to provide electricity to run the proposed mall. The proposed building is positioned such that sun rises and moves across on the shorter part reducing the amount of excess heating coming into the building. Solar panels are placed across this sun path on the roof and over the parking area on site to gain as much incident solar radiation throughout the day.

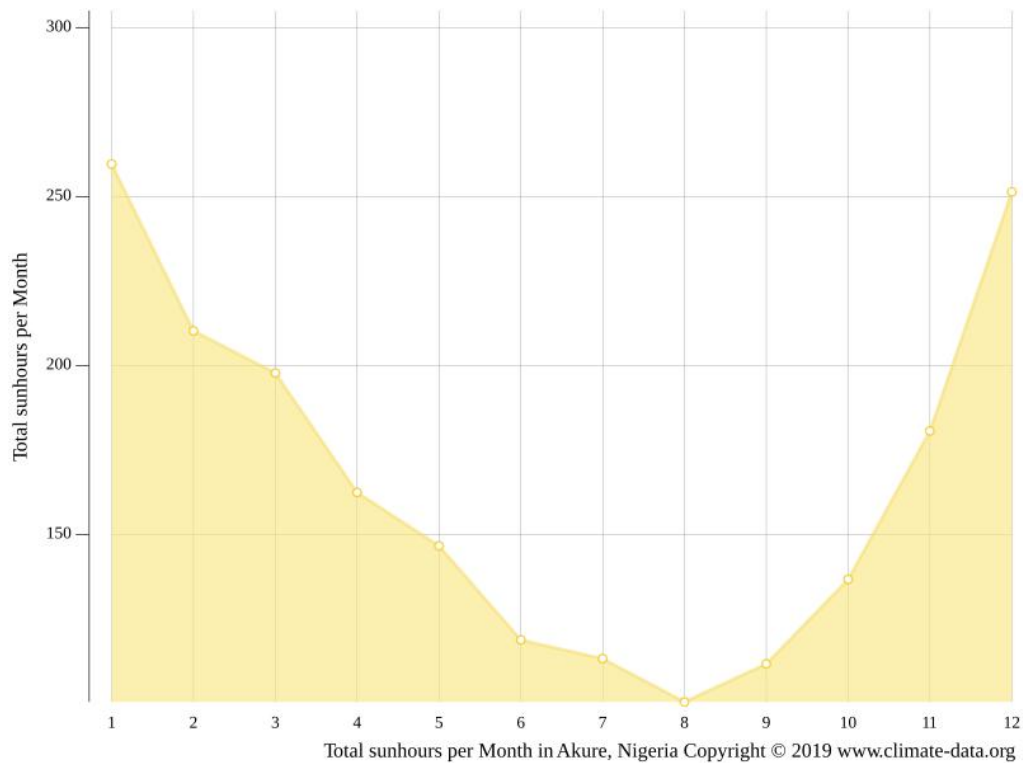


Figure 45; Sunshine hours per month
Source; Climate-data.org

4.3 Project Analysis and Design Synthesis

4.3.1 Conceptual Development

Ideas birth from specific instances or elements either living or non-living are referred to as concepts in architecture. There are five main types;

1. Ideal; solving architectural problems.
2. Essence; looking beyond the function
3. Analogous i.e., looking at other things
4. Metaphor i.e., looking at abstraction
5. Pragmatic; looking at the function

Site Concept

The sites concept is the idea that guides the planning of the elements on site. It should not be done in isolation i.e., existing conditions on site should be noted and the new site plan designed around them. The site for the proposed Akure GreenLife mall was designed to take access from the existing roads. Entrances and exits are on the road adjoining the site to the North. General parking areas are placed along this road for easy ingress and egress. Service access for delivery trucks and vans is located along the road adjoining the site to the East and parking for these vehicles placed opposite. Parking area for staff members is placed on the western part of the site making them a bit secluded. Extra parking spaces are available under the building.

Special consideration is given to the specially abled as their car parks are placed very close to the building. Also, a special car park for electric cars is placed close to the building too to encourage the use of sustainable cars.

The electrical and mechanical unit is designed to be at the back of the site close to service entrance in case there is a need to move a machine. Refuse disposal area is placed at the right edge corner of the site far away from any activity.

The sun path and other existing features on site were considered in all of these arrangements. Entrances and exits to the building itself are placed to seamlessly flow with pedestrian assigned walkways and vehicular paths.

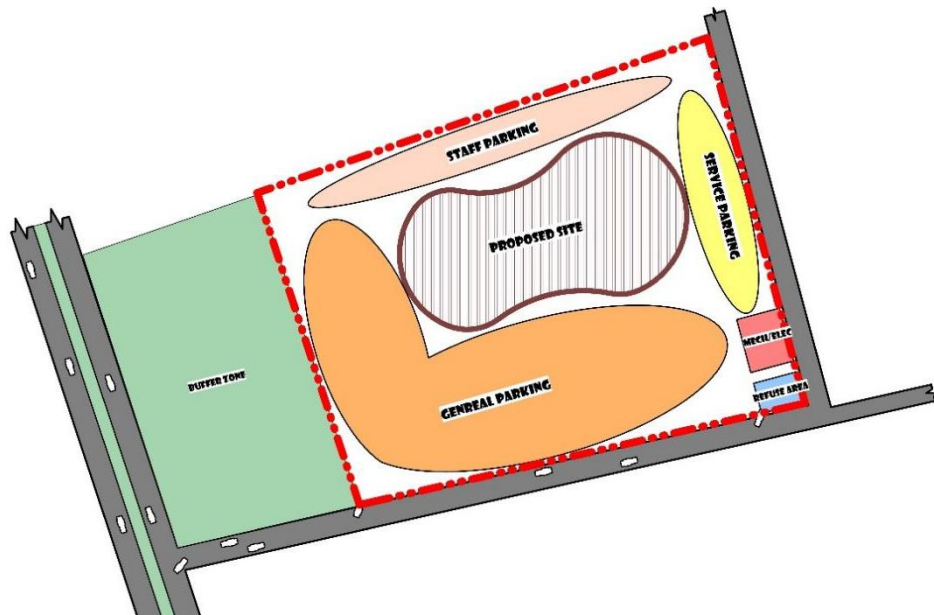


Figure 46; Site concept/zoning
Source; Researcher's field work

Building Concept

Stack effect, the shading of a tree, a section of a tree cell with its shape and biological functioning (Biophilic & Biomimetic design) was what combined to inspire the shape/internal configuration and functionality of this design. The building will be raised on columns to allow the inlet of air from the ground floor. Air raises to cool the major circulation area and escapes through the atrium.

