PROJECT REPORT

ON

AS BUILT SURVEYING OF PART OF HONEYWELL ESTATE, OFF OKEOSE/OKEOYI ROAD, ILORIN EAST LOCAL GOVERNMENT AREA, ILORIN KWARA STATE

BY

TIJANI DAMILOLA FUNMILAYO

HND/23/SGI/FT/100

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

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

JULY, 2025

CERTIFICATE

I hereby certify that all the information given in this project were obtained as a result of observations and measurements made by me and that the survey was carried out in Accordance with Survey Rules, Regulations and Departmental instructions.

SIGNATURE OF STUDENT: ……………………………………

NAME OF STUDENT: TIJANI DAMILOLA FUNMILAYO

DATE OF COMPLETION: ……………………………………….

CERTIFICATION

This is to certify that **TIJANI DAMILOLA FUNMILAYO** with Matric No. **HND/21/SGI/FT/100** have satisfactorily carried out the survey duties contained in this project report under our direct supervision.

I hereby declare that he has conducted himself with due diligence, honesty andsobriety on the project.

……………………………… ……………………………..

SURV. AYUBA **DATE**

PROJECT SUPERVISOR

…………………………….. ………………………

SURV. R.S. AWOLEYE **DATE**

PROJECT CO-ORDINATOR

…………………………….. …………………………….

SURV. A.I ISAU **DATE**

HEAD OF DEPARTMENT

…………………………….. …………………………….

EXTERNAL SUPERVISOR **DATE**

DEDICATION

This project is dedicated to Almighty God and my lovely parent

ACKNOWLEDGEMENT

I give thanks to almighty Allah, the creator of my life for his protection and guidance over me through and through the completion of my project.

Firstly, I would like to express my sincere gratitude to my supervisor, [SURVEYOR AYUBA], for his guidance and support throughout this project. His expertise and feedback were invaluable in shaping this work.

Secondly, To my HOD, SURVEYOR ISAU A.I, A father figure for real, thank you for your support and guidance throughout my project journey..

I also wish to thank my Colleagues for their contributions to data collection and analysis. Additionally, I appreciate the support provided by [Funding And dedication towards this final projects].

Big appreciation to 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. R.S Awoleye, Surv. A.G Aremu, Surv. B.F Diran, Surv. Williams kazeem and Surv. Kabir Babatunde for their support and the knowledge they impacted in us, May almighty Allah be with them all.

To my friends, I'm grateful for their motivation and collective support that made this journey more enjoyable..

To my man, I always appreciate you. THANK YOU…

I would like to thank my parents and siblings for their encouragement. To every one who contributed to this journey of mine, I sincerely send my genuine appreciation, I'm thankful to the gift of you all, may Allah swt bless you all, be you family, friends or acquaintances, THANK YOU…

My sincere gratitude goes to my sister ARAMIDE for standing by me, for her unending support and understanding throughout this project and education….

Thank you all for your support and contributions. I am grateful for the opportunity to work with such a wonderful team. Thank you for making this project possible. I appreciate everyone's help and guidance throughout this project.

ABSTRACT

This project presents the as-built survey of a section of Honeywell Estate, Ilorin, conducted to determine and document the precise positions and dimensions of existing features within the estate. The aim of the survey was to verify the conformity of built structures with the original design plans, support effective land administration, and aid in future planning decisions. Field data were acquired using a South Differential Global Positioning System (DGPS) for georeferencing and a Total Station for detailed measurements. Observations were processed using appropriate surveying software to generate accurate plans showing buildings, roads, drainage lines, and other physical developments. The resulting as-built plan provides a reliable spatial framework for property documentation, development control, and infrastructural assessments within the estate. This survey underscores the critical role of as-built mapping in estate management and urban development.

TABLE OF CONTENTS

Title page i

Certificate ii

Certification iii

Dedication iv

Acknowledgement v

Abstract vi

Table of contents vii

CHAPTER ONE **PAGES**

1.1 INTRODUCTION…………………………………………… 1

1.2 STATEMENT OF PROBLEM……………………………… 2

1.3.0 AIM AND OBJECTIVES OF THE STUDY……………… 3

1.3.1 AIM………………………………………………………… 3

1.3.2 OBJECTIVES……………………………………………. 3

1.4 SIGNIFICANCE OF THE STUDY………………………… 3

1.5 PERSONNEL…………………………………………….. 3

1.6 STUDY AREA…………………………………………… 4

CHAPTER TWO………………………………………….. 6

2.0 LITERATURE REVIEW…………………………….. 6

CHAPTER THREE…………………………………………. 10

3.0 METHODOLOGY………………………………………. 10

3.1 PLANNING……………………………………………….. 10

3.1.1 OFFICE RECONNAISSANCE…………………………….. 10

3.1.2 FIELD RECONNAISSANCE………………………………… 10

3.2 DATABASE DESIGN…………………. ………………..… 12

3.2.1 VIEW OF REALITY ………………………….………..… 12

3.2.2 CONCEPTUAL DESIGN ……………………….……… 13

3.2.3 LOGICAL DESIGN …………………………….……..… 14

3.2.4 PHYSICAL DESIGN…………………………..……….… 15

3.3 EQUIPMENT USED/SYSTEM SELECTION AND SOFTWARE…………………………………….…………..… 16

3.3.1 HARDWARE USED ………………….…………………….. 16

3.3.2 SOFTWARE COMPONENT…………………….…..… 16

3.4 INSTRUMENT TEST ……………………………………..17

3.4.1 HORIZONTAL COLLIMATION TEST…..……..……….… 17

3.4.2 VERTICAL INDEX ERROR TEST…………………..……. 18

3.4.3 ANALYSIS OF COLLIMATION ND VERTICAL INDEX ERROR…………………………………………………...18

3.5 CONTROL CHECK.……………………………………...19

3.6 MONUMENTATION ……………………………………...20

3.7 DATA ACQUISITION …………………………..………21

3.7.1 GEOMETRIC DATA ACQUISITION …….………..………21

3.7.2 TRAVERSING………..……………………………..………21

3.7.3 DETAILING………..……………………………..…………21

3.7.4 ATTRIBUTE DATA ACQUISITION …….………..………22

3.8 DATA DOWNLOADING AND PROCESSING……………..……22

3.8.1 DATA DOWNLOADING AND DATA EDITING ………..... 22

3.8.3 SPATIAL RELATIONSHIPS……………..………………….... 23

3.8.4 OVERLAY OF PLAN……………………….…………….. 23

3.9 DATABASE IMPLEMENTATION……….. ……….…….. 23

3.9.1 DATABASE MANAGEMENT SYSTEMS……….….….. 24

3.9.2 DATABASE MAINTENANCE……….. ……………….. 24

3.9.3 BACK COMPUTATION TABLE……….. ………………... 25

3.9.2 AREA COMPUTATION …….……….. ……………….. 26

CHAPTER FOUR………………………………………………………… 28

4.0 RESULT ANALYSIS AND DISCUSSION…………………….. 28

4.1 TESTING OF DATABASE……………………………………….. 28

CHAPTER FIVE…………………………………………………………….. 32

5.0 COST ESTIMATION, SUMMARY, RECOMMENDATION AND CONCLUSION…………………………………………… 32

5.1 COST ANALYSIS…………………………………………………32

5.2 SUMMARY………………..……………………………………35

5.3 RECOMMENDATION……………………………………………35

5.4 CONCLUSION………………………………………………………… 36

REFERENCE………………………………………………………… 37

APPENDIX…………………………………………………………… 39

CHAPTER ONE

1.1 INTRODUCTION

Surveying is the science and art of determining the relative position of point above on or beneath the surface of the earth or establishing such point. In a more general sense however survey can be regarded as the discipline which encompasses all methods of gathering and processing information about the physical earth and environment source.

In surveying there is an essential need for map production for future planning development, for modification and proper assessment of the existing development in a particular area where As-built surveying is vital. Map, according to the American congress on surveying and mapping (1972) is a representation on a plain surface on an established scale of the physical features (natural and man-made) of a part of the whole of the earth surface by the use of sign and symbols and with the method of orientation.

As – built map is a kind of map whose primary purpose is to show and identify the original shape and size of the building both natural and suitable man made feature of the earth surface using a scale. The purpose of the As –built survey also commonly called a physical survey is to show the property "AS IT IS BUILT" as a particular point in time. While a pre – construction survey is performed to document coordinates prior to construction work being performed. The As – built survey is conducted to show the current state of the site at various state throughout the duration of the project. It also serve as a close document to verify that the work authorized was completed to plan and in compliance with all relevant standards and regulations.

The project As – built survey is made for gathering data about natural and man – made feature of Honeywell Estate, that is the buildings, structures, roads and other details within its environments was obtained pertaining to elