PROJECT REPORT

ON

TOPOGRAPHIC INFORMATION SYSTEM OF PART OF JUDGES QUARTERS, TANKE, ILORIN SOUTH LOCAL GOVERNMENT AREA, ILORIN KWARA STATE

BY

OLABOSOYE GIFT FUNMILAYO
HND/23/SGI/FT/034

PROJECT SUBMITTED TO THE DEPARTMENT OF SURVEYING AND GEO-INFORMATICSINSTITUTE OF ENVIRONMENTAL STUDIES

IN PARTIAL FUFILMENT OF THE REQUIRMENT FOR THEAWARD OF HIGHER NATIONAL DIPLOMA (HND) IN SURVEYING AND GEO-INFORMATICS

MAY, 2025

CERTIFICATE

I hereby certified that the information given in this project was obtained as a result of the observation and measurement made by me and that the survey was carried out in accordance with survey laws, regulations and departmental instructions.

………………………………

OLABOSOYE GIFT FUNMILAYO

Matric. No: HND/23/SGI/FT/034

CERTIFICATION

This is to certify that this project was carried out by OLABOSOYE GIFT FUNMILAYO with Matric No: HND/23/SGI/FT/034 under my instruction and supervision for the award of Higher National Diploma in Surveying and Geoinformatics, Kwara State Polytechnic, Ilorin, Kwara State Nigeria.

I hereby declared that she has conducted herself with due diligence, honesty and sobriety on the said duties.

……………………………… ……………………………….

SURV. A.O AKINYEDE **DATE**

PROJECT SUPERVISOR

………………………………… ………………………….

SURV. R.S. AWOYELE **DATE**

PROJECT CO-ORDINATOR

…………………………….. ……………………………….

SURV. A.I ISAU **DATE**

HEAD OF DEPARTMENT

…………………………….. ……………………………….

EXTERNAL SUPERVISOR **DATE**

DEDICATION

I dedicate this project to God Almighty, my Creator, my strong pillar, my source of motivation, wisdom knowledge and understanding. He has been the source of my strength throughout this program and on His wings only have I soared. I also dedicate this to my Parents and my lovely siblings who encouraged and support me all the way and by whose encouragement have made sure that I give it all it takes to finish that which I have started. May the blessings of God be with them now and always. Amen.

ACKNOWLEDGEMENT

With gratitude and thanks to Almighty God who out of his infinite power and mercy gave me the grace of writing this project report. I esteem it a privilege to give glory and thanks.

I am grateful to my parent Pastor and Mrs. Olabosoye who out of their immense love and care gave me the necessary moral guidance, financial support and affection toward success in my education.

My appreciation also goes to my Godfather Adeniyi Adetoun Opeyemi for his unwavering love and support throughout the journey

I wish to express my sincere appreciation to my project supervisor in person of Surv. A.O Akinyede, He constructively and objectively criticized and scrutinize the manuscript. I

appreciate my wonderful lecturer Surv. R.O Asonibare for his teachings and motivating speeches and mentorship. I also wish to place on record the efforts of all lecturers right from Surv. Ayuba Abdulsalam, Surv. R.S Awoleye, Surv. A.G Aremu, Surv. B.F Diran, Surv. Williams kazeem and Surv. Kabir Babatunde of Kwara State Polytechnic surveying and geo informatics department.

Lastly my acknowledgement is made to my dearest friend Ademiyi Aishat Ewatomi. for being the best of friends from day one , i am obliged with your companionship.

ABSTRACT

This project centers on the creation of Topographic information system for part of Judges Quarters, Ilorin South local Government area of Kwara State. This study describes the design and implementation of a topographic database with a spatial modeling approach .the objectives are to propose a design of a spatial database that fulfills the requirement for spatial queries for topographic data. Implementing this design in the study area, and enforce the development of multipurpose motivated topographic data. In order to meet the study objectives, the required characteristic of a topographic database were taken into consideration while performing the design. The phases followed during database design process include the conceptual design, the logical design, the data acquisition, physical design, analysis and the implementation of the database system. Attribute data was obtained through questionnaire and oral interview .the graphic drafting was done in AutoCAD land development while ArcGIS was used for data analysis, queries and presentation. Queries were performed and generated to demonstrate the capabilities of the software used and the database created.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Surveying has been described as an essential element in every human development activity since the beginning of recorded history. It has been discovered to be an imperative requirement in the planning and execution of every forms of meaning development (Bannister, 1986). Provision of infrastructure; planning of towns and cities; management of hazardous natural events and human actions such as erosion, flooding, earthquakes and subsidence; coastal management; exploration and exploitation of minerals; sitting of industries; resources exploitation on the land and on the sea are dependent on land surveying products (Oriola, 2011).

The most appropriate method to be used depends on the scale, size (extent of the area of interest), purpose and complexity of the subject to be studied. Also, it depends on the accessibility and the quality of existing survey information (Olaniyi, 2013).Understanding the topography of the land around and beneath any type of structure is essential when it comes to changing an existing property or even building an entirely new one.

Infrastructural changes are in the basic essential services or amenities put in place for development to occur. The need for building more structure in a developing country keep increasing, this automatically has caused increasing demand for geoinformation about the topographic features on the landscape which is multiplying continuously, as the precise and on time informative details about land dynamic changes is important to the update and management of topographic features on map (Zhang and Li, 2018). Vital areas of application include spacious planning of power supply, road construction, planning of flood control and more. All these areas of use will always need an up-to-date digital topographic database.

Ndukwe (2001), said topographic information system (TIS) is the combination of topographic survey and geographic information system (GIS). It can be defined as a GIS database of topographic features and other related data.

According to Uluocha (2007), the implementation of GIS into the planning aspect to enhance decision making has continued at an impressive rate. This is because GIS manage large spatial and attribute data with a distinct valuable application for policy makers in area of planning. A geographical information system (GIS) integrates hardware, software, and data (spatial and attribute) for capturing, managing, analyzing manipulating and displaying all forms of geographically referenced information. GIS allows one to view, understand, question, interpret and visualize data in many ways that reveals relationship, patterns and trends of form of maps, globes, reports and charts. Emakoji,and Otah (2018), also explains GIS as a tool to solve enquires and produce solution to arising problems which are related to earth by viewing the database in quick understandable manner and related.

Several methods are applied in topographic surveying. Some include, ground surveying, photogrammetry, aerial imagery and satellite imagery, remote sensing. Olaniyi, (2013), said the most appropriate method to be used on a project at hand depends on the location of interest (size), scale, purpose etc. Furthermore, it"s based on availability, accuracy and precision i.e. quality of the existing map of the study area.

Need for erecting more buildings has continually increased in the akufo high school, having the knowledge that no meaningful development can occur without the topography data of the area. Therefore, this study shows the topographic information system created for the study area by acquiring the spatial value of the controls nearby, which serve as the base in which the spatial data acquired rely, the attribute data was acquired, the processing of this data was done using the necessary software such as AutoCAD 2018 software, surfer 10 and ArcGIS 10.3, a database was also created which relate both spatial data and attribute data and maps such as digital terrain model (DTM), water flow map were produced to serve as reliable data which should guide decision making for the development of the school.

Judges Quarter, G.R.A, Tanke, Ilorin, Kwara State, as a residential estate has undergone rapid development. So, there is need to produce a complete topographic information system based on the existing topographic data in order to determine the topographic variation of the land surface, to ensure effective socio-economic development and to produce an updated map in digital format thereby displaying the shortcomings of the analogue map. It is also imperative that a comprehensive database be created, which will serve as a source of information for future development, hence the necessity of this research

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1.2 AIM AND OBJECTIVE OF THE PROJECT

1.2.1 AIM OF THE PROJECT

This project aim is to carry out Topography with the application of Geographic Information System for part of Judges Quarter, G.R.A, Tanke, Ilorin south Local Government, Ilorin, Kwara State.

1.2.2 OBJECTIVES

The objectives of this project are underlisted s follows:

i. To collect accurate data of the natural and manmade features using direct ground method

ii. To create topographicmaps that shows the terrain and details of the land

iii. Acquire Site data using direct ground method

iv. Creation of the Attribute database and Geometric database

v. Performing Queries like Overlay Analysis, Buffering, Classification and Retrieval

1.3 SIGNIFICANCE OF THE STUDY

This paper is a plot study to examine Topographic Information System as a tool for environmental management. A part of Judges Quarter, G.R.A, Tanke, Ilorin South Local Government, Ilorin, Kwara State Nigeria was used for the plot study. Locational and Attribute data of features were collected for the study. The usefulness of the Topographic Information generated was highlighted. topographic map revealed the existing locations and areas for future development; Aspect map shows sun facing surfaces for agricultural sun drying process and information for building construction in the study area. The ruggedness of the landscape was presented for amount of solar radiation received in a given area. The information is also available for query that will assist in the physical planning of the area under study. The study concludes that Topographic Information System is essential for physical planning and accurate decision making. The system allows easy updating of information and quick

1.4 SCOPE OF THE PROJECT

The scope involves gathering of spatial data (coordinates, elevations) using total station and attribute data, processing it by converting the field data into a digital format using Softwares like AutoCAD, and ArcGIS then organising and structuring the collected data in a database that can be easily queried and analyzed.

1.5 PERSONNEL INVOLVED

TABLE 1.1:- Personnel

1	OLABOSOYE GIFT FUNMILAYO	AUTHOR
2	IYANDA PHILIP AYOMIDE	
3	BELLO IBRAHIM OPEYEMI	
4	ADENIYI AISHAT ADERAYO	
5	UTHMAN BADIRAT BUKOLA	
6	EMMANUEL MERCY UNEKWUOJO	

1.6 STUDY AREA

The study area is part of JudgesQuarter, G.R.A, Tanke, Ilorin south Local Government, Ilorin, Kwara State. It is a Private owned residential estate which is situated between latitude 58°15'26"N and longitude 2°44'41"E. The total area of the study area is 5 hectares and the study area is an area with features such as residential, administrative, street light, roads, electric poles and power line etc.

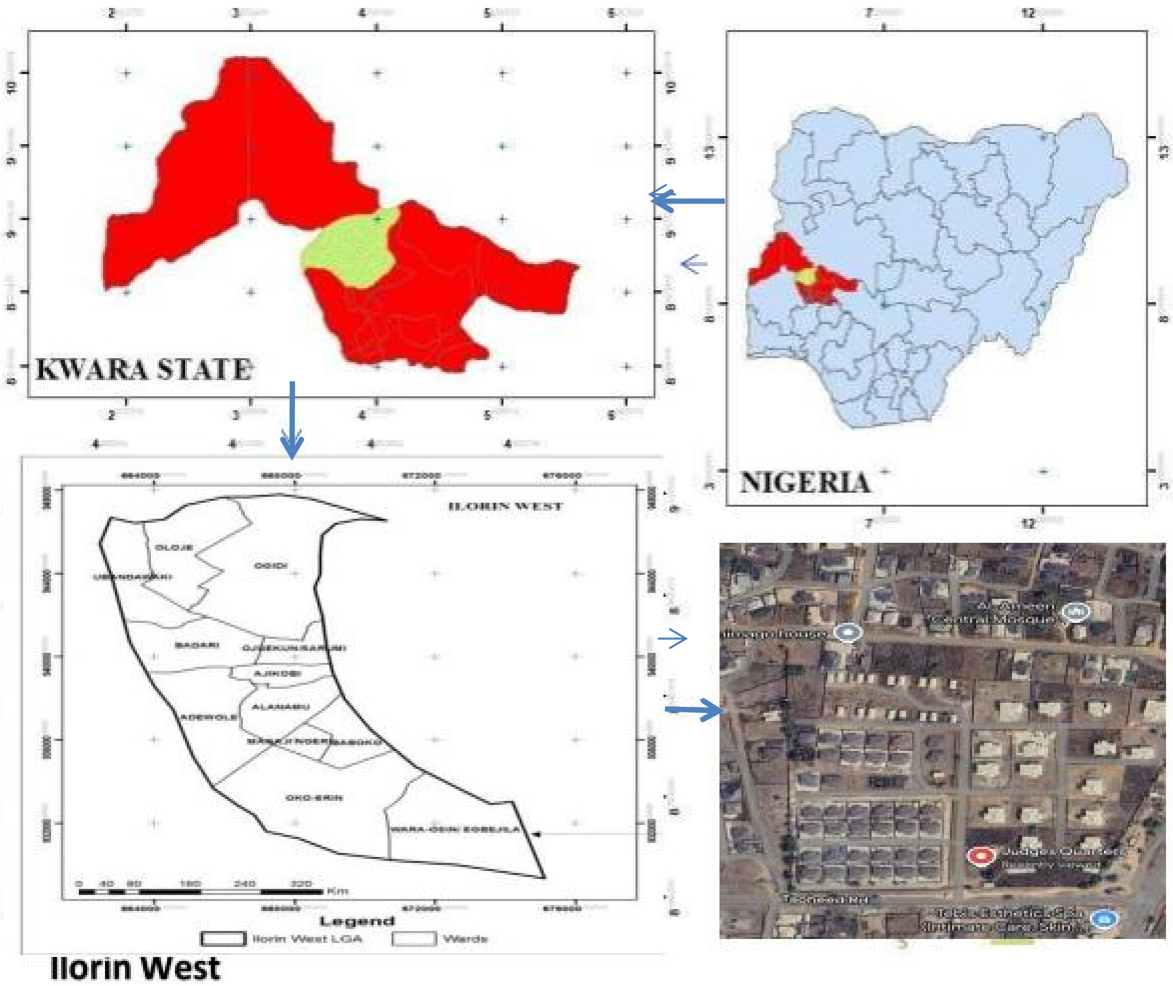


Fig 1.1 Image of the study area.

CHAPTER TWO

2.0 LITERATURE REVIEW

Topography is the study and representation of the Earth's surface features. These include mountains, valleys, rivers, roads, vegetation, and buildings. A Topographic Information System (TIS) is a specialized branch of Geographic Information Systems (GIS) that focuses on collecting, storing, analyzing, and visualizing topographic data.

TIS allows us to see and understand how different physical and man-made features exist and interact on the Earth's surface. These systems are especially useful in fields like environmental science, urban planning, agriculture, disaster management, military operations, and infrastructure development. In simple terms, TIS helps people make better decisions by giving them a clearer picture of the landscape.

Topographic Information Systems (TIS) play a pivotal role in modern geospatial sciences, offering critical insights for a wide range of applications including environmental monitoring, urban planning, disaster management, and infrastructure development. The evolution of TIS has been driven by advances in Geographic Information Systems (GIS), remote sensing, digital cartography, and spatial data infrastructure. As the demands for precise terrain representation and spatial decision-making increase, TIS have become more sophisticated, integrating high-resolution data, 3D visualization, and real-time analytics.

This literature review explores the development, technological frameworks, key applications, and emerging trends in TIS.

The origin of topographic information can be traced back to traditional cartographic practices where terrain was represented using contours, hachures, and shading techniques (Harley, 1989). With the advent of digital computing in the late 20th century, paper-based topographic maps evolved into digital topographic databases, paving the way for TIS. The integration of remote sensing data and digital elevation models (DEMs) in the 1980s and 1990s revolutionized topographic mapping (Burrough, 1986). TIS emerged as a subdomain of GIS focused specifically on topographic data management, analysis, and visualization.

Early systems such as the U.S. Geological Survey's Digital Line Graphs (DLG) and DEM products provided structured formats for digital topographic data. Over time, these evolved into more comprehensive platforms integrating multiple layers of spatial information. The development of the National Map by USGS and INSPIRE in the European Union exemplifies the institutionalization of TIS.

At the core of a TIS lies the integration of various data sources including satellite imagery, aerial photography, LiDAR, and ground surveys. These data are processed into raster and vector formats that represent the physical features of the Earth's surface.

Topographic information is typically represented through raster DEMs for elevation and vector layers for features like rivers, roads, and boundaries. These models allow the computation of slope, aspect, contour lines, and hydrological modeling. Triangulated Irregular Networks (TINs) are also used for high-precision applications.

Modern TIS utilize advanced data collection technologies:

a) LiDAR (Light Detection and Ranging): Provides highly accurate elevation data.

b) Synthetic Aperture Radar (SAR): Enables terrain mapping under cloud cover.

c) Unmanned Aerial Vehicles (UAVs): Offer flexible, cost-effective data collection for small areas.

TIS are built upon GIS platforms such as ArcGIS, QGIS, and GRASS GIS, allowing for the integration, manipulation, and analysis of topographic data. Remote sensing enhances the capacity of TIS by supplying up-to-date imagery and terrain information.

TIS are essential in various domains:

a) Environmental Management: TIS support ecosystem modeling, land use planning, and environmental impact assessments. By modeling watersheds, soil erosion, and forest coverage, TIS aid in sustainable resource management.

b) Urban and Regional Planning: Urban planners use TIS for zoning, infrastructure development, and transportation network design. Accurate topographic data help assess terrain constraints, optimize construction, and plan drainage systems.

c) Disaster Risk Reduction: TIS contribute to disaster preparedness and response through terrain modeling and hazard mapping. Flood risk analysis, landslide prediction, and evacuation planning rely heavily on accurate topographic information.

d) Military and Defense Applications: Topographic data has historically been critical in military strategy and logistics. Modern defense systems use TIS for surveillance, mission planning, and terrain analysis in combat operations.

Challenges and Limitations

Despite significant advancements, TIS face several challenges:

a) Data Accuracy and Resolution: While high-resolution data improves analysis, it increases storage and processing requirements. Errors in DEMs due to vegetation, shadows, or sensor limitations can distort analyses.

b) Interoperability: Diverse data formats and proprietary software can hinder data integration. Standardization efforts such as the Open Geospatial Consortium (OGC) help address this but are not universally implemented.

c) Accessibility and Cost: High-quality topographic datasets, particularly those derived from LiDAR or commercial satellites, can be expensive and are not always publicly accessible.

d) Real-Time Data Integration: Most TIS rely on static data. Integrating dynamic or near-real-time updates, such as those from UAVs or IoT sensors, remains technically and logistically complex.

Emerging Trends in TIS

As technology evolves, so does the scope and capability of TIS:

a) 3D and 4D Topography: With advances in 3D visualization and geospatial modeling, TIS are moving toward dynamic 4D systems that include the temporal dimension, enabling the study of terrain changes over time (e.g., erosion, urban growth).

b) Cloud-Based Platforms: Platforms such as Google Earth Engine and AWS-hosted GIS services allow users to process and analyze large-scale topographic data without local infrastructure.

c) Artificial Intelligence and Machine Learning: AI is increasingly used to classify terrain features, detect changes, and automate map generation. Deep learning models trained on large datasets can identify patterns and anomalies with high accuracy.

d) Integration with Internet of Things (IoT)

In smart city applications, TIS are being integrated with real-time sensor data for adaptive urban planning and emergency response systems.

Topographic Information Systems are indispensable tools in understanding and managing the Earth's surface. From traditional cartography to AI-powered geospatial platforms, TIS have undergone a remarkable transformation. The future of TIS lies in their ability to integrate real-time data, provide multi-dimensional analysis, and support decision-making across diverse sectors. Addressing challenges in data accessibility, interoperability, and accuracy will further enhance the impact and adoption of these systems.

Topographic Information Systems have transformed the way we understand and manage our environment. From ancient maps to modern 3D digital models, TIS now supports critical tasks in planning, safety, and sustainability.

Though there are challenges—like cost, data accuracy, and system integration—the benefits are vast. With the rise of AI, real-time sensors, and cloud computing, TIS is set to become even more powerful and accessible in the future.

CHAPTER THREE

3.0 METHODOLOGY

This phase outlines the methods and procedures employed in the planning, data acquisition, data processing, and development of both the database and the database management system, as well as the presentation of information. These activities were systematically organized and executed in sequential stages, including the design of the database. The process typically involves a spatially referenced, structured digital database, along with suitable application software for geospatial analysis. It essentially highlights the techniques and principles applied throughout the project. Geographic Information System (GIS) methodologies were utilized to achieve the intended outcomes.

3.1 DATABASE DESIGN

The design of any database involves three stages namely;

i. Conceptual design

ii. Logical design

iii. Physical design

3.1.1 VIEW OF REALITY

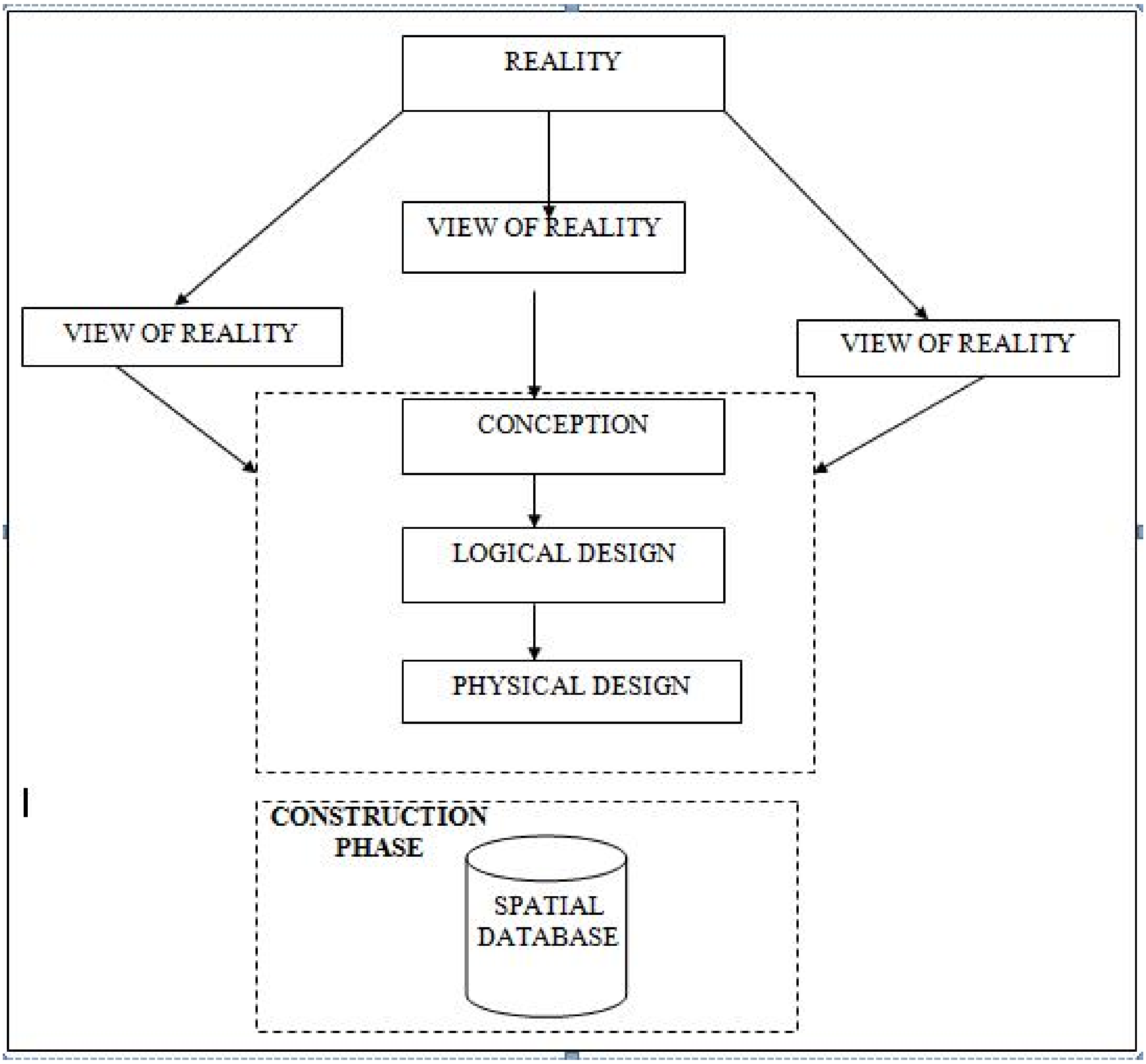
In database design, it is essential to consider *reality*, which refers to the actual physical phenomena that exist encompassing all elements, whether or not they are perceived by individuals. A *view of reality*, however, is a mental abstraction tailored for a specific application or set of applications.

For this project, the view of reality is based on the topographical features of the study area. Since it is not feasible to replicate the real world exactly, the approach involves conceptualizing and modeling the real-world environment in a structured way to allow for accurate representation and analysis.