CONCEPTUAL DEVELOPMENT

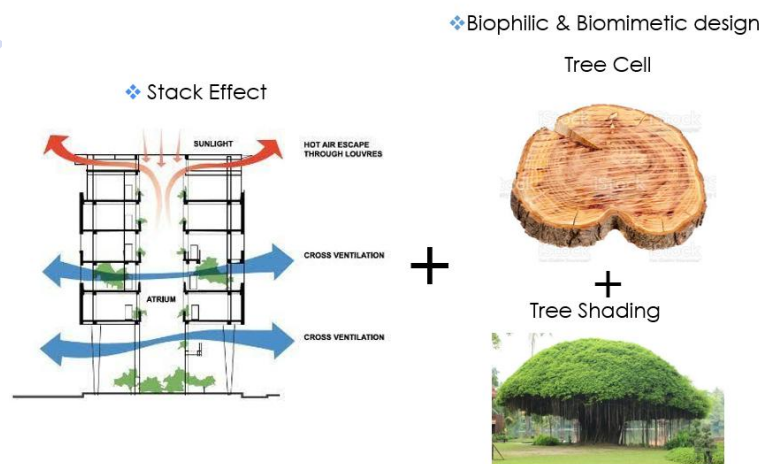


Figure 47; Conceptual development
Source; Researcher's field work

CONCEPT Tree Cell

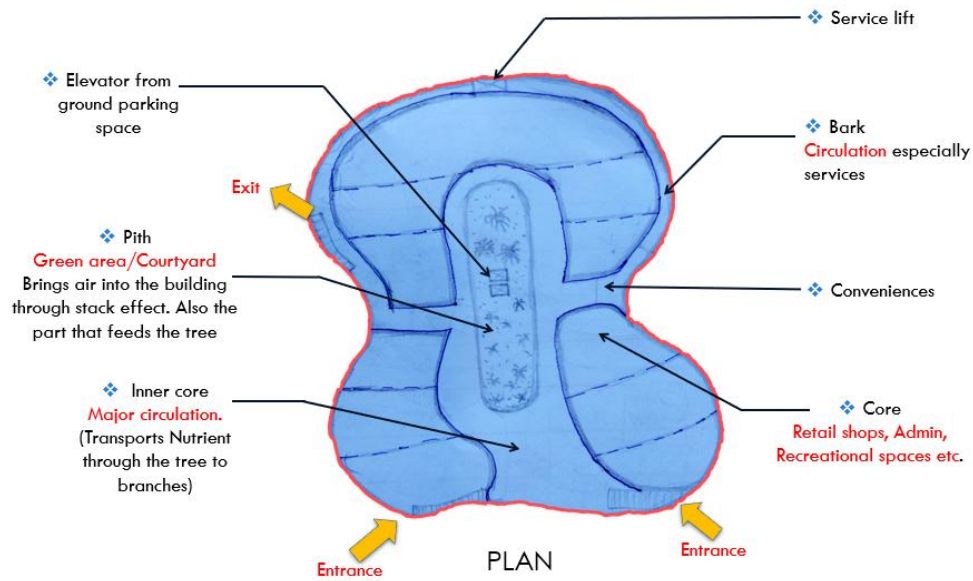


Figure 48; Concept
Source; Researcher's field work

4.3.2 Functional Relationship

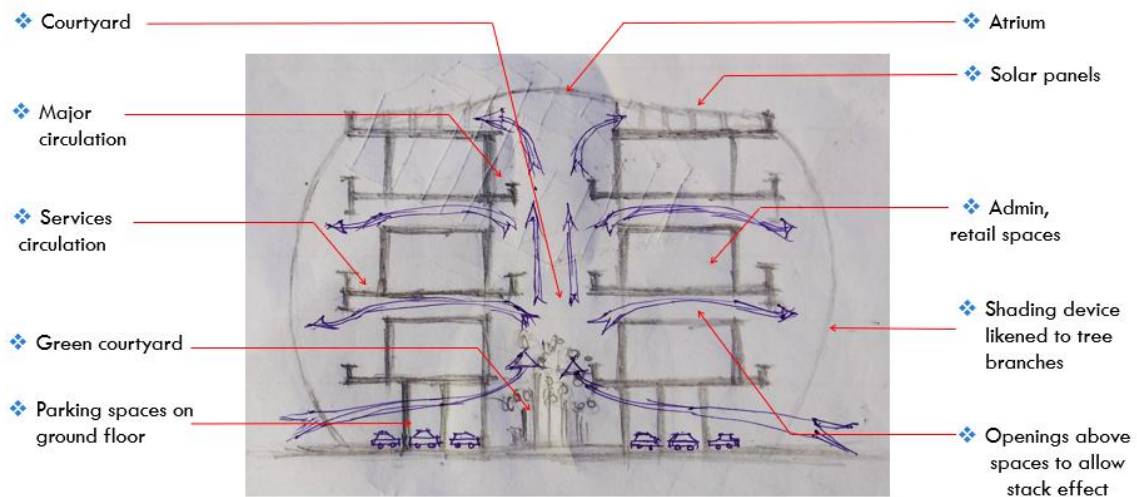


Figure 49; Showing vertical zoning
Source; Researcher's field work

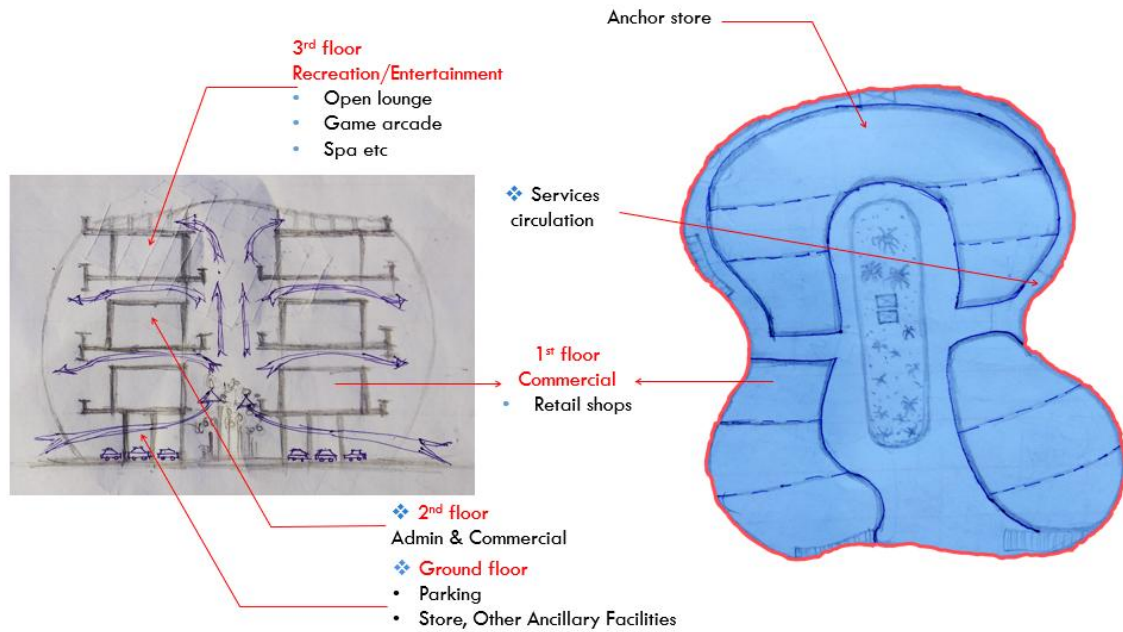


Figure 50; Zoning vertically and on plan
Source; Researcher's field work

The functional relationship chart gives an insight into the degree of relationships among the various spaces in the facility. It helps the designer to see at a glance which spaces are or not related to one another. This helps the designer to locate related spaces within easy proximity of each other and isolate those which are not related. It also aids zoning of spaces and functionality of the design. General functional relationship principles taken into consideration include;

1. Separation of the various traffics from one another i.e., vehicular, pedestrian, Staff, students etc.
2. Orientation of buildings to create maximum thermal comfort and convenience.
3. Orderliness, functionality, aesthetics, unity.
4. Green areas with soft and hard landscaping.
5. Ample parking spaces.

4.3.3 Space Allocation/ Schedule of Accommodation

Spaces were grouped into four depending on their relationship to one another and the similarities of activities performed in them.

Administration

- General manager's office
- Finance manager's office
- General secretary
- Marketing manager's office
- Conference room
- Staff lounge
- Staff convenience
- Store
- Changing room with lockers

Recreation/Entertainment

- Cinema halls
- Game arcade
- Bars lounge
- Children entertainment area
- Gym
- Spa
- Bowling Alley

Commercial

- Anchor store
- Retail shops
- Food courts
- Restaurants
- Pharmacy store

Other ancillary facilities

- Parking

- ATM gallery
- Convenience
- Storage spaces
- Delivery/loading bays
- Mechanical & electrical rooms, Technical
- Circulation grouped with services.
- Refuse disposal area.
- Recycling building.
- Stair Hall
- Warehouse
- Outdoor technical room

Schedule of Accommodation

Space	Capacity	Size
Anchor store	300 people	900m ²
Staff office	6 staff	18m ²
Conference room	For 15 staff	34m ²
Changing room		16m ²
Bowling Alley	60 people	629m ²
Gym	15 people	200m ²
Parking	For about 700 cars	
Circulation lobbies	At least 2.4-3m wide	

Wearhouse		316m ²
Cinema	100 seats	110m ²
Retail outlets; Type A Type B Type C Type D		60-96m ² 100-144m ² 160-250 m ²
Electrical & mechanical department		200m ²
Indoor lounges	can accommodate up to 50 people	60m ²
A tech hub for digital creatives	Can house up to 10 people	70m ²
Children entertainment area	Can house up to 70 people	670m ²
Gym	15 people	180m ²
Restaurants	Can seat 20 people each	200m ²
Arcade	40 people	252m ²
Conveniences	9 for the physically challenged, 20 on each floor for both male and female	
MD's office		24m ²
Staff lounge	20 people	42m ²

Source; Researcher's field survey

4.3.4 Construction Methods and Materials

Sustainable materials were used in the design of this project. Factors that influenced their choice are;

- Aesthetics
- Durability
- Climatic condition

- Availability in Akure
- Their functionality
- Regulations and bye-laws

Substructure; reinforced concrete

Walls; Hydraform bricks for external walls

MDF wood and glass for internal partition

Interior walls painted with Airlite paint to protect against growth of mold and microbes, and eliminates germs

Floor; parquet wood flooring, piezoelectric floors, clay tiles

Door: wooden panel doors, steel doors, glass doors

Roof; long span aluminium roofing sheet covered with solar panels. Glass with steel roof support for atrium

Ceiling; wooden ceiling finished with Airlite paint

4.3.5 Building Services

Duct are destined close to areas that need a lot of plumbing and energy throughout the building. The service circulation surrounding the building will double as an open duct for pipes and wiring. The ducts are wide enough to be accessible from the back in case an area needs fixing.

Some deep areas e.g., toilets will still need central air conditioning and artificial lighting. Internal spaces like the retail store, staff area etc will need artificial air conditioning and lighting too. The circulation space will be ventilated by stack effect and lit by natural light coming through the atriums.

Fire extinguishers, sand pots and fire space routes and stairs are placed strategically throughout the building in the case of a fire emergency. A dedicated fire safety space is centrally place on each floor close to a duct to fight fire outbreak too.

Chapter Five

Conclusion

5.1 Project Appraisal

The study investigated sustainable design approaches and materials that can be used in designing a shopping mall in Nigeria which can be said to be environmentally friendly in all its sense. Five case studies were investigated in the course of this thesis.

The sustainable energy sources and energy solutions seen in most of the malls in the case study will be employed in this design. They include; Photovoltaics/solar panels on the roof top, east elevation & over parking spaces to generate sustainable energy (see appendix 1 and 6), Led/energy saving light fixtures for efficient lighting while using the least amount of energy (for spaces that need artificial lighting), Piezoelectric floors at all entrances, lobbies and anchor malls to generate electricity by converting mechanical energy to electrical from the huge traffic in that area.

Green areas and potted plants will be placed around circulation and lobbies to create a feel of connection to nature while they help absorb toxic air and CO₂ present in the environment. These will help create a cool natural feel within the mall (appendix plate 2).

Natural lighting will be allowed into circulation spaces in this design. Atriums and curtain walls will be used to achieve this (see appendix 6 and 15).

Wide and properly defined circulation that connect spaces within the mall is a must. Consideration will be made for the physically challenged too (see appendix 1, 3, 4, and 5).

Also, Signages should be strategically placed around the building to indicate what spaces are where.

Circulation on site is of utmost importance, both for services and shoppers. It will flow seamlessly with the entrances and exit that leads into or goes out of the building. It shouldn't be clumsy too (see appendix 1).

Pedestrian walkways should be such that they don't cross vehicular path to avoid accidents (see appendix 1). Spaces like children outdoor area on the site should be should be shielded from vehicular path too. Green areas should be sufficiently designed around all these spaces (see appendix 1).

Materials seen in the case studies that will be used in this design include;

- Curtain walls;
To allow sufficient natural lighting into the space
- Steel;

Steel is one of the most commonly used materials as reinforcement for construction due to its high strength, durability and relatively low cost. Steel has an almost endless life cycle to its ease of recover and 100% practical recyclability without any substantial loss of quality other materials gotten from research to be adopted include;

- Hydraform bricks (see appendix 8 and 9)
- Photochromic glass windows to respond to incident solar gain by adjusting to allow only the required amount into the building
- The paint finish (Airlite paint) material will be used in the interior to neutralize pollutants, disallow the growth of mold and microbes, and ensure the absence of germs.

5.2 Recommendation

Very little has been done as regards sustainability in the design and running of a shopping mall in Nigeria. This is majorly due to the fact that the concept of sustainability and shopping mall is relatively novel in this part of the world. This study has however proffered solutions to a lot of these challenges to add to the body of knowledge. More still need to be done on this subject though as Nigeria is still a little behind on the world stage.

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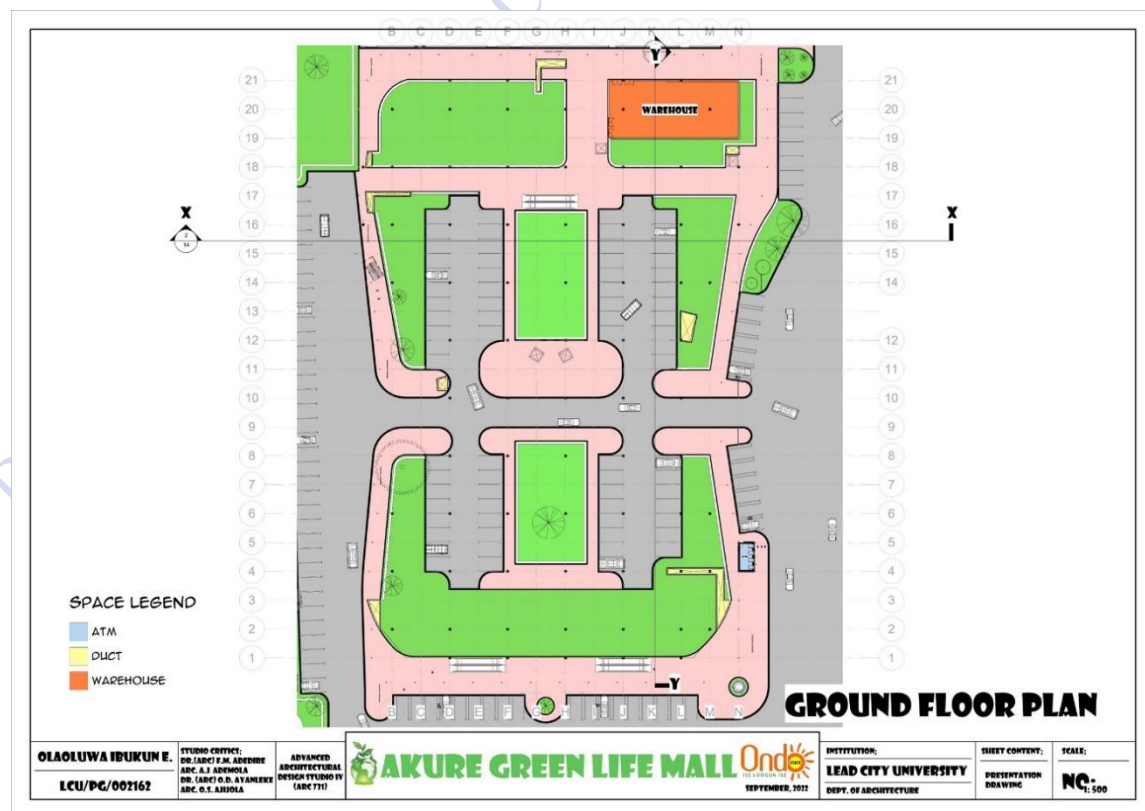
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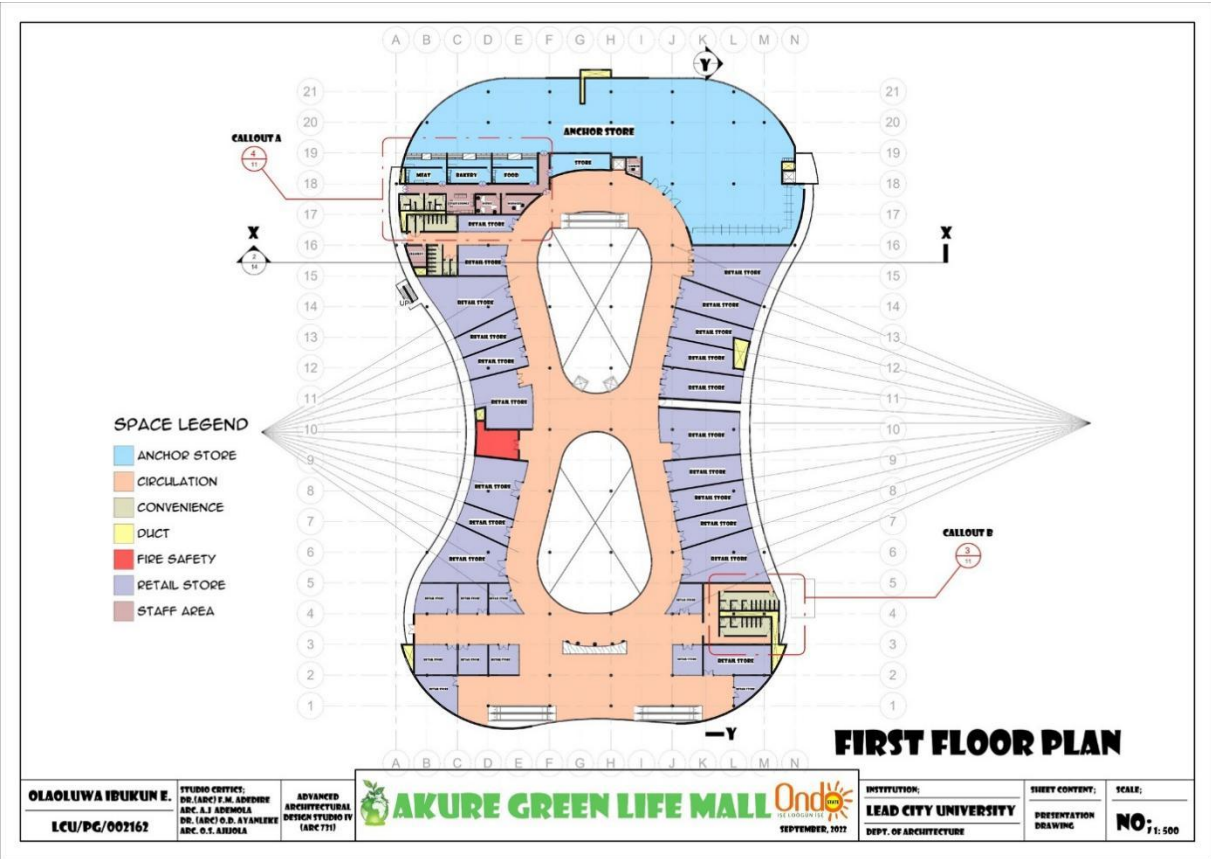
Appendix 1; Presentation Drawings



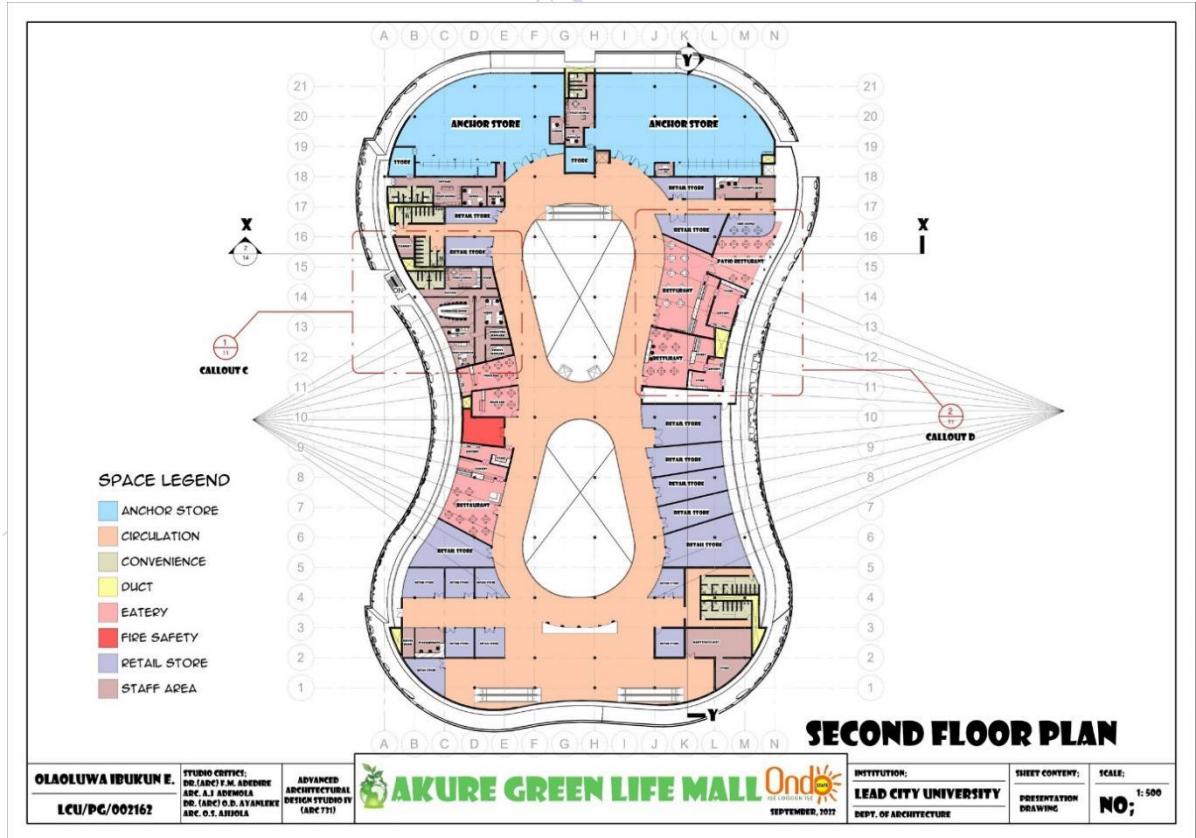
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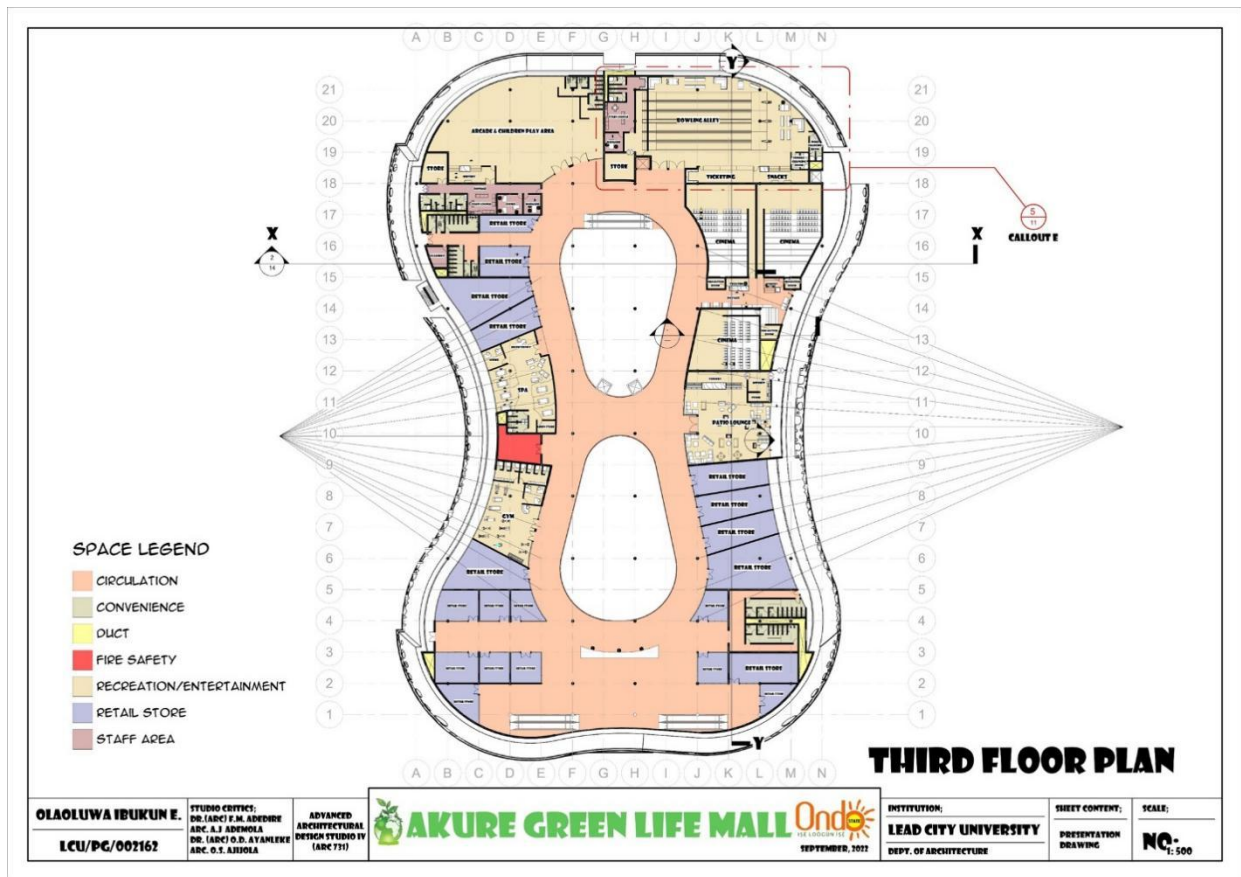
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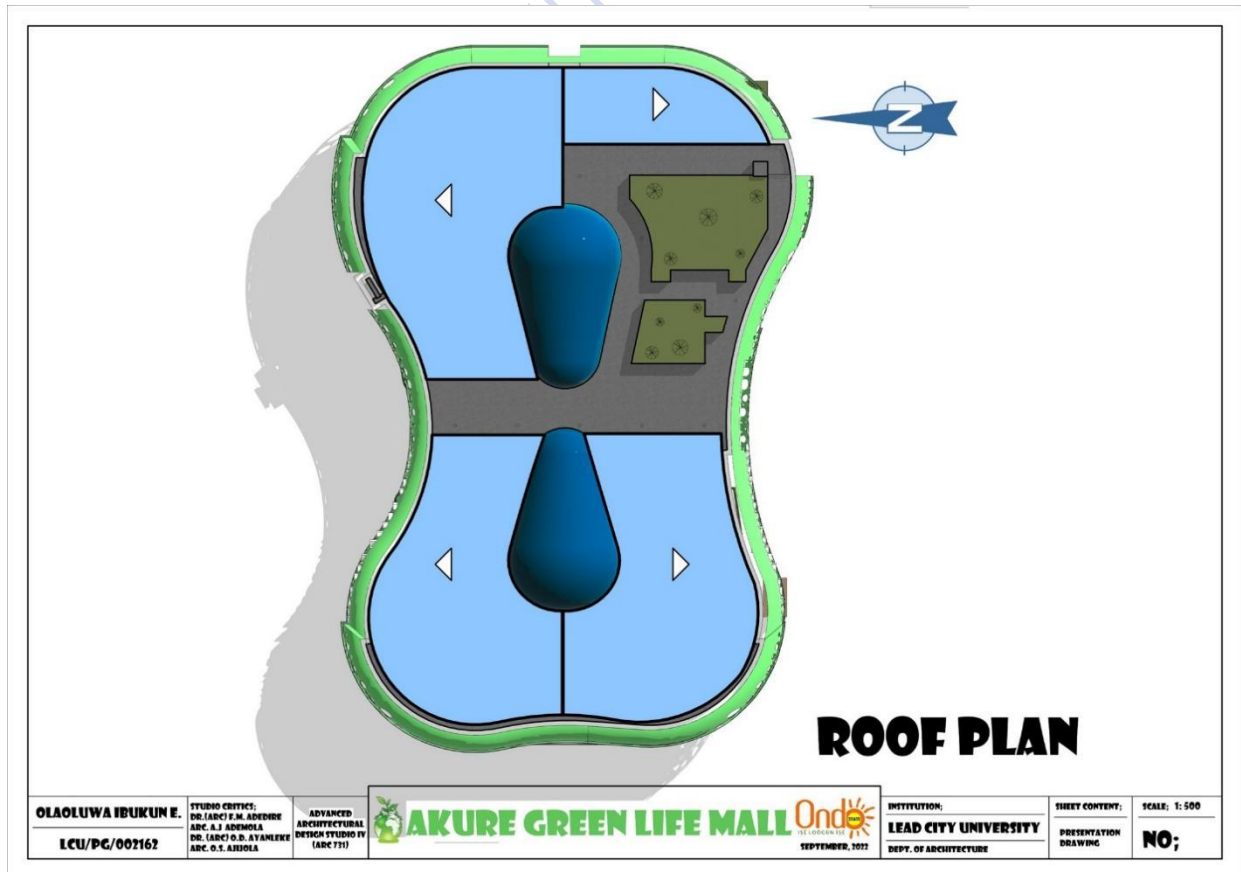
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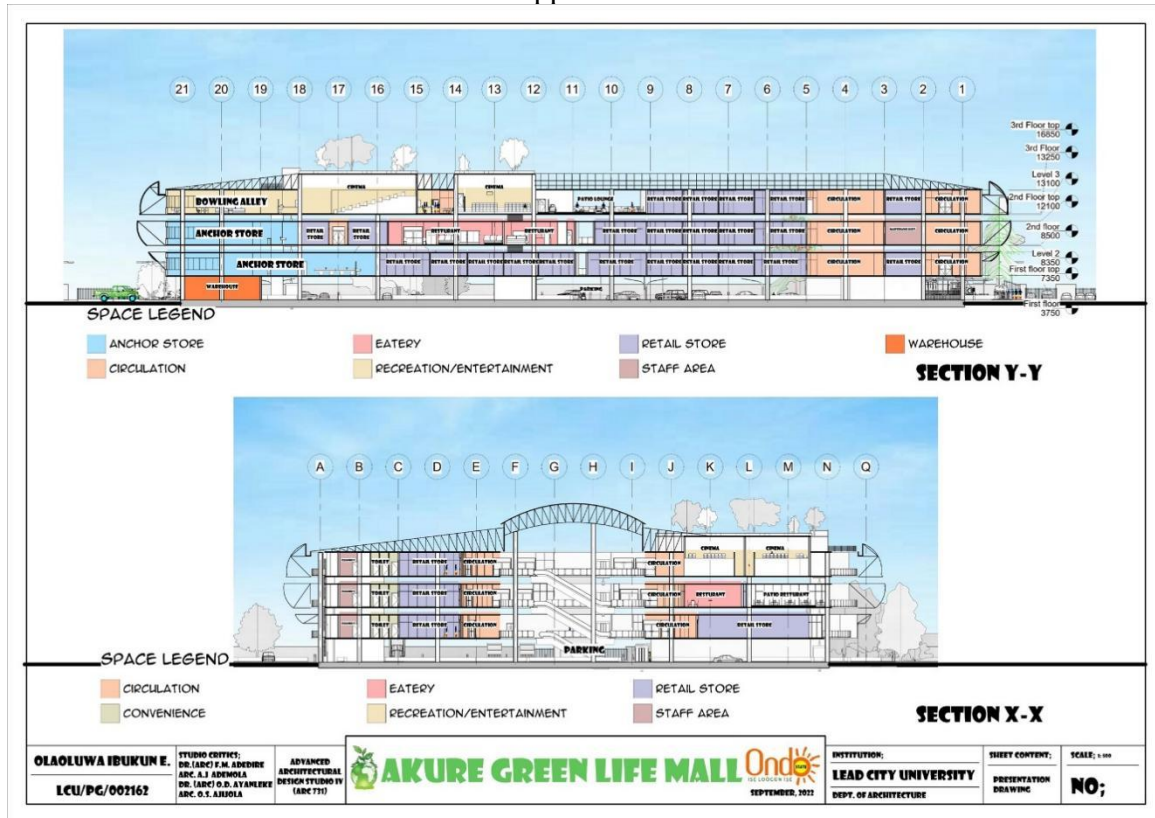
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Appendix 5



Appendix 6



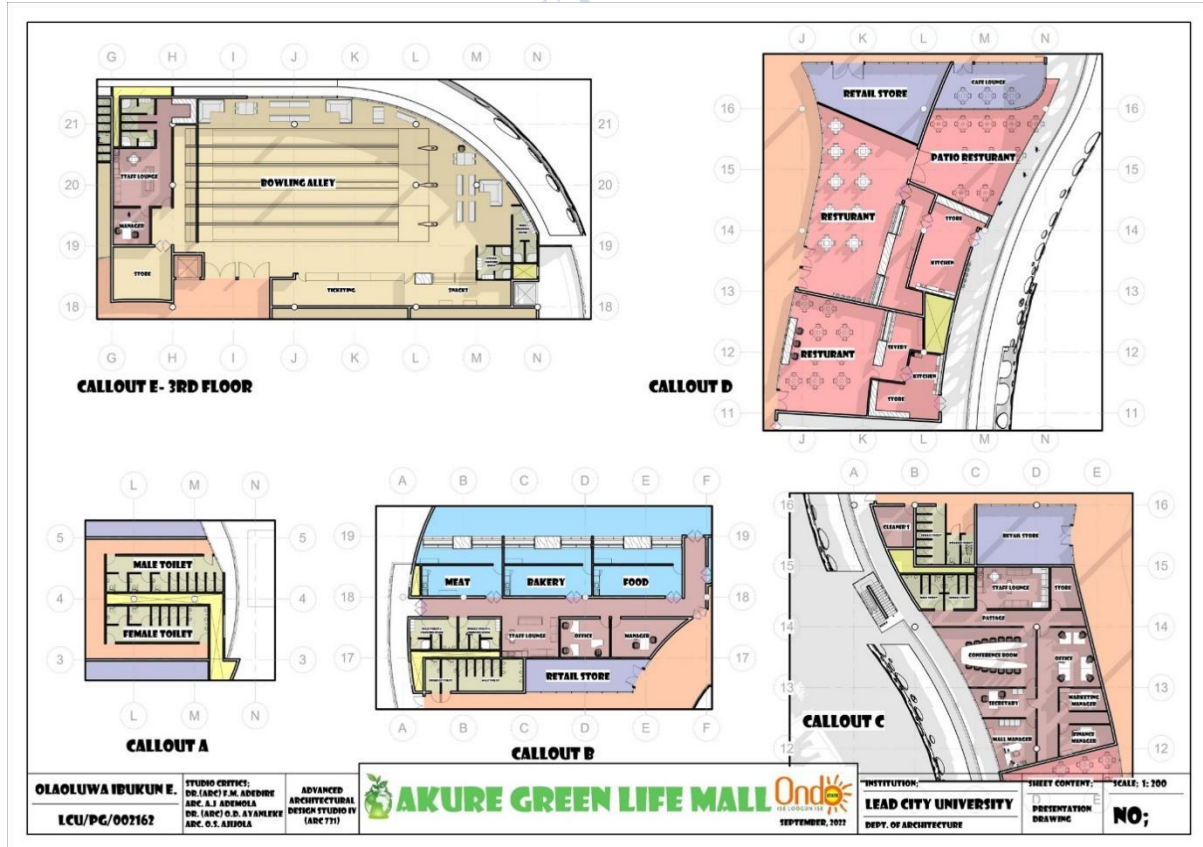
Appendix 7



Appendix 8



Appendix 9



Appendix 10



OLAOLUWA IBUKUN E.
LCU/PG/001162

ADVANCED ARCHITECTURAL
DESIGN STUDIO IV



AKURE GREEN LIFE MALL

Ondu
121 KODUN 151
AUGUST, 2022

LECTURERS: DR. FUMOLAYO ADEDIRI
ARC. ADEMOLA DR. AYANLEKE

SCALE:
NO;

Appendix 11



OLAOLUWA IBUKUN E.
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ADVANCED ARCHITECTURAL
DESIGN STUDIO IV



AKURE GREEN LIFE MALL

Ondu
121 KODUN 151
AUGUST, 2022

LECTURERS: DR. FUMOLAYO ADEDIRI
ARC. ADEMOLA DR. AYANLEKE

SCALE:
NO;

Appendix 12



OLAOLUWA IBUKUN E. LCU/PG/007162	ADVANCED ARCHITECTURAL DESIGN STUDIO IV	 AKURE GREEN LIFE MALL  Ondo THE GREEN STATE AUGUST, 2022	LECTURERS: DR. FUMOLAYO ADEDIRE ARC. ADEMOLA DR. AYANLEKE SCALE: NO:
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Appendix 13



OLAOLUWA IBUKUN E. LCU/PG/007162	ADVANCED ARCHITECTURAL DESIGN STUDIO IV	 AKURE GREEN LIFE MALL  Ondo THE GREEN STATE AUGUST, 2022	LECTURERS: DR. FUMOLAYO ADEDIRE ARC. ADEMOLA DR. AYANLEKE SCALE: NO:
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Appendix 14



OLAOLUWA IBUKUN E.
LEU/PG/002162

ADVANCED ARCHITECTURAL
DESIGN STUDIO IV



AKURE GREEN LIFE MALL

Ondu
THE VISION IS
AUGUST, 2022

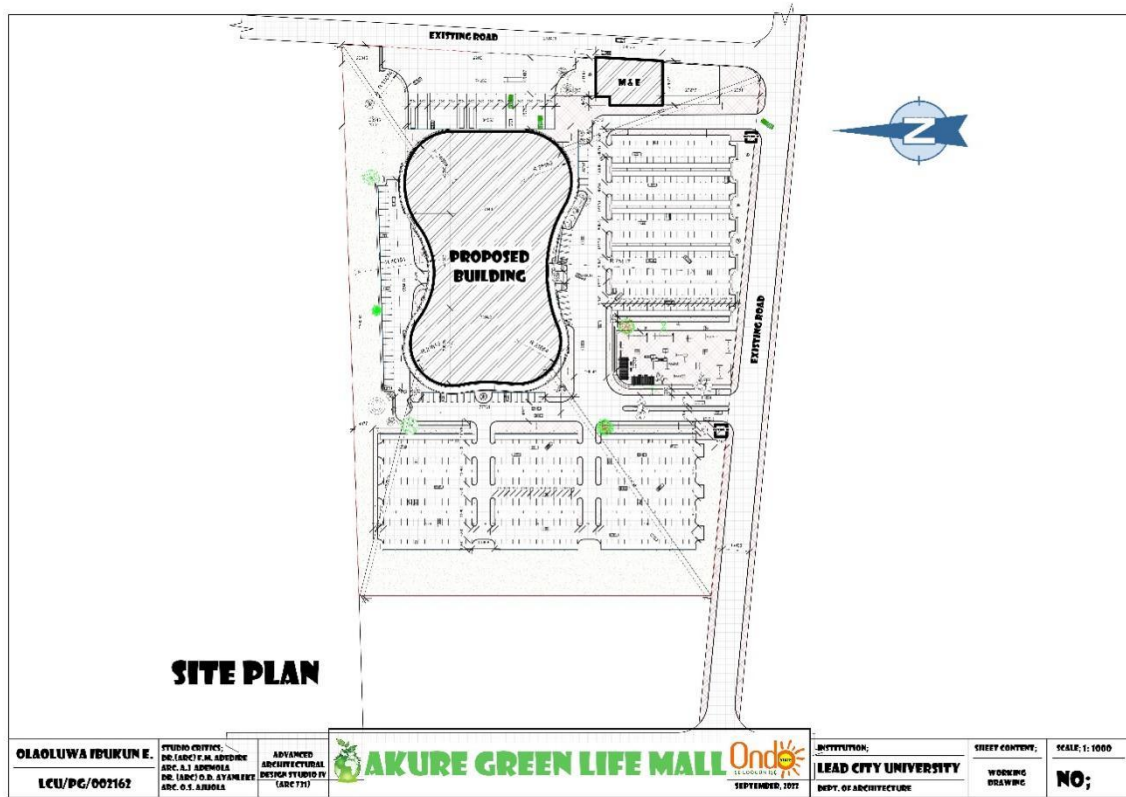
LECTURERS; DR. FUMOLAYO ADEDIRE
ARC. ADEMOLA DR. AYANLEKE

SCALE;
NO;

Appendix 15

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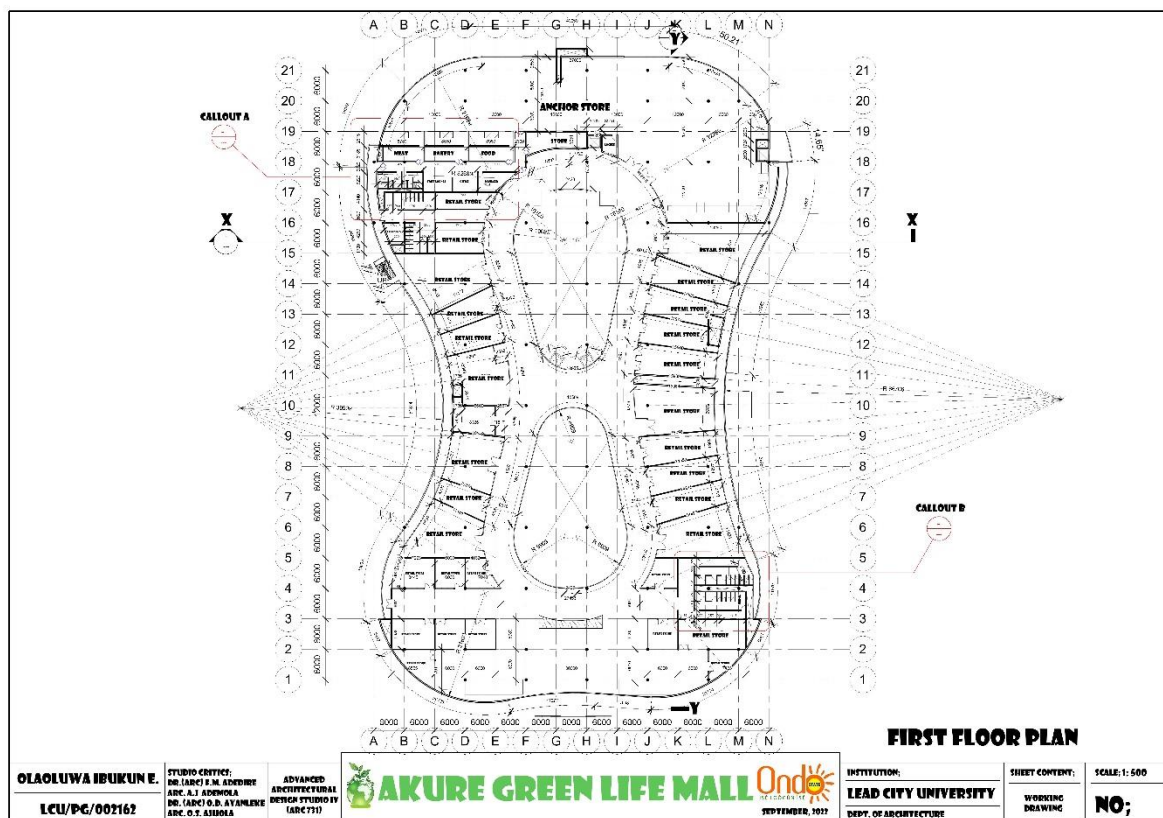
Appendix 2; Working Drawing



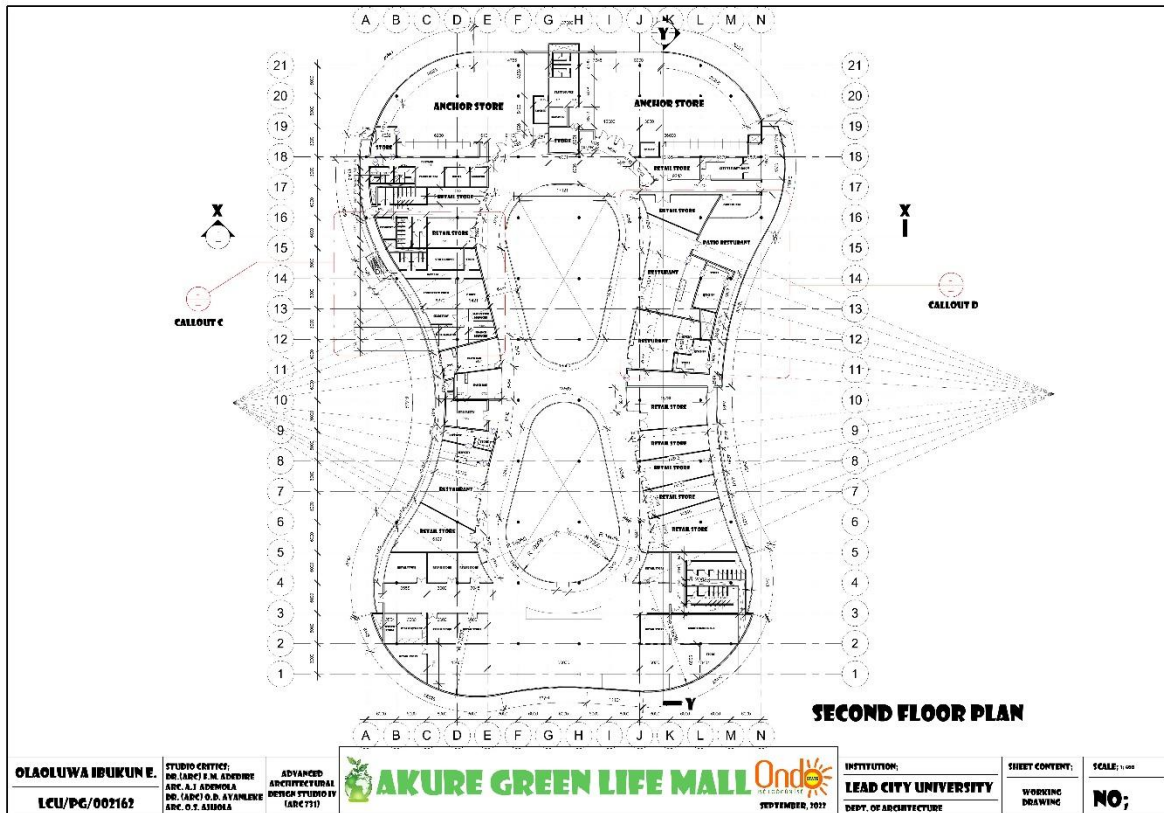
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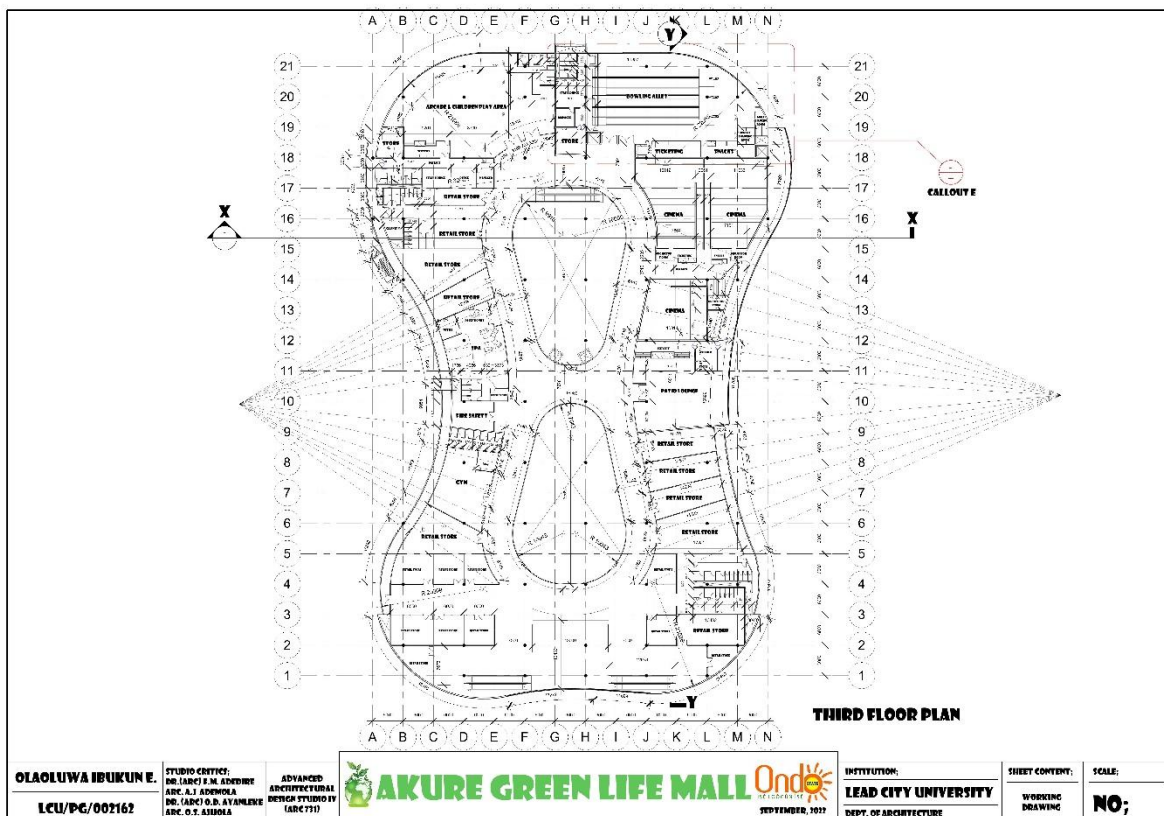
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Appendix 18



Appendix 19



Appendix 20

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University Compliance Form

This is to certify that this thesis by Ibukun Emmanuel OLAOLUWA with matriculation number LCU/PG/002162 in the Department of Architecture, Faculty of Environmental Design and Management, Lead City University, Ibadan is in full compliance with the approval of the University's format and style.

Signature

Date

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