PROJECT REPORT

ON

LAND INFORMATION SYSTEM OF URBAN ESTATE ALONG OKE-OSE/OKE OYI ROAD, ILORIN ILORIN EAST LOCAL GOVERNMENT AREA KWARA STATE

BY

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HND/23/SGI/FT/0074

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF HIGHER NATIONAL DIPLOMA IN SURVEYING AND GEO-INFORMATICS TO THE DEPARTMENT OF SURVEYING AND GEO-INFORMATICS, KWARA STATE POLYTECHNIC ILORIN, KWARA STATE

JUNE, 2025

CERTIFICATE

I hereby certify that the information contained in this project report was obtained as a result of observations and measurements made by me on the field and that the survey was done in accordance with survey rules, regulations, and departmental instructions.

AKEEM HAMID AJAGBE
HND/23/SGI/FT/0074

CERTIFICATION

This is to certify that **AKEEM HAMID AJAGBE** with matriculation Number **HND/23/SGI/FT/0074** has satisfactorily carried out his project under my instruction and supervision.

I here declare that He has conducted himself with diligence, honestly and sobriety on the project.

SURV.AKINYEDE ADEBANJI **DATE**
Project Supervisor

MR. A I ISSAU **DATE**
Head of Department

SURV.R.S AWOLEYE **DATE**
Project coordinator

External supervisor **DATE**

DEDICATION

This project is dedicated to Almighty God for his, protection and guidance and also to my caring parent in person **MR&MRS. AKEEM**

AKNOWLEDGEMENTS

The dream of becoming an achiever in life comes true, not only by one's fortitude and hard work based on his knowledge, but it is also involving the positive influence of various factors and ideas of some people in the community.

First and foremost, all glory, honor and adoration is to Almighty God. I appreciate God for his grace upon my life, for keeping me safe since my advent in this school and most especially, during the execution of this project.

I sincerely wish to express my affectionate gratitude to my lovely and caring parent **MR&MRS. AKEEM** whose toils and struggles have helped a lot in transforming my life for better may Almighty God grant them long life to enable her reap the fruits of their labour.

My next gratitude goes to my supervisor, **SURV. AKINYEDE ADEBANJI** for his useful guidance, understanding, patience, and professional advice during the execution of this project that led to the successful completion of the exercise. I pray that God will continue to bless you (amen). More so, my appreciation goes to my able HOD **MR. A I ISSAU** and **SURV. ASONIBARE R. O, SURV AYUBA ABDULSALAM, SURV A.G AREMU, SURV R.S AWLEYE, SURV. KAZEEM SURV. BABATUNDE KABBIR AND SURV BELLO DIRAN FELIX**God bless you all.

More so, I seize this opportunity in acknowledging the efforts and contribution of my boss**SURV. MUFTAU WASIU ISHOLA** for his support morally, financially and for the impartation of knowledge in me that pertains to surveying profession.

I will not forget to express my gratitude to my friends in the likes of **GANIYUAKEEM,MUFTAU JAMIU OPEYEMI, IDOWU HABEEBLOLADE, AHMED TOYYIB, AROWOLO NURUDEEN AYINDE, HUSSAIN TAWAKALITU OLAMIDE, ALAI ABDULLAHI AKANI** and all my classmatesfor their support, advice and love I really appreciate you all.

My heartfelt thanks also go to all my group members for their cooperation and understanding during the project, I pray that we will never fail in our life.

ABSTRACT

Land management could be enhanced through effective land administration, which involves the processes of land registration, Cadastre, valuation and land inventory. Manual Land Administration has been in use by most of the Ministries of Lands and Survey in Nigeria since their inception. Most of the cities and their surroundings have been expanding rapidly beyond projections. With this rapid expansion, manual Land Administration has become inefficient, ineffective, time-consuming and prone to abuses, whereby some land officers siphon generated revenues, because of inefficient land transaction records; hence, there is need for a digital, scientific, and operational approach of Land Administration to be adopted in the development of an Integrated Land Information System. This paper gives an insight into a digital approach to Land Information System and Management of ***URBBAN ESTATE OPPOSITE GOVERNMENT CEMETRY ALONG OKE OSE/OKE OYI ROAD, KWARA STATE ILORIN****. This has been achieved by conversion of existing land related information to digital formats with the aid of relevant software like MS Excel, MS Access, AutoCAD Land Development and ArcGIS 9.2 and the combination of necessary queries and analysis. The results show an efficient, effective and proper Land Administration and revenue generation procedure.*

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CHAPTER ONE

1.0 INTRODUCTION

A Land Information System (LIS) is a system used to manage and analyze land-related data. It integrates geographic information systems (GIS) with land data, providing a digital platform for managing information about land ownership, boundaries, land use, zoning, land value, taxation, and other spatial data.

LIS is used by government agencies, municipalities, urban planners, real estate professionals, and other stakeholders to streamline land management processes, improve decision-making, and ensure efficient land administration. By organizing and mapping land data, a LIS enhances the ability to track and update land-related information, making it easier to handle land disputes, land use planning, environmental monitoring, and development projects (MP Ralphs, P Wyatt - 2003).

Pindiga and Orisakwe (2013) developed a land information system of Tumpure residential and commercial layout in Akko Local Government Area of Gombe State. They created and tested a multimedia relational database of the attributes of the individual parcels and properties and linked them to the polygonised spatial positioning GIS software. On the other hand, video clips of properties within the studied neighborhood were obtained and linked to GIS software and the system developed afterwards was found to be efficient. The study recommended the use of Arc 3.2 GIS software in land administration.

Fourie (1999) looked at developing cadastre and land information systems for decision makers in the developing world. The study emphasized that African countries should design land information management systems without a cadastral layer due to the cost implications associated with putting up such a structure. He therefore recommended a national spatial framework solely for visualization.

Due to challenges such as cadastral maps problems and the insufficiency of paper maps and land registers, Ibraheem (2012) proposed the development of computerized land and geographic information systems (LIS/GIS). The system is poised on digital cadastral maps and digital cadastral data bases (DCDB). The methodology involved several phases which include data collection and conversion, LIS structure and analysis, and the assessment of the accuracy of the digital maps. The results showed that the developed system can present the structure and information content of the digital maps as well as its differences with analogue maps. This digital cadastral map can be the basis for additional thematic layers, successively converting it into a complex system for management of administrative units.

Ibraheem developed a large-scale land information system (LIS) by using geographic information systems (GIS) and field surveying. His work portrayed the problems of analogue cadastral maps, observing that the existing cadastre which consists of paper maps and land registers was highly insufficient. Here commended the creation of a land information system and a digital map.

According to (LS Macarringue, ÉL Bolfe, PRM Pereira -Geographic Information, 2022) Define a Land Information System (LIS) combines modern technology, such as Geographic Information Systems (GIS), with land data to create a comprehensive tool for managing and analyzing land resources. It typically includes databases, spatial data, and various tools to manage land-related information like property ownership, land use patterns, zoning regulations, and environmental features.

Key components of a LIS include:

1. Geospatial Data: This is the mapping layer that shows the physical boundaries of land parcels, topography, infrastructure, land cover, and other spatial data that helps in visualizing land features and their relationships to other geographical elements.

2. Attribute Data: This consists of descriptive information about the land parcels, such as ownership details, size, land use type (residential, commercial, agricultural), zoning regulations, land value, tax rates, and any other relevant land data.

3. Data Management: LIS includes databases to store, organize, and update large amounts of land-related data. These systems often have tools for data querying, analysis, and reporting.

4. User Interface: A friendly interface allows users to interact with the system, view maps, search for land information, and run analyses. This makes it accessible to both technical professionals and non-experts.

Functions and Benefits of LIS:

- Efficient Land Administration: LIS streamlines the processes of land registration, land transfer, and ownership verification, reducing paperwork and improving transparency.

- Urban Planning and Development: It assists urban planners and policymakers in making data-driven decisions about land use, zoning, infrastructure development, and environmental conservation.

- Taxation and Valuation: Local governments use LIS to assess property taxes, track land valuations, and ensure that properties are taxed fairly based on their usage and value.

- Environmental Management: LIS helps in monitoring land-use changes, protecting natural resources, managing protected areas, and supporting sustainable land practices.

- Conflict Resolution: LIS can play a critical role in resolving land disputes by providing accurate and up-to-date information on land boundaries, ownership, and usage rights.

- Disaster Management and Response: By integrating environmental and hazard data, LIS can help in planning and managing land resources during emergencies, like floods or earthquakes, by identifying vulnerable areas and optimizing evacuation routes.

- In summary, a Land Information System is a powerful tool that integrates land data and mapping technology, offering numerous advantages for governance, urban planning, resource management, and public service. It supports decision-making processes at various levels and ensures that land-related activities are efficient, transparent, and sustainable.

1.1 BACKGROUND TO THE STUDY

The background to the study of a Land Information System (LIS) typically explores the historical, technological, and socio-economic contexts that have led to the development and implementation of such systems. It highlights the importance of accurate, accessible land data for effective land management and governance. The study often examines existing land administration systems, their limitations, and how modern technologies like Geographic Information Systems (GIS) and database management systems can overcome these challenges.

1. Historical Context:

Land management has been a key concern for societies for centuries, from ancient times when land was used for agriculture and resource extraction to modern times, where urbanization and industrialization have increased the demand for efficient land use and administration. Traditional land record-keeping methods were paper-based, often inefficient, and prone to errors and disputes. As populations grew and land use became more complex, there was a growing need for more advanced and organized methods of managing land information.

2. Technological Advancements:

With the advent of GIS, remote sensing, and database technologies in the late 20th century, there was a significant shift in how land information could be collected, stored, analyzed, and disseminated. GIS technology, for instance, allows for the creation of digital maps that can be easily updated and analyzed, improving the accuracy and accessibility of land-related data. The integration of GIS with land administration processes resulted in the creation of Land Information Systems that combine spatial and non-spatial data for better decision-making.

3. Socio-Economic Needs:

The need for efficient land management systems is driven by several socio-economic factors. Rapid urbanization, population growth, and land development have led to the fragmentation of land ownership and increased pressure on land resources. In many countries, particularly in developing regions, land tenure systems can be complex, with unclear ownership rights and disputes over land use. An LIS helps streamline land registration, facilitates land transfers, and improves transparency, reducing the risk of fraud and conflicts.

Governments and urban planners need accurate, up-to-date information for effective land use planning, zoning, and policy-making. Furthermore, the rise of environmental concerns, such as climate change, resource management, and sustainable land use, calls for an integrated approach that considers both the physical and regulatory aspects of land.

4. Current Challenges in Land Management:

Despite the advancements in technology, many countries still rely on outdated land management systems that are fragmented, inefficient, and unable to handle the complexities of modern land governance. Some common challenges include:

- Lack of centralized and accurate land data.

- Problems with land ownership disputes and unclear land titles.
- Inadequate land use planning in rapidly growing urban areas.
- Limited access to land information by the public and stakeholders.

5. Purpose of the Study:

The purpose of the study of Land Information Systems is to examine how the integration of spatial and non-spatial land data can address these challenges. The study aims to explore the design, implementation, and effectiveness of LIS in improving land administration, increasing transparency, reducing disputes, and supporting informed decision-making in land use and management.

The study also investigates the role of LIS in promoting sustainable land use, supporting urban development, enhancing resource management, and contributing to national economic growth. Additionally, it may explore the potential barriers to LIS adoption, such as technological, financial, and institutional constraints, and provide recommendations for improving land governance through the use of these systems.

1.2 STATEMENT OF PROBLEM

Due to the challenges faced in land management and administration, particularly in Nigeria, land administration faces significant challenges such as inefficiency, lack of accurate data, inadequate accessibility to land records, and poor management of land resources. The absence of an integrated and automated system to store, update, and retrieve land data often leads to confusion, land disputes, and ineffective policy implementation. The complexity of managing land ownership, boundaries, transactions, and land use further exacerbates issues like corruption, encroachment, and the illegal allocation of land.

This situation results in substantial economic losses, delays in infrastructure development, and an overall lack of transparency and accountability in land management processes. Traditional land management systems are outdated, paper-based, and prone to human error, making it difficult for land stakeholders, including government agencies, developers, and the general public, to efficiently access and manage land-related information. The absence of a comprehensive and digitized Land Information System (LIS) impedes sustainable development and poses a significant barrier to effective urban planning, investment, and governance in land-related matters.

This problem statement addresses key issues like inefficiency, poor data management, disputes, and outdated systems that can be alleviated with the implementation of a comprehensive Land Information System.

1.3 AIM AND OBJECTIVES OF THE PRACTICAL

1.3.1 AIM OF THE PROJECT

The aim of this project is to provide an integrated platform for managing, storing, and analyzing land-related data to support efficient land administration, planning, and decision-making.

1.3.2 OBJECTIVES OF THE PROJECT

The following objectives were considered in order to accomplish the above aim

1. Project planning
2. Monumentation
3. Data downloading and data processing
4. Data analysis and information presentation
5. Query
6. Report writing

1.4 SCOPE OF THE PROJECT

The scope of the work involves detailed procedures for the development of Land Information System of Urban Estate. It however entails the creation of functional Database of the present situation of the research Area and to display digital Information and such as Ownership details, Parcel information, Plot type, Land use, Status was developed and other attribute information. All these entities and attributes will form the base for database creation.

Base and significance of this project, the scope includes;

1. Project planning: which include office planning and field reconnaissance

2. Monumentation: (At least 5 hectares of land according to Higher National Diploma)

3. Data acquisition (geometric data with total station, social survey through oral interview for the purpose of query and building name and colors

4. Data processing: This includes downloading and processing of data using appropriate software (AUTOCAD GIS software)

5. Information presentation: It involved plotting of survey data on both soft copy and hard copy showing correct location of points.

1.5 PERSONNEL

The following are the personnel who participated in the execution of the project.

Table 1.1 shows the personnel involved in project

S/N	NAME	MATRIC NO	REMARKS
1	AKEEM HAMID AJAGBE	HND/23/SGI/FT/0074	AUTHOR
2	ABDULFATAI ABDULAFEEZ O.	HND/23/SGI/FT/0120	MEMBER
3	AYODELE TAIYE OPEYEMI	HND/23/SGI/FT/0072	MEMBER
4	ABOLADE BISOLA OPEYEMI	HND/23/SGI/FT/0073	MEMBER
5	AFOLAYAN IFEOLUWA MARY	HND/23/SGI/FT/0077	MEMBER
6	AYEGBOYIN QUDUS A.	HND/23/SGI/FT/0071	MEMBER
7	ABDULQUADRI ABUBAKR S.	HND/23/SGI/FT/0075	MEMBER
8	ADEKUNLE FLORENCE A.	HND/23/SGI/FT/0123	MEMBER

1.6 STUDY AREA

Urban estate opposite Government cemetery area along OKE-OYI ROAD OKE-OSE ILORIN, KWARA STATE, ILORIN East local government area. (683903E, 946221N). The project site is geographically defined by these parameters; Latitude 8° 33' 23.443"N and Longitude 4° 40' 15.384"E

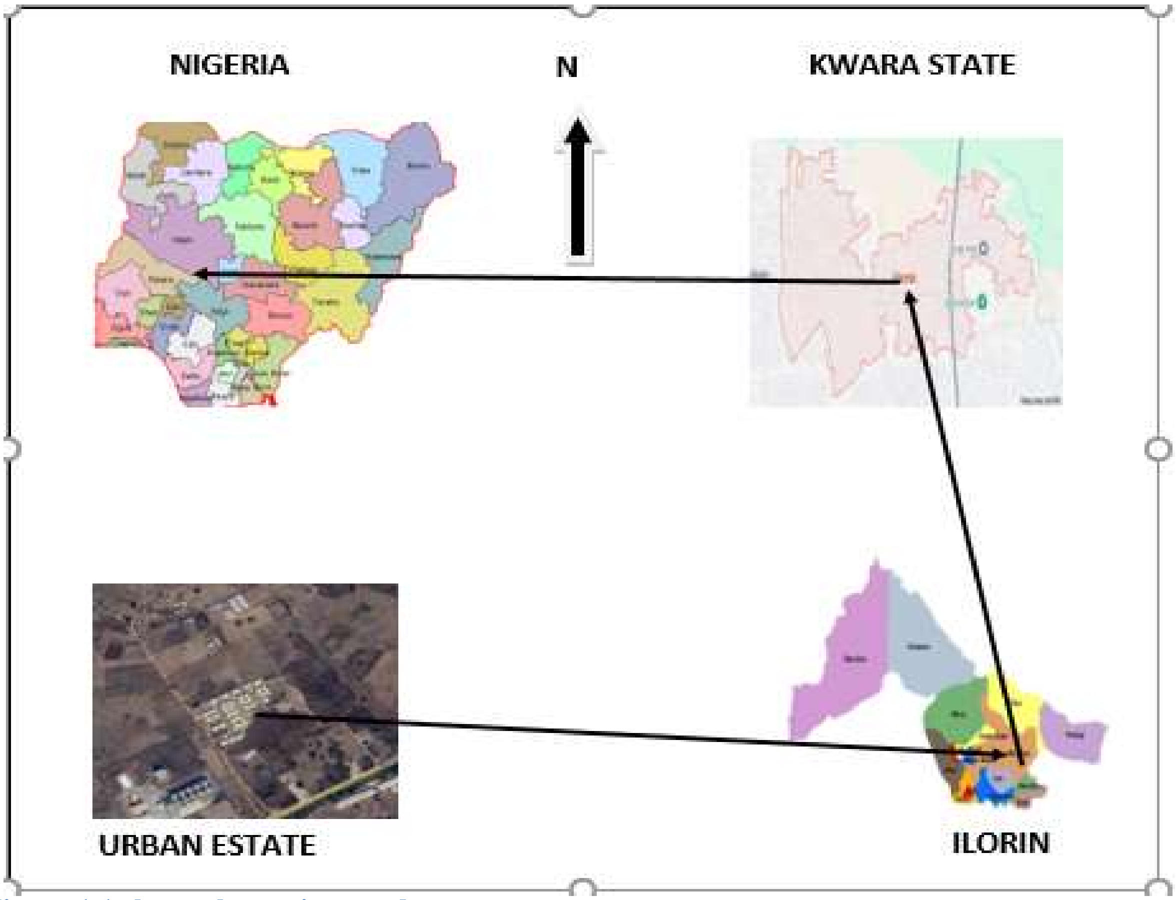


Figure 1.1 shows the project study area

1.7 SPECIFICATIONS

The project specifications were referenced to the speciation for land information system using total station which was sources from the Higher National Diploma. The specification includes the following:

i. Total station
ii. Minimum number of datum control required- three (3)
iii. Traverse should run between secondary or higher order control point.

CHAPTER TWO

2.0. LITERATURE REVIEW

A literature review on Land Information Systems (LIS) aims to provide a comprehensive overview of the evolution, technologies, applications, challenges, and future directions of these systems. The review will explore how Land Information Systems are used to manage land-related data, their integration with other spatial technologies, and their role in decision-making for land management.

2.1 Introduction to Land Information Systems (LIS)

Land Information Systems (LIS) are designed to collect, manage, and analyze land-related data, including information about land tenure, ownership, land use, and property boundaries (R OwusuAnsah - 2022 - essay.utwente.nl).

LIS are often seen as a tool for enhancing land management practices and providing stakeholders with accurate and up-to-date information for making informed decisions. They combine Geographic Information Systems (GIS) with land administration, cadastral data, and other spatial information (M BIRARO - 2022 - ris.utwente.nl).

2.2 Historical Development and Evolution

The concept of Land Information Systems emerged in the late 20th century as governments and organizations began to recognize the need for efficient land management tools. Traditionally, land records were kept in paper form, leading to issues of accessibility, accuracy, and duplication. Early LIS applications were developed to address these problems by digitizing land records and mapping the data onto digital platforms. Over time, advancements in GIS technology and database management systems have significantly enhanced the capabilities of LIS, enabling real-time data access, spatial analysis, and decision support.

2.3 Technological Foundations of LIS

LIS are built upon a combination of hardware, software, and data management systems. Key technological components include:

- Geographic Information Systems (GIS): GIS provides the spatial platform for mapping and analyzing geographic data, which is essential for visualizing land-related data.

- Database Management Systems (DBMS): These systems store and manage vast amounts of land-related information, including cadastral data, land tenure, and ownership records.

- Remote Sensing: Satellite and aerial imagery are often integrated into LIS to provide updated maps and support land use analysis.

- Global Positioning Systems (GPS): GPS is used for precise location-based data collection and mapping of land boundaries.

- Cloud Computing: Cloud platforms facilitate the storage, sharing, and processing of land data on a global scale.

2.4 Applications of Land Information Systems

LIS play a critical role in various sectors, including:

- Land Administration and Registration: LIS assist in recording and managing land ownership, transactions, and legal rights. This is crucial for ensuring transparency and preventing disputes.

- Urban Planning: By providing accurate land-use data, LIS supports zoning, land allocation, and infrastructure planning.

- Environmental Management: LIS helps monitor land cover changes, deforestation, and urban sprawl, aiding in sustainable development practices.

- Disaster Management and Risk Assessment: LIS are used to map vulnerable areas, assess risks, and assist in emergency response during natural disasters like floods or earthquakes.

- Agriculture: Farmers and agricultural planners use LIS for land suitability analysis, crop monitoring, and optimizing land use.

- Land Value Assessment and Property Taxation: Local governments utilize LIS for property tax assessments and to determine land values based on location and usage patterns.

2.5 Challenges in Implementing and Managing LIS

While LIS offer tremendous potential, several challenges hinder their widespread adoption and effectiveness:

- Data Quality and Accuracy: Ensuring the accuracy of land records and spatial data is a critical challenge, especially in regions with incomplete or outdated records.

- Interoperability: Integrating data from various sources (e.g., cadastral records, GIS layers, government databases) is often difficult due to differences in formats and standards.

- Legal and Institutional Barriers: In some countries, land tenure and property rights are poorly defined, complicating the implementation of LIS.

- Cost and Resource Constraints: Developing and maintaining a comprehensive LIS can be expensive, and many developing countries face budgetary constraints in building such systems.

- Data Security and Privacy: Protecting sensitive land data from unauthorized access and misuse remains a concern, particularly as more land information is digitized.

2.6 Future Directions of LIS

The future of LIS is marked by several key trends and advancements:

- Integration with Big Data and Artificial Intelligence (AI): By incorporating AI and machine learning algorithms, LIS could offer predictive analytics for land use planning and management.

- Block chain Technology for Land Registration: Block chain has the potential to provide a secure and immutable method for recording property transactions, ensuring transparency and reducing fraud.

- Crowd sourcing and Participatory Mapping: The use of mobile applications and crowd-sourced data can enhance the accuracy and timeliness of land information in remote areas.

- 3D Mapping and Modeling: As cities grow vertically, 3D GIS mapping is expected to play a larger role in representing land use and infrastructure in urban settings.

- Mobile Platforms: The increasing use of smartphones for collecting field data will facilitate the real-time updating of LIS and improve access to information in remote regions.

2.7 Governance and Policy Issues in Land Information Systems

The successful implementation of a Land Information System depends not only on technological capabilities but also on sound governance frameworks and policies. Land governance refers to the rules, processes, and institutions that regulate land use, access, and ownership. In the context of LIS, governance includes the legal and institutional structures that define how land data is collected, maintained, accessed, and shared.

- Legal Frameworks: A comprehensive legal framework is crucial for the establishment and functioning of LIS. This involves clear policies related to land tenure, property rights, dispute resolution, and land registration systems. In countries where land tenure is poorly defined or where land laws are unclear, the effectiveness of LIS can be significantly compromised.

- Institutional Coordination: Effective coordination between different stakeholders, including government agencies, local authorities, land surveyors, and private sector players, is essential for the successful implementation of LIS. In some regions, lack of institutional capacity or political will has slowed LIS adoption.

- Public Access to Information: The role of public participation and transparency in land information is becoming increasingly important. As more governments adopt open data policies, LIS systems are moving toward greater accessibility for the public, allowing citizens and communities to have a say in land governance.

2.8 Global Perspectives on Land Information Systems

Land Information Systems have been implemented in diverse contexts across the world. The effectiveness of LIS varies depending on the country's level of technological development, institutional capacities, and legal frameworks.

- Developed Countries: In developed countries like the United States, Canada, and the European Union, LIS are often sophisticated and integrated into national cadastral systems. These systems tend to have high data quality, and public access to land information is often ensured through open data policies. For example, countries like the Netherlands and Finland have highly advanced LIS that integrate land registration, taxation, and spatial planning systems.

- Developing Countries: In developing countries, the situation is more complex. Many countries in Africa, Asia, and Latin America face challenges in terms of data availability, legal frameworks, and institutional coordination. In these regions, land tenure insecurity and inadequate land records are widespread, and LIS can provide solutions, especially when integrated with land reform efforts. However, challenges such as incomplete data, lack of funding, and political instability may hinder successful implementation.

- Post-Conflict and Transitional Societies: For post-conflict countries or nations in transition, LIS can play a critical role in land reform and reconciliation processes. Disputes over land ownership and use are often exacerbated in such contexts, and LIS can provide a transparent means of recording land claims and rights, supporting the peacebuilding process.