The key features of interest in this project include:

- Roads
- Electric Poles
- Trees
- Building

Fig. 3.1 Design and Construction Phases in Spatial Database

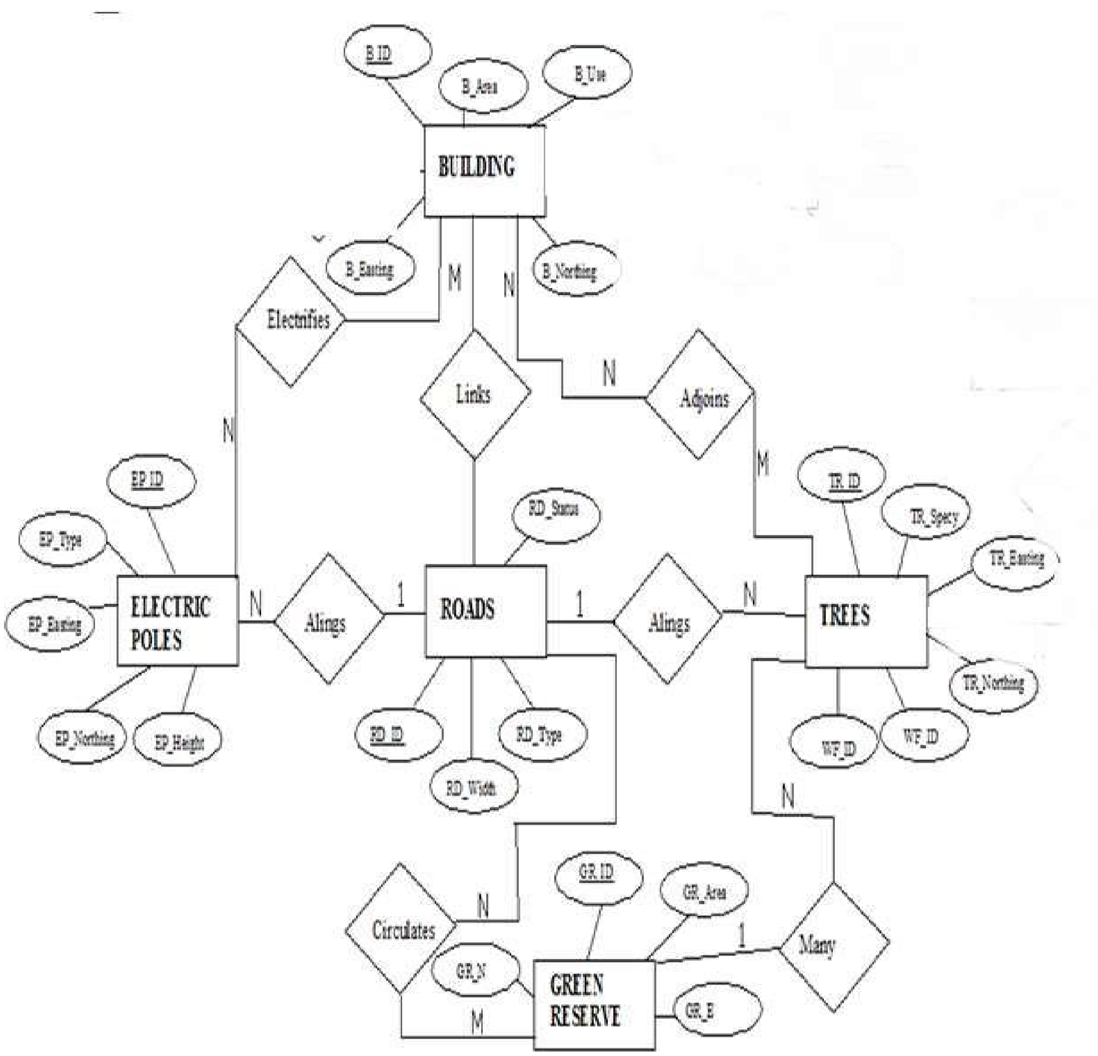


3.1.2 CONCEPTUAL DESIGN

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

a. Roads (line)
b. Electric poles (point)
c. Trees (point)
d. Buildings(polygon)

Fig. 3.2: E-R Diagram (Entity relationship diagram)



3.1.3 LOGICAL DESIGN

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 the rules for datamanipulation 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 type is 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. ree (TR_ID, TR_spp, TR_Importance, TR_Easting, TR_Northing)
v. Electric Pole (EP_No, EP_Type, EP_Height,EP_Easting, EP_Northing)

3.1.4 PHYSICAL DESIGN

Table 3.1: 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 Northings

Table 3.2: Road and its attributes

ENTITY	DESCRIPTION
R_ID	Road Identifier
R_Length	Road Length
R_Width	Road Width
R_Type	Road Type
R_Condition	Road Condition

Table 3.3 : Trees and its attributes

ENTITY	DESCRIPTION
TR_ID	Tree Identifier
TR_Spp	Tree specy
TR_E	Tree_Easting
TR_N	Tree Northing

Table 3.4: Electric Poles and its attributes

ENTITY	DESCRIPTION
EP_ID	Electric pole Identifier
EP_Type	Electric pole Type
EP_Height	Electric pole Height
EP_E	Electric pole Easting
EP_N	Electric pole Northing

Table 3.5: Vegetation and its Attributes

ENTITY	DESCRIPTION
V_ID	Vegetation Identifier
V_Area	Vegetation Area
V_E	Vegetation Easting
V_N	Vegetation Northing

3.2 RECONNAISSANCE

This stage represents the groundwork laid prior to the execution of the project. It involves gathering all available and relevant information about the project area to ensure a smooth and effective implementation.

The necessary steps for the successful execution of the project are divided into two main phases:

1. Office Planning
2. Field Reconnaissance

3.2.1 OFFICE RECONNAISSANCE

This phase entails the collection and review of information related to the study area. It also includes testing the instruments intended for use during the project, listing the required equipment, estimating the number of days needed for field activities, and outlining how each task will be performed. Additionally, responsibilities are assigned to team members based on the supervisor's guidance and instructions.

Table. 3.6: Coordinates of Controls

Station	Northing (m)	Easting (m)	Height (m)
PBIL3306	940288.197	678281.701	355.212
PBIL3304	940275.508	678254.250	350.532
PL1	939677.97	678331.46	349.087

Source: Surveying and Geo-informatics Department Kwara state polytechnic.

3.2.2 FIELD RECONNAISSANCE

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

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: Recce diagram of the study area (not drawn to scale)

3.3 EQUIPMENT USED/ SYSTEM SELECTION AND SOFTWARE

3.3.1 HARDWARE USED

i. Total station
ii. 1 reflector with a tracking rod.
iii. 1 Tripod
iv. One (1) 50m tape
v. One (1) umbrella
vi. 1 cutlass
vii. Hand held GPS
viii. Hammer
ix. Nails and bottle cover
x. Field book and writing materials
xi. 1-No of Personal Computer HP655 and its accessories
xii. 1-No of HP DeskJet K7100 A3 printer
xiii. 1-No of HP DeskJet 1110 A4 printer

3.3.2 SOFTWARE COMPONENT

i. Notepad.
ii. Microsoft Excel.
iii. AutoCAD 2007
iv. ArcGIS 10.3
v. Surfer 2010
vi. Microsoft Word.

3.4 INSTRUMENT TEST

To ensure data quality, the Total Station used in this project was tested for both **vertical index error** and **horizontal collimation error**. These tests were conducted to confirm the instrument's accuracy, efficiency, and overall reliability before use. The procedures followed are detailed below.

3.4.1 HORIZONTAL COLLIMATION TEST

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). Avertical 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.

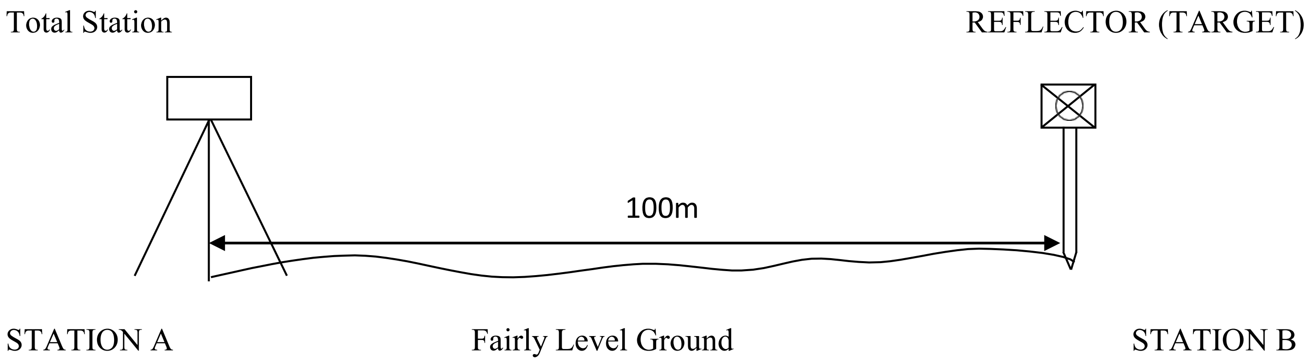


Fig 3.4: Horizontal Collimation and Vertical Index error test.

Table 3.7: Horizontal Collimation Data

Station	Target	Face	Hz Reading	Difference	Error
A	B	L	38˚42�even32”		
		R	218˚42‶35”	180˚00‶03”	03”

3.4.2 VERTICAL INDEX ERROR TEST

This test was conducted to verify the accuracy of the vertical angle measurement when the line of sight is perfectly horizontal. The expected reading for this test is exactly ninety degrees (90°); any deviation from this value is known as the **vertical index error**.

The Total Station was set up over a designated point, with necessary temporary adjustments made to ensure proper alignment and functioning. A target was placed approximately 100 meters away, and the instrument was carefully aimed at it. The target was bisected by aligning the instrument in the **Face Left** position, and the corresponding vertical angle reading was recorded. The process was then repeated with the instrument in the **Face Right** position, and that reading was also documented. The recorded values are presented below.

Table 3.8: 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”

3.4.3 ANALYSIS OF COLLIMATION AND VERTICAL INDEX DATA

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

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

Vertical collimation = {(FL + FR) – 360} = (90˚00‟00” + 270˚00‟02”) - 360} = 02”The result shows that the instrument is still in good working condition.

3.4.4 CONTROL CHECK

Three control beacons (PBIL3306, PBIL3304) were utilized in this project. To verify their positions on-site, a check was performed by measuring the angles between these beacons and comparing the observed angles with those calculated from their known coordinates.

The Total Station was set up on the control beacon PBIL3304. After completing all necessary temporary adjustments, the reflector was positioned on the control beacon PBIL3306, designated as the back station. A horizontal angle reading was taken and recorded with the instrument set to **Face Left**.

Next, the reflector was moved to the control beacon PL1, the forward station. Horizontal angle readings were then recorded in both **Face Left** and **Face Right** positions. Finally, the reflector was returned to the back station, and a horizontal angle reading was recorded with the instrument set to **Face Right**.

Table 3.9: Table showing the back computation of the control coordinates

From STN	Bearing	Dist(m)	ΔN	ΔE	Northing(m)	Easting (m)	To STN
					940288.197	678281.701	PBIL3306
PBIL3306	65°11'30"	30.242	-12.689	-27.451	940275.508	678254.250	PBIL3304
PBIL3304	7°21'45"	602.506	-597.538	77.21	939677.97	678331.460	PL1

Table 3.1 0 : Table showing the distance observation result of the control check

FROM	OBSERVED DISTANCE(m)	COMPUTED DISTANCE (m)	TO
PBIL3306	30.140	30.242	PBIL3304
PBIL3304	602.451	602.506	PL1

Table 3.11: Table showing the observation result of the control check

STN	SIGHT	FACE	OBSERVED HZ ANGLE	REDUCED HZ ANGLE	MEAN
	PBIL3306	L1	357° 08' 35"		
PBIL3304	PL1	L2	291° 57' 00"	65°11'35"	
	PL1	R2	111° 57' 1"	65°11'25"	
	PBIL3306	R1	177° 08' 35"		65°11'30"

Difference in angle (observed - computed) =65° 11' 30"-65° 11' 25"

= 00° 00' 05"

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' 05") is less than allowable error. Therefore, the controls were angularly intact.

3.5 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.

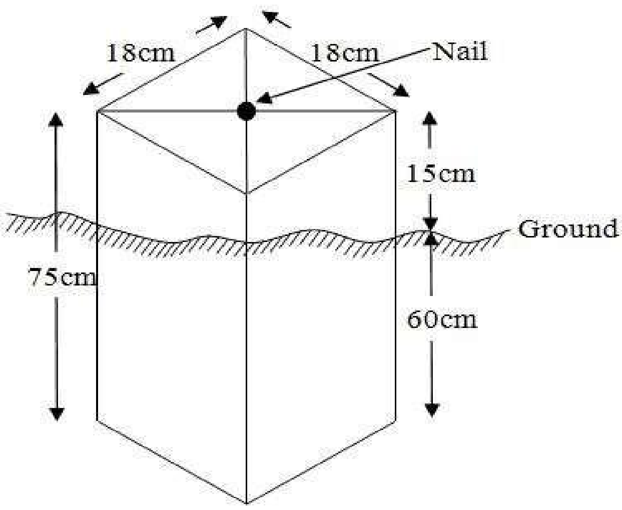


Fig. 3.5: Pillar Description

3.6 DATA ACQUISITION

PRIMARY DATA SOURCE

Field observation served as the primary data source for this project. A ground-based method was employed to collect data using a Total Station instrument, which involved recording X, Y, and Z coordinates from Ground Control Points (GCPs) established at prominent locations throughout the study area.

SECONDARY DATA SOURCE

An updated imagery of the area was obtained from Google Earth and used to determine the extent of coverage for the project area.

3.6.1 GEOMETRIC DATA ACQUISITION

The Total Station instrument was carefully set up on control point PBIL3304, with a back sight taken to PBIL3306 after performing the necessary station adjustments, which included centering, leveling, and focusing. The following procedures were then followed to determine the position of the next point (PL1), and this process was repeated sequentially until the entire site was covered. The data acquisition method used on site was the **radiation method**, where two or more points are coordinated from a single instrument station.

Procedure:

i. After setting up the instrument and completing temporary adjustments, the instrument was powered on, and a new job was created under the job menu in the instrument's internal memory. The job was named **GROUP 5A**.

ii. The coordinates of the three control points were entered into the instrument's memory, along with relevant codes such as:

- 'RD' for roads
- 'SP' for spot heights
- 'BD' for buildings, etc.

iii. The instrument height and reflector height were measured and saved in the instrument memory.

iv. In the coordinate menu, orientation was set by inputting the coordinates of the instrument station and the back sight. The reflector at the back station was carefully bisected before confirming the orientation by selecting 'yes'.

v. After orientation, the reflector was bisected at the next point (nail), and the **'obs'** (observe) option was selected. The three-dimensional coordinates (East, North, Height) of the point were displayed on the instrument's screen, and **'rec'** (record) was pressed to save the data. For subsequent observations, the **'all'** option was used to streamline the process without separately pressing 'obs' and 'rec'.

vi. It was ensured that the prism center of the reflector was precisely bisected and securely set on the tripod to minimize height measurement errors.

vii. The instrument was then moved to the next point after all details—including spot heights and boundary points visible from the current station—were recorded. Temporary adjustments were made after repositioning.

viii. This sequence was repeated until all boundary points and their heights were accurately coordinated.

ix. Spot heights in this project were acquired randomly rather than at regular grid intervals. Additionally, three edges of each building were surveyed.

x. Upon completion of the data acquisition, all collected details were properly recorded and mapped to their respective positions on the project plan.

3.6.2 ATTRIBUTES DATA ACQUISITION

Attribute data is information about spatial features. They provide the characteristics, 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 andaround the study area.

3.7 DATA DOWNLOADING AND PROCESSING

3.7.1 DATA DOWNLOADING AND EDITING

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.

3.7.2 DATA PROCESSING AND DATA EDITING

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

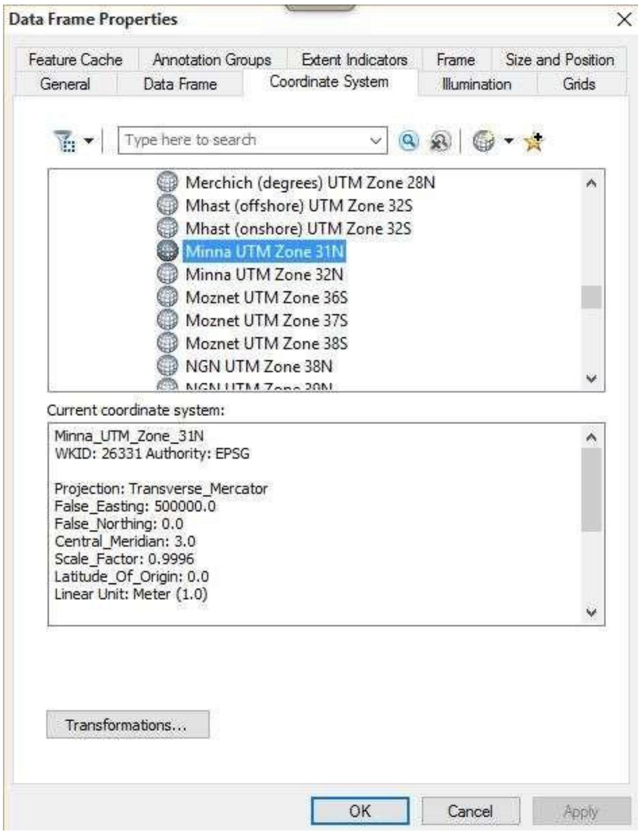
3.7.3 DATA PROCESSING USING ARCGIS 10.3

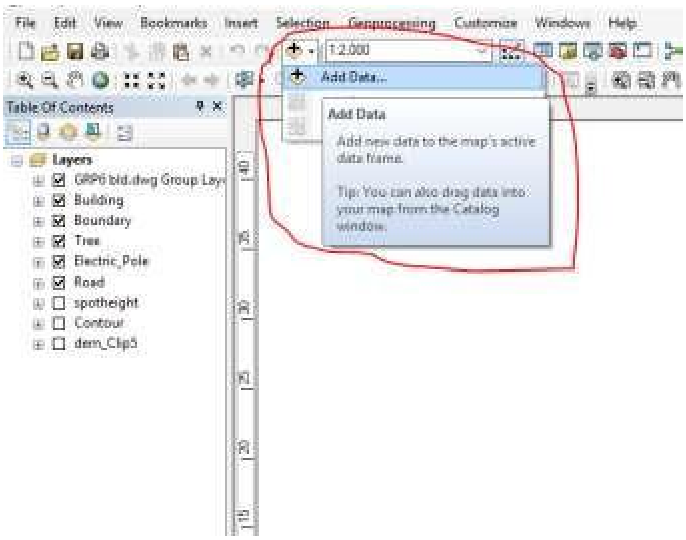
Before launching ArcGIS, AutoCAD was used to plot feature data, which were saved separately in different files named **road**, **boundary line**, **buildings**, **trees**, and **electric poles**.

Steps to load and prepare data in ArcGIS 10.3:

1. Launch **ArcMap** in ArcGIS 10.3.
2. In the dialog box that appears, click **A NEW EMPTY MAP** to create a new project.
3. On the menu bar, click **Tools**, then select **Extensions**. Check all available extensions, then close the window.
4. On the left-hand side (LHS), right-click on **Layers**, and select **Properties**.

5. In the **Properties** window, go to the **Coordinate System** tab to set the projection system to **MINNA DATUM ZONE 31N**. Then, go to the **General** tab to set the map units. Click **Apply** and then **OK**.
6. Click **Add Data** on the toolbar, browse to the saved AutoCAD files, select all relevant files, and load them into the **Table of Contents** (Layer section).

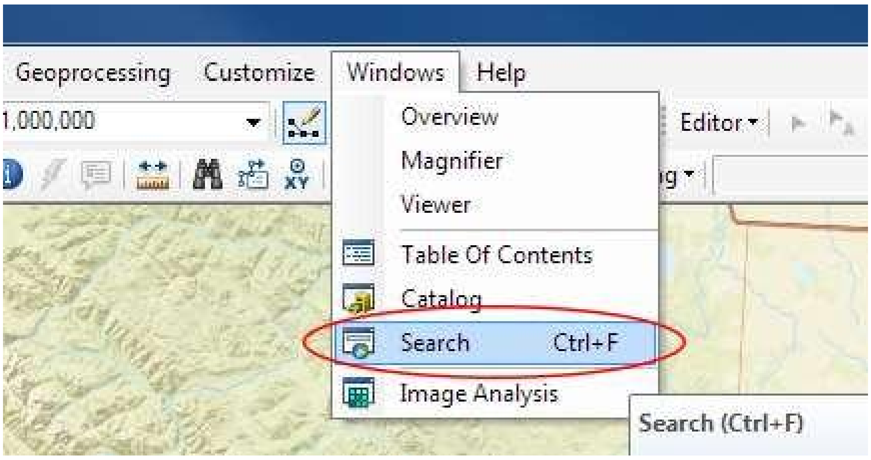




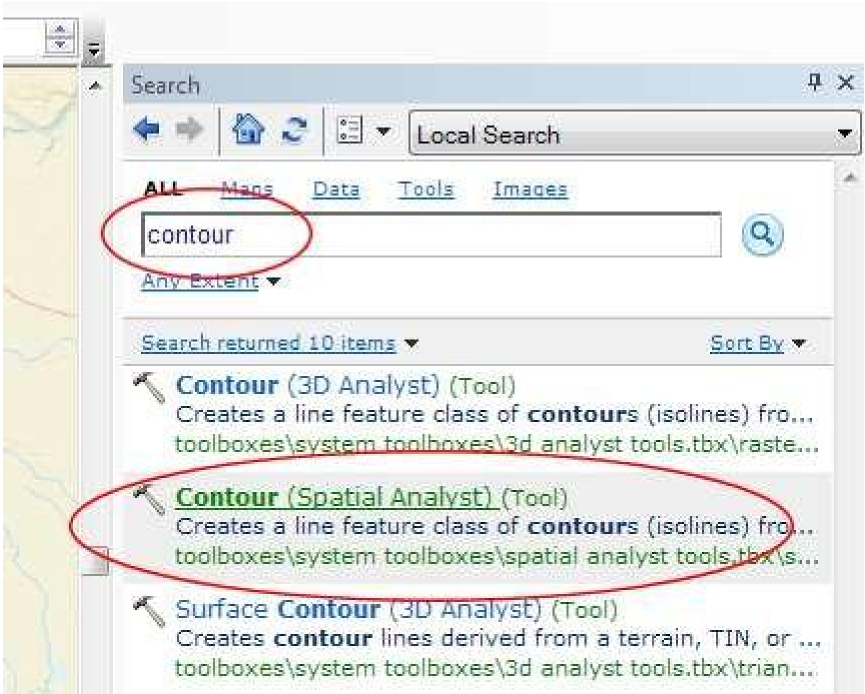
All drawing was exported to shape file. After the feature class has been creates, click onEditor to start Editing, and then click on the load object.

Creating Contours

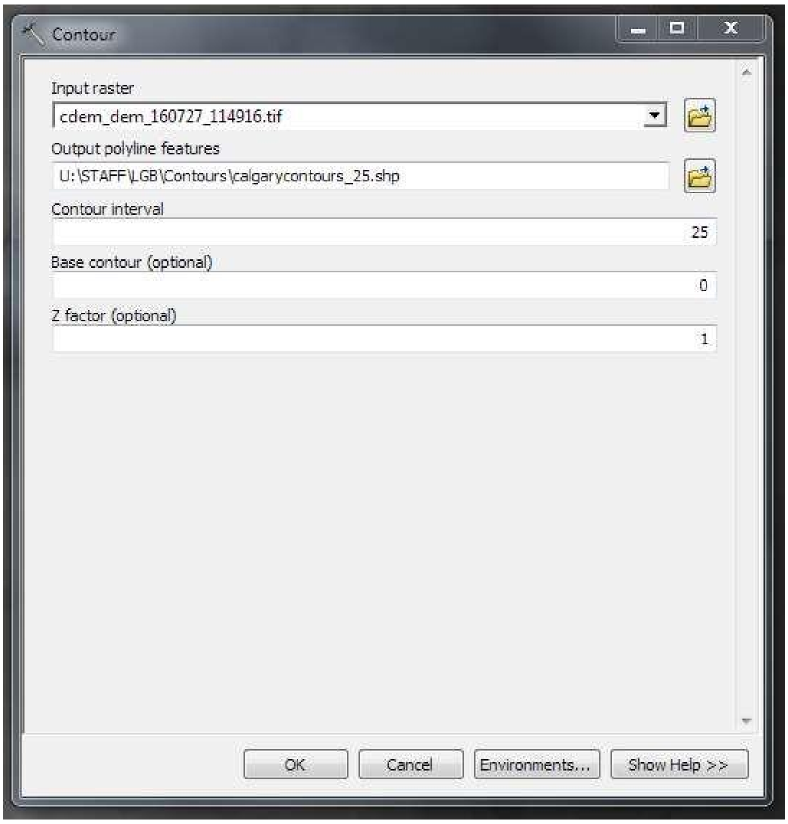
1. First, a Digital Elevation Model (DEM) was created by using the **Natural Neighbor** interpolation method. To do this, open the **Search** bar and type **Interpolation**, then select **Natural Neighbor**.
2. Choose the **XYZ** data as the input for creating the DEM, setting the project **boundary line** as the extent for the interpolation.
3. To generate contours, ensure that the **Spatial Analyst** toolbar is enabled. You can activate it by navigating to **Customize > Toolbars > Spatial Analyst**.
4. Alternatively, open the search bar by clicking **Windows > Search** or by clicking the search icon and type relevant commands or tools.



In the search bar type **Contour**, and select **Contour (Spatial Analyst)** from the searchresults list.



After choosing **Contour**, a dialogue window will appear, prompting you for five settings: **Input raster:** select the DEM file from which you want to generate contours by locating it on your hard drive or in the dropdown menu, showing layers present in the Table of Contents **Output polyline features**: indicate where you want to save your output contours **Contour interval:** set the distance between contour lines in meters – the smaller the number, the greater the number of lines **Base contour (optional):** the starting point from which the lines are generated – for example, the default is 0 so with an interval of 25 meters, the contours are generated at 25, 50, 75, 100…, but if the base contour is set at 40, then the contours are generated at 65, 90, 115, 140 and so on **Z factor (optional):** can be used to adjust the units of data; for example, if you have data in meters and you want to produce your contours in feet, use a z-factor of 3.28 because 3.28 feet equals one meter.



The generated contours will automatically be added to the map.

Input the data which is the AutoCAD drawing and select the feature type you want to load,

- Click Add and Next, then select the Target layer you want it to be
- Load it into from the feature class created on the ARCGLS.
- Click on Next, then select "only the features that satisfy the
  - Query" and click on Query Builder to query for the feature to be loud e.g. "layer" = Boundary".

- Click on Next..... Then finish

Right click on the Boundary In the table of content and click on zoom to layer to display thefeature.

EDITING, CONVERTING AND MERGING GEODATABASE

- Remove all necessary features by right clicking on it and press "REMOVE"
- Convert some features that are not in their correct „features -type" like point, line, and polygon features etc.

To convert a GOEDATABASE FEATURE CLASS to another the following steps weretaken:

- FOR LINE FEATURE CLASS TO POLYGON FEATURE CLASS
- Go to WINDOW on the menu bar and select ARC Toolbox.
- Select DATA MANAGEMENT TOOLS, click on FEATURES, and then Select FEATURE TO POLYGON.
- ON INPUT FEATURES, select feature to be converted, on OUTPUT FEATURE CLASS, then save on the GRP6C FOLDER, press OK and CLOSE.
- Then remove the converted feature class in the LAYER Menu and ARC CATALOGfiles.
- On INPUT DATASETS, select features to be merged, on OUTPUT DATASETS,then save on the GRP6C folder, press OK and CLOSE.
- Then remove the converted feature class in the LAYER Menu and ARC CATALOGfiles.

TABLE CREATION

There is need to create attribute tables for the features so as to be used for queries. NOTE: The editor on the menu bar must be stopped before adding field to its table. **THE FOLLOWING PROCEDURES WERE FOLLOWED:**

- Right click on the feature class, then select OPEN ATTRIBUTES TABLE click on OPTIONS and select ADD FIELD.
- Give it FIELD NAME, click on TYPE and select [SHORT INTEGER or LONG INTEGER for SHORT or LONG WHOLE VARIABLES or DOUBLE FOR

DECIMAL VARIABLES OR TEXT variable or DATE for DATE], then enter precision or LENGTH for text width and scale for DECIMAL PLACES, and then click OK

- To input variables on the ATTRIBUTE TABLE, go to the EDITOR on Menu bar, select START EDITING,
- Click on ATTRIBUTE on menu bar [behind the TARGET], click on the features on the DATA VIEW display, and then input the variables of data acquired through SOCIAL SURVEY or DATA ACQUIRED ON THE FIELD.
- Save it after the input by selecting SAVE EDITS on the editor menu. To switch to other layers, select STOP EDITING on the EDITOR menu. Then repeat the above step to create other fields. Populate the table and save.

Table 3.12: Building

Table

BUILDING_A

OBJECTID *	SHAPE *	SHAPE_Length	SHAPE_Area	BLD_OWNER	BLD_USES	X	Y
1	Polygon	84.406847	363.400803	MR RASAQ	<Null>	678416.667	363.400803
2	Polygon	82.710406	369.490638	MRFLORENCE	<Null>	678447.669	369.490638
3	Polygon	36.843475	83.366956	<Null>	<Null>	678455.057	83.366956
4	Polygon	23.084988	33.209357	<Null>	<Null>	678468.524	33.209357
5	Polygon	83.503462	368.60541	<Null>	<Null>	678478.957	368.60541
6	Polygon	79.190294	336.66112	<Null>	<Null>	678441.819	336.66112
7	Polygon	76.940109	316.408618	<Null>	<Null>	678456.75	316.408618
8	Polygon	84.123322	349.316367	<Null>	<Null>	678493.961	349.316367
9	Polygon	78.026213	345.930362	<Null>	<Null>	678556.675	345.930362
10	Polygon	83.563237	343.435734	<Null>	<Null>	678586.112	343.435734
12	Polygon	84.974994	360.811561	<Null>	<Null>	678520.952	360.811561
13	Polygon	86.676746	381.806738	<Null>	SHOP	678499.834	381.806738
14	Polygon	86.169928	382.667674	<Null>	<Null>	678481.732	382.667674
15	Polygon	31.811369	55.853679	<Null>	<Null>	678520.253	55.853679
16	Polygon	44.346327	101.287692	<Null>	<Null>	678387.814	101.287692
17	Polygon	48.472223	119.325622	<Null>	<Null>	678464.797	119.325622
18	Polygon	83.685035	365.801723	<Null>	<Null>	678428.05	365.801723

Table 3.13: Road

ENTITY	FIELD ALIAS	DATA TYPE	FIELD SIZE
R_ID	Road Identifier	Numeric	-
R_Length	Road Length	Numeric	-
R_Width	Road Width	Numeric	-
R_Type	Road Type	Text	10
R_Condition	Road Condition	Text	10

Table 3.14: Trees

ENTITY	FIELD ALIAS	DATA TYPE	FIELD SIZE
TR_ID	Tree Identifier	Numeric	-
TR_Spp	Tree specy	Text	10
TR_E	Tree_Easting	Numeric	-
TR_N	Tree Northing	Numeric	-

Table 3.15: Electric Poles

ENTITY	FIELD ALIAS	DATA TYPE	FIELD SIZE
EP_ID	Electric pole Identifier	Numeric	-
EP_Type	Electric pole Type	Text	10
EP_Height	Electric pole Height	Numeric	-
EP_E	Electric pole Easting	Numeric	-
EP_N	Electric pole Northing	Numeric	-

ADDING SPOT HEIGHTS DATA

- NOTE: STOP EDITING on the EDITOR MENU before adding data field,
- Go to FIELD ON THE MENU BAR, scroll to add Data and then ADD XYZ DATA
  - Browse the EXCEL FILE for SPOT HEIGHTS, select EASTING VALUE on X - FIELD and NORTHING VALUE on Y - IELD and ELEVATION
  - « Select DATA the EXPORT DATA, locate the folder created and give it name then YES AND OK, remove the previous layer by right clicking on it and select REMOVE.

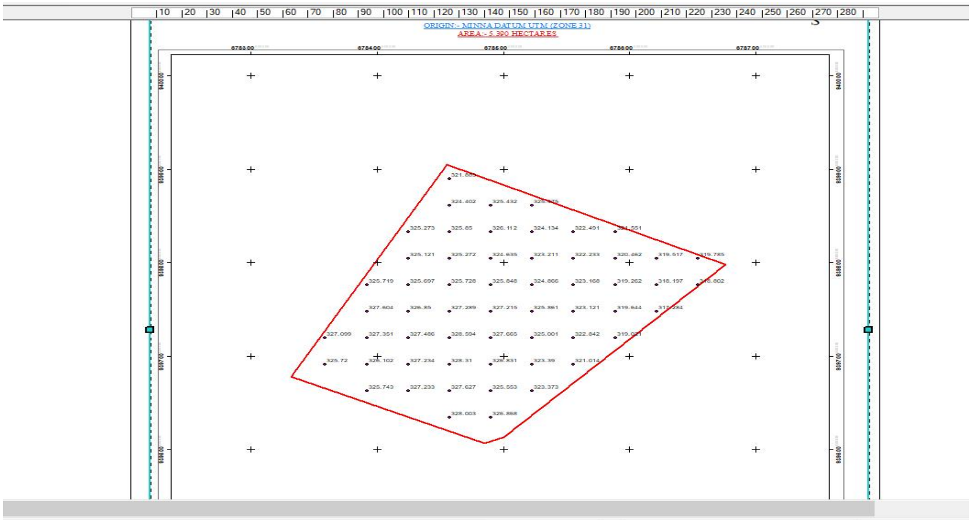


Fig. 3.6 shows the spot height

TIN, ASPECT AND SLOPE CREATION USING ARCMAP

NOTE: Making sure the 3D Analyst Extension is active, select VIEW on MENU bar, then click TOOLBARS and MARK the 3D Analyst EXTENTION Then X, Y Data

TO CREATE TIN

- Click on 3D Analyst arrow, select create TIN and then create TIN from FEATURE.
- On layers mark the SPOTHEIGHT LAYER, select height data on HEIGHT, then ok.

TO CHANGE THE FACE OF THE TIN ACCODING TO ITS ELEVATION

- RIGHT CLICK on the TIN, select PROPERTIES, and click on SYMBOLOGY.
  - Then ADD, select FACE ELEVATION WITH COLOR RAMP, click ADD, and then select APPLY and OK.

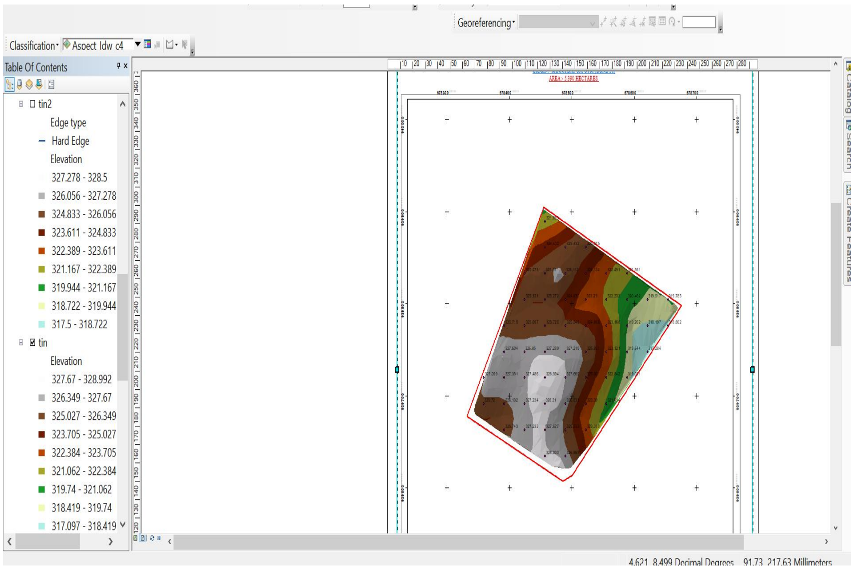


Fig. 3.7: Shows the Tin creation

TO CREATE ASPECT

- Click on 3D analyst arrow, select SPATIAL ANALYST TOOLS, SURFACE and THEN DOUBLE CLICK on ASPECT.
- Browse to where the raster format of all the acquired data created from the surfer was saved to.
- Browse to where you want the OUTPUT RASTER to be saved
- You can change the OUTPUT MEASUREMENT to Degree OR percent
- Click OK [then it displays on the data view screen], then Close.

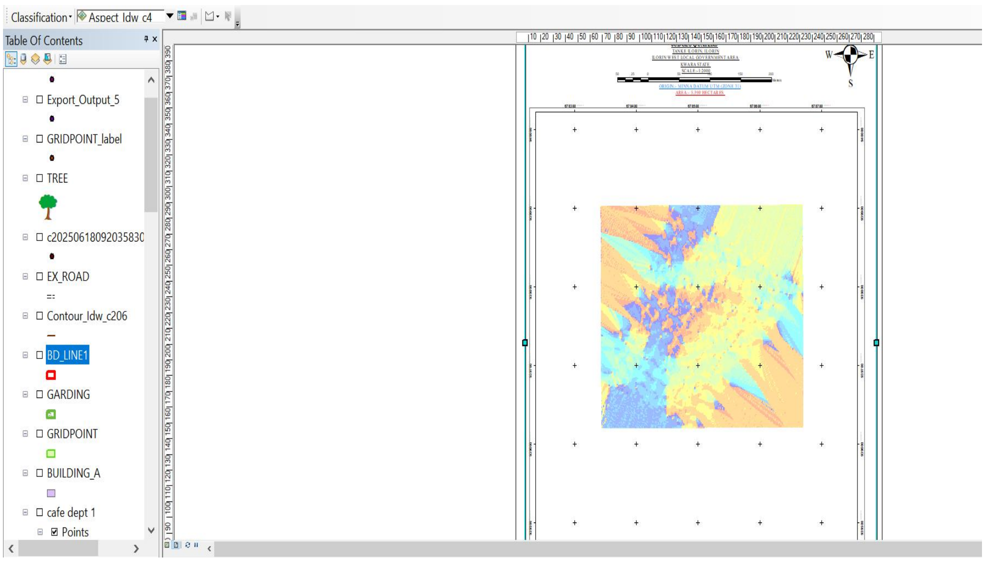


Fig. 3.8 shows the slope aspect

3.8 DATABASE IMPLEMENTATION

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 ArcGIS 10.3 software. It involves the combination and storage of acquired graphic data and attributes data in 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 were automatically displayed by special command in the ArcGIS 10.3 version. The ArcGIS software was used to link the graphic data and table for query generation.

3.8.1 DATABASE MANAGEMENT SYSTEMS

Database management refers to a collection of software designed for creating, storing, manipulating, updating, organizing, and querying information within a database (Kufoniyi, 1998). A Database Management System (DBMS) functions as intermediary software that manages the database on behalf of the user.

A good DBMS should provide the following key functions:

a. Efficient storage and retrieval of data.

b. Concurrent access by multiple users.

c. A standardized interface between the database and application programs.

d. Standardized data access and clear separation of data storage/retrieval from the application logic.

e. Maintenance of data security and integrity.

3.8.2 DATABASE MAINTENANCE

After creating the database, proper maintenance practices were implemented to ensure it met its stated objectives. Maintenance allowed for the addition of new data and removal of outdated or irrelevant information. Regular updates are essential to reflect physical changes in the landscape over time. Additionally, security and data integrity measures were enforced to maintain the database's reliability and effectiveness.

Consistent updating and management of the database are crucial for maintaining its currency and quality, which in turn enhances its suitability as part of a Spatial Decision Support System (SDSS). The overall quality of a database depends on its timeliness and fitness for use within a decision support framework.

It is also important to periodically review the storage media to prevent data inaccessibility or deterioration due to physical damage. Care must be taken when populating the database, as its value directly depends on the accuracy and quality of the input data.

For long-term archiving, stable storage media should be used, such as:

- Computer-compatible tape readers
- Magnetic tapes
- Optical discs and compact discs

3.9 BACK COMPUTATION

Table *3.16: Back Computation*

S/N	BEARING	DIST	Δ N	Δ E	X	Y
PT1					678331.46	939677.97
PT2	28.517403	258.4696	227.11	123.40	678454.86	939905.08
PT3	64.10621	245.4521	-107.19	220.81	678675.67	939797.89
PT4	43.628299	254.3273	-184.09	-175.48	678500.19	939613.80
PT5	65.699528	16.52403	-6.80	-15.06	678485.13	939607.00
PT1	65.210911	169.2667	70.97	-153.67	678331.46	939677.97

3.9.1 AREA COMPUTATION

Table 3.17: Area Computation

X	Y	P	Q
678331.46	939677.97		
678454.86	939905.08	637567185177.817	637529085581.434
678675.67	939797.89	637610445888.245	637890709905.404
678500.19	939613.80	637693025256.246	637653046926.599
678485.13	939607.00	637523528025.330	637513991242.794
678331.46	939677.97	637557529633.586	637364988136.220
		3187951713981.220	3187951821792.450
		2A	107811.227
		AREA	53905.614
		HECTARES	5.391

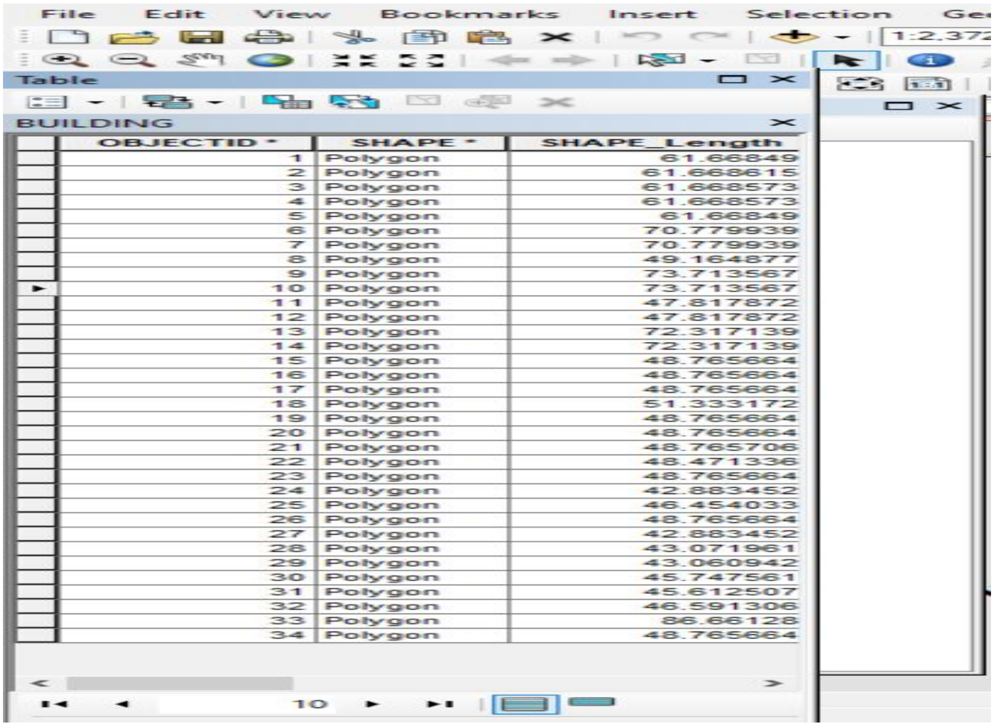
CHAPTER FOUR

4.0 SPATIAL ANALYSES AND PRESENTATION

GIS stands out among other information systems due to its powerful spatial analytical capabilities, including overlay operations, buffering, spatial search, topographic analysis, as well as neighborhood and connectivity operations. GIS leverages these capabilities to answer fundamental questions related to location, condition, trends, routing, patterns, and modeling through the manipulation and analysis of spatial data. In this project, the major analyses performed were overlay operations, topographic analyses, and spatial searches.

4.1 TESTING OF DATABASE

This test was conducted to evaluate the relationships between data modeled as entities in the spatial database and to assess the database's retrieval capabilities. A sample query with specific conditions was designed and executed to verify whether the desired results could be obtained.



OBJECTID *	SHAPE *	SHAPE_Length
1	Polygon	61.66849
2	Polygon	61.668615
3	Polygon	61.668573
4	Polygon	61.668573
5	Polygon	61.66849
6	Polygon	70.779939
7	Polygon	70.779939
8	Polygon	49.164877
9	Polygon	73.713567
10	Polygon	73.713567
11	Polygon	47.817872
12	Polygon	47.817872
13	Polygon	72.317139
14	Polygon	72.317139
15	Polygon	48.765664
16	Polygon	48.765664
17	Polygon	48.765664
18	Polygon	51.333172
19	Polygon	48.765664
20	Polygon	48.765664
21	Polygon	48.765706
22	Polygon	48.471336
23	Polygon	48.765664
24	Polygon	42.883452
25	Polygon	46.454033
26	Polygon	48.765664
27	Polygon	42.883452
28	Polygon	43.071961
29	Polygon	43.060942
30	Polygon	45.747561
31	Polygon	45.612507
32	Polygon	46.591306
33	Polygon	86.66128
34	Polygon	48.765664

Fig. 4.1: Shows the attribute database

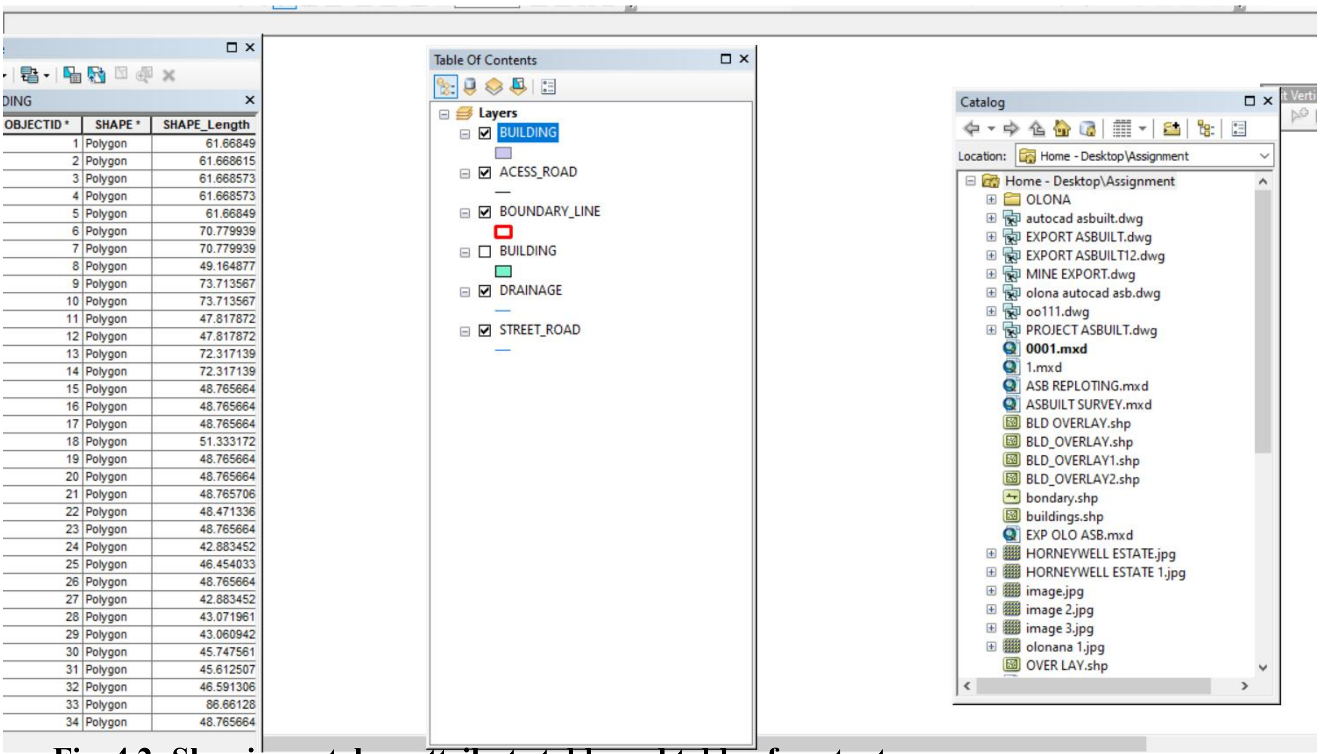


Fig. 4.2: Showing catalog, attribute table and table of content

Analysis of Result

The query retrieved contours with elevation values greater than or equal to 350 meters, indicating areas likely to be less prone to flooding within the project area, as shown in Figure 4.5 (Query 1). These contours represent points with elevations above 350 meters.

The attribute table confirmed that the northeast part of the institute has the highest elevation. Elevation is a critical factor when considering terrain surface and slope. Conversely, the southwest part of the school has the lowest elevation and is therefore more susceptible to erosion. Buildings planned for this region should have foundations elevated significantly above ground level to mitigate potential damage.

The results of this query provide valuable information to the school management, enabling informed decisions about terrain characteristics and appropriate building designs across different regions of the project area.

SINGLE SELECTION CRITERION

Query 1: Retrieving Area whose height is Greater than 350 meters

SELECT* **FROM** Contour **WHERE** "CONTOUR">3.007

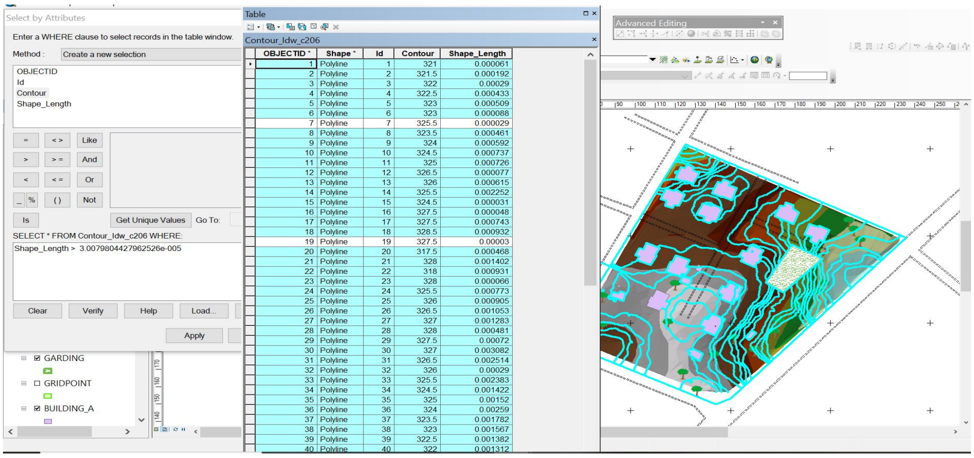


Fig 4.3.: Retrieving Area whose height is greater than 3.007 meters

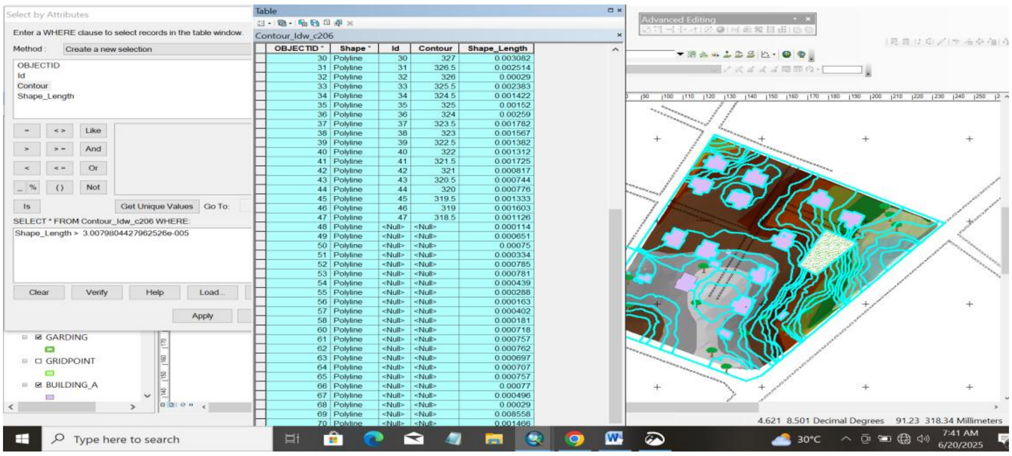


Fig 4.4: Result of area whose height is greater than 3.007 meters

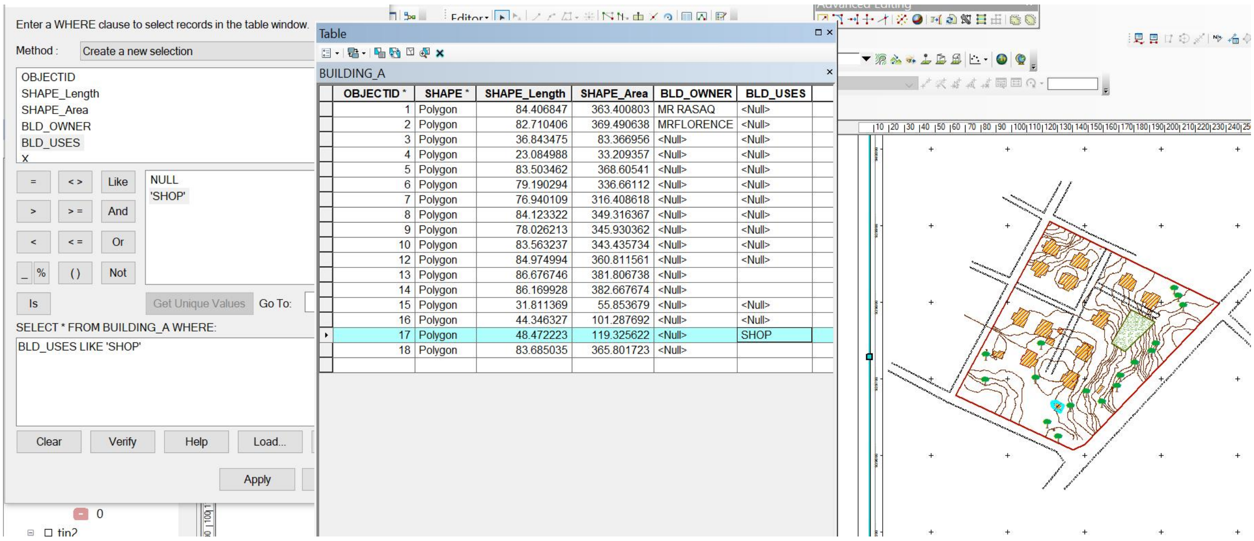
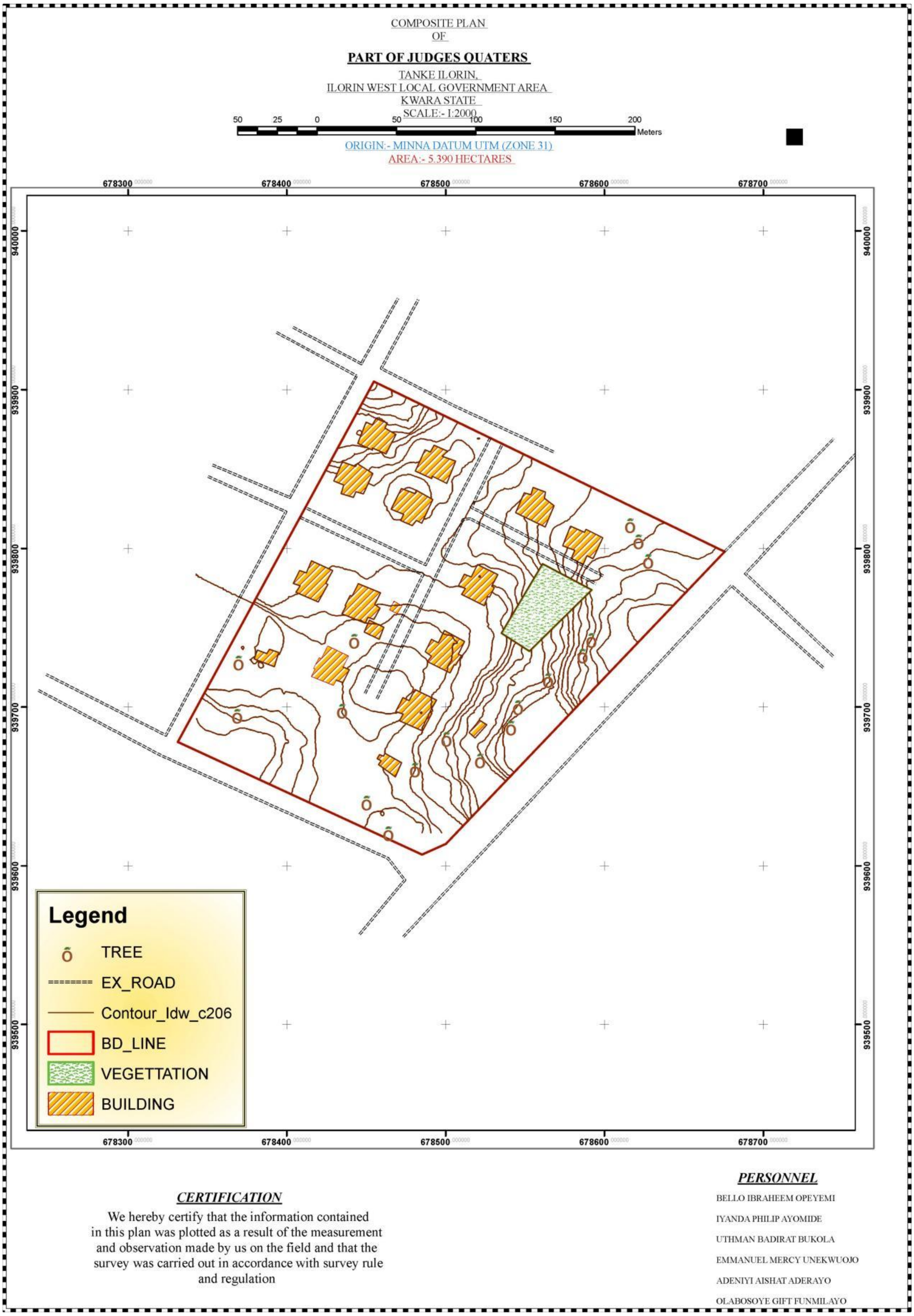


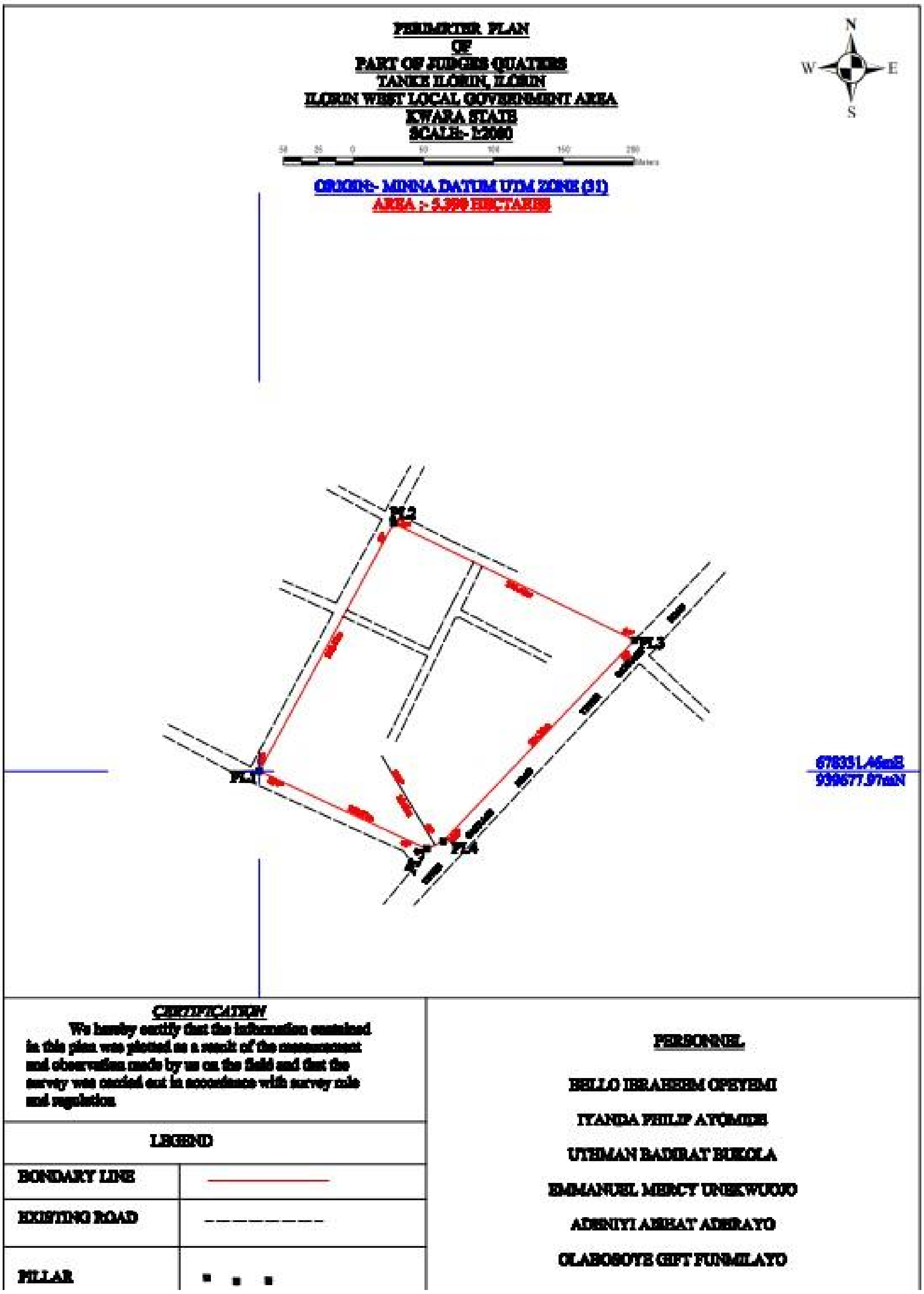
Fig 4.5: Shows the building use for shop

4.2 INFORMATION PRESENTATION AND RESULT ANALYSIS

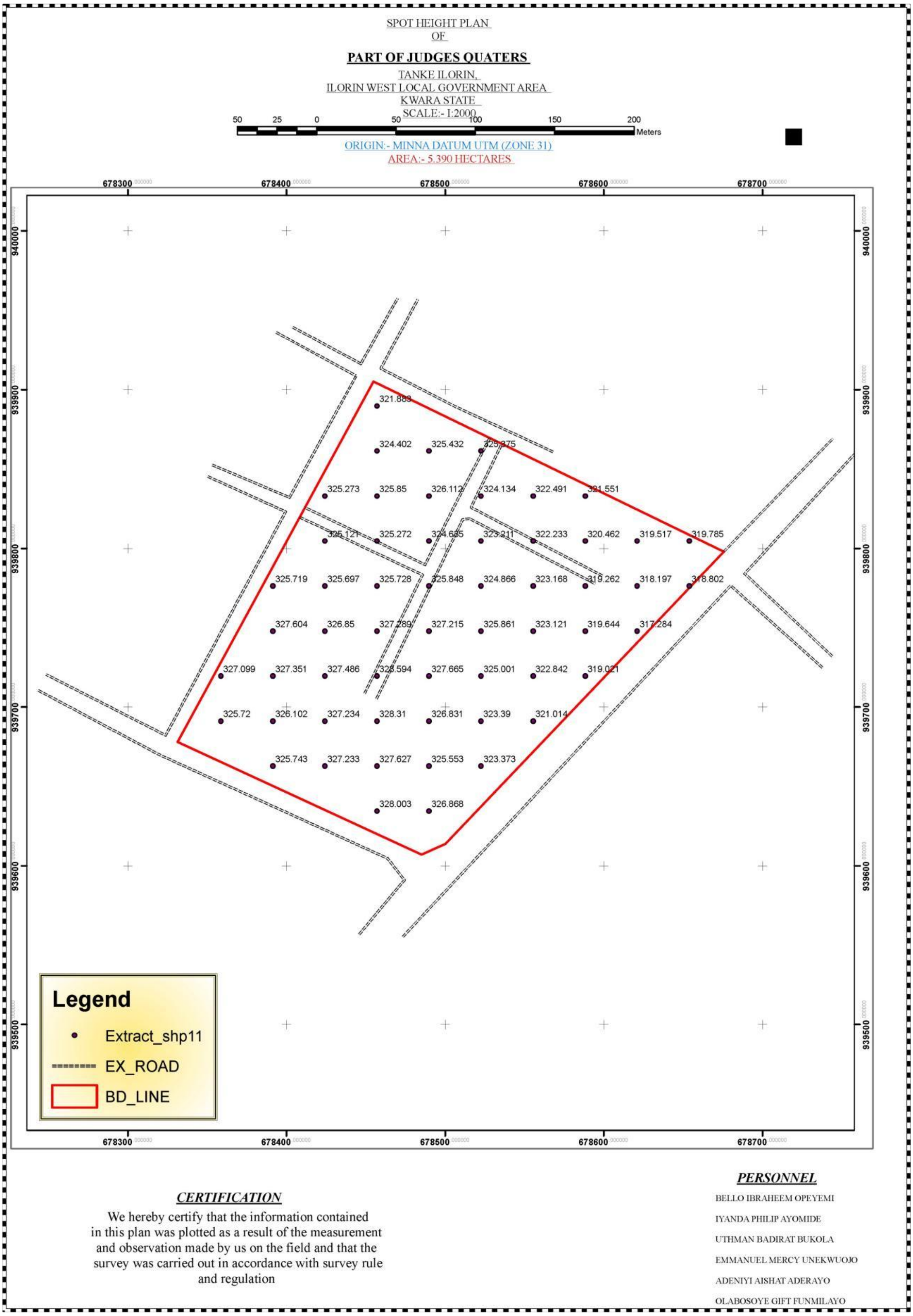
4.2.1 THE TOPOGRAPHIC PLAN (COMPOSITE PLAN)



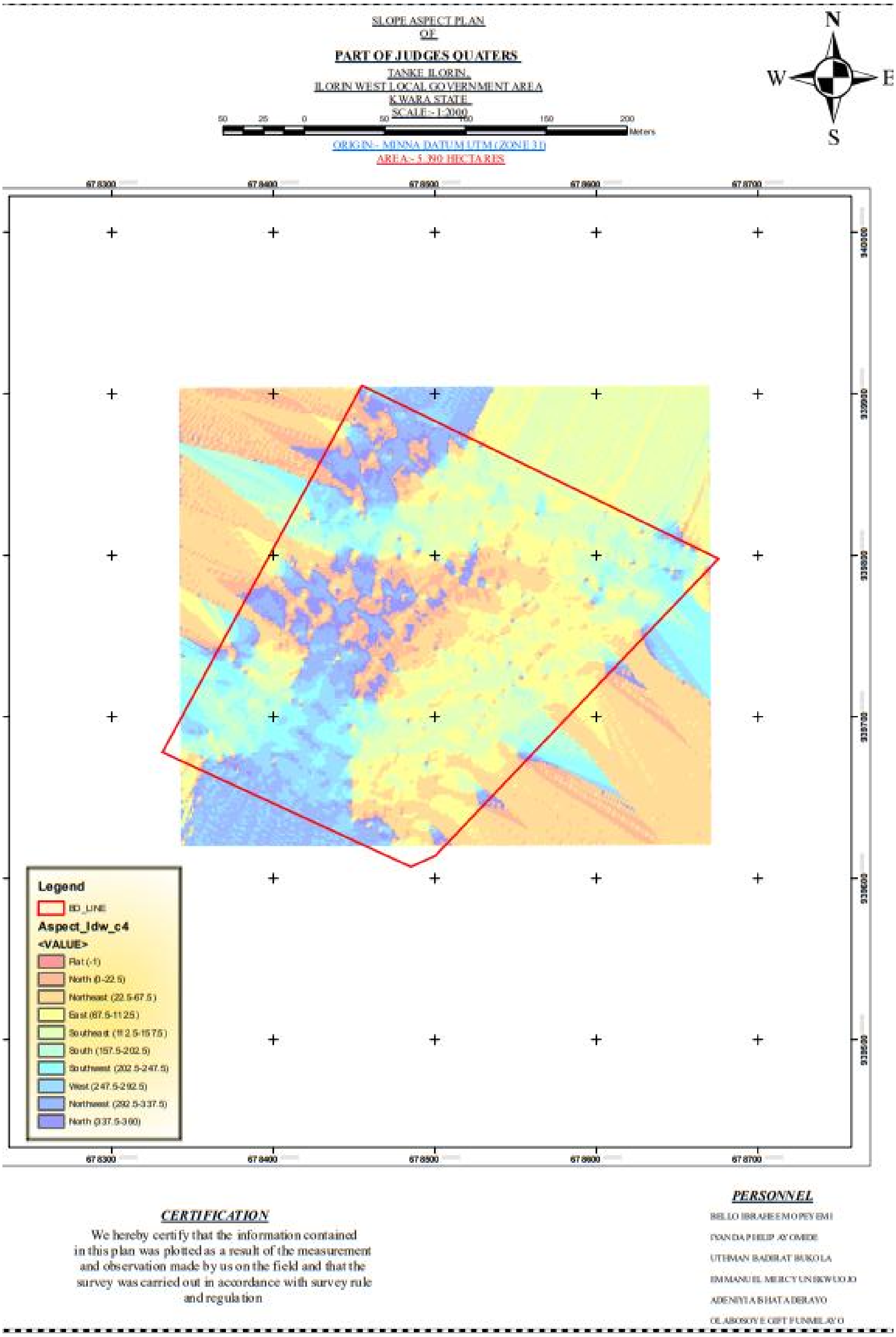
4.2.2 THE PERIMETER PLAN



4.2.3 THE SPOT HEIGHT PLAN



4.2.4 THE SLOPE ASPECT PLAN



CHAPTER FIVE

COSTING, SUMMARY, PROBLEM ENCOUNTERED, CONCLUSION AND RECOMMENDATIONS

5.1 COST ESTIMATION

This stage the total cost spent on the project from day one to the final stage.

Table 5.1.1: Direct cost parameters

S/N	DIRECT COST		
1	**Reconnaissance (1 day)**		
	PERSONNEL	**Rate**	**Total Amount (₦:K)**
	1 x surveyor	10500	10500
	1 x assistant surveyor	7500	7500
	1 x technical officer	6500	6500
	3 x skilled labour	4000	12000
	basic equipment	5000	5000:00
	transportation (vehicle, Driver and fuel)	10000	10000:00
		sub-total	**51,500**
2	**Monumentation (1 day)**		
	PERSONNEL		
	1 x assistant surveyor	7500	7500
	1 skilled labour	4000	4000
	transportation (vehicle, Driver and fuel)	10000	10000
	basic equipment	5000	5000:00

	Beacon (6)	1000	6000
		sub-total	**32,500**
3	**Data acquisition (2 days)**		
	PERSONNEL		
	1 x assistant surveyor	7500	7500
	1 x technical officer	6500	6500
	3 x skilled labour	4000	12000
	Total Station and accessories	15000	15000
	transportation (vehicle, Driver and fuel)	10000	10000
		sub-total	**51,000**
5	**Data Processing (2 days)**		
	PERSONNEL		
	1 x surveyor	10500	10500
	1 x assistant surveyor	7500	7500
	1 x technical officer	6500	6500
	computer / accessories	15000	15000
		sub-total	**39,500**
7	**Technical Report (1 day)**		
	PERSONNEL		
	1 x surveyor	10500	10500
	1 x assistant surveyor	7500	7500

	1 x secretary	5000	5000:00
	computer / accessories	15000	15000:00
		sub-total	**38,000**

TOTAL (DIRECT COST) 212,500 MOBILIZATION/DEMOBILIZATION = 5% of Direct Cost

= 0.05 × 212,500

= **₦10,625**

CONTINGENCY ALLOWANCE

= 5% of Direct Cost

= 0.05 × 212,500

= **₦10,225**

GRAND TOTAL = ₦212,500 + ₦10,625 + ₦10,625

= ₦233,750

VAT (@5% GRAND TOTAL) = 0.05 × 233750

= **₦11,687.5**

TOTAL COST PAYABLE = GRAND TOTAL + VAT

= ₦233,750+ ₦11,687.5

= ₦245,437.5

5.2 SUMMARY

The main aim of the project is to carry out the topographical information system of Judges Quarter Estate, Taoheed Road Ilorin. Kwara State. It was done in accordance with the survey rule and regulation and the departmental instruction. A digital ground survey method was basically use for data acquisition. A data base was created to house all the relevant data collected on the field, AutoCAD, suffer Microsoft word, Microsoft Excel and Notepad were combined to carryout data processing manipulation, Analysis and retriever. The final presentation of information was produced in form of digital map both in hard copy/soft copy.

5.3 PROBLEMS ENCOUNTERED

During the execution of this project the problem encountered are the followings:

1. The pegs used for monumentation were removed repeatedly, but this was overcome by referencing each peg to a fixed mark with the distance of the peg from the reference mark noted.

5.4 CONCLUSION

The aims of the project were achieved as the expected accuracy and the obtained results conformed to required accuracy of a third order job also the task actually exposed and broadened my knowledge on the scope, concepts and skills, involved in topographical surveying, more so, the project has been successfully executed as adequate data were acquired processed and represented in plans.

This project was interesting in spite of the numerous problems encounter thought the execution of the project.

The exercise was not an easy task, it is much cumbersome. It consume money, energy, time and other tangible factors, but at the end of it, I realize that it had helped me in the practical aspect of land surveying and exposed me to that types of problem. Surveyors usually encounters on the field.

5.4 RECOMMENDATIONS

Having successfully carried out the project assignment, I hereby recommend that.

1. The x, y and z coordinates of the features were which confirm the position of the features
2. The topographical surveys of the area enhanced the use of various surveys of software's such as AutoCAD; suffer e.t.c and the preparation of plan. Hence it is highly recommended for further studies.
3. The authority should make modern instrument like global positioning system (GPS) receiver, total station, and digital level etc. available to the prospective student of Higher National Diploma so as to be widely exposed to them for easy operation.
4. I also recommend that instrument should be released to the student on time for quick execution of the project.

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APPENDIX I

S/N	X	Y	Z
PT1	678457.2303	939634.3698	328.003
PT2	678490.0255	939634.3698	326.868
PT3	678391.6401	939662.7202	325.743
PT4	678424.4352	939662.7202	327.233
PT5	678457.2303	939662.7202	327.627
PT6	678490.0255	939662.7202	325.553
PT7	678522.8206	939662.7202	323.373
PT8	678358.8449	939691.0705	325.72
PT9	678391.6401	939691.0705	326.102
PT10	678424.4352	939691.0705	327.234
PT11	678457.2303	939691.0705	328.31
PT12	678490.0255	939691.0705	326.831
PT13	678522.8206	939691.0705	323.39
PT14	678555.6158	939691.0705	321.014
PT15	678358.8449	939719.4209	327.099
PT16	678391.6401	939719.4209	327.351
PT17	678424.4352	939719.4209	327.486
PT18	678457.2303	939719.4209	328.594
PT19	678490.0255	939719.4209	327.665
PT20	678522.8206	939719.4209	325.001
PT21	678555.6158	939719.4209	322.842

PT22	678588.4109	939719.4209	319.021
PT23	678391.6401	939747.7712	327.604
PT24	678424.4352	939747.7712	326.85
PT25	678457.2303	939747.7712	327.289
PT26	678490.0255	939747.7712	327.215
PT27	678522.8206	939747.7712	325.861
PT28	678555.6158	939747.7712	323.121
PT29	678588.4109	939747.7712	319.644
PT30	678621.206	939747.7712	317.284
PT31	678391.6401	939776.1216	325.719
PT32	678424.4352	939776.1216	325.697
PT33	678457.2303	939776.1216	325.728
PT34	678490.0255	939776.1216	325.848
PT35	678522.8206	939776.1216	324.866
PT36	678555.6158	939776.1216	323.168
PT37	678588.4109	939776.1216	319.262
PT38	678621.206	939776.1216	318.197
PT39	678654.0012	939776.1216	318.802
PT40	678424.4352	939804.4719	325.121
PT41	678457.2303	939804.4719	325.272
PT42	678490.0255	939804.4719	324.635
PT43	678522.8206	939804.4719	323.211
PT44	678555.6158	939804.4719	322.233

PT45	678588.4109	939804.4719	320.462
PT46	678621.206	939804.4719	319.517
PT47	678654.0012	939804.4719	319.785
PT48	678424.4352	939832.8223	325.273
PT49	678457.2303	939832.8223	325.85
PT50	678490.0255	939832.8223	326.112
PT51	678522.8206	939832.8223	324.134
PT52	678555.6158	939832.8223	322.491
PT53	678588.4109	939832.8223	321.551
PT54	678457.2303	939861.1726	324.402
PT55	678490.0255	939861.1726	325.432
PT56	678522.8206	939861.1726	325.375
PT57	678457.2303	939889.523	321.883