EVALUATION OF SECURITY MEASURES, IN THE DESIGN OF A PUBLIC BOARDING SCHOOL IN FUNTUA, KASTINA STATE.

BY

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Mtech/SET/2019/9645

DEPARTMENT OF ARCHITECTURE

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

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A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY IN ARCHITECTURE

August, 2023

DECLARATION

I hereby declare that this thesis titled: **Evaluation of Security Measures in the Design of a Public Boarding School in Funtua, Kastina State,** is a collection of my original research work and has not been presented for any other degree anywhere. Information from other source (published or unpublished) has been duly acknowledged.

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CERTIFICATION

The Thesis titled: **Evaluation of Security Measures in the Design of a Public Boarding School in Funtua, Kastina State,** by: Momoh ThankGod (MTECH/SET/2019/9645) meets the regulations governing the award of the degree of (MTECH) of the Federal University of Technology, Minna and it is approved for its contribution to scientific knowledge and literary presentation.

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DEDICATION

This work is dedicated to the all loving God for the abilities he has bestowed in me, my loving parents and siblings for their prayers, encouragement and support and also to my supervisor for the effort inputted throughout the entire project.

ACKNOWLEDGEMENT

I am deeply indebted to God Almighty whose hand of help was available at every point to ensure that this thesis is a success. Special thanks go to my wonderful supervisor, Dr C.Y. Makun, for the constructive criticism and counsel which has led to the success of this thesis. Special thanks goes to my parents, Mr. and Mrs. Momoh and my siblings for their prayers, moral and financial support throughout my educational endeavour and also special appreciation goes to all the lecturers of the Department of Architecture, Federal University of Technology Minna, for their individual and collective mentorship throughout my years of studies. Also, special thanks goes to my friends who have contributed in every possible way and every one of my course mates, who in one way or the other inputted and helped in the realization of this thesis.

ABSTRACT

Over the years, there have been a global increase in terrorist attacks, Nigeria as a country has had its own fair share of terrorism attacks ranging from kidnapping to terrorism especially in the northern part of the country, which includes recent waves of adoptions and kidnapping in the north east part of the country. Hence, Professionals are saddled with the responsibility of creating safe learning environments for students. The aim of this study is to evaluate the various security measures which can be applied in the design of a public boarding school in Kastina State, which is located in the Northern Nigeria. To create a safe and conducive learning space for students the various security strategies must be adopted in designing the school. Qualitative research and a descriptive research design approach was adopted in the study, which involves the evaluation of some of the existing public boarding school, six public boarding were selected, four from the case studied sampled are located in the northern part of the country and two foreign schools. Evaluation was done through the use of various security measures indicators and the information gotten was evaluated through the use of Microsoft excel analysis software. Findings shows that most public boarding schools are not designed putting into consideration the various security measures as a vital emphasis in designing the schools, this study concludes that most of the public schools are neglected in terms of security and the need for a secure space cannot be overemphasized. Therefore the research recommends that Creating a safe and secure environment for public learning can be achieved by firstly, locating the schools in conducive environments which should be close to security forces and also located in major part of the cities not out sketch of the cities, also reducing the number of entry and exit points into the public boarding school, and also proper adoption both passive and active security strategies throughout the school will by far go a long way in creating a space learning space for public boarding school students.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

The concept of security is an all-encompassing condition in which people and communities live in freedom, safety and peace, and generally participate fully in the administration of their nation, enjoy the protection of fundamental rights, have access to resources and basic necessities of life, and inhabit an environment which is not detrimental to their health and well-being. This description revealed that security embraces all aspect of societal prospects and human endeavours geared towards promoting freedom and safety of people and their properties. In this sense, the focus on people, their values and properties are aspects of security that specifically deal with the issues of personal and physical security.

Kidnapping in secondary schools has increased in recent times, School as a social organization is singled out for attacks by terrorists worldwide, we have examples like in 1874 around 17th century as child abduction in Britain when the kids of the rich families were been abducted for “ransom while asleep ” (Tzanelli, 2009). Also, Nigeria in recent times especially in the north-west region of the country there are over five hundred reported cases of students adoption by bandits, most times attacks are indicative of “targeted violence” aimed at educational institutions, most times by rebel or terrorist groups with a view to sending strong messages to the state authorities *(*Mohammed *et al*., 2016). According to Applebury (2018), providing proper school security and keeping schools safe allows children to look forward to being in an encouraging environment that promotes social and creative learning. When their basic safety needs aren't met, children are at risk for not feeling comfortable at school and may stop showing up, or they may

remain on edge throughout the day. Promoting school safety creates an open space for kids to explore, learn and grow. The case of the Chibok girls, the abducted Dapchi girls, the 300 students from the Government Girls Science Secondary School in Jangebe, Zamfara state and the more recent on case of the abduction of school children in the kagara district of Niger by an armed gang who stormed the government secondary school this is an indicator that points to the fact that other states are also encountering the same security challenges

1.2 Statement of the Research Problem

According to Aly *et al*. (2021), in 2014, the small non-descript town of Chibok in Borno State in northeast Nigeria became notorious worldwide after 276 girls were abducted from a public secondary school, Subsequently in the followings years, from 2015 to 2022 there have been serious cases of student adoptions predominantly in the northern part of the country which have sparked reactions worldwide therefore evidences show that most public boarding schools in Nigeria were not designed with proper architectural measures in mind, which in turn affects the total safety of the students The abduction of the Chibok girls, as they became known, sparked a national and international campaign calling for their return, with one hundred and one girls still missing, the Bring Back Our Girls campaign continues to organize daily demonstrations in Nigeria's capital.

Security is no longer meant for the armed agencies alone but the society at large. In the last decade attacks has been made on public boarding secondary schools, predominately in the northern part of the country. So it is on this note that hands most be put together to tackle insecurity in our educational sector.

1.3 Aim and Objectives of the Study

1.3.1 Aim of the study

The study is aimed at evaluating the various security measures in the design of public boarding secondary school with the view to creating a safe learning space for students.

1.3.2 Objectives of the study

i. To identify architectural design features that promotes security in buildings.

ii. To evaluate the various security measures that can be adopted in public boarding secondary schools.

iii. To Propose an appropriate design that integrate all the various security measures to in the design of boarding secondary school as well as explosions and other forms of attack.

1.4 Justification of Study

The need for provision of security measures has globally been identified. The benefits of security cannot be over emphasized. security measures in government schools is very poor as the absence or less implementation of security measures, this study will further enhance building practitioners with the right security tool to counter insecurity and also makes the parents, teachers and students feel insecure which in turn affect their well-being and academic performance, as a result of all these, creating a well secured environment is the only solution to counter all the problems listed above. This research was embarked upon to create such opportunities in public boarding schools. In funtua, Kastina state by providing a healthy and aesthetically pleasing environment for learning.

1.5 Scope of Study

This study is focused on security measures to be taken in public boarding schools. As the recent insecurity problem as created fear in the heart of the students, teachers and parents. This may reduce the number of students applying for public boarding schools if not properly tackled. This study therefore focuses on investigating all the possibilities of limiting the effects of insecurity and the activities of its perpetrators. This research work explores the various measures of safety and security and identify those that can be applied to the design of a public boarding school. This thesis also involves the design of the needed facilities for the design of a public boarding school.

1.6 Limitations of Study

It is of difficult task in assessing several facilities related to the research due to proximity, time constraint and financial inadequacy which were challenges in gathering enough data to enhance study and evaluation of existing situations. The availability of research data was hampered as respondents refused to provide detailed security report on the basis of lack of trust and fear. Taking of photographs was also banned as a security control measure in places visited for this research making it very difficult.

1.7 Study Area

Funtua is a local government area in katsina state. Its headquarters is in the town of funtua on the A126 highway. Funtua lies on the latitude and longitude 11°32’n and 7°19’e respectively. The city has an average of 32°c and humidity of 44%. Funtua has an area of 448km² and a population of (420,110). The inhabitants of the town are predominantly Hausa, Yoruba, Igbo and Fulani by tribe. Funtua has a conducive weather condition, the city has an average temperature of 32°c and humidity of 44%.

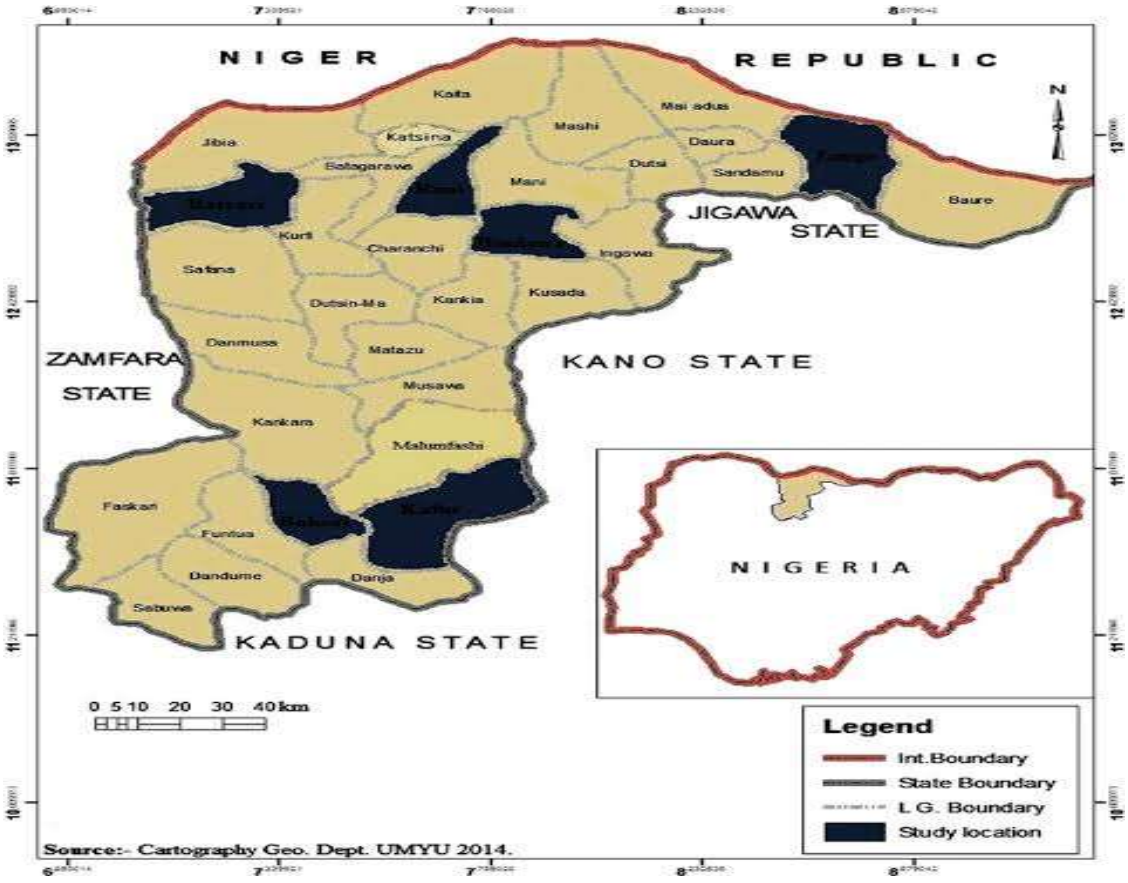

Figure 1.1: Map of Kastina State showing the various local Governments

Source: Kastina State Ministry of Lands and Survey (2023).

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 General Overview

A school is an educational institution designed for teaching and learning, it takes place between teachers and students and therefore it should be built putting into consideration security measures for the teachers and students. According to Rogers (2009), Security can broadly be defined as a means of providing effective levels of protection against pure risk. It is a process used to create a relatively crime free area. The term 'security' can be defined as the as protection from danger, attack and theft it can also be defined as the conscious resistance from harm or attack. Any measure therefore targeted at safeguarding life or property is referred to as security.

The aim of security is to assess the vulnerability to risk and thereafter to employ techniques and measures in order to reduce that vulnerability to reasonable level. Security will therefore assist in creating a stable, fairly predictable environment in which individuals may move freely with reduced or without any disturbance or injury (Lambaard and Kole, 2008). It can be likened to the efforts which are to be made to protect the environment where students learn and teachers teach in a warm and welcoming environment which will be free from intimidation and fear of violence (Henry, 2000). An effective way of ensuring that there is safety and security of the school plant was suggested by the Warsaw Community Schools Bylaws and Policies (Ike, 2015). The policies stated that the school board should provide notice to all students; the public and its employees of the potential of video surveillance and electronic monitoring in order to protect corporation property that promote security and health, welfare and safety of staff and visitors. Also, it stated that the supervisors should develop and supervise a

programme for the security of the entire students, staff, visitors, school grounds, school equipment and vehicles in compliance with statue and rules of the state (Ike, 2015). There is a wide range of physical security measures that can be put in practice to ensure security in female schools. They can be divided into categories, consisting of the outside perimeter measure, inner middle perimeter measure and internal measures (Lamboard and Kole, 2008). The outside perimeter measures are those measures that can be found outside the school building normally the perimeter of the premises such as signs, fences and other barriers, lighting, alarms and patrols measures used within the boundaries of the facility and can include fence and other barriers, alarms, light, CCTV external cameras, warning signs, doors, lock, burglar proofing on windows, security staff and access control system. Lastly, there are the internal physical security measures which are the ones that can be found within building such as alarms, CCTV cameras, turnstiles, windows and door bars, locks, safes, vaults protective lighting and other barriers (Ike, 2015).

To enhance the security in a school compound, there is need to have one entrance to the school building for proper monitoring of who enters or leaves the school compound. Ideally, this entrance does not grant immediate access to the buildings but will rather require passage through of a reception window, glass wall, or electronic access system (Ken, 2008). Emergency services must be granted quick access to and from the building and signs referring students, staff and visitors to the monitored unlocked entrance should be clearly visible (Sprague and walker, 2005). For proper school security, there is need for a communication device in the school. This provides easy and immediate facilitation of communication among faculties, administrators and school bus driver. According to Sprague and walker (2005), every room within a school building should provide immediate notification and contact capabilities in the event of an isolated or school-wide.

There should be a public address system which should have the capacity to reach every individual school member regardless of their location. Shannon theory conducted a study on school security practices their consequences on students and climate. The researcher observed that many public secondary schools do not have safety and security devices needed to keep school safe. Shannon found out that schools that have safety and security devices perform better in their academics than in the schools where few of the devices were found. Students in the schools where few of the security devices were found were more security conscious than student in the schools where they were not found at all. Similarly, a study was conducted by Nompumelelo (2010), on exploration and promotion of safety in schools. The purpose of the study was to discover security prevention strategies for handling safety and security threats in the female public secondary schools.

2.2 Concept of Terrorism

The word terrorism can be traced back to the French Revolution's Reign of Terror. terror is a Latin word translated 'terrere', meaning "frighten" or "panic." the French suffixisme used to complete terrorism means "to practice", it together means "causing panic" or "causing the fright." in other words mean fear, panic, and anxiety. Terrorism is a word used to describe violence or the threat of violence aimed at creating an atmosphere of panic to the general public or a group of people. Although, different groups have surfaced at different points in history of Nigeria in various forms, scope and the ways they operate, none is quite comparable with Boko Haram which is believed to be Abubakar Shekau group existing in the Sambisa forest, Mandara/Gwoza Mountains and some parts of Cameroon (Adagba *et al*., 2014).

Terrorism can also be described as an anxious trouble making method of taking violent action, used by clandestine persons, groups or state actors, for offensive reasons, this is a key factor of insecurity. Terrorism can also be seen as the use of force or violence against people or property in violation of the criminal laws for purposes of intimidation, coercion, or ransom, (USA, FBI). Terrorism is broadly divided into two categories namely;

Domestic (intra- territorial) terrorism and International terrorism.

i. Domestic (Intra- territorial) Terrorism – This category of terrorism is targeted on facilities or populations of a given country or region without the intervention of foreigners. It is perpetrated by indigenes of a given locality and the people or properties targeted are also of the same region.

ii. International Terrorism – This category of terrorism is targeted on facilities or populations of a given country or region involving the intervention of foreigners. This category of terrorist activities is inter regional and occurs between nations.

The difference between domestic (intra-territorial) and international terrorism is not necessarily defined by the geographical location the terrorist act takes place but by the origin of perpetrators. Terrorists use the following to carry out their assault on targets;

Conventional bomb, Biological agent, Chemical agent, Biological agent, Nuclear bomb, Radiological agent, Arson/incendiary attack, Armed attack, Arson/incendiary attack, Intentional hazardous materials release, Assaults on the infrastructure and electronic information systems. All of which are aimed at affecting human life, health and safety.

2.3 Kidnapping as a Form of Terrorism

Kidnapping is the offspring of terrorism and social vices that spread all over the world. It is an endemic disease that cut-across all the state in Nigeria. The word Kidnap was derived from two English words "Kid" meaning (Infant) and "Nap" meaning (Sleep). Literarily, it is a process of abduction people as hostage for ransom payment. Historically, kidnapping was traceable to 1874 around 17th century as child abduction in Britain when the kids of the rich families were been abducted for "ransom while asleep (nap)" (Tzanelli, 2009). Kidnapping is a notorious and nefarious behaviour orchestrated by criminal with the mind-set of abducting and hostage students for ransom package. Student kidnapping is a nefarious, villainous, terrible and seasonal crime that portend security challenges in Nigeria. According to Turner (2008), the phenomenon began in the Niger Delta region as a freedom fight by militants protesting the degradation of their environment by oil industry activities. According to Demola (2011), it soon turned into a money making avenue through kidnapping of expatriate oil workers for huge ransoms. Since then, kidnapping has become a daily occurrence and it has spread throughout Nigeria with focus on the north east. Many Youths have taken to the business of kidnapping with some godfathers working behind the scene. People no longer sleep with their two eyes closed. Bello (2017), argued that the term national security is very broad to give a precise definition but attempted it explanation as the concern of government about the stability and safety of a state that is being carried out using policies, strategies, military strength and whatever available within the context of law.

The recent increasing crime of kidnapping has created serious security challenges for Niger state as it affects secondary schools and create negative image for the state. The security of the Niger state secondary schools is at stake with series of incidence of

kidnapping activities in many parts of the state. Kidnapping of student have become a bullish market like armed robbery business. The rate of such menace is on the geometric progression while the security tactics of combating it is on arithmetic progression. Kidnapping is a social vice that bedevilled secondary school students in Niger state. Our students have been the victims of such menace. Niger state has a palpable security challenge. Also, the porosity of the Nigerian borders has made it possible for unwarranted influx of migrants from neighbouring countries such as Republic of Niger, Chad and Republic of Benin (Olanisakin, 2017). The kidnap of secondary school students has become rampant and the high incidence of insecurity on student kidnapping have portends danger for the peace, progress and development and kidnapping in the state. Kidnapping refers to criminal offence which involves abducting a person against his freedom and subjugating him to the threat of murder or assassination and requesting for ransom before his release. Kidnapping is arguably one of the newest and latest threats. It is partly attributed to the growing unemployment syndrome in the polity and bad governance (Pius, 2018).

It is a criminal and traumatic behaviour orchestrated by gangsters with the mind-set of abducting human being for ransom. Abraham (2010), Define kidnapping as an act of seizing, taking away and keeping a person in custody either by force or fraud. However, it includes snatching and seizing of a person in order to collect a ransom in return or settle some scores of disagreement among people. Goldberg (2000), Argues that kidnapping is a criminal act involving seizure, confinement, abduction, subjection, forcefulness, acts of threats, acts of terror and servitude. Dode (2007), Saw kidnapping as a process of forcefully abducting a person or group of persons perceived to be the reasons behind the injustice suffered by another group. It is “a low-cost, high-yield terror tactics”. This was

the initial case in the Niger Delta region of Nigeria. Kidnapping as robbery of the highest rank. According to them, it is an organized and systematic robbery which is not as deadly as armed-robbery, but more profitable than the former. The profitability has encouraged those that indulged in it to carry on with the act although there is a law prohibiting it. In criminal law, kidnapping is defined as taking away of a person by force, threat or deceit with intent to cause him/her to be detained against his or her will (Asuquo, 2008 cited in Inyang and Abraham, 2014). Whereas Nwaorah (2009), Viewed kidnapping as an act of an angry man who wants to take any person of value hostage, and who could be rescued by loved ones. In most cases, victims are often released after payment of ransom. According, to Ogabido (2009), "kidnapping" means to abduct, capture, carry off, remove or steal away a person. Ngwama (2014), Defined kidnapping as false imprisonment in the sense that it involves the illegal confinement of individuals against his or her own will by another individual in such a way as to violate the confined individual's right to free from the restraint of movement. According to Uzorma and Nwanegbo-Ben (2014), kidnapping is the act of seizing and detaining or carrying away a person by unlawful force or by fraud, and often with a demand for ransom However, Ottuh and Aituf (2014), States that kidnapping is the transportation of a person against the person's will usually to confine the person in false imprisonment without legal.

2.4 Record of Kidnaping Nigeria

Nigeria as a country is not exempted from the global terrorism especially in this twenty first century with the northern part of the country coming under severe attacks from the Boko Haram sect. The disturbing issue with these kinds of attacks is how they are in almost all cases happened under the eyes of security. These activities of herdsmen no

doubt pose more threats than any other security challenge in the country at the moment (Olaniyan and Yahaya, 2016).

Whose activities though paralyzed today owing to the amnesty agreement between the sect and the federal government of Nigeria, have their name labelled in the record books of terrorist activities in the country. The recent kidnap cases involving kidnap of students from their dormitories as quell up fear and insecurities in the heart of many. Additionally, there are also security challenges posed by different kinds of violent crimes, ethnic or tribal and religious conflicts, trans-border criminal activities, election violence, conflicts as a result of resource locations, control and allocation and cyber-crime. All these security challenges no doubt pose threats to the social, economic and political stability of Nigeria (Danbazzau, 2014).

Below is a summary of Nigeria's insurgency history in the 21st century.

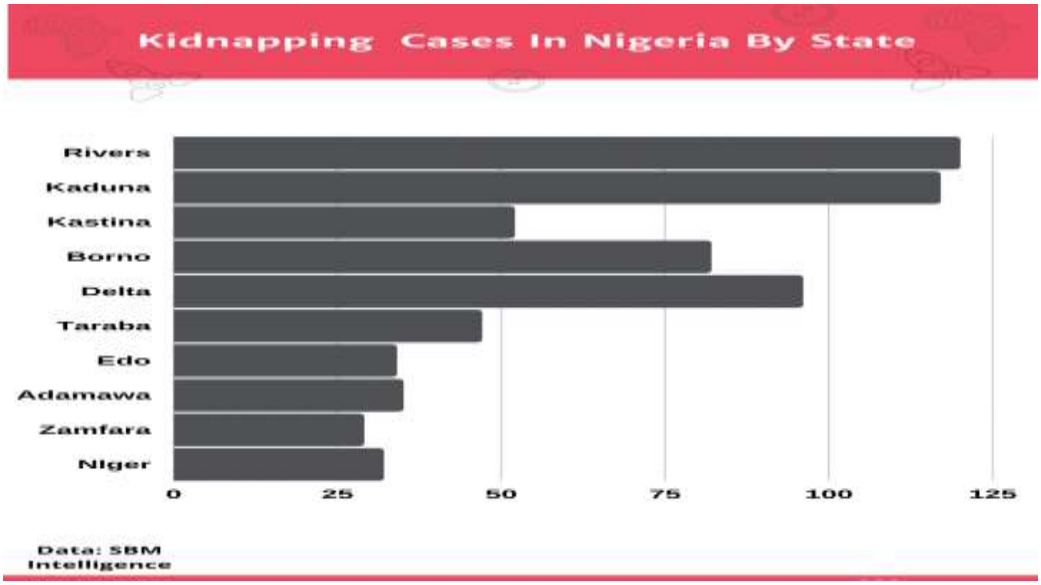

Figure 2.1**:** chart showing the recorded cases of Kidnap.

Source: SBM Intelligence.

2.5 Security in Architecture

The sole purpose of architecture is preparation of comfort, serenity and relaxation for occupants and can be considered as a major factor in a feeling of safety and security and also there are several factors that are effective in this case such as behavioural, environmental, social, textural, and cultural factors. The concept of site "zones" is introduced here as the framework for this discussion of individual element types. The site security zones, follows the physical organization of a site from the outside (Zone 1) to the inside (Zone 6). Each zone offers opportunities to increase site security and enhance site appearance and function.

2.6 Discussion on Safety and Security Measures

Nunes-Vaz *et al.* (2011), describes security measures or controls as a physical, psychological, procedural, electronic, or other structure that executes or contributes to one or more security functions by dividing physical space into zones. Most safety and detection measures, according to the entire building design guide (WBDG), have to do with a balance of organizational, mechanical, and physical safety approaches. A primarily operational approach, for example, would emphasize the round-the-clock deployment of guards; a primarily electronic approach would emphasize video monitoring and warning sirens; and a primarily physical approach would emphasize closed doors and vehicle barriers to secure a given facility from unwelcome intruders. It is critical to implement certain specific security measures outside and inside the facility in order to minimize danger. Trees, thick plantings, heavy structures such as huge sculptural objects, giant boulders, and concrete shapes could be used as defence precautions.

Passive measures for a working protection infrastructure, according to the National Capital Planning Commission (2002), are a permanent protective function provided by both the location and the structure that necessitates the effective application of architecture and engineering to increase protection by removing potential threats. According to Randall (2003), protective precautions can be addressed using words like perimeter and exterior security, entrance security, interior security, security preparation, and crime reduction by urban design (CPTED). His steps included both passive and active methods, as well as the types of plants to be used during the design process. Parking areas and monitors, CCTV surveillance, lighting with emergency backup, and physical barriers are all part of perimeter and exterior protection. Perimeter protection is the most important first line of defence in a facility's physical security strategy (Clifton and David, 2017). Intrusion warning systems, upgrades to existing life protection requirements, video mail, individual and parcel inspection, entry control with CCTV and electronic door hits, and high-security locks are all examples of entry security. According to Brown, (1995) property crimes has been less due to the impact of CCTV. Employee ID, visitor control, control access to services, provide emergency power to vital systems, and determine the location of day-care centres are all handled by interior protection.

Zahner (2017), stressed the importance of building for protection without losing aesthetics. He clarified that landscaping sculpture, secondary structures, and camouflage barriers could all be used to do this. Security is so important in building design that it reminds us why we began building in the first place; security is so important in building design that it should be taken seriously. Passive security is about using good design strategy to incorporate a layer of protection, secrecy, and security, rather than existing as a product to be defined. According to Zahner (2017), the most effective passive

interventions are: Landscape art should be used to protect structures. Protection and artistic perforation are added by secondary building annexes, and lastly Art can be used to mask obstacles. Perforated metal with designs and artwork will include a lot of security details that aren't obvious. People are less likely to note that a wall or divider is being used to block entry when it is rendered artistically, and are more likely to believe that it has a primary artistic purpose. Physical obstacles are so important in general that they explain why natural geological characteristics like rivers, mountains, and thick forest were once seen as barriers between humans and the outside world (Stuart, 2004). Soft landscaping can also be used to soften, reinforce, and give a pleasing effect to perimeter fences and other hard security elements (FEMA, 2007). Thorny hedges and tall hedge rows can be used as a perimeter fence in these soft environments. Security techniques such as proper identification of employees at tourist location, protective barriers, surveillance and alarm system are essential as a remedy to security threats.

Security measures mainly passive measures are static bollards, elevated concrete planters, walls and trees of ample girth, standoff zone distance, integrated in the architecture from the stage of inception, according to the Physical Security Design Manual (2007) for veteran's affairs facilities on a practical guide for security, key security measures have been deduced and listed for the purpose of the intended study. Since the building's shell is also considered the security perimeter, the number of openings should be reduced to those required for entry, ventilation, and natural light. All doors, windows, and roof lights must be secured during the quiet hours to reduce the chance of significant volume failure and to withstand a concerted physical assault for as long as it takes for responding forces to arrive. The presence of pipes, ledges, and buttresses may provide an attacker access to windows, roof lights, and doors. Emergency escape routes that are not guarded internally

during closed hours or properly covered during open hours will often make access/exit simpler. Good design will also reduce the likelihood of criminals hiding inside premises during open hours in order to sneak in after closing time. By eliminating empty rooms, dead ends, vulnerable ducts, and panels where anyone might conceal threats to the collections from theft, threats to the collections from theft may be limited (Shehu *et al*., 2017).

A protected division between areas that are open to the public and those that are inaccessible to the public must be made, with an intruder detection device planned accordingly. Paying attention to the outside will help you avoid hiding places like vegetation, porches, heavily recessed doors, and neighbouring houses. According to the whole building design guide (WBDG), it is possible to strike a balance between security and safety priorities and the facilities other design requirements and needs. Establishing an organized planning process in which all members of the design team are aware of each other's objectives will help overcome these obstacles and contribute to the implementation of a solution that meets all of the criteria. Early in the design process, understanding the interrelationships with the other WBDG design goals such as Sustainability, Aesthetics, Cost-Effectiveness, Historic Preservation, Accessibility, Functionality / Operationally, and Productivity is critical to addressing the challenges that often arise in the pursuit of a secure and safe building. The most effective and commonly used controls, according to Karam (2015), are linked to two dimensions: "Detectors and Access Control." He also stressed the importance of medical preparedness, guest room security, and emergency preparedness, which he believes has been overlooked in certain cases.

2.6.1 Zoning for security

An application of zoning concept simply entails a proper control of human movement in terms of security. The main idea behind zoning is to allow for visitors, vendors, and others to reach their respective destinations or points without any hindrance and simultaneously prevent them from entering areas where they have no business (Randall, 2003). This can go long way in reducing congestion and also helping in spotting unauthorized persons. According to Nunes-Vaz, *et al.* (2011), Security layers around a sphere may be used to zone for defence, and these layers lead to the installation of a series of controls that can theoretically avoid or completely prevent the dangerous occurrence of a given incident. According to Droge and Hopper (2004), a comprehensive site management scheme considers fundamental principles that determine the security requirement and protect against a range of threat scenarios. Zoning for security is achieved by site security (usage of certain vital elements and factors that helps to restrict space). This can be achieved through setbacks, physical barriers and perforation, and landscaping

i. Set Backs as a Security Measure

Terrorism attacks focus on explosive devices concealed in vehicles near target buildings in around 80% of cases. This is why many site security designs emphasize maintaining a minimal gap between the target building and possible bomb sites, such as a vehicle or a static feature on the premises. This is referred to as a "standoff" or "setback" gap. Setbacks, also called "standoff" zones, are specified distances between a "target" object, such as a house, and the nearest point of attack (Droge and Hopper, 2004).

ii. Physical Barriers and Perforations as a Security Measure

To enforce setbacks, physical barriers are any mixture of built elements that delay or prevent persons or items from approaching a specified "perimeter" area. Barriers range in height from 0.15 to 4.2 meters and can be made up of moveable or permanent components. Some barriers can survive the effect of a moving car, while others can be quickly relocated to meet shifting crowd control requirements (Droge and Hopper, 2004).

iii. Landscape as a Security Measure

Landform protection, water component blend, raised grower, foliage, improvements in cleared area lift, fences, a wide range of road furniture, site materials, and comforts (bollards, kerbs, benches, flagpoles, and booths) can all be used to improve security. This site design features may be used to restrict and monitor pedestrian and vehicular distribution and entry, as well as to prevent unwanted inspection. They should be placed so that they do not obstruct walker access to accessible passageways, disrupt the flow of people on foot at the edge walk, or prevent disaster vehicles from entering.

The use of soft landscape however must be properly positioned and selected ensuring that they do not block important sightlines or create hiding places (Adedayo *et al*., 2017). Their creative application can result in environments that are responsive to the needs of the people who use them, resulting in diverse open spaces brimming with constructive activities. As a passive protection measure, arranging is an incredibly effective tool, especially in the area of buffering the building from a possible threat.

Plate I: Bollard placement as a blockage against vehicle trespassing

Source: Zahner, (2017)

2.6.2 Access control for security

Procedures for blocking, identifying, and/or searching individuals trying to obtain access to a building are known as access controls (Droge and Hopper, 2004). Designing for protection, according to Bulla (2004), is similar to peeling an onion: it is done layer by layer. Mechanical and electronic structures, operating protocols, and natural and architectural features are used to create a sequence of overlapping layers of security defences. They provide the basic foundation of any effective defence infrastructure: deterrent, detection, and delay, as all of these functions together. At any of these layers, access control is a factor in ensuring security and safety. You will reduce the likelihood of crime by limiting entry. True barriers, such as fences, or symbolic barriers, such as low-growing landscaping trees, height changes, or even changing the texture of the sidewalk, can all be used. People entering or exiting a room are driven by the location of doors, exits, walls, landscaping, and lighting. The attractiveness of a low Hawthorn hedge

does not compensate for the debilitating punctures caused by its thorns. As a result, it's a perfect alternative to unsightly barbed wire fencing. Stop trees and shrubs that could serve as scaling aids for the deck or higher story windows (Bashir and Isuwa, 2014).

2.6.3 Crime prevention through environmental design (CPTED)

Professor C. Ray Jeffery invented the term "crime deterrence by environmental design" in 1971, and Architect Oscar Newman built on it in his book "Defensible Space". CPTED can be described as a multi-disciplinary approach towards designing for security (Randall, 2013). It involves designing the built environment in such a way that it reduces the fear of, and opportunity for, disorder and crime. Natural surveillance, natural access control, territorial reinforcement, and maintenance are the four components of CPTED. According to Cozens (2015), a critical look into CPTED can bring into focus the realization of seven key concepts; territoriality, surveillance, image management, activity support, access control, target hardening, and geographical juxtaposition. According to the author, nonviolent crimes like burglary can be deterred by providing adequate illumination, monitoring, and visual access to the location, The CPTED principles are a great collection of tools for preventing antisocial behavior and encouraging community ownership of public spaces. It also gives the impression that outdoor space planners and architects have some control over the final group of potential risks and violent crime. Many of these risks occur outside the building, where site protection architecture principles will prevent and/or mitigate harm while also allowing for the creation of high-quality public spaces (Cozens, 2017).

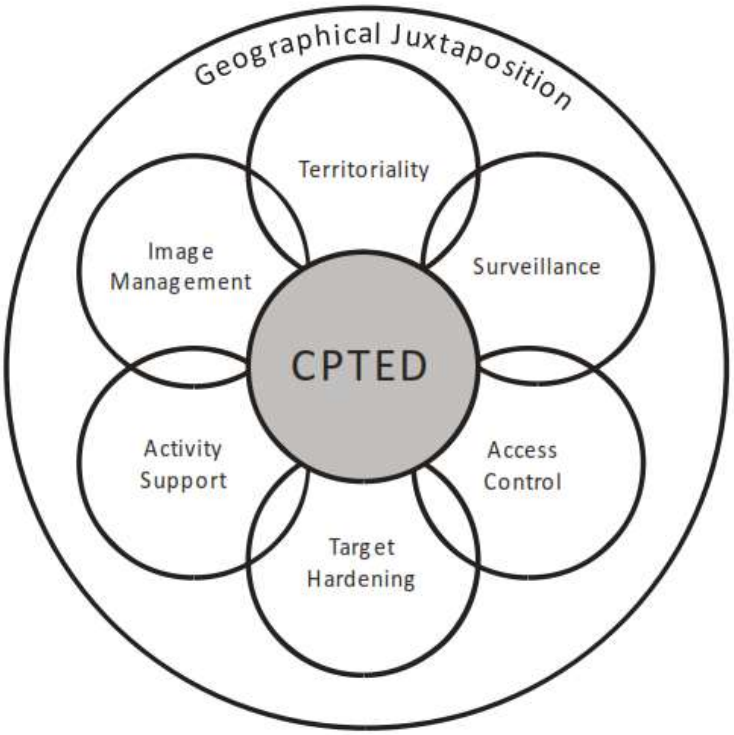

Figure 2.2: Bollard placement as a blockage against vehicle trespassing

Source: Zahner, (2017)

2.6.4 Layered approach to security

A successful security approach can be achieved by an active implementation of multiple geographic layers. Facilities' physical defence necessitates the use of concentric and parallel lines for defences in order to have a gradually increased degree of security whilst maintaining a good standoff gap in the event of attacks (Alexander, 2016). Layered approach to security involves the following;

I. District level

ii. Site level

iii. Threshold level

iv. Asset

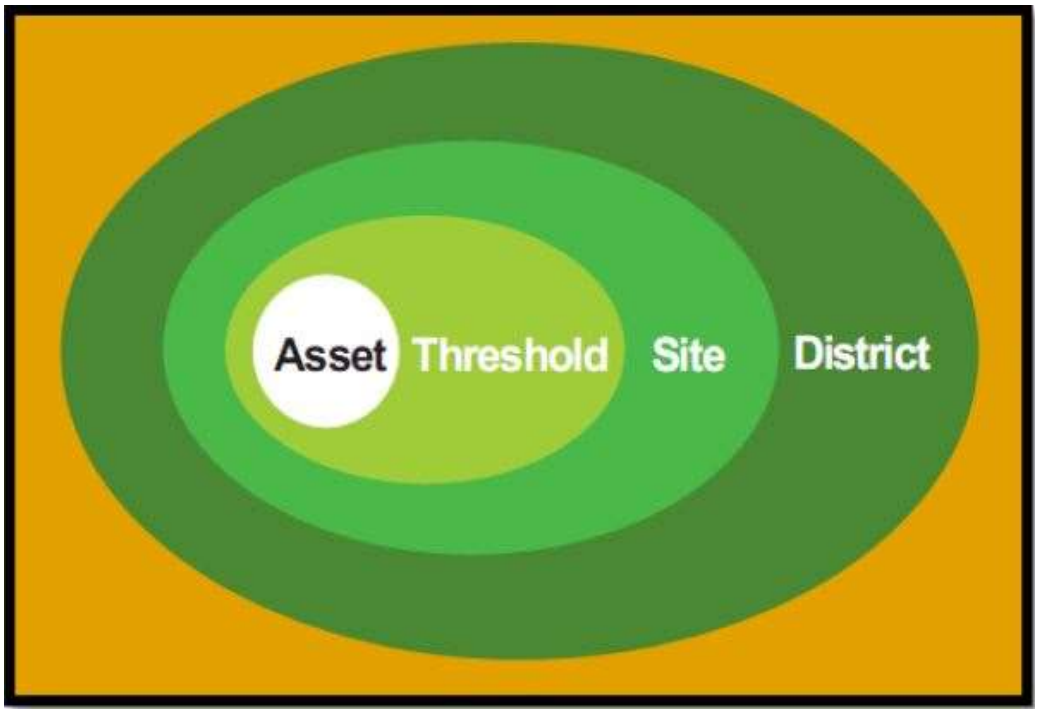

Figure 2.3: Different layers of protection

Source: Centre for the Protection of National Infrastructure (2017).

i. District Level

From the figure above, this refers to the outer level protection and as the name implies, is offered at the district level which must include considerations for a wider site planning, access control and traffic management. The asset is best protected when security is implemented on a wider scale (Centre for the Protection of National Infrastructure, 2017).

ii. Site Level

The site level of protection involves considerations for site planning, traffic management and control of access into the site as well as the physical characteristics of the surrounding area, building types and the nature of activities will be scrutinized as they relate to the

security of the facility to be evaluated. Sometimes, these factors have positive security implications and at other times, it might be negative (National Institute of Building Sciences, 2014). Through effective site planning, vehicle approach could be directed away from the building to reduce impacts from hostile vehicle approach speeds and also maximize stand-off distances through careful site planning.

iii. Threshold

This typically describes the last line of defence before the asset, it is the zone that lies immediately around the asset. It must be designed to prevent and, in some cases, control vehicular access and minimize blast effects in the event of an explosive attack (vehicle borne). Factors such as topography and level changes, fences, walls, hedges, bollards could be employed in the building's landscape design to achieve this. Blast stand-off is also an important consideration at the threshold layer of security.

iv. Asset

This refers to the interior parts of the building. It includes people (staff and users) as well as physical components i.e. building structures, equipment and other sensitive materials.

2.7 Security Measures

This is a universal concept which is therefore categorized into so many components as it relates to various disciples and aspects of daily life. The categories are;

i. Physical security

ii. Political security

iii. Information technology security

iv. Monetary security

v. Food security

vi. Home security

vii. Personal security.

Considering all the aforementioned, home security is the most related to this research. Although terrorism as discussed earlier may be triggered by so many other reasons but its resultant effect on the built environment is the subject of this research and on this, we shall dwell our research.

2.8 Passive Security Measures

This involves space planning, landscaping, lighting to achieve a functional and safe environment and the use of all such design related components not needing mechanical operations (Gallick, 2015). This is a design feature that deters threats and still remains largely invisible to its users. These can be achieved by the use of high fences, barb wires, and bollards, directing traffic using curbs, multiple layers of protection, distant parking and buffer creation.

This type of security measure is economical, most effective and permanent of all protective security measures of building structures, content and its occupants through adequate planning from conceptualization of the design. Passive security measure also integrates functionality into the environment components and furniture without conflict as the architect thinks along with such plans in his preliminary sketch design aside securing the intended properties, it components and furniture (Alimba, 2016).

2.9 Active Security Measures

According to Oscar (1972), Active security measures involve the use of devices and technologies designed to prevent, identify, report and respond to security threats. (Terrence, 2015). Devices such as surveillance systems, motion detectors and alarms are mechanically controlled and used for this purpose. It is a very effective and almost accurate security measure as it is programmed and controlled by computer. It has been in extensive use in Nigeria recently as a result of the fast growing insecurity. It is even becoming necessary in buildings considering the recent terrorism (Rui, 2020).This is an important measure in curbing insecurity challenges but is not independently sufficient considering the level that terrorism has attained and its resultant effects in human casualties, the environment, the economy and loss of properties. This has been made evident in the continuous perpetration of attacks even with the active security devices in place. For security to be effective, a blend of active and passive security measures must be put in place in order to complement themselves.

2.10 Landscape Design as a Passive Security Measure

Whenever we go to the bank we notice the use of passive security measure in their parking design. They make use of heavy curbs and chamfered one-way driveways to deter in and out getaways. When we take a further look at other high pole assets such as government buildings and embassies which employ larger blockades and bollards to prevent vehicles-borne threats. Landscaping is an important aspect of architecture be it a residential building or a commercial building. Landscape should be properly addressed in the site planning as well as the design of the school. Though the use of these types of barricades are often ugly with their purpose self- evident. One way to reduce the visual impact of a bollard is by treating the object as a form of art beautifying the environment and providing

security to the environment. Design palette like the control of landforms, mix of water components, vegetation, changes in rise of cleared regions, fences, bollards, Krebs, seats, flagpoles, booths, an extensive variety of road furniture, site components can be utilized to deliberately give the required level of security. (Pat, 1979).

Site outlined elements can be utilized to limit and control people on foot and vehicular dissemination and access and in addition counteract undesirable observation. They should be precisely situated as not to block walker access to open passageways, disturb the stream of person on foot activity at the edge walk, or avert access by crisis vehicles. Their imaginative use can bring about spaces that are receptive to the necessities of the general population that utilizes them. Arranging accordingly is an extremely proficient instrument as a latent security measure particularly in the zone of buffering the building from a potential risk.

2.11 Securing the Built Environment

The totality of the site must be geared towards prevention of encroachment, unwarranted accessibility and attacks which can be achieved by integrating these security measures to the buildings as kidnap is an ugly and fast rising trend that must be frowned at and curbed by all means. The site plan is a good place to start from. This will be more functional and effective if the architect comprehensively understands man made threats, hazards and methods employed by terrorists during attacks. Counter active measures will therefore be drawn based on this information (Oscar, 1996).

2.12 Other Security Measures to be employed

A combination of passive and active security measures will be put in place in order to complement themselves. They following security measures will be integrated into the design (Rui, 2020).

2.12.1 Access control

This is a way of guaranteeing that users are who they say they are and that they have the Appropriate access to company data. It is used to permit access by authorized personnel to the Building or other secure installation. Electronic access control may allow access using credentials such as: Passcodes, Pins, Key cards, Access badges, Finger prints, Keys, Key fobs, Video verifications (Heba, 2014).

2.12.2 Closed-circuit tv systems.

According to Rui (2020), CCTV systems consist of a number of security cameras connected to a central digital video Recorder (DVR) or computer by cables such as Ethernet cables or via Wi-Fi signal. CCTV images can be transmitted to a remote monitoring facilities for proper analysis. Surveillance provides the information needed to perform the following functions:

i. Measure traffic and environmental conditions.

ii. Make control decisions

iii. Monitor System performance.

Plate II: Showing CCTV (closed circuit) systems

Source: Heba, (2014).

2.12.3 Intruder alarms systems

Today, the project, installation and use of security alarm systems for intrusion prevention is massively present in our own homes and work facilities. A simple intruder alarm system consists of a control panel (with rechargeable battery power backup, and internal or external (Webster, 1961).

Plate III: Showing Intruder Alarm Systems.

Source: Rui, (2020).

2.12.4 Integrated systems

This helps integrate security systems together so that they operate as a unit as it helps reduce Cost. For instance, access control, alarms, sensors and responses can be integrated into one System. This permit greater control, better response and improved flexibility. The system can

Operate across a number of site.

Plate iv: Showing Integrated Systems.

Source: Rui,(2020).

2.12.5 Security assessments

This is useful to assess the needs of an organization and its estate and to determine its weak Points. Advice can then be given on which components are necessary to build an effective System that helps in reducing accidents on the site. As it is important that security solutions Remain up-to-date, reflecting emergency threats and that systems and procedures are tested and re-assessed regularly. A thorough assessment will also take local crime trends into account when devising a solution (Rui,2020).

2.12.6 High fences, spiked Gates with barb wires

Fence is an upright structure used to demarcate, enclose an area and restrict access to a site. Gates are used to control access to a building, spiked gates gives a view to the site which also Aids security. Barb wire is a type of steel fencing wire usually at the top of a fence they are used to prevent Climbing over fences and to secure people and properties.

2.12.7 Armed security patrols

Armed security patrols should be made available in and around the environment so as to ensure the security measures provided are adequately followed (Webster, 1961).

2.12.8 Security personnel

Well trained and experienced security personnel should be employed in order to control, monitor and maintain the security measures that has been put in place.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

To meet the objectives as stated in the chapter one of this research, this work adopts a descriptive research method. A descriptive research method simply involves observing and describing the nature and behaviour of a subject mostly accompanied with an observation or survey tool. Sufficient data was collected and analysed to serve as guidelines throughout the research, for better understanding of this project. Different research methods were employed to gain important and more information about the whole design. Descriptive Survey method was employed for compiling data for this research work. This implies examining and recording a situation as it is.

3.2 Data sources

The data gotten for the research was a combination of Primary and secondary sources. While the data type generated from the research was qualitative.

3.2.1 Primary data

This was done by carrying out cast studies in the study areas and interviews with security personnel with emphasis on security measures as regards the design in this research work also the consultation of professionals in the building industry and built environment yielded positive contributions. The outcome shaded light on some passive security measures to enhance security in public boarding secondary schools. Primary data was collected using a well prepared observation schedule. The parameters that were taken into consideration includes:

i. Setbacks from roads

ii. Site fencing and controlled accessibility

iii. Multiple gates and check points

iv. Winding and exposed long accessibility

v. Distant parking from buildings

vi. Standoff zone

3.3 Method of Data Collection and Analysis

For the purpose of this research, descriptive survey method was employed which includes analysis of case studies, internet sources, literature/document review and questionnaire. This method will help give a view to understanding the principles and factors behind their composition and design. The case studies will be obsevered based on spatial arrangement of available facilities, design concept, composition landscape, architectural features, material and planting.However, the various case studies will be sufficient to provide adequate information. Generally, this will help to shed more light on the trend and concepts.

3.3.1 Case studies

Case studies of existing structures similar or related to the area of research was taken. The case studies were selected based on sampling method. It involves the use of certain factors based on the research area to pre select participants. Existing secondary schools were examined, pictures of buildings and their background information were acquired for proper comprehension of the schools and its underlying problems. What it ought to be and what is obtainable as it exists. Which will help to proffer solutions to the challenges of security faced by schools and give a basis for recommendation and conclusions.

3.3.2 Internet sources

Information relating to security solution measure on the internet and how to implement them in the design of female secondary schools. A review of passive and active security measures, the use of landscape as a security measure, magazines, journals, publications and internal based researches of the study area to enhance knowlegde.

3.4 Instruments for Data Collection

Based on the qualitative nature of this research, the usage of observation schedule was considered as the instrument for data collection. The observation schedule contains list of checklists that were used by the researcher to collect vital information about security and safety measures adopted or considered in existing public boarding schools.

The observation schedule contains two sections namely; part A and Part B. Part A of the schedule gives a general description of the observed school which includes; the name of the school, location of the building, type of the tourist centre, list of available facilities on site, type of design adopted for the accommodation as a product, and number of accommodation units provided. Part B gives the design methods or measures adopted for ensuring security and safety which includes; site zoning for security, nature of site boundary, drop off procedure, landscaping for security (type of hard and soft landscaping elements used on site), nature of route into the centre, and availability of a tour guide and a watch tower. All these were outlined in a checklist format and also allowing for further description of data as observed.

3.5 Method of Data Analysis and Presentation

Computation of information for this research was completed by observation, taking photos, Taking physical estimation where procurements were made in the case studies furthermore Demonstrating existing condition. Information gathered were analysed utilizing a straightforward distinct factual method on Microsoft excel basically by tables, maps, sketches and picture photos utilized as plates against guidelines set up from reviewed Literatures, textbooks, diaries, eBooks, interviews and pertinent publications on the web.

3.6 Sampling and Sampling Techniques:

In this thesis, samples were obtained using a convenience non-random sampling procedure, which involves collecting or choosing samples depending on a specific interest and subjective judgment. These samples were chosen for case studies from a list of well-known public boarding schools most were taken from the northern part of the country which is the most affected and also both home based and foreign case studies were observed based on their importance to the research at hand. Six schools were observed, they are; The Emma Wilard School in U S A, Federal Government Girls College Kabba Kogi state, The federal Government Girls college batori, Kastina State, Command Secondary School Kaduna State, Sabon Gari Model Secondary school, Funtua Katina state, and Zee Alpha International school Funtua Kastina State. The table below shows the various sampled tourist centres as well as their location within Nigeria.

Table 3.1: List of Sampled Public Secondary Schools in Nigeria and Beyond.

S/No	Names	Location
1	The Emma Wilard School	U S A
2	Federal Government Girls College	Kogi State
3	Federal Government Girls College	Kastina State
4	Command Secondary School	Kaduna State
5	Sabon Gari Model Secondary school	Kastina State
6	Zee Alpha International school	Kastina State

Source: Author's field work, (2023).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

Case studies are basically organised and established research design which involves an indebt review and study of a specific subject within a real world. The importance of case studies is that, its creates a platform for critical analysis of already existing structure which are synonymous to the proposed design. In this proposed design seven existing public secondary schools all predominantly in Nigeria and beyond were studied and examined. Case studies were carried out, Deductions and information's gotten have been analysed using various software's for analysis , Microsoft excel software, based on the following variable; Nature of site boundary, Zoning for security, Drop off procedure, Hard landscaping for security, Soft physical barriers , landscaping for security, escape route, Availability of tour guide and watch tower.

4.1 Case Studies

The observed case studies are discussed below;

4.1.1 Emma wilard school

The Emma Willard School is originally called the Troy Female Seminary school, and also often referred to as EMMA, is an independent boarding school for young females located in Troy, New York on mount Ida, Offering grades 9-12. It is the first female higher education institution in the United States, it was founded by women's right advocate Emma Willard.

The school land area is about 55acres and was designed by Architect Fred M.. Cummings. The architectural style adopted in the construction of the structures is the Georgian, Jacobethan Revival. The school contains about 30 buildings, all of collegiate

Gothic style. The facilities in the school includes; class rooms, hostels, theatre, a student centre, a library, a chapel, sporting facilities. The school is very coordinated and organised for an all-girls school, presence of properly organised landscape elements used for security and circulating purposes so as to properly control movements in and out of the school. Entry points into the school is only one entry points.

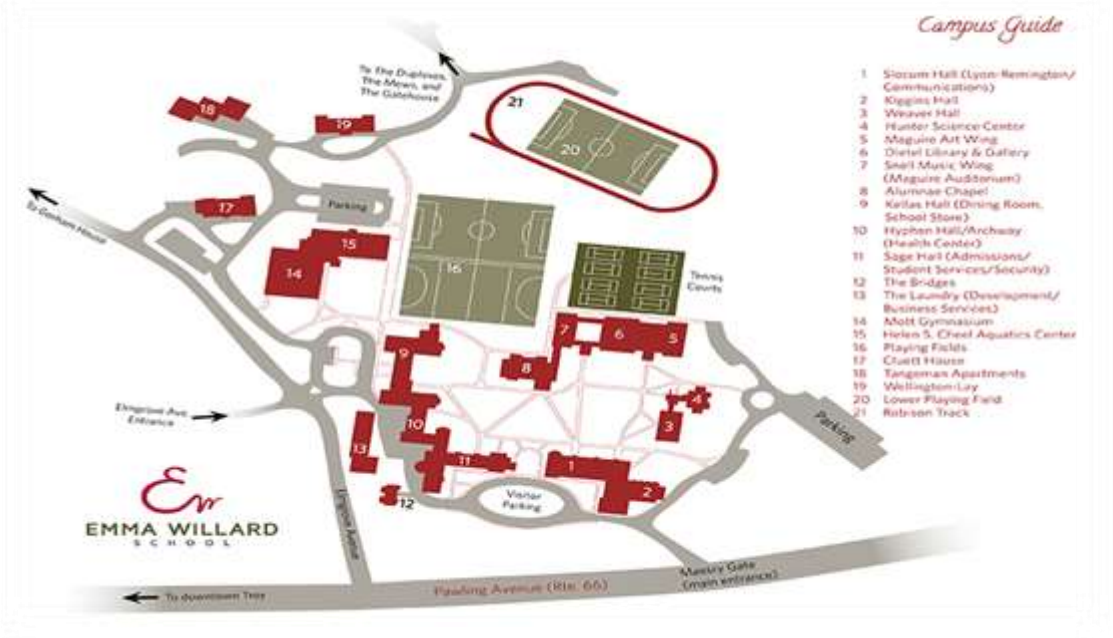

Fig 4.1: School Administrative Block

Source; Author's field work, (2023).

Plate V: The Entrance to the school

Source; Author's field work, (2023).

Plate VI : The Aerial view of the school

Source; Author's field work, (2023).

Plate VII: The Student Hostel of the school

Source; Author's field work, (2023).

Plate VIII: Admin Block of the school

Source; Author's field work, (2023).

4.1.2 Federal government college (fgc), Kabba Kogi State

The federal government college kabba, kogi state was established in May 1995. The school is located along the Kabba/Lokoja road. The college site is a place for learning and discipline, however the college inherited the various facilities of the school, which were in poor state, the school was initially a teachers college to kabba teachers, the population of the school has greatly increased over the years, the mission of the school is bring out students excellent and highly skilled while diligent in an (ICT) driven world.The various facilities in the school includes the admin block, the various classroom areas, the student hostels, religious centre, dining halls. The school is not properly planned because it was not initially designed for students but for teachers, most of the buildings are worn out and old, the whole topography of the school are not properly fenced, the area fenced is only the entrance of the school, no proper access control, and Poor overall security management of the school as a whole.

Plate IX: The Entrance of the school

Source; Author's field work, (2023).

Plate X**:** Library and Administrative unit

Source; Author's field work, (2023).

Plate XI: the classroom block

Source; Author's field work, (2023).

Plate XII: The classroom block

Source; Author's field work, (2023).

4.1.3 Federal government girls college Batori, (FGGC) Kastina State

Federal Government Girls College Bakori is a complete boarding secondary school for girls. It is located at kilometre five on the Funtua, Bakori Road. The school was established on the eighteenth of October 1974. Primarily the aims and objectives of the founders are to equip the students with the various knowledge for societal values and knowledge, in a very unique and simplified manner, the motto of the school is looked in three cardinal points, to work hard, be disciplined and behave well. In a much broader sense, the various aims of the school is to inculcate moral discipline and values and overall, to provide a teaching and learning environment for students to attain high value and level of understanding in both educational and personal excellence.

In terms of security of the school, it is lacking in various departments, the security personnel's in the school are very minimal compared to the facilities they are supposed to be guarding, the location of the school is poor cause it is located in a dispersed settlement along the road, which is quit far from settlement's, no proper fencing of the

school site boundaries, Navigation and movement in and out of the school are not properly managed due to poor access control designed employed in the school, Facilities are old and worn out, most materials and construction technique used for the school were not properly done putting security of the pupils , staffs and students in mind, also the school lacked the presence of security equipment like the closed circuit television (CCTV).

Plate XIII: The Admin Block and Classroom block

Source; Author's field work, (2023).

Plate XIV: The Classroom blocks.

Source; Author's field work, (2023).

Plate XV: The Library of the School

Source; Author's field work, (2023).

Plate XVI: Inside the classroom Area

Source; Author's field work, (2023).

4.1.4 Command secondary school Kaduna, Kaduna State

Command Secondary school, Kaduna is a mixed education full public boarding school located in the heart of Kaduna State, Nigeria, It is located along the Sabo, Casua road, Kaduna State. The school ensures all round secondary education thereby leading to the award of West Africa School Certificate (WASC), this lasted until the national education system was switched from 5 year secondary education programme to 6 year secondary education programme in 1990. The school first pioneer principal Mr. D.B Ajayi, 3 teaching staffs, 33 non- teaching staff with 75 boys and girls. The school was basically created for military personnel's children but as the times go by, the children of civilian's were also employed too. The school contains classrooms, Admin block, shopping centres, school field, Library, Students Hostels but for the females and the males, Laboratory and Staff Quarters. The school workers generally are both civilian and soldiers for both

teaching and non-teaching staffs, The school is one of the most secured school located in the northern part of the country, Firstly it is located in the main heart of the city not in the outskirts of the city, the school has only one entry and exit points, they have various check points in the school to check out intruders, security personnel's like soldiers are employed every day to safe guard the school, the school is fenced all round and are always renovated every new section.

Plate XVII: The Entrance view of the school

Source; Author's field work, (2023).

Plate XVIII: Administrative Building of the school

Source; Author's field work, (2023).

Plate XIX: Aerial view of the school

Source; Author's field work, (2023).

Plate XX: The assembly Auditorium of the school

Source; Author's field work, (2023).

Plate XXI: The Clinic of the school

Source; Author's field work, (2023).

4.1.5 Sabon Gari model secondary school, Funtua, Kastina State

Sabon Gari model secondary school, Funtua is located in Kastina state Nigeria, it was constructed in 2012, by the Kastina state agencies for development. The school contains classrooms, hostels, admin hall, the have a school field, the school has no defined boundaries or fences, building materials employed by the school are just masonry blocks, aluminium's, retarded blocks, the schools has no proper landscaping elements, the buildings are old and worn out, lack of proper security both passive and active. Firstly it is located in the main heart of the city not in the outskirts of the city, the school has multiple entry and exit points, they have no check points in the school to check out intruders, security personnel's like soldiers are employed every day to safe guard the school, the school is fenced all round and are always renovated every new section.

Plate XXII: The classroom Area of the School

Source; Author's field work, (2023).

Plate XXIII**:** Open School field and the classroom Area

Source; Author's field work, (2023).

Plate XXIV: Showing the classroom Area

Source; Author's field work, (2023).

Plate XXV: Inside classroom Area

Source; Author's field work, (2023).

Plate XXVI : Classroom Area and Fencing Used

Source; Author's field work, (2023).

4.1.6 Zee Alpha international school, Funtua, Kastina State

The Zee Alpha International School, Funtua, Kastina State is located in Kastina state, Nigeria, it has a landmass is 4500sqm, it is located in the core town of funtua, it's a private school designed by architect Yusuf Rufai. The school comprises of all the basic equipment's for schooling, it has classrooms, admin offices, staff offices, hostels. The building materials used for the construction of the school buildings are Concrete, Block, Aluminum and Glass. The school boundaries is well fenced and marked, it is well landscaped, most of the classes are well ventilated, the have conducive hostel spaces and classes for proper learning, the only problem is the poor parking spaces for cars there by causing accessibility in and out of the school. And also landscaping in the school is quite impressive compared to the normal public boarding schools. The school most buildings are clustered together because the total landmass of the school is very minimal compared to the other boarding schools.

Plate XXVII: Entrance of the School

Source; Author's field work, (2023).

Plate XXVIII: The classroom Area of the School

Source; Author's field work, (2023).

Plate XXIX: The classroom Area

Source; Author's field work, (2023).

Plate XXX: The classroom Area and School Field

Source; Author's field work, (2023).

4.2 Summarized Observation of Variables across Case Studies

As earlier established the used variables for the actualization of safety and security can be classified into various phases of security in the public secondary school space which can be either by Active means and Passive means. The passive emphasizes solely on the access of the design, These variables include; the nature of the site boundary, number of entry points to the site zoning for security, drop off procedure, hard landscaping for security, Soft landscaping for security, availability of tour guide and natural surveillance, While the active means emphasis on the use of detectors like the close circuit televisions, alarm systems and security sensors.

4.2.1 Zoning for security

The public schools observed showed that only (1) out of all the schools had and overall excellent security zoning, which took only 10% of the particular analysis, the private

schools examined also had a fairly good security zoning and most public schools used had poor general security zoning.

Table 4.1 Zoning for Security

NAMES	POOR	GOOD	EXCELLENT
Emma Willard School, USA.			✓
Federal Government College(FGC)Kogi State	✓		
Federal Government College(Batori) Kastina State	✓		
Command Secondary School, Kaduna State.		✓	
Sabon Gari Model Secondary School Kastina State	✓		
Zee Alpha International School, Kastina State.		✓	

Source: Author's Work, (2023).

4.2.2 Nature of site boundary

Site boundaries are the defined landmass area covered or owned by the school that is properly fenced and marked for the school, the percentage distribution showed that most public school in the north had poor site boundaries demarcations only private case studies used had fairly good defined site boundaries.

Table 4.2 Nature of Site Boundary

NAMES	POOR	GOOD	EXCELLENT
Emma Willard School, USA.		✓	
Federal Government College(FGC)Kogi State.	✓		
Federal Government College(Batori) Kastina State	✓		
Command Secondary School, Kaduna State.		✓	
Sabon Gari Model Secondary School Kastina State	✓		
Zee Alpha International School, Kastina State.		✓	

Source: Author's Work, (2023).

4.2.3 Well established drop off procedure

Drop off zones refers to the defined zones for vehicular movements, car parks stations how defined they are in terms of security. The chart shows that most vehicular movements in and out of most of the schools are not closely monitored.

Table 4.3: Well established drop off zone

NAMES	POOR	GOOD	EXCELLENT
Emma Willard School, USA.			✓
Federal Government College(FGC)Kogi State.	✓		
Federal Government College(Batori) Kastina State	✓		
Command Secondary School, Kaduna State.		✓	
Sabon Gari Model Secondary School Kastina State	✓		
Zee Alpha International School, Kastina State.	✓		

Source: Author's Work, (2023).

4.2.4 Use of long sterm trees, Bollards and Barricades

This involves the use of barricades which can either plants, bollards or any other devices as security guide in the various public schools. This chart shows the percentage of barricades distribution in the schools.

Table 4.4: use of long stem trees, bollards and barricades

NAMES	POOR	GOOD	EXCELLENT
Emma Willard School, USA.			✓
Federal Government College(FGC)Kogi State.	✓		
Federal Government College(Batori) Kastina State	✓		
Command Secondary School, Kaduna State.		✓	
Sabon Gari Model Secondary School Kastina State	✓		
Zee Alpha International School, Kastina State.	✓		

Source: Author's Work, (2023).

4.2.5 Presence of watch towers

The percentage of schools employing the use of watch tower is very poor. The chart shows the percentage of schools employing the use of watch towers.

Table 4.5: Presence of Watch Towers.

SECONDARY SCHOOLS	YES	NO
Emma Willard School, Newyork, USA.	✓	
Federal Government College, Kabba, Kogi State.		✓
Federal Girls Government college, Batori, Kastina State		✓
Command Secondary School, Kaduna State.	✓	
Sabon Gari Modern Secondary School, Funtua Kastina state.		✓
Zee Alpha International School, Funtua Kastina State.		✓

Source: Author's Work, (2023).

4.2.6 Gates and checkpoints

This charts shows how the various checkpoints and gates in the school are ranked in terms of security of the various schools.

Table 4.6: Presence of Watch Towers

NAMES	POOR	GOOD	EXCELLENT
Emma Willard School, USA.			✓
Federal Government College(FGC)Kogi State.	✓		
Federal Government College(Batori) Kastina State	✓		
Command Secondary School, Kaduna State.		✓	
Sabon Gari Model Secondary School Kastina State	✓		
Zee Alpha International School, Kastina State.	✓		

Source: Author's Work, (2023).

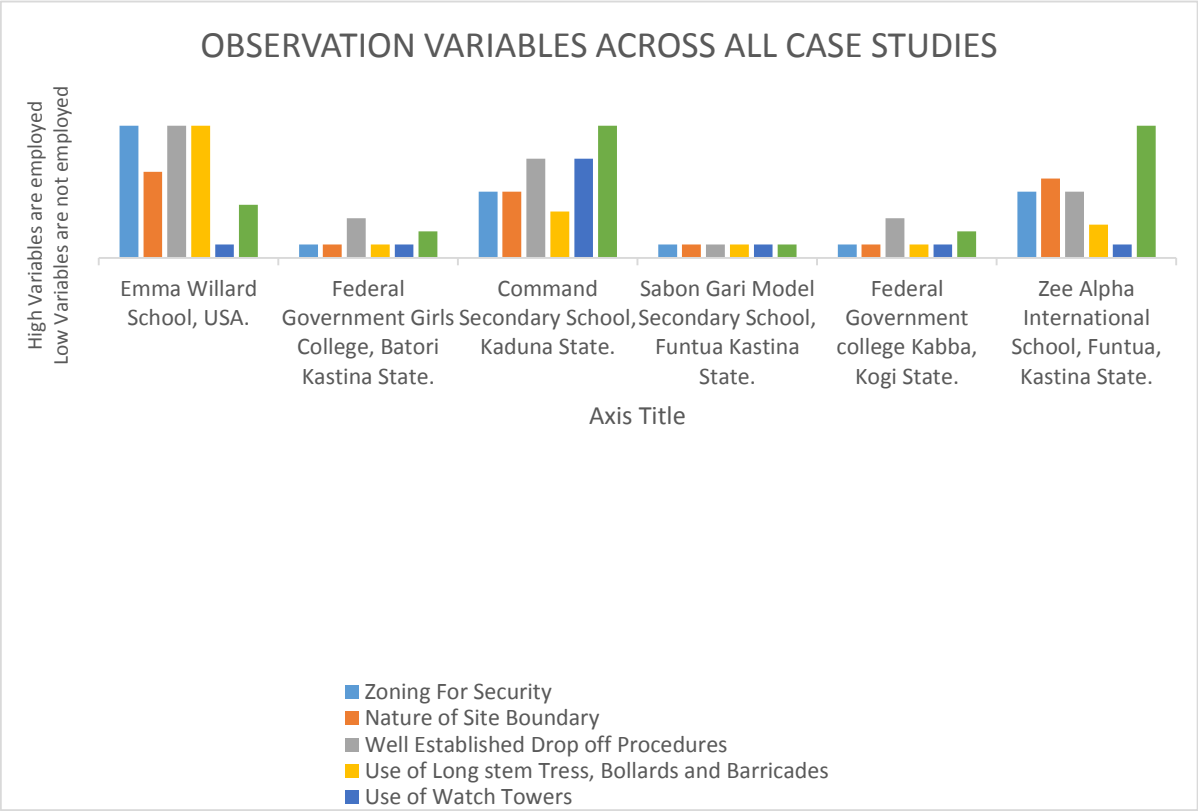

Fig 4.2: Observation Variables across All Case Studies.

Source: Author's Work, (2023).

Table 4.7: Percentage Value of the Variables Observed over the various schools.

	Zoning For Security (%)	**Nature of Site Boundaries (%)**	**Established Drop Off Procedures (%)**	**Use of Landscapes (%)**	**Use of Watch Towers (%)**	**Gates and Checkpoints (%)**
Observed Cased Studies.	40	25	45	20	10	45

Source: Author's Work, (2023).

4.3 Discussion of Findings

The vital role of security and safety in Nigeria nowadays cannot be over emphasized especially in our public secondary schools. Public secondary schools generally if well managed can go a long way in life's of the future leaders of the country and properly managed can go a long way in boosting the economy of any country. The findings showed that zoning for security was carried out by 40% of the study.

The design consideration for the Nature of the site boundaries has been not really been considered having 25%. Which is generally poor in terms of security. Established drop-off procedures showed an implementation of 45 percent across the case studies. Also for gates and checkpoints 45 percentage was established across all case studies. General observation showed most public schools lack basic security guides and safety strategies adopted for students safety and it is cause for major concerns.

4.4 Proposed Public Boarding School

4.4.1 Proposed site and its location

The site is located along the Batori Funtua express way. Its headquarters is in the town of Funtua on the A126 highway. Funtua lies on the latitude and longitude 11°32'n and 7°19'e respectively. The city has an average of 32°c and humidity of 44%. Funtua has an area of 448km² and a population of (420,110). The inhabitants of the town are predominantly Hausa, Yoruba, Igbo and Fulani by tribe. Funtua has a conducive weather condition, the city has an average temperature of 32°c and humidity of 44%.

Figure 4.3: Google Earth Image of The site

Source: Authors' Work, (2023).

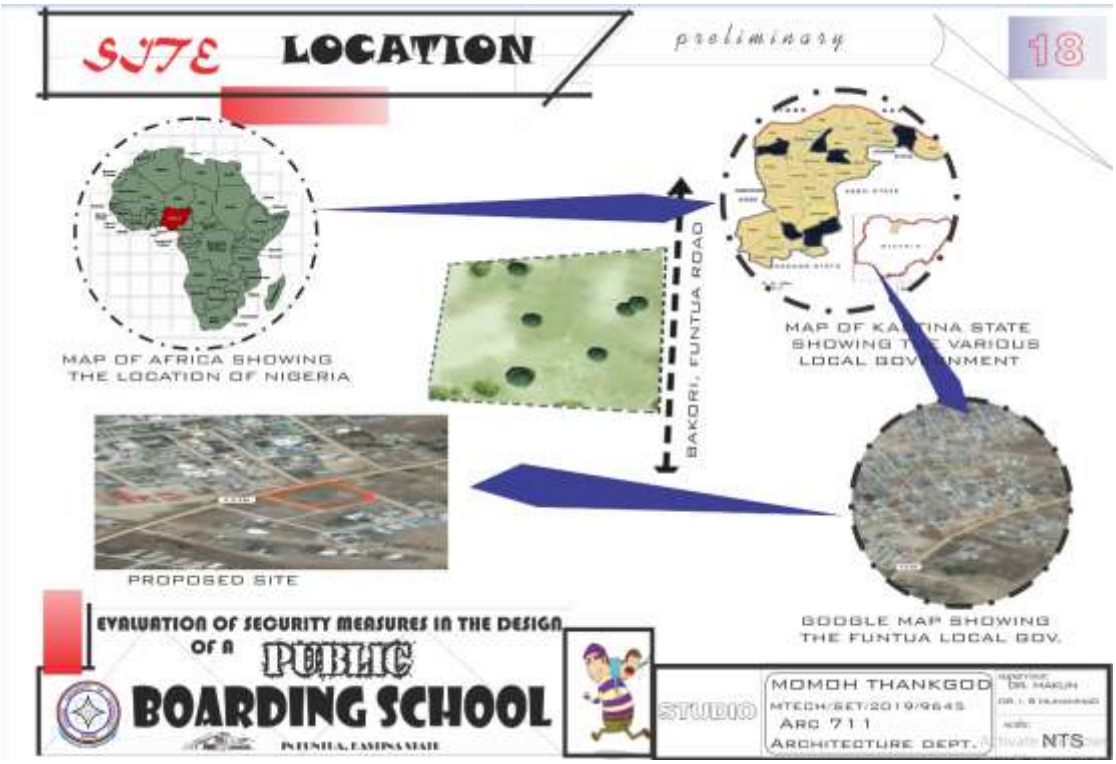

Figure 4.4: Site Location

Source: Authors' Work, (2023).

4.4.2 Site selection justification

The site has a very good weather, nice scenery. The location of the site is in the main part of the town. It is cited close very good adjoining structures which are very good in terms which overall creates security of the place. The site is close to the police station, it is very close to educational institutions, a primary school and secondary school. The topography of the site is very friendly and it has a very even level. The site is part given by the Kastina state government for education in the state in Funtua.

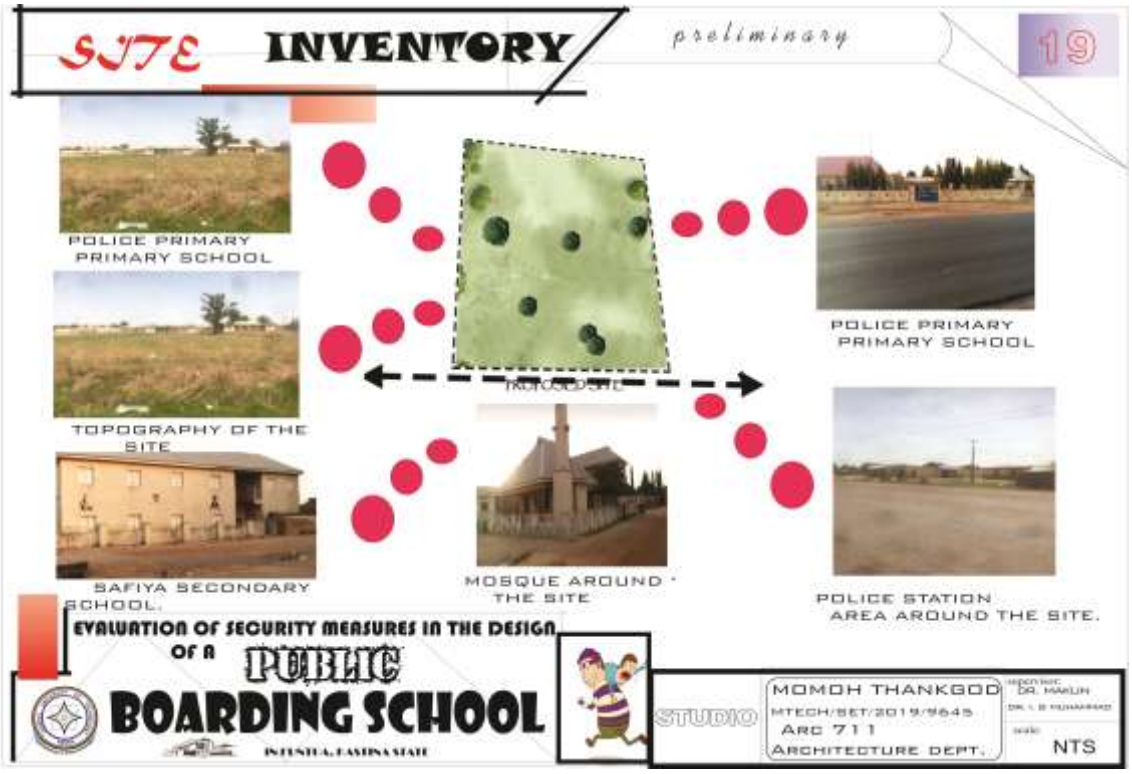

Figure 4.5: Site Inventory

Source: Authors' Work, (2023).

4.4.3 The study area

The total site measures an area of 193517 square metre with a site perimeter of 55701 metre. The proposed site characteristics include the following under the listed headings: Site Topography: The topography of the site is very friendly and level.

Vegetation: The site is scarcely populated covered with trees and shrubs. Clearing of proposed building perimeter, pathways, open spaces, and places that depict or can harbour threats will be done, Services on Site: The layout of the site has a good electricity, communication network, and a good road network that gets to and terminate at the site.

4.4.4 Site analysis and evaluation.

The site was critically observed using the cardinal points facing the North West directions. The site was zoned basically for security purposes, the site is also close to the city centre in Funtua Kastina state, easily accessible and also presence of electricity and pipe borne water in the site .The nature of the site is flat very linear site, the students area, Residential areas, staff and admin areas are all zoned for proper managements and security purposes.

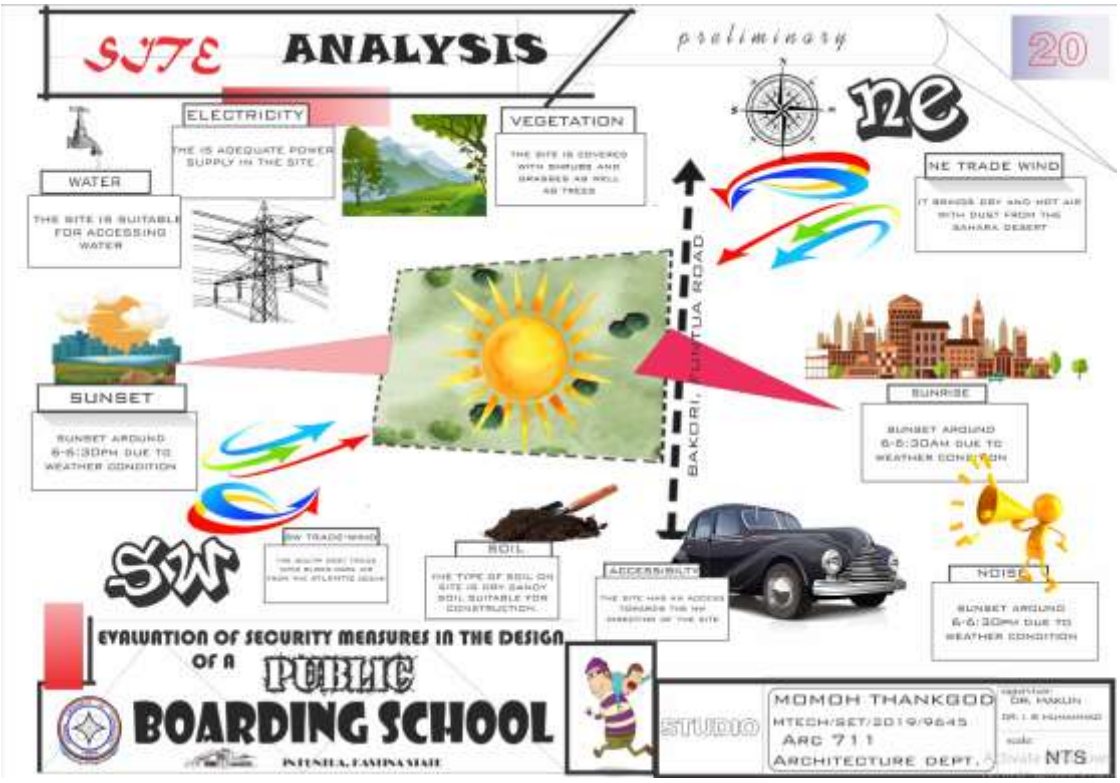

Figure 4.6: Site Analysis

Source: Authors' Work, (2023).

4.5 Design Report

The report contains an overview about my proposed designs, which entails evaluating the various methods through which security measures can be adopted in the design of a public boarding school in Funtua, Kastina State, Nigeria

4.5.1 Design brief

The design brief entails designing a well functional public boarding school which adopts the various security measures to create a safe and conducive environments for students

4.5.2 Design concept of the proposed public boarding school.

The design concept adopted is the principle made by Oscar Newman for security called the defensible spaces , which involves the use of environments whose physical and site panning functions allows inhabitants of that particular spaces to be agents of security themselves. The theory argues that a space becomes safer when people feel a sense of ownership and responsibility for space that piece of space. So for the purpose of this design defensible spaces theory was critically and carefully use to provide a proper and conducive safe environments for students and teachers of the school.

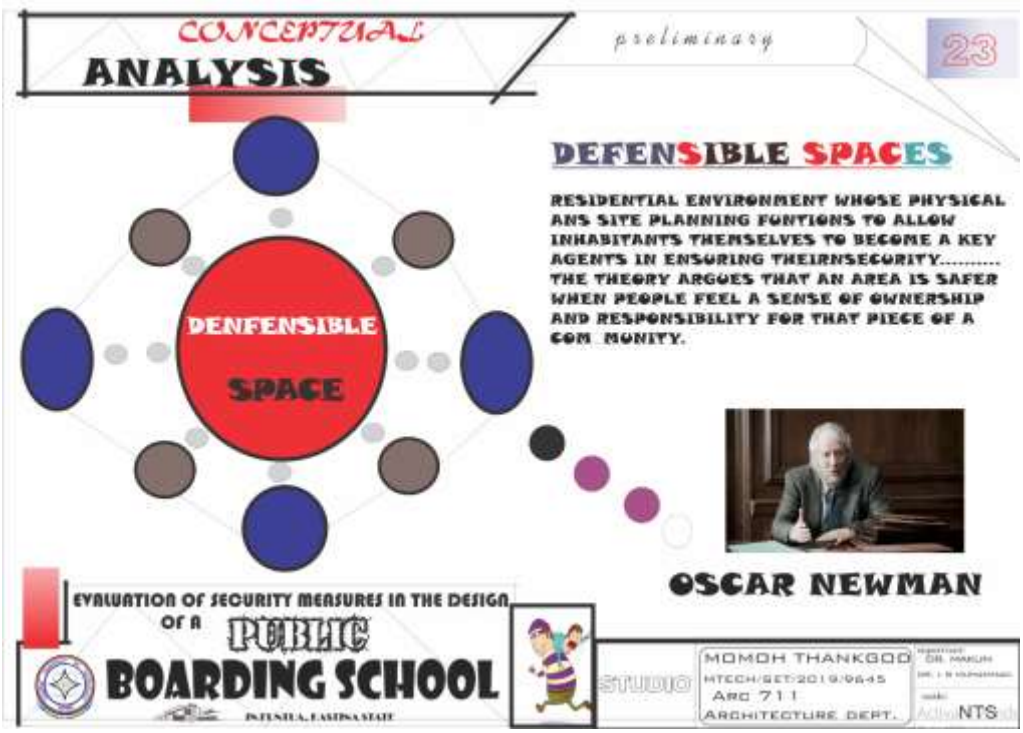

Figure 4.7: Conceptual Analysis

Source: Authors' Work, (2023).

4.5.3 Construction

Construction of the various buildings in the design was done using good and contemporary building materials, and also modern materials used for security purposes were also adopted in the thesis, to create a proper designed structure.

4.5.4 Design considerations and planning principles

Different designs consideration has been adopted at the various design stages such as drop off procedure zoning for security, artful barriers for security and safety, Landscaping for security, security and transport shuttle points within the centre perimeter demarcation, well planned emergency routes, watch towers.

Table 4.8: Security and Safety elements adopted in the proposed design

S/N	Passive elements adopted
1	Defined site boundary
2	Zoning For Security
3	Use of watch Towers
4	Use of Long stem trees, bollards, and barricade
5	Well established drop off Procedures.
6	Designing of residential apartments in units to further enhance the defensible space theory

Source: Author's Work, (2023).

4.5.5 Integration of proper zoning principles and a well-defined site boundary

The first approach of the security is the use of the theory of defensible spaces, which entails zoning the most vital area which will called the defensive space, as regards this design which is a public boarding school, the most vital in area to be secured is the student environment which is the most vital area in the schooling environment. So in order of security safety priority they are zoned, which is properly implemented in my design and also creating a well-designed boundary void of of many entry points.

Figure 4.8: A Close view of certain Security Measures employed around the proposed site

Source: Author's Design, (2023).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In Nigeria generally there have been increase over the years in insecurity, which have ravage the nation and caused fear all around the nation, there have been issues of insecurity in terms of but terrorism, kidnapping and robbery are the major ones which is predominantly in the northern part of the country which is where our design is to be established. The research clearly shows that most public boarding schools in Nigeria are not properly designed putting security as a vital part of its design, Major security zoning procedures were considered in most schools in Nigeria especially public schools in the country. The boarding schools are cited in spaces which is far from the city centre, most schools have poor site security zoning, poor and improper fencing and also lack of proper entry and exits points in terms of accessibility is very poor, lack of proper facilities which make the schools very pliable and vulnerable to attacks from different angles.

5.2 Reccommendations

It will be advised that most boarding schools in Nigeria should be cited first in areas very close to public eyes not very far away from the city centre, they should be cited advisably close to police and security agency centres, and also proper security zoning procedures should be one of the major things to be considered when designing a public school, the number of entry points should be properly minimized to limit improper movements within the school, and also ,There should be proper fencing all-round the site of the school, also the proper use of vegetation's and landscaping for security purposes should be adopted, there should, there should also adopt the use of watch towers to guard the school, also zoning the movements of students all across the school.

5.3 Contributions to Knowledge

This research lays down a guide to assist designers tackle security and safety in public boarding schools. It outlines the various aspects of passive security control and safety measures that can be implemented in tourist centres. These measures include: zoning for security, nature of site boundary, drop off procedure, hard landscaping for security, soft landscaping for security, number of entry points, and availability of a tour guide and watch tower. The findings showed that planning for single route entry had the highest level of consideration of 90 percent while the level of importance given to a definite site boundary, hard landscaping for security, and soft landscaping for security had the least consideration with a percentage level of 27.5 percent. A good drop off procedure had a percentage consideration of about 66.6 percent and an ideal zoning showed a percentage consideration of about 50 percent. These findings indicate that Enhanced security and safety should be approached, by a proper implementation of these deduced measures: zoning for security, nature of site boundary, drop off procedure, hard landscaping for security, soft landscaping for security, number of entry points, and availability of a tour guide and watch tower.

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APPENDICES

Appendix A: An Observation Schedule on Security Measures in the Design of a Public boarding School in, Funtua Kastina State.

PART A- ABOUT THE CENTRE

1. Name of the Public Boarding

   School…….....**.....**

   …….

2. Location of the

   building…….....

   …….

3. Type of School Design Adopted

   Centre……...

   …….

4. List of available facilities on

   site……..……..…

   ……..……

   ……

   ……..…

   …….

5. Type of design adopted for the accommodation

   product…….……

   …….

6. Number of accommodation units

   provided……...

PART B- DESIGN METHODS FOR ENSURING SAFETY AND SECURITY

Site Zoning for Security

- What type of zoning has been adopted in the site design

a) Public to Private Zoning……..

b) Noisy to Quiet Zoning……..

c) Zoned based on Attraction/Property……..

d) Indicate if there is any further detail……

   ……..……

   ……...……..

Nature of Site Boundary

Type of Site Boundary	Mark
Sand Crete Block fence	
Rocks and Vegetation	
Wooden Fence	

Barbed Wire Fence

Further observation on Nature of Site Boundary if the above does not fully explain the nature……..

……

…..……..

Drop Off Procedure

Drop off Procedure	Mark
Planned General Parking Drop Off	
Unplanned General Parking Drop Off	

Landscaping for Security

- Type of landscaping adequately employed

Type of Landscaping	Mark
Hard Landscaping	
Soft Landscaping	
Both	

- Type of hard landscaping elements used on site……

  ……

- Type of Soft Landscaping elements used on site……..……...

  ……

- Are there dense and broad-leaved trees around used spaces?

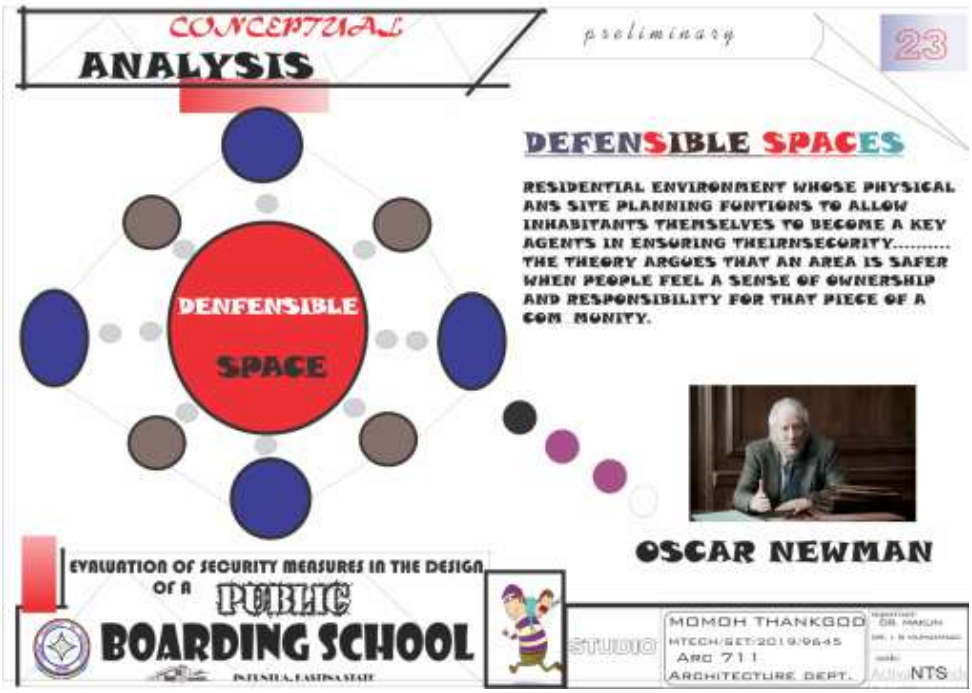
  a) Yes ☐ b) No ☐

- Are paths clearly defined and planned? a) Yes ☐ b) No ☐

Nature of Route into the School

Single Access for Entry and Exit	Mark
Double Access for Entry and Exit	
No Defined Entry	

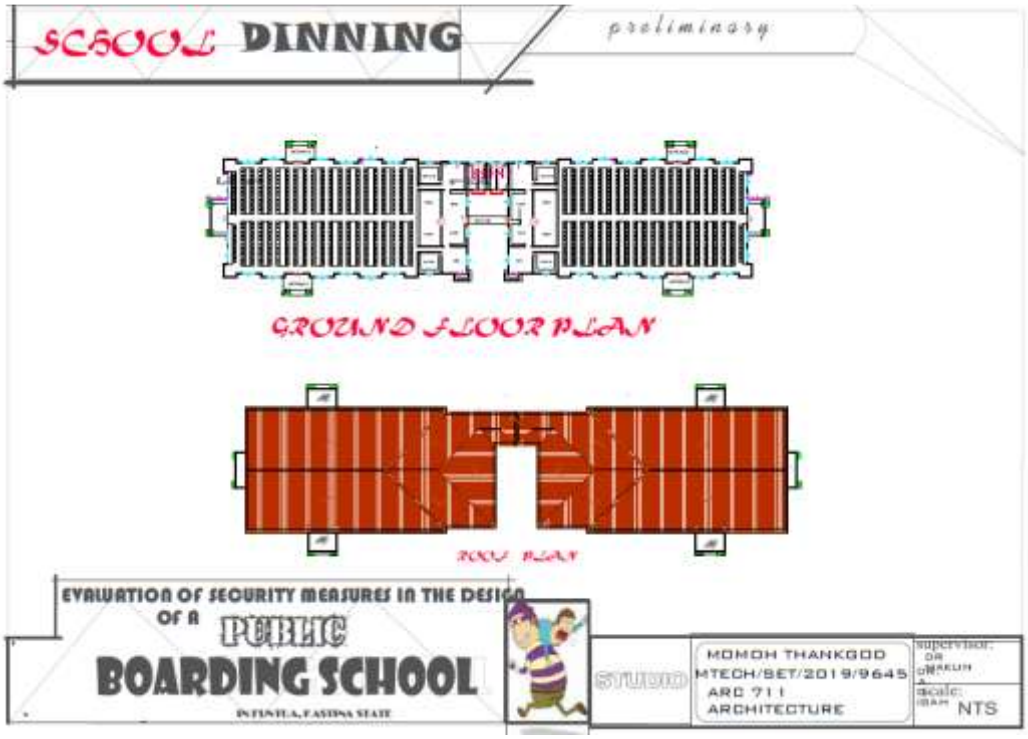
Appendix B: Site Concept



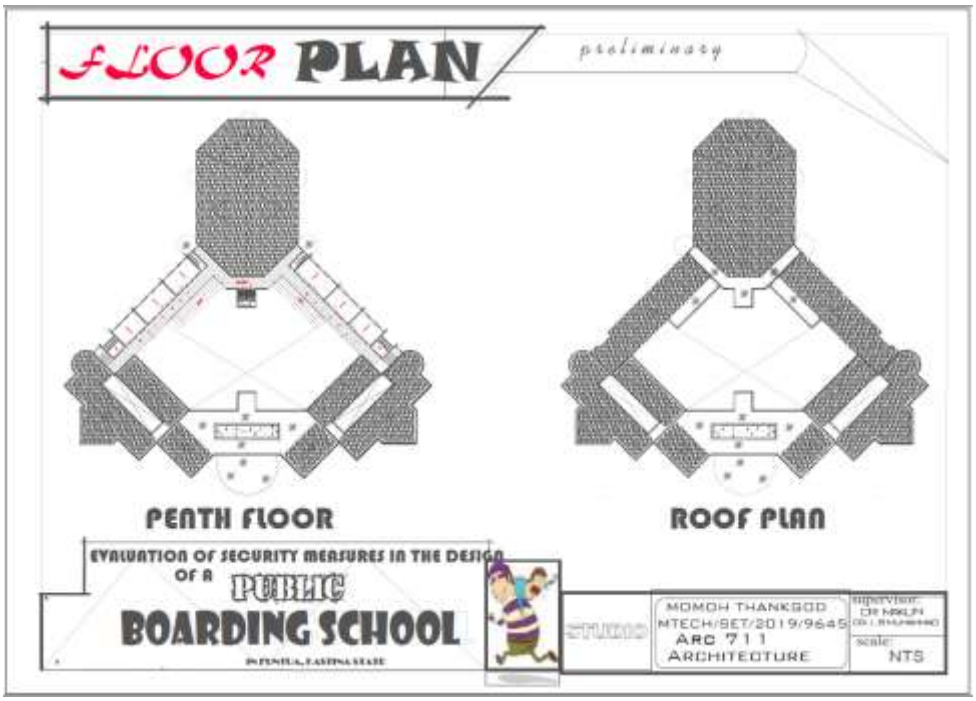
Appendix C: Site Plan

Appendix D: (Class Areas) Ground Floor Plan

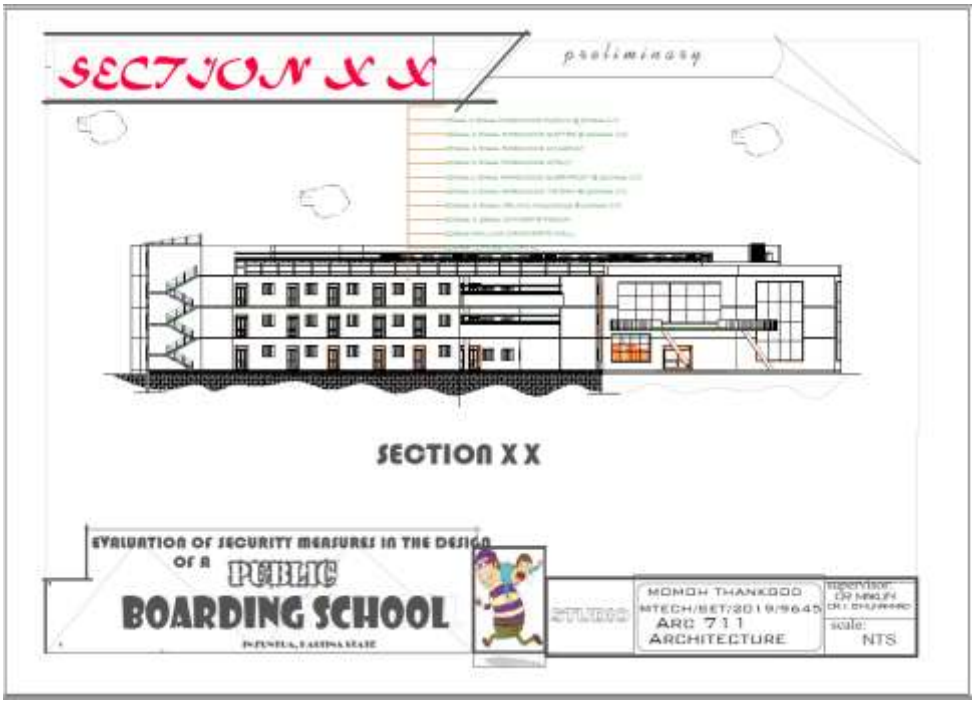
Appendix E: Dinning Area (Ground floor)



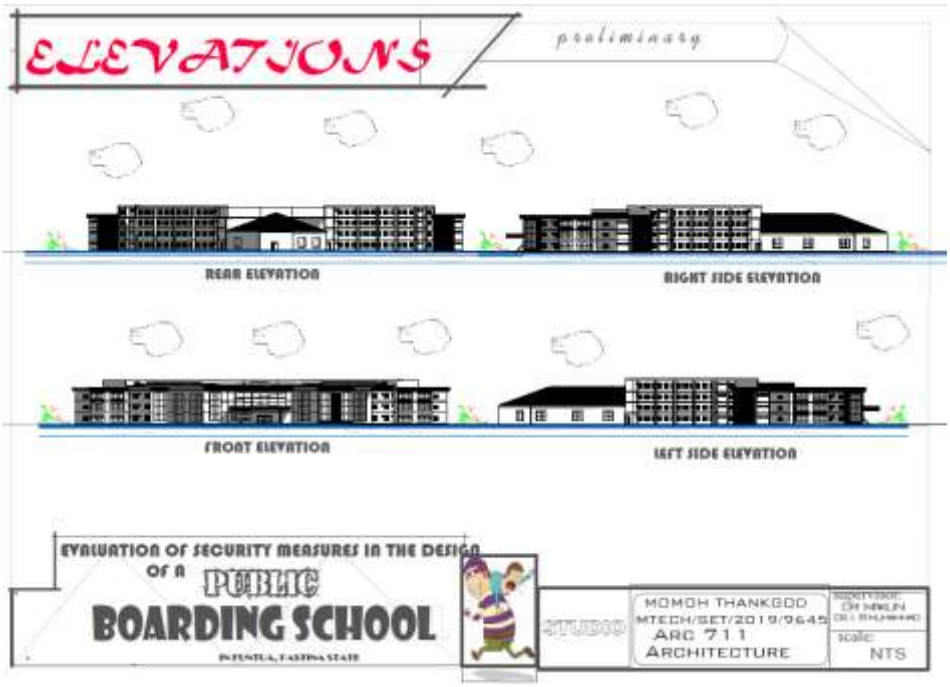
Appendix F: Roof Plan



Appendix G: Section



Appendix H: Elevation



Appendix J: Details