2.9 Social and Economic Impacts of Land Information Systems

LIS have broad socio-economic impacts, influencing not just land administration, but also economic development, poverty alleviation, and social equity.

- Economic Development: Effective land information management can facilitate investment in land and property, increase land market efficiency, and help businesses and investors make informed decisions. By reducing the time and costs associated with land transactions, LIS also promote a more efficient allocation of resources.

- Poverty Alleviation: In many rural and peri-urban areas, secure land tenure is a critical determinant of poverty. LIS systems can help improve land rights security, particularly for marginalized populations, by providing accurate and accessible land information. This is important for enhancing the economic prospects of communities, especially in regions where land is a primary asset.

- Social Equity and Inclusivity: LIS can help ensure social equity by enabling marginalized groups, such as women, indigenous people, and rural communities, to access land rights and manage resources. In some parts of the world, LIS have been used to promote gender equality in land rights, where women are often excluded from property ownership or land registration.

2.10 Sustainability and Environmental Management

Land Information Systems are vital tools in supporting sustainable land use and environmental management, particularly in the context of climate change and environmental degradation.

- Land Use Planning: LIS facilitate efficient land use planning by providing data on land use patterns, natural resources, and land suitability. This can guide decisions on zoning, urban expansion, and infrastructure development. For example, in cities experiencing rapid urbanization, LIS can assist in identifying areas for sustainable development and preventing urban sprawl.

- Environmental Monitoring: By integrating remote sensing data with land information, LIS can monitor environmental changes such as deforestation, soil erosion, and wetland degradation. This helps to track progress toward sustainability goals and provides early warning signs for environmental hazards.

- Climate Change Adaptation: In the context of climate change, LIS can assist governments and organizations in assessing vulnerability and planning adaptation strategies. This includes mapping areas at risk of flooding, droughts, or other climate-related events, and supporting land-use decisions that are more resilient to changing environmental conditions.

2.11 Data Standards and Quality Assurance

The successful integration and functioning of Land Information Systems depend heavily on the quality and consistency of the data used within the system. This has led to the development of various data standards and protocols to ensure interoperability and data quality.

- Data Standards: Establishing common standards for land data is essential to ensure that information from different sources (e.g., government agencies, private sector, or non-governmental organizations) can be integrated and used effectively. International standards, such as those developed by the International Organization for Standardization (ISO), are often adopted to guide LIS development.

- Data Quality: Data accuracy, precision, and currency are critical for the reliability of LIS. Ensuring high-quality data requires continuous updating, validation, and verification processes, particularly when dealing with dynamic land use changes or land ownership transactions. The use of technologies like GPS and remote sensing plays an important role in improving data accuracy.

2.12 User Needs and Stakeholder Engagement

The design and implementation of LIS should be tailored to the specific needs of the stakeholders who will be using them. Engaging stakeholders in the development process is crucial for ensuring that LIS meet the practical requirements of land administrators, policy makers, businesses, and the general public.

- Stakeholder Identification: Key stakeholders include government agencies responsible for land administration, urban planners, landowners, real estate developers, environmental organizations, and community groups.

- User-Centered Design: To ensure that LIS are user-friendly and meet stakeholder needs, their design should consider factors such as accessibility, ease of use, and language. This is particularly important in developing countries where literacy rates may be low, and complex technical interfaces can be a barrier to widespread use.

A Land Information System project is the work done by Dr. John Smith (hypothetical name), who conducted a study on the development and implementation of a LIS for land tenure management in (Kigali, Rwanda). The project aimed to improve land administration and secure property rights in urban areas by digitizing land records and implementing a GIS-based mapping system to monitor land use and ownership. The project was funded by international development agencies and local government support.

In regions where land conflicts are common, LIS systems are also being used to help resolve disputes. By digitizing land records and providing clear, accessible data, LIS can help resolve conflicting claims and improve land tenure security. In (Ghana), for example, the LIS project supports both land administration and conflict resolution by ensuring transparent land records are accessible to both authorities and landowners.

Contributions from Key Researchers and Projects:

Prof. Mohamed Ali Hamade (Hypothetical Name) conducted research on the integration of GIS and remote sensing technologies in (Egypt) to enhance land administration and improve property mapping in rural areas. His work helped design a hybrid system that integrated spatial data and legal land records, making land registration more efficient and reducing property disputes in regions with complex land tenure systems.

Dr. Sarah Ochieng (Hypothetical Name) worked on a project in (Kenya), focusing on the role of Land Information Systems in promoting sustainable land management practices and supporting the government's vision for "smart cities." Dr. Ochieng's research emphasized the potential of using LIS to monitor urban sprawl, inform land policy decisions, and promote.

In Land Information System (LIS) implementation in Nigeria is (Dr. John A. O. Olayinka). He was instrumental in pioneering GIS and LIS efforts in Nigeria, particularly in the Lagos State Government.

- -Name: Dr. John A. O. Olayinka
- Location: Lagos State, Nigeria
- Area: Urban Planning and Development, Land Administration

Dr. Olayinka was part of the team that contributed to the development of a GIS-based Land Information System for Lagos State, beginning in the early 2000s. His work focused on integrating modern technologies to streamline land management, improve urban planning, and ensure efficient land resource management for the state.

The use of GIS and LIS in Lagos State has been a model for other regions in Nigeria, contributing significantly to land tenure security and effective land administration.

Land parcel is basic unit for access and control of land, land use and decisions. Current reliable and information necessary for many public programs, for example: Land planning, Infrastructural development and maintenance, Environmental protection and resource management, Emergency services, Basis for land market, development, and other economic activities and Social services programs. However, all organizations need information in order to survive. Most organizations have a large number of data sources but are hampered by their inability to combine them in a meaningful way. Developing a good land information system in Nigeria has been hindered by so many obstacles as stated by Asoegwu, R.N. (unpublished 2000):

- Most parcels of land have not been located by proper surveys that are tied to the national framework of controls;
- The records of land already surveyed are either not available or faulty;
- The records that are pertinent to the parcels of land properly surveyed are not located in a central place;
- Inadequate laws that could enforce the compulsory collection of appropriate land data;
- Ignorance on the part of experts to appreciate the need for land records;
- Reluctance of some governments to fund adequately long-term projects that do not yield immediate profits;
- Initial high cost/financial barrier. Conventional paper-based map information, any information associated with a map feature has to be recorded separately.

A simple example is topographical map showing the parcels of land, and properties in a particular location where the details relating to these land and properties would need to be referred to other files and records. There is a need for a tool to manage the huge volume of map data. There is a need also for a system that will remain flexible enough to handle the sophisticated modern needs of mapping information. The solution is Land Information System.

CHAPTERTHREE

3.0 METHODOLOGY

This stage involves the methods and procedure used in planning, data acquisition, data processing, and creation of database, creation of database management system and information presentation. These operations were logically structured and carried out in stages involving database design. It is normally considered to involve a spatially referenced and structured digital database and appropriate application software for geospatial analysis. This basically describes the techniques and principles adopted in carrying out the project.

Geographic information system methods were adopted in accomplishing the desired results.

3.1 DATABASEDESIGN

The design of any database involves three stages

namely;

i Conceptual design

ii Logical design

iii Physical design

3.1.1 VIEW OF REALITY

In database design, there is need for reality which is referred to as the phenomenon that actually exists, including all aspects which may or may not be perceived by individuals. The view of reality however, is the mental abstraction of the reality for a particular application or group of applications.

For this application, the view of reality is made of the topography of the project. Since it is not possible to represent the real world, the only option is to conceptualize and model it in a specified manner to represent the real world. The area of interest to using this project

Includes;GreenReserve,Roads,Electricpoles,Trees,WaterFacilities,Buildings,Footballpitch,Streams.

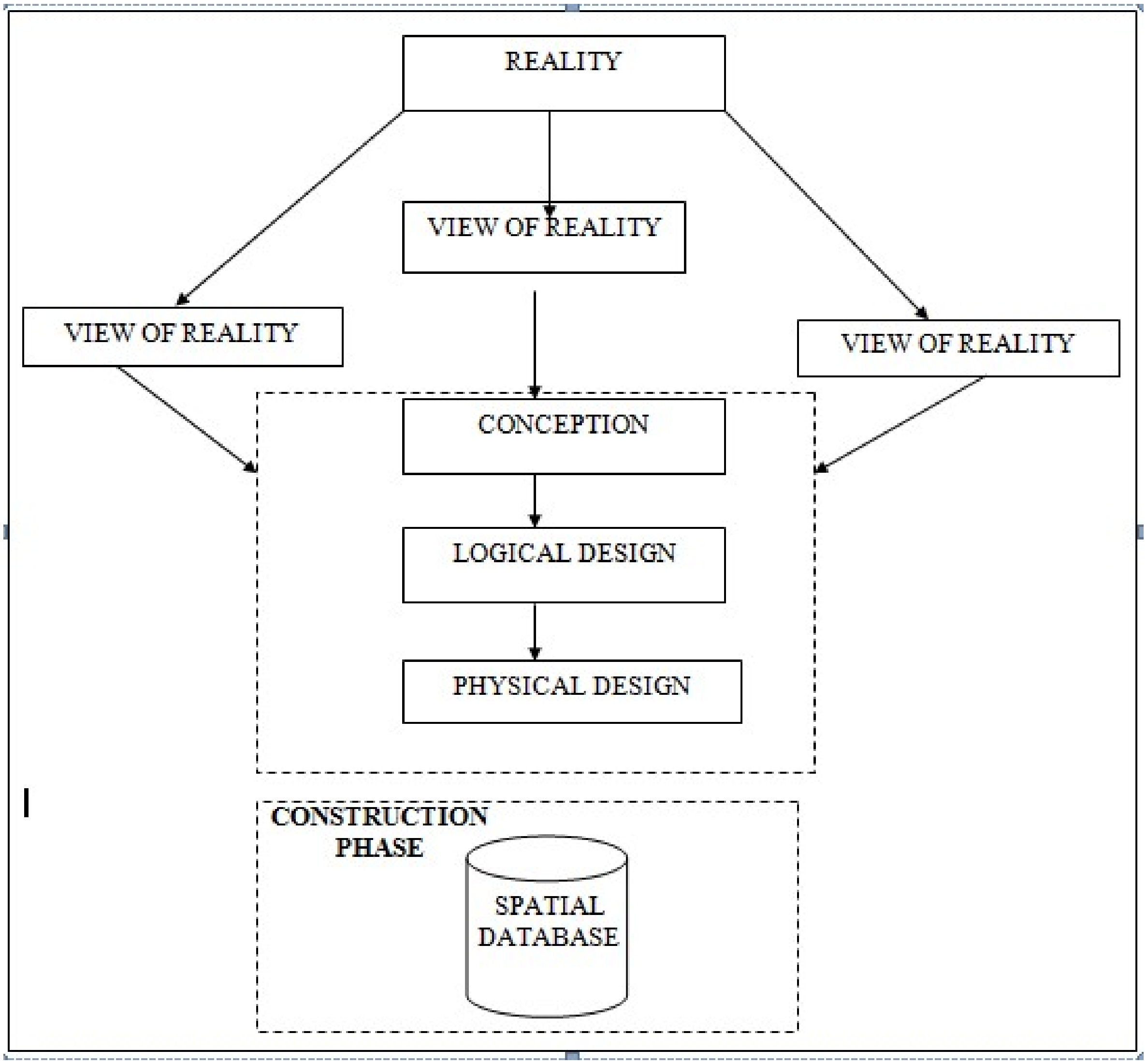


Fig.3.1Design and Construction Phases in Spatial Database

3.1.2 CONCEPTUALDESIGN

Vector data mode list the data type adopted for this project, which is represented, by points, lines and polygon. The identified entities are:-

a. Vegetation area (polygon)

b. Roads(line)

c. Trees(point)

d. Boundary line (polygon)

e. Buildings(polygon)

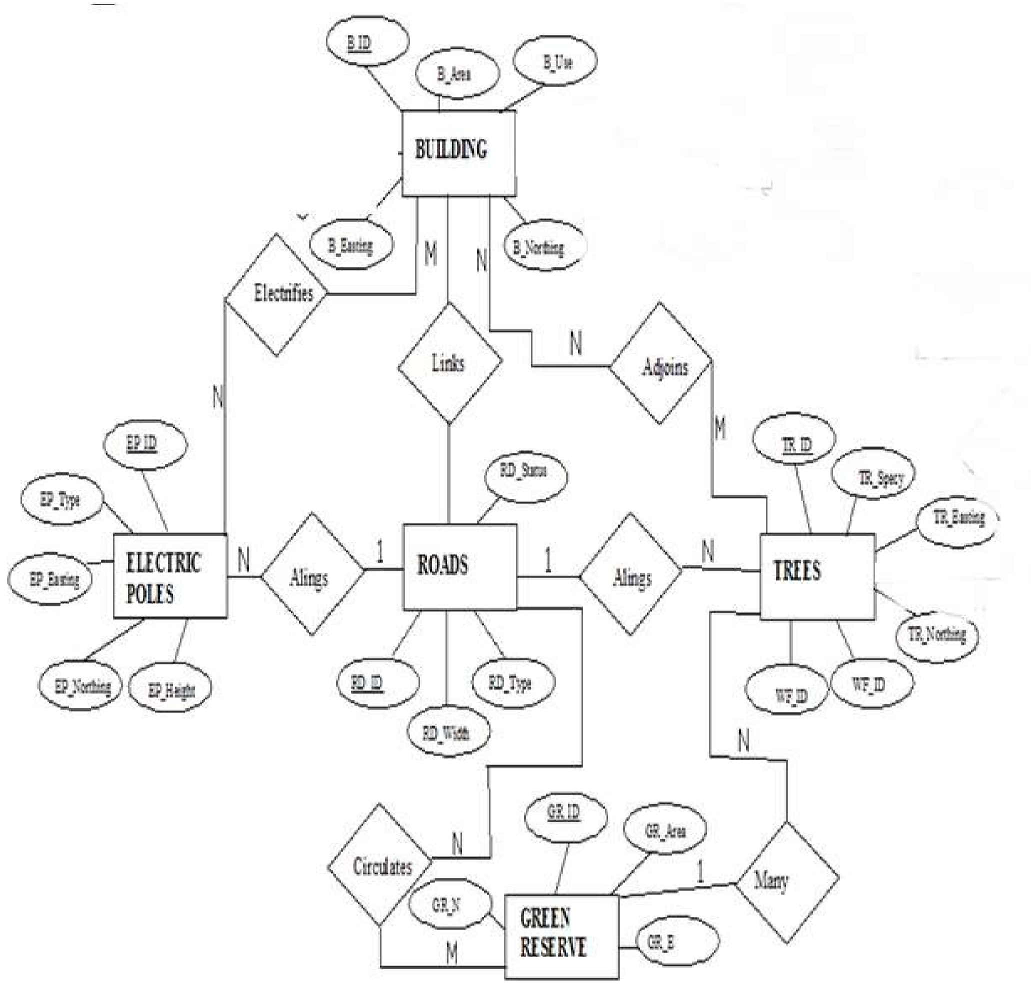


Fig.3.2.:E-RDiagram(Entityrelationship diagram)

3.1.3 LOGICALDESIGN

This is the design aspect of the database refers to the process of creating a conceptual framework or model that represents the structure and organization of spatial data within the system. It involves defining the data element, their relationship, and therules for data manipulation and analysis. In this phase, the entities, their attributes and their relationships are represented in a single uniform manner in form of relation in such a way that would be no information loss and at the same time no unnecessary duplication of data. In this study, the logical database design is employed to generate a geo-relation database structure. Each entity has unique identifier in bold type. An attribute type or combination of attribute types that serves to identify an entity typeis termed an identifier.

i Building (B_ID,B_Area, B_Name,B_Easting,B_Northing)

ii Roads (R_ID,R_Width,R_Type,R-Condition,R_Easting,R_Northing)

iii Vegetation (V_ID,GR_Area,)

iv Tree (TR_ID,TR_spp,TR_Importance,TR_Easting,TR_Northing)

v Electric Pole (EP_No,EP_Type,EP_Height,EP_Easting,EP_Northing)

vi Water Facility (WF_ID,WF_Depth,WF_Type,WF_Easting,WF_Northing)

vii Football Pitch(FP_ID,FP_Area,FP_Status)

viii Stream (S_ID,Length,Width)

3.1.4 PHYSICALDESIGN

Table3.1: Building and its attribute

ENTITY	DESCRIPTION
B_ID	Building Identification
B_name	Building Name

B_Area	Building Area
B_Easting	Building Easting
B_Northing	Building Nothings

Table3.2:Road an ditsattributes

ENTITY	DESCRIPTION
R_ID	RoadIdentifier
R_Length	RoadLength
R_Width	Road Width
R_Type	RoadType
R_Condition	RoadCondition

Table3.3:Treesand its attributes

ENTITY	DESCRIPTION
TR_ID	Tree Identifier
TR_Spp	Tree specy
TR_E	Tree_ Easting
TR_N	Tree Northing

Table3.4.:VegetationanditsAttributes

ENTITY	DESCRIPTION
V_ID	Vegetation Identifier
V_Area	Vegetation Area
V_E	Vegetation Easting

V_N	Vegetation Northing

3.2 RECONNAISSANCE

This is the preparatory stage before the execution of this project; it involves collection of available information about the project area.

The necessary step taken for the successful execution of the project involves two stages, which are:-

1. Office Planning
2. Field reconnaissance

3.2.1 OFFICEPLANNING

This involves the collection of information about the study area, testing the instrument to be used in execution of the project and itemizing the numbers of equipment needed, number of days to be use, how each activity is to be carried out, delegation of works to each team members based on supervisor's guide/instructions.

Table.3.5CoordinatesofControls

Station	Northing(m)	Easting(m)	Height(m)
KPT 120X	945235.040	682280.278	211.976
KWCS102	945738.095	683583.702	201.532
SC/KWEAS5072	945974.041	684070.314	200.087

Source: office of surveyor general kwara state

3.2.2 FIELDRECONNAISSANCE

The field reconnaissance is the first visitation to the project site to get intimated with the environment.

i. Boundary points was selected

ii. The distribution of features was studied

iii. Controls to be used were located

iv. Method and type of instrument to be uses was determined

v. Subsidiary point for Ground control Points were picked and define using nail and bottle cock

vi. A diagram of the study area was drawn.

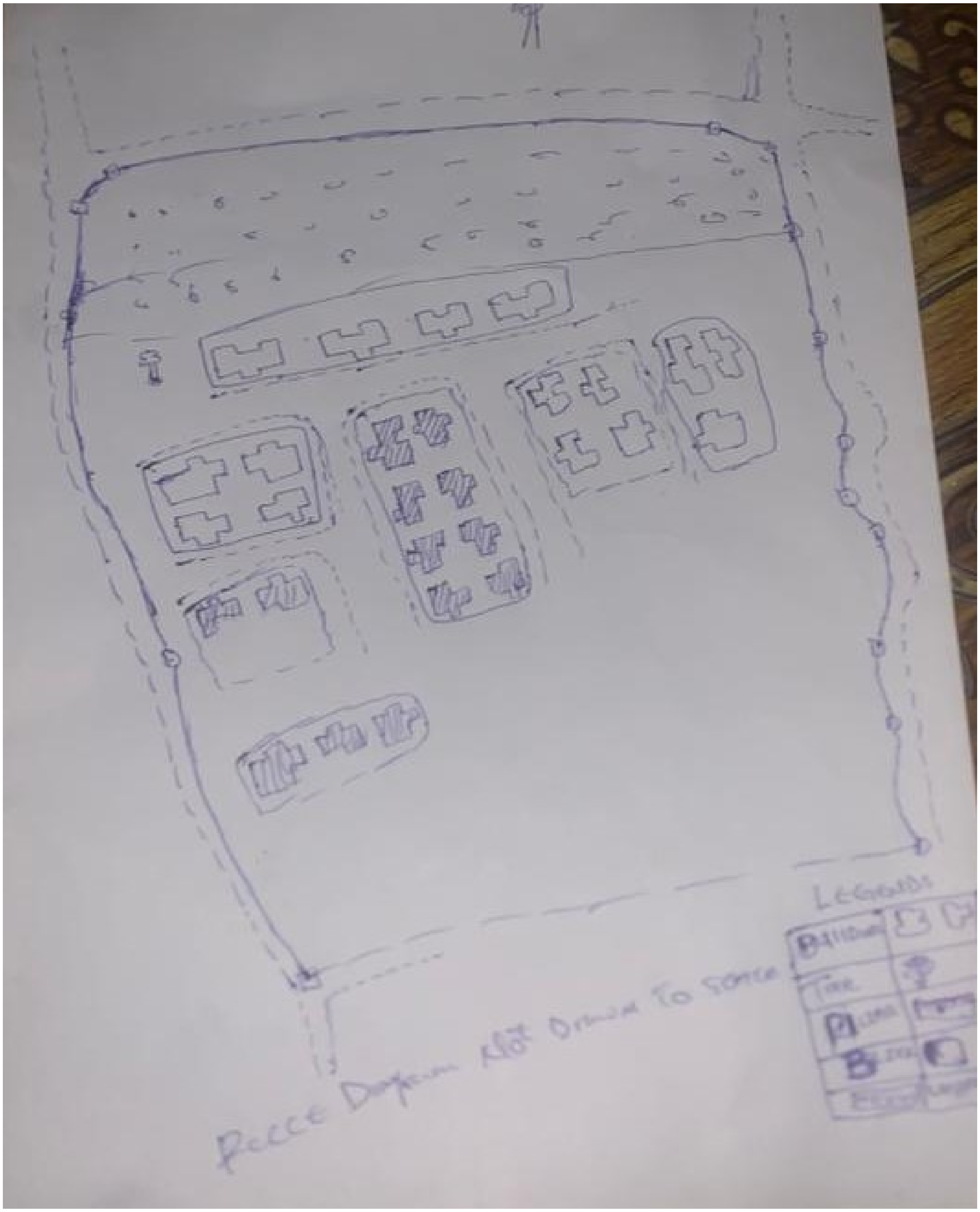


Fig.3.3: Reccediagramofthestudy area (notdrawn to scale)

3.3 EQUIPMENTUSED/SYSTEMSELECTIONANDSOFTWARE

3.3.1 HARDWAREUSED

i. Total station

ii. 1reflectorwith a tracking rod.

iii. 1Tripod

iv. One(1)50m tape

v. One(1)umbrella

vi. 1cutlass

vii. Handheld GPS

viii. Hammer

ix. Nails and bottle cover

x. Field book and writing materials

xi. 1-NoofPersonalComputerHP655 and its accessories

xii. 1-NoofHP DeskJetK7100 A3 printer

xiii. 1-NoofHPDeskJet 1110 A4printer

3.3.2 SOFTWARECOMPONENT

i. Notepad.

ii. Microsoft Excel.

iii. AutoCAD2007

iv. ArcGIS10.2

v. Microsoft Word.

3.4 INSTRUMENTTEST

To ensure data quality, the Total Station used for this project was tested for both vertical index and horizontal collimation errors .It was also to ascertain the efficiency and reliability of the instrument. The procedure used is described below.

3.4.1 HORIZONTALCOLLIMATIONTEST

This test was conducted to ensure that the line of sight was perpendicular to the trunnion axis. The Total Station was positioned over a specific point, and initial adjustments were made to ensure proper alignment, leveling, and focus (to eliminate parallax in the telescope). A vertical target was placed at a distance of 100 meters from the Total Station. To access the configuration menu of the Total Station, the menu key was pressed and held for approximately 2 seconds. From the main menu, the calibration sub-menu was selected, and within that, the horizontal collimation test option was chosen. The target was then observed and divided into two halves, with horizontal readings recorded for Face left and Face right. The readings are shown in Table 3.4.1 below.

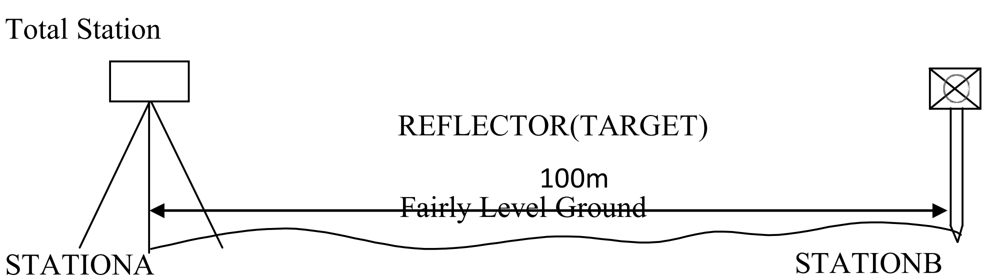


Fig3.4; Horizontal Collimation and Vertical Index error test.

Table3.6: Horizontal Collimation Data

Station	Target	Face	Hz Reading	Difference	Error
A	B	L	38˚42‟32”		
		R	218˚42‟35”	180˚00‟03”	03”

Source field work

3.4.2 VERTICALINDEXERRORTEST

This test was conducted to verify the accuracy of the vertical reading when the line of sight is horizontal. The desired measurement for this test is exactly ninety degrees (90˚), any deviation from this value is referred to as the vertical index error.

The Total Station was positioned over a specific point, and necessary temporary adjustments were made to ensure proper alignment and functionality. A target was placed approximately100 meters away from the Total Station, and the instrument was aimed at the target .The target was bisected by aligning the instrument on the face left, and the corresponding reading was recorded. Similarly, the target was then bisected on the face right, and the respective reading was also recorded. The recorded readings are provided below:

Table3.7: Vertical Index Data

Instrument Station	Target Station	Face	Vertical	Sum	Error
A	B	L	90˚00‟00”		
		R	270˚00‟02”	360˚00‟02”	02”

Source field work

3.4.3 ANALYSISOFCOLLIMATIONANDVERTICALINDEXDATA

The reading obtain during calibration were reduced to obtain new collimation and vertical errors.

Horizontal collimation={(FR–FL)–180}/2={(00˚00‘‘03”}/2=1.5”

Verticalcollimation={(FL+FR)–360}=(90˚00‘‘00”+270˚00‘‘02”)-360}=02”Theresult shows that the instrument is still in good working condition.

3.5 CONTROLCHECK

Three control beacons (**KPT 120X**, **KWCS102** and **SC/KWEAS5072**) were used.In order to ascertain the in-situ of the control beacons, a check was carried out on them by observing the angle between them and comparing the result obtained with the computed angles from the giving coordinates.

The total station instrument was set on the control beacon **KWCS102**. After performing all the necessary temporary adjustment, the reflector was placed on the control beacon **KPT 120X** which served as the back station. The horizontal angular reading was taken and recorded while the instrument was on face left. The reflector was then taken to the control beacon **SC/KWEAS5072** which serves as the forward station, the horizontal angle reading was then taken and recorded on both face left and face right. The reflector was taken back to the back station, the horizontal angle was then recorded on face right.

Table3.8: Table showing the back computation of the control coordinates

From STN	Bearing	Dist (m)	ΔN	ΔE	Northing(m)	Easting(m)	ToSTN
					945235.040	682280.278	KPT 120X
KPT 120X	68°53'46"	1397.130	503.050	1303.424	945738.095	683583.702	KWCS102
KWCS102	64°07'57"	540.797	235.946	486.612	945974.041	684070.314	SC/KWEAS5072

Source: office of surveyor general kwara state

Table3.9 : Table showing the distance observation result of the control check

FROM	OBSERVED DISTANCE (m)	COMPUTED DISTANCE (m)	TO
KPT 120X	1397.029	1397.130	KWCS102
KWCS102	540.694	540.797	SC/KWEAS5072

Table3.1 0 : Table showing the observation result of the control check

STN	SIGHT	FACE	OBSERVEDH ZANGLE	REDUCED HZ ANGLE	MEAN
	KPT 120X	L1	357° 08'47"		
KWCS102	KPT 120X	L2	288° 14'07"	68° 54'40"	
	SC/KWEAS5072	R2	108° 52'13"	68° 54'46"	
	SC/KWEAS5072	R1	177° 46'59"		68° 54' 43"

Difference in angle (observed -computed)=68°54'43"-68°54'40"

=00° 00'03"

Since the allowable accuracy (angular) of third order traverse of one station is 00° 00' 30" and the result obtained from the control check (00°00'03") is less than allow able error. Therefore, the controls were angularly intact.

3.6 MONUMENTATION

The boundary of the area carved out was demarcated with the precast concrete beacons, after clearing the required line of sights. The identified points of changes in directions were dug and beacons were buried on it, leaving about 15cm part of the beacon above the ground level. The beacons were buried at convenient distances as dictated by the nature of the boundary.

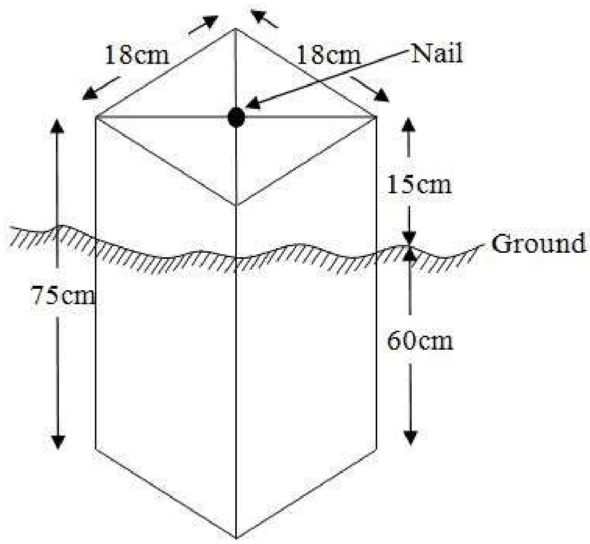


Fig.3.5: Pillar Description

3.7 DATAACQUISITION

It's fundamental to digital mapping. Data acquisition here implies security coordinate data of map features in a computer compatible from there exist several topographical data collection techniques the choice of a particular technique depends on the source of data available hardware / software, envisage revel of accuracy, man power etc. apart from field and laboratory data acquisition data may be obtained from social survey, in this project, data acquisition it refers the ways and method through which the data used were obtained. There was divided in to two viz; geometric data and attribute data

PRIMARYDATASOURCE

Field observation was the primary source of data for this project. Ground based method was used in acquiring data with the use of Total Station Instrument, which involved the collection of X, Y, Z data through coordinated Ground control Points (GCP) established at conspicuous points within the study area

SECONDARYDATASOURCE

Animageryoftheareawasacquiredthrough UpdatedGoogleearth;thiswasusedtoascertainthe extent ofcoverageof theproject area.

3.7.1 GEOMETRICDATAACQUISITION

The total station instrument was set carefully on control point; **KWCS102** back sight taken to **KPT 120X** after necessary station adjustments has been carried out on it. The adjustments include; centering, leveling and focusing. The following procedures were then followed to determine the position of the next point **SC/KWEAS5072** and the same procedure were repeated until all we come close to the site. The method used in acquiring data on site was radiation method where two or more points are coordinated from one point.

i. Having setup the instrument and temporary adjustment carried out,the instrument was powered „on‟ and a job was created under job menu in the internal memory of the instrument. The job created was named GRP5B

ii. On the job, the coordinates of the three (3) control points were keyed in to the memory of the instrument and some codes were also saved. The codes include „RD‟forroad,„SP‟forspotheight,„BD for buildings ,etc.

iii. The height of the instrument was measured and saved on the memory of the instrument as well as the reflector height.

iv. On coordinate menu, orientation was set by inputting the coordinates of the instrument station and back sight. The reflector at the back station was perfectlybisectedbeforetheorientationwasconfirmedbyclicking„yes‟.

Having done the orientation, the reflector at the next nail; was bisected and „obs‟(observe)optionwasclicked.Thethreedimensionalcoordinateofthepoint N, H) were displayed on the display unit of the instrument and „rec‟ (record) was clicked to save the detain to the memory of the instrument. For subsequent to observation after this, "all‟ option was used instead of pressing „obs‟ and pressing

„ Record‟ later.

v. It was ensured that the center of the prism of the reflector was bisected and that itwassetperfectlyonthetripodinordertominimizetheerroronheightdetermination.

vi. The instrument is been shifted to another nail after all details, spot height and boundary point visible from the instrument station have been picked, set over it and temporary adjustments carried out.

Nonetheless, the above operations were repeated until all the boundary points with heights were coordinated.

In this project all spot height are not in grid intervals but randomly acquired. Three edges (3) of building were picked. At the end of data acquisition process all details were acquired and properly recorded to be shown in their respective positions on the plan.

3.7.2 TTRIBUTESDATAACQUISITION

Attributedataisinformationaboutspatialfeatures.Theyprovidethecharacteristics,description and nomenclature about spatial objects. Thus the attributes data acquired includes names of buildings and their uses such as classrooms, roads, water facilities and prominent natural features likes river and trees found and vegetation were properly identified within and around the study area.

3.8 DATADOWNLOADINGANDPROCESSING

3.8.1 DATADOWNLOADINGANDEDITING

This is stage whereby all data acquired which were automatically stored in the Total Station were downloaded into personal computer. This was done with the aid of downloading cable connected to the computer and some associated complementing software installed on the System.

3.8.2 DATAPROCESSINGANDDATAEDITING

The geometric data downloaded were further processed in order to convert it to auseful format and to enhance its accuracy. The output coordinates, were edited and exportedin *.txt, *.xls and *.pdf format. Thereafter, they were imported into Arc GIS 10.3 for further operations and to carryout spatial analysis.

3.8.3 DATA PROCESSING IN AUTOCAD

The AutoCAD is tool that can be used for design and drawings, the software was built to general drawing standard hence the difficulty that comes with localizing this standard to various discipline.

Plotting in AutoCAD can be achieved using coordinate geometry (COGO)by either running script file (.scr) or using the command line (i.e. inputting the values using keyboard). In this project plotting was achieved by using command line in AutoCAD environment. The layout plan was produced as shown in figure below.

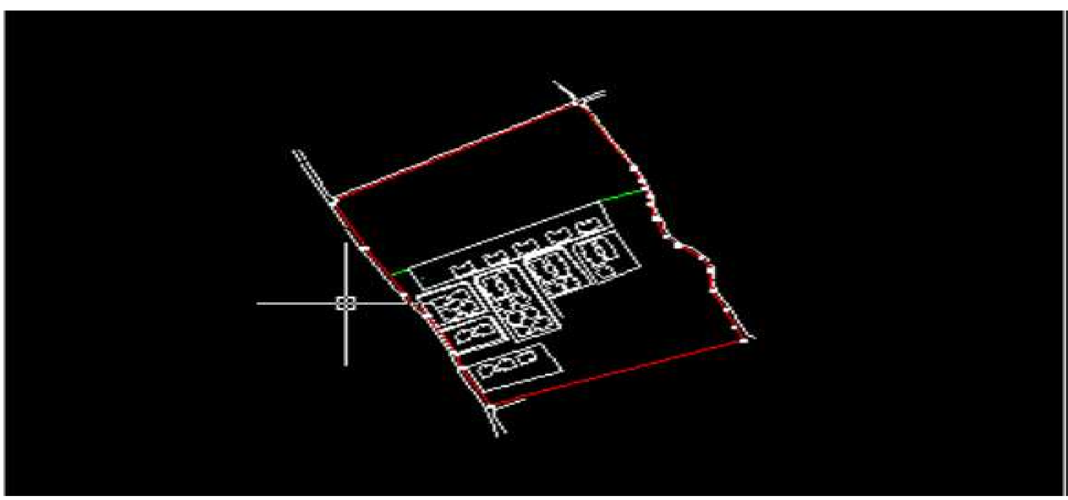


Figure 3.6 shows the layout plan in AutoCAD

Exporting to Arc View, cad file can be exported to GIs software environmental for final cartographic production. This requires that the graphic data can be in a standard exchange format. A standard graphic data exchange format AutoCAD dxf (data exchange format).

3.8.4 DATAPROCESSINGUSINGARCGIS10.3 SOFTWARE

Is one of the contemporary software that is easy and facilitate geographic system operation design, map production, analysis and result computation possibility in any spatial project. Arc View was launched by double clicking on the desktop shortcut icon. See the attribute table in table 3.1

Table

BLD

OBJECTID *	SHAPE *	SHAPE_Length	SHAPE_Area	BLD_COND	BLD__YEAR	BLD_NAME
1	Polygon	66.109612	188.639047	GOOD	2024/2025	MR ALIRU IBRAHEEM
2	Polygon	60.581841	156.903823	GOOD	2024/2025	MR FAWAS HASSAN
3	Polygon	64.998052	182.261182	GOOD	2024/2025	MRS SULAIMAN MUSA
4	Polygon	63.612702	174.081686	GOOD	2024/2025	MR OGUNDEGBO
5	Polygon	63.669847	187.086143	GOOD	2024/2025	MR ASHEER
6	Polygon	79.14498	268.60093	GOOD	2024/2025	MRS AKEEM SEMIAT
7	Polygon	76.521803	232.452935	GOOD	2024/2025	MRS ELIZABETH O.
8	Polygon	50.346939	138.085159	GOOD	2024/2025	MR MURITALA MUSA
9	Polygon	76.347123	244.80315	GOOD	2024/2025	MR HAMED TOYYIB
10	Polygon	80.375451	258.836124	GOOD	2024/2025	MR AWONIYI FIYIN
11	Polygon	50.026159	134.681929	GOOD	2024/2025	MR LEKAN SALAMI
12	Polygon	48.248453	125.263314	GOOD	2024/2025	MR SIKIRU AFEES
13	Polygon	79.108336	258.044627	GOOD	2024/2025	MR QUDUS WAISU
14	Polygon	79.623041	253.855207	GOOD	2024/2025	MR ALIU SHEU
15	Polygon	51.177929	138.283597	GOOD	2024/2025	MRS ALIU RAFAT
16	Polygon	49.745097	125.461477	GOOD	2024/2025	MRS ROFIAT AKEEM
17	Polygon	52.046513	136.459776	GOOD	2024/2025	MR KAFI ALIU
18	Polygon	49.568075	131.721162	GOOD	2024/2025	MR SOLIU
19	Polygon	48.126995	125.903441	GOOD	2024/2025	MR FATAI WALIU
20	Polygon	50.003073	133.809415	GOOD	2024/2025	MR SEMIU AKANO
21	Polygon	49.002194	127.382158	GOOD	2024/2025	MRS BARAKAT LUKMAN
22	Polygon	50.868973	137.488206	GOOD	2024/2025	MRS MUSAH ABEEB
23	Polygon	47.676939	115.937421	GOOD	2024/2025	MRS HAMID MAKANJU
24	Polygon	50.517576	135.529881	GOOD	2024/2025	MR ABDUL WALIU
25	Polygon	48.478043	121.518568	GOOD	2024/2025	MR SIKIRUDEEN MUHEEZ
26	Polygon	50.227298	133.213764	GOOD	2024/2025	MR LAWAL ABDUL
27	Polygon	50.642426	130.068298	GOOD	2024/2025	MR KAZEEM MUIZ
28	Polygon	48.156818	126.304516	GOOD	2024/2025	MRS SULIAT HAMID
29	Polygon	50.330841	129.997333	GOOD	2024/2025	MR DAUD ISSAH

Figure 3.7 shows the attribute table

It demonstrates capability of carrying out a wide range of spatial analysis that may required in land administration. The land information system (LIS) was robust enoughto produce (spatial and non spatial). It was subjected to as show in figure 2 below;

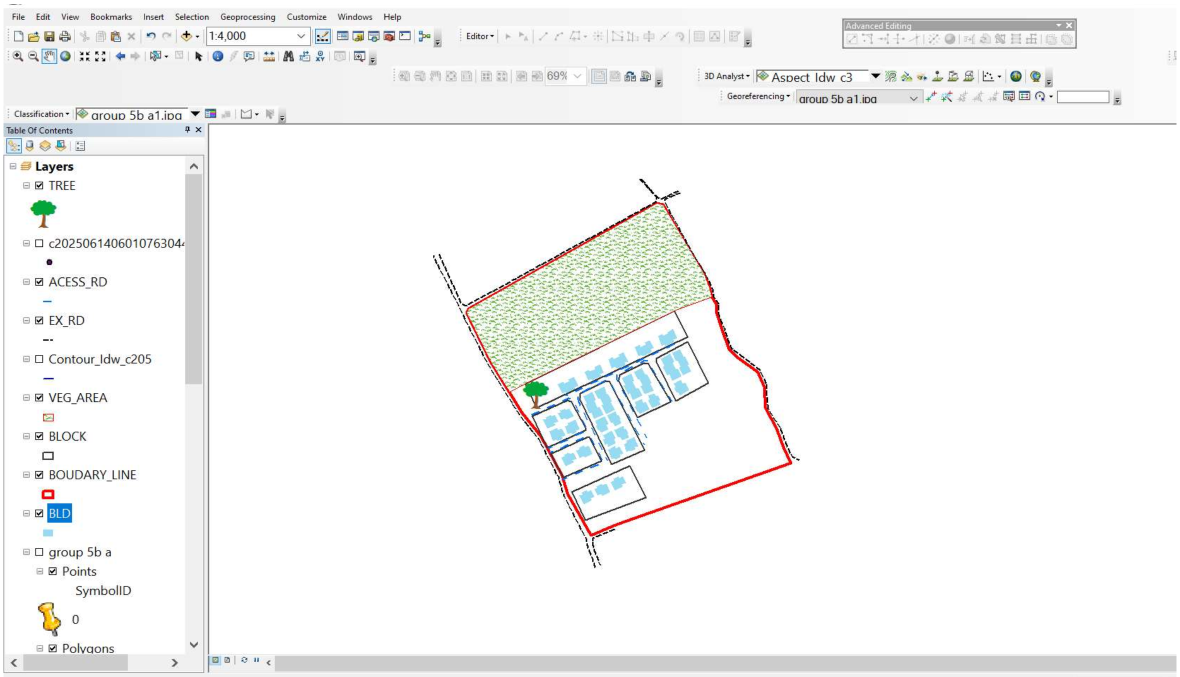


Figure 3.8 shows lay out view in Arc View windows

3.9 DATABASEIMPLEMENTATION

This is the database creation phase. Having completed the three stages of design phase (i.e .Reality, Conceptual and Logical design), the database was created using ArcGIS10.2 software. It involves the combination and storage of acquired graphic data and attributes detain creating the database for the purpose of spatial analysis and query. Database is an organized integrated collection of data stored so as to be capable of use by revenant application with data being accessed by different logical part. After the Attribute table was populated via the keyboard, some attributes such as areas of settlements wereautomaticallydisplayedbyspecialcommandintheArcGIS10.3version.TheArcGISsoft warewas used to link the graphic data and table for query generation.

3.9.1 DATABASEMANAGEMENTSYSTEMS

Database management is a collection of software for creating, storing, manipulating, updating, organizing and querying of information in a database (Kufoniyi, 1998). It is a soft ware package whose function is to manipulate a database on behalf of the user.

A good DBMS must provide the following functions:

- Storage and retrieval of data.
- Access to by several users at a time.
- A standardized interface between database and application programmed.
- Standardized access to data and separation of data storage and retrieval functions from the program using the data.
- Maintenance of data security and integrity.

3.9.2 DATABASEMAINTENANCE

Having created the database, proper maintenance practice was made to meet its stated objectives. The ability to include more data and remove irrelevant data was possible by way of maintenance. There is every need for the data to be updated regularly because of the physical changes that may occur on the landscape with time. Both security and integrity were also exercised to ensure maintenance and to meet its stated objectives.

Proper observance, updating and management of database ensure its currency and quality to stand a profound chance in Spatial Decision Support System (SDSS). The quality of any database depends on the currency and fitness for use as a decision support system (SDSS).The quality of database depends on its ability to generally fit and use as a decision system(DSS). The storage media should be from time to time justified if otherwise could necessitate data inaccessibility or physical deterioration of the storage media. Also care must be taken during populating any database system, as a database is only good as the data supplied. In archiving stable media should be used. Examples of these are

- Computer compatible tape reader
- Magnetic tape
- Optical disc and compact disc

3.9.3 BACK

COMPUTATION Table

3.11: Back Computation

STATION	BEARING	DISTANCE	△ N	△ E	X	Y
PLI					683783.92	946362.91
PL2	29.3204759	5.024	4.38	2.46	683786.38	946367.29
PL3	60.1999543	5.024	107.56	187.81	683974.19	946474.85
PL4	80.2050939	216.430	-1.06	6.14	683980.33	946473.79
PL5	29.0826063	6.231	-43.42	24.15	684004.48	946430.37
PL6	31.0277537	49.684	-27.63	16.62	684021.1	946402.74
PL7	22.4875944	32.243	-14.47	5.99	684027.09	946388.27
PL8	12.3717585	15.661	-8.89	1.95	684029.04	946379.38
PL9	30.6880943	9.101	-7.97	4.73	684033.77	946371.41
PL10	2.1210964	9.268	-9.45	0.35	684034.12	946361.96
PL11	16.5707862	9.456	-15.56	4.63	684038.75	946346.4
PL12	18.9152817	16.234	-20.34	6.97	684045.72	946326.06
PL13	45.9066824	21.501	-9.95	10.27	684055.99	946316.11
PL14	53.0182916	14.299	-14.18	18.83	684074.82	946301.93
PL15	24.0882347	23.572	-14.36	6.42	684081.24	946287.57
PL16	3.58605376	15.730	-22.02	1.38	684082.62	946265.55
PL17	27.1949902	22.063	-22.07	11.34	684093.96	946243.48
PL18	19.8029979	24.813	-19.69	7.09	684101.05	946223.79
PL19	24.910475	20.928	-14.75	6.85	684107.9	946209.04
PL20	70.0543082	16.263	-62.93	-173.41	683934.49	946146.11
PL21	66.1235099	184.476	-11.5	-25.98	683908.51	946134.61
PL22	28.6170141	28.411	42.87	-23.39	683885.12	946177.48
PL23	17.7033955	48.836	18.64	-5.95	683879.17	946196.12
PL24	26.8588441	19.567	40.46	-20.49	683858.68	946236.58
PL25	38.7557659	45.353	23.27	-18.68	683840	946259.85
PL26	30.6827093	29.840	52.92	-31.4	683808.6	946312.77
pl1	26.2074157	61.534	50.14	-24.68	683783.92	946362.91

3.9.4 AREA COMPUTATION

Table3.12:Area Computation

STN	X	Y	P	Q
PT1	683783.92	946362.91		
PT2	683786.38	946367.29	647110735315.977	647110068395.166
PT3	683974.19	946474.85	647186611442.543	647290800620.245
PT4	683980.33	946473.79	647363643871.480	647370180239.700
PT5	684004.48	946430.37	647339756794.622	647392312562.579
PT6	684021.1	946402.74	647343714044.275	647378342760.807
PT7	684027.09	946388.27	647349545472.497	647365112210.227
PT8	684029.04	946379.38	647349133337.404	647357059795.361
PT9	684033.77	946371.41	647345527065.746	647355455151.663
PT10	684034.12	946361.96	647343539283.389	647350334632.509
PT11	684038.75	946346.4	647333226939.168	647348252165.950
PT12	684045.72	946326.06	647323695174.825	647344204557.408
PT13	684055.99	946316.11	647323484812.549	647340009836.099
PT14	684074.82	946301.93	647323503565.061	647351022611.350
PT15	684081.24	946287.57	647331499115.987	647347397688.793
PT16	684082.62	946265.55	647322510813.282	647338880159.033
PT17	684093.96	946243.48	647308718956.318	647334547311.078
PT18	684101.05	946223.79	647305979547.308	647326158223.654
PT19	684107.9	946209.04	647302597783.492	647319169906.941
PT20	683934.49	946146.11	647266028405.269	647144997205.790
PT21	683908.51	946134.61	647094091961.699	647077376332.396
PT21	683908.51	946134.61	647094091961.699	647077376332.396
PT22	683885.12	946177.48	647098830542.355	647047381296.003
PT23	683879.17	946196.12	647089447069.734	647071069695.092
PT24	683858.68	946236.58	647111486954.039	647064429644.322
PT25	683840	946259.85	647108011957.998	647074422867.200
PT26	683808.6	946312.77	647126524636.800	647060623264.710
PT27	683783.92	946362.91	647131096579.026	647073455416.658
PT1	683783.92	946362.91	647107740342.407	647107740342.407
			17475740681785.300	17475740804893.100
			2A	123107.891
			AREA	61553.945
			HECTARES	6.155

CHAPTERFOUR

4.0 SPATIALANALYSESANDPRESENTATION

GIS is distinct among other information system because of its spatial analytical capability;especiallyoverlayoperation,buffering,spatialsearch,topographicoperation,andn eighborhoodandconnectivityoperations.GISusesthisspatialanalyticalcapabilitytoanswerfu ndamentalgenericquestionoflocation,condition,trend,routing,patternandmodeling by the manipulation and analysis of input data. The major analyses performed in this project were overlay operations, topographic operations and spatial search.

4.1 TESTINGOF DATABASE

This is the test carried out to determine whether there exists a relationship between datamodeledaboutentitiesinaspatialdatabaseaswellasputtingintotestitsretrievalcapabilities . This was done by designing a sample query with certain conditions attached and the query will began to see if desired result is achieved.

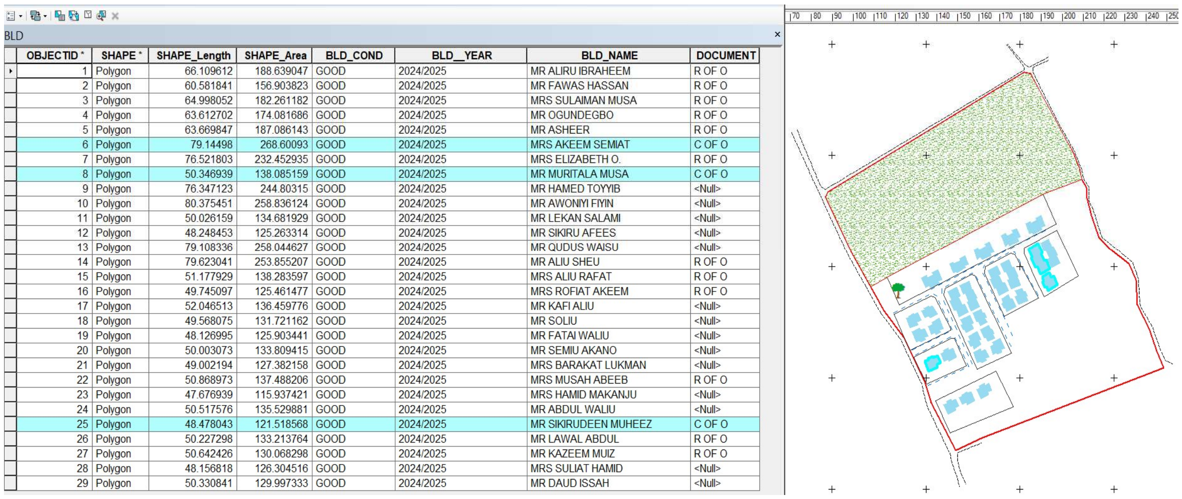
Analysis of Result

Data captured were full to ensure standardization of task. Coordinated point were used in order to produce information required (LIS) and lastly to decision making and produce the output in digital form, while the attribute presented in tabular form. In most GIS operation package including arc view these include measurement techniques, query analysis and geometric operation in this project include questions such as:-

- Residential land use
- Vegetation area
- Developed area
- Slope aspect
- Building that does not have C of O
- Building that have C of O

- Building that have R of O

The above listed queries are shown in blue



OBJECTID *	SHAPE *	SHAPE_Length	SHAPE_Area	BLD_COND	BLD__YEAR	BLD_NAME	DOCUMENT
1	Polygon	66.109612	188.639047	GOOD	2024/2025	MR ALIRU IBRAHEEM	R OF O
2	Polygon	60.581841	156.903823	GOOD	2024/2025	MR FAWAS HASSAN	R OF O
3	Polygon	64.998052	182.261182	GOOD	2024/2025	MRS SULAIMAN MUSA	R OF O
4	Polygon	63.612702	174.081686	GOOD	2024/2025	MR OGUNDEGBO	R OF O
5	Polygon	63.669847	187.086143	GOOD	2024/2025	MR ASHEER	R OF O
6	Polygon	79.14498	268.60093	GOOD	2024/2025	MRS AKEEM SEMIAT	C OF O
7	Polygon	76.521803	232.452935	GOOD	2024/2025	MRS ELIZABETH O.	R OF O
8	Polygon	50.346939	138.085159	GOOD	2024/2025	MR MURITALA MUSA	C OF O
9	Polygon	76.347123	244.80315	GOOD	2024/2025	MR HAMED TOYYIB	<Null>
10	Polygon	80.375451	258.836124	GOOD	2024/2025	MR AWONIYI FIYIN	<Null>
11	Polygon	50.026159	134.681929	GOOD	2024/2025	MR LEKAN SALAMI	<Null>
12	Polygon	48.248453	125.263314	GOOD	2024/2025	MR SIKIRU AFEES	<Null>
13	Polygon	79.108336	258.044627	GOOD	2024/2025	MR QUDUS WAISU	<Null>
14	Polygon	79.623041	253.855207	GOOD	2024/2025	MR ALIU SHEU	R OF O
15	Polygon	51.177929	138.283597	GOOD	2024/2025	MRS ALIU RAFAT	R OF O
16	Polygon	49.745097	125.461477	GOOD	2024/2025	MRS ROFIAT AKEEM	R OF O
17	Polygon	52.046513	136.459776	GOOD	2024/2025	MR KAFI ALIU	<Null>
18	Polygon	49.568075	131.721162	GOOD	2024/2025	MR SOLIU	<Null>
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21	Polygon	49.002194	127.382158	GOOD	2024/2025	MRS BARAKAT LUKMAN	<Null>
22	Polygon	50.868973	137.488206	GOOD	2024/2025	MRS MUSAH ABEEB	R OF O
23	Polygon	47.676939	115.937421	GOOD	2024/2025	MRS HAMID MAKANJU	<Null>
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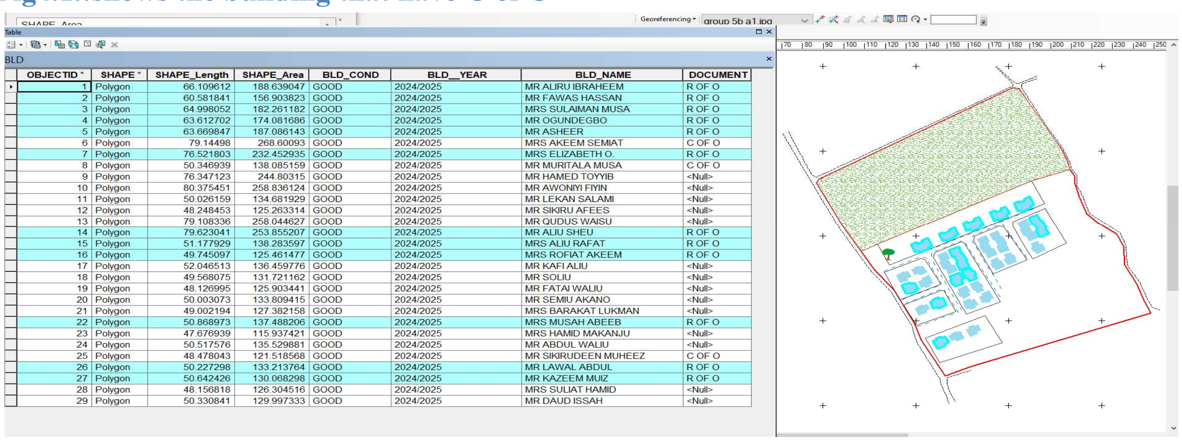
25	Polygon	48.478043	121.518568	GOOD	2024/2025	MR SIKIRUDEEN MUHEEZ	C OF O
26	Polygon	50.227298	133.213764	GOOD	2024/2025	MR LAWAL ABDUL	R OF O
27	Polygon	50.642426	130.068298	GOOD	2024/2025	MR KAZEEM MUIZ	R OF O
28	Polygon	48.156818	126.304516	GOOD	2024/2025	MRS SULIAT HAMID	<Null>
29	Polygon	50.330841	129.997333	GOOD	2024/2025	MR DAUD ISSAH	<Null>

Fig4.1.:shows the building that have C of O



OBJECTID *	SHAPE *	SHAPE_Length	SHAPE_Area	BLD_COND	BLD__YEAR	BLD_NAME	DOCUMENT
1	Polygon	66.109612	188.639047	GOOD	2024/2025	MR ALIRU IBRAHEEM	R OF O
2	Polygon	60.581841	156.903823	GOOD	2024/2025	MR FAWAS HASSAN	R OF O
3	Polygon	64.998052	182.261182	GOOD	2024/2025	MRS SULAIMAN MUSA	R OF O
4	Polygon	63.612702	174.081686	GOOD	2024/2025	MR OGUNDEGBO	R OF O
5	Polygon	63.669847	187.086143	GOOD	2024/2025	MR ASHEER	R OF O
6	Polygon	79.14498	268.60093	GOOD	2024/2025	MRS AKEEM SEMIAT	C OF O
7	Polygon	76.521803	232.452935	GOOD	2024/2025	MRS ELIZABETH O.	R OF O
8	Polygon	50.346939	138.085159	GOOD	2024/2025	MR MURITALA MUSA	C OF O
9	Polygon	76.347123	244.80315	GOOD	2024/2025	MR HAMED TOYYIB	<Null>
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14	Polygon	79.623041	253.855207	GOOD	2024/2025	MR ALIU SHEU	R OF O
15	Polygon	51.177929	138.283597	GOOD	2024/2025	MRS ALIU RAFAT	R OF O
16	Polygon	49.745097	125.461477	GOOD	2024/2025	MRS ROFIAT AKEEM	R OF O
17	Polygon	52.046513	136.459776	GOOD	2024/2025	MR KAFI ALIU	<Null>
18	Polygon	49.568075	131.721162	GOOD	2024/2025	MR SOLIU	<Null>
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20	Polygon	50.003073	133.809415	GOOD	2024/2025	MR SEMIU AKANO	<Null>
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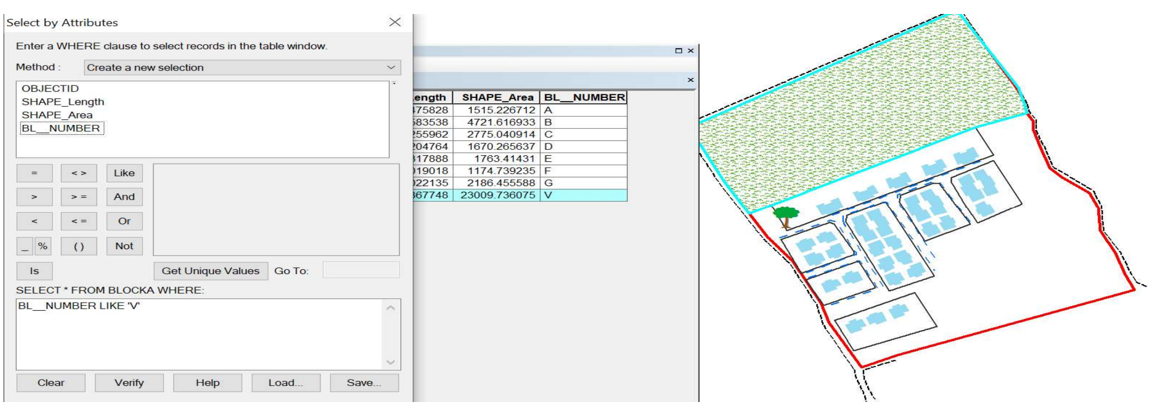
23	Polygon	47.676939	115.937421	GOOD	2024/2025	MRS HAMID MAKANJU	<Null>
24	Polygon	50.517576	135.529881	GOOD	2024/2025	MR ABDUL WALIU	<Null>
25	Polygon	48.478043	121.518568	GOOD	2024/2025	MR SIKIRUDEEN MUHEEZ	C OF O
26	Polygon	50.227298	133.213764	GOOD	2024/2025	MR LAWAL ABDUL	R OF O
27	Polygon	50.642426	130.068298	GOOD	2024/2025	MR KAZEEM MUIZ	R OF O
28	Polygon	48.156818	126.304516	GOOD	2024/2025	MRS SULIAT HAMID	<Null>
29	Polygon	50.330841	129.997333	GOOD	2024/2025	MR DAUD ISSAH	<Null>

Fig4.2:shows the building that have R of O



ength	SHAPE_Area	BL__NUMBER
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583538	4721.616933	B
255962	2775.040914	C
204764	1670.265637	D
317888	1763.41431	E
)19018	1174.739235	F
)22135	2186.455588	G
367748	23009.736075	V

Fig 4.3: show the area use for vegetation

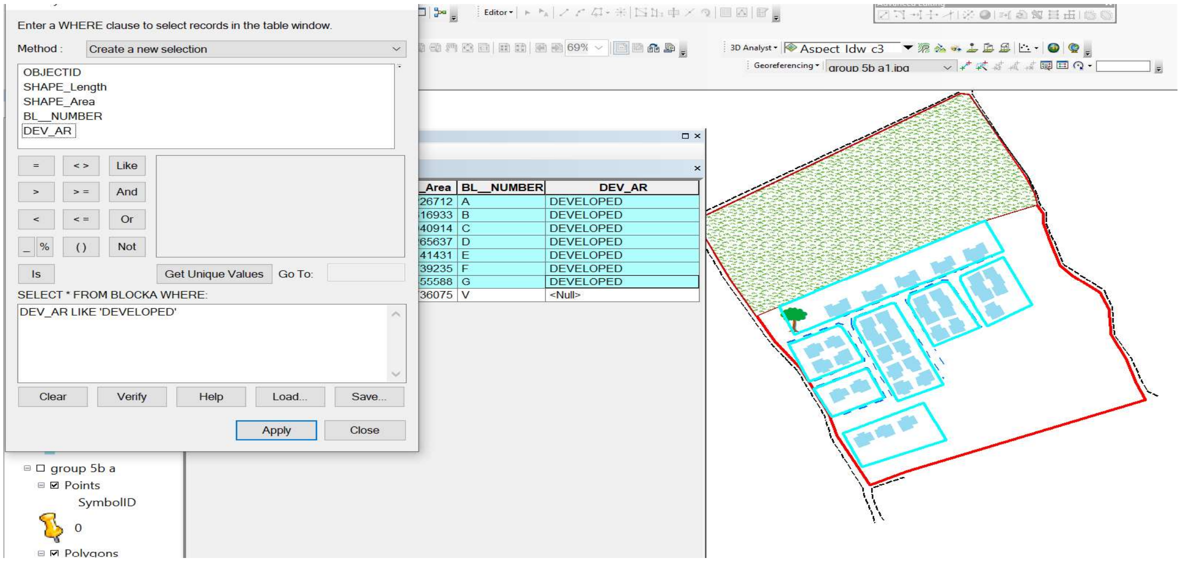

Fig 4.4: show the developed area

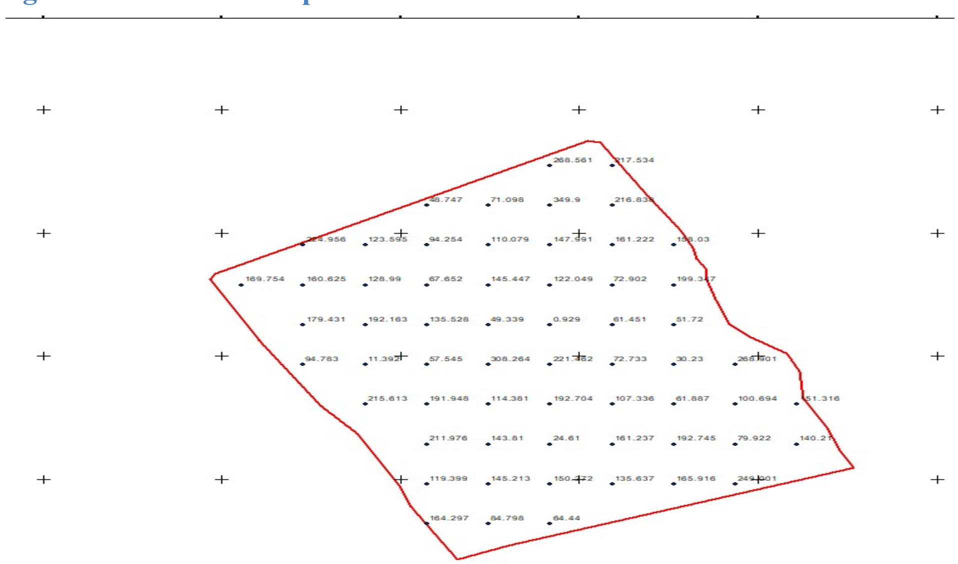

Figure 4.5 shows the spot height

This is the compass direction of that a slope faces and it plays a significant role in environmental and land management decision

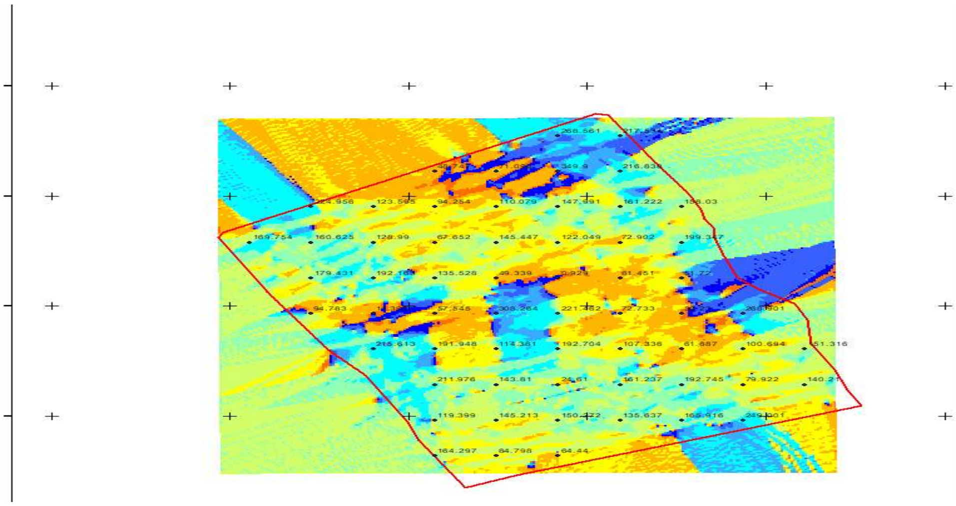

Figure 4.6 shows the slope aspect

The total number of building in the lay out are29 all of them are residential and vegetation area is 1, the table 4.1 below shows the land use percentage

Table 4.1 shows the land use percentage

Residential	0.475266 percent
Vegetationarea	2.292255 percent

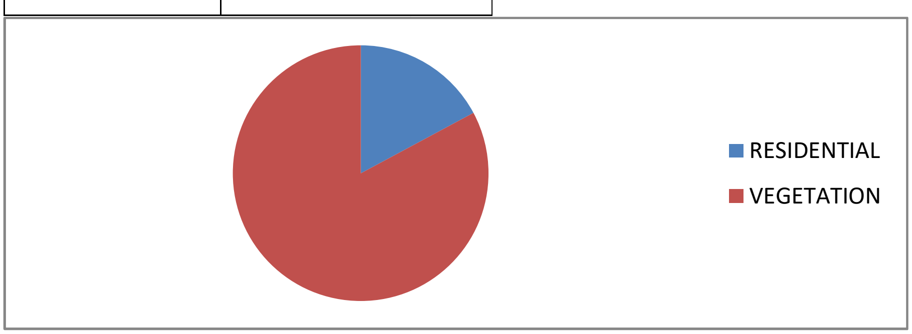

Figure 4.7 shows the pie chart of land use

CHAPTER FIVE

5.0 COST ESTIMATION, SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 COST ESTIMATION

RECCONNAISSANCE

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	Group leader	1	5000	1	5000
2	Ass group leader	1	2500	1	2500
3	Basic equipment	1	25000	1	25000
4	Transportation	1	3000	1	3000

Subtotal = #35,500

Monumentation

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	Group leader	1	5000	1	5000
2	Ass group leader	1	2500	1	2500
3	Skilled labor	3	1500	1	4500
4	Basic equipment	1	25000	1	25000
5	Transportation	1	7500	1	3000

Subtotal = #40,000

Beaconing

S/N	**PERSONNEL**	**QTY**	**DAILY RATE**	**NO OF DAYS**	**REMARK**

1	Group leader	1	5000	1	5000
2	Ass group leader	1	2500	1	2500
3	Basic equipment	1	5000	1	5000
4	Transportation	1	3000	1	3000

Subtotal = #5,500

Beacon

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	Group leader	1	5000	1	5000
2	Ass group leader	1	2500	1	2500
3	Beacon	10	1000	1	10,000
4	Transportation	1	3000	1	3000

Subtotal = #19,500

Traversing

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	supervisor	1	6000	1	6000
2	Group leader	1	5000	1	5000
3	Ass group leader	1	2500	1	2500
4	Skilled labour	6	1500	1	10,000
5	Basic equipment	1	25000	1	5000
6	Transportation	1	10,500	1	10,500

Subtotal = #43,500

Spot height

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	Supervisor	1	6000	2	12,000
2	Group leader	1	5000	**2**	10,000
3	Ass group leader	1	2500	2	5000
4	Skilled labor	6	1500	2	20,000
5	Basic equipment	1	25000	1	5000
6	Transportation	1	10,500	2	21,000

Subtotal = #73,000

Data processing

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	Group leader	1	5000	1	5000
2	Ass group leader	1	2500	1	2500
3	Basic equipment	1	10,000	1	10,000
4	Generator and fuel	1	10,000	1	10,000

Subtotal = #27,500

Technical report

S/N	PERSONNEL	QTY	DAILY RATE	NO OF DAYS	REMARK
1	Group leader	1	5000	1	5000
2	Ass group leader	1	2500	1	2500
3	Basic equipment	1	10,000	1	10,000
4	Generator and fuel	1	10,000	1	10,000

Subtotal = #27,500

Sum total = **271,500.00**

Contingency allowance = $\frac{271{,}500.00 \times 5}{100}$ = **13,575**

VAT = $\frac{271{,}500.00 \times 7.5}{100}$ = **20,362.5**

ACCOMODATION = $\frac{271{,}500.00 \times 1.5}{100}$ = **4,072.5**

MOB/DEMB = $\frac{271{,}500.00 \times 10}{100}$ = **27,150**

GLEARANCE TAX = **65, 159.5**

5.2 SUMMARY

The project is based on land information system (LIS) of Urban Estate at Oke-Ose Ilorin Opposite Government Cemetry Along Sango Oke-Oyi Road, Ilorin East local Government Area, Kwara State. The reconnaissance was done in order to have thorough sketch of an area, the data were acquired using TOTAL STATION survey method in a static mode. The pillar descriptions and detailing were done TOTAL STATION; the data processing involves transformation of reduction book and adjustment of acquired data using forward computation. The survey was done in accordance to the specifications stipulated and a total number of thirty-two (5) pillars were buried all together and the final coordinate (X, Y, Z) value of all buried pillars were obtained. The plan was produced using AutoCAD and GIS software at a suitable scale and data were presented in both hardcopy and softcopy finally, a comprehensive report was written covering the whole procedures employed in the execution of the project using Microsoft word.

5.3 PROBLEM ENCOUNTERED

It is occasional for a successful project to start and end without facing any problem but every problem encountered was taking to be a challenge. The pole was given a problem during the project is not good at all and also, Communication between rover and reference was another serious problem encountered mobile phone was employed to resolve the problem.

5.4 CONCLUSION

Having completed the project successfully, the aims and land information system were achieved to serve as a base for further survey operations. The whole project was done in accordance with specification stipulated and direct supervision according to departmental instructions.

5.5 RECOMMENDATION

At this juncture, I hereby recommend that:

i. More digital equipment should be bought by the school which could be used for the precise work so as to build up students to meet up with advanced technology and to make work easier for them.

ii. The school authority should try and find solution to the issue of instrument and the project should be issued on time to enable the student to meet up with the date specified.

iii. Finally, the land information should be extending to other part of the town by student for public and private uses and records should be kept in order to avoid land dispute of in our area.

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APPENDIX

STN	X	Y	H
PT1	683783.92	946362.91	164.297
PT2	683786.38	946367.29	84.798
PT3	683974.19	946474.85	64.44
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PT6	684021.1	946402.74	150.272
PT7	684027.09	946388.27	135.637
PT8	684029.04	946379.38	165.916
PT9	684033.77	946371.41	249.001
PT10	684034.12	946361.96	211.976
PT11	684038.75	946346.4	143.81
PT12	684045.72	946326.06	24.61
PT13	684055.99	946316.11	161.237
PT14	684074.82	946301.93	192.745
PT15	684081.24	946287.57	79.922
PT16	684082.62	946265.55	140.21
PT17	684093.96	946243.48	215.613
PT18	684101.05	946223.79	191.948
PT19	684107.9	946209.04	114.381
PT20	683934.49	946146.11	192.704
PT21	683908.51	946134.61	107.336
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PT23	683879.17	946196.12	100.694

PT24	683858.68	946236.58	151.316
PT25	683840	946259.85	94.783
PT26	683808.6	946312.77	11.392
PT27	683783.92	946362.91	57.545
PT28	683893.31	946163.83	164.297
PT29	683924.4	946163.83	84.798
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PT32	683924.4	946196.18	145.213
PT33	683955.5	946196.18	150.272
PT34	683986.59	946196.18	135.637
PT35	684017.68	946196.18	165.916
PT36	684048.77	946196.18	249.001
PT37	683893.31	946228.52	211.976
PT38	683924.4	946228.52	143.81
PT39	683955.5	946228.52	24.61
PT40	683986.59	946228.52	161.237
PT41	684017.68	946228.52	192.745
PT42	684048.77	946228.52	79.922
PT43	684079.86	946228.52	140.21
PT44	683862.22	946260.87	215.613
PT45	683893.31	946260.87	191.948
PT46	683924.4	946260.87	114.381
PT47	683955.5	946260.87	192.704
PT48	683986.59	946260.87	107.336

PT49	684017.68	946260.87	61.887
PT50	684048.77	946260.87	100.694
PT51	684079.86	946260.87	151.316
PT52	683831.13	946293.21	94.783
PT53	683862.22	946293.21	11.392
PT54	683893.31	946293.21	57.545
PT55	683924.4	946293.21	308.264
PT56	683955.5	946293.21	221.462
PT57	683986.59	946293.21	72.733
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PT59	684048.77	946293.21	268.901
PT60	683831.13	946325.56	179.431
PT61	683862.22	946325.56	192.163
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PT63	683924.4	946325.56	49.339
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PT81	684017.68	946390.25	158.03
PT82	683893.31	946422.6	48.747
PT83	683924.4	946422.6	71.098
PT84	683955.5	946422.6	349.9
PT85	683986.59	946422.6	216.838
PT86	683955.5	946454.95	268.561
PT87	683986.59	946454.95	217.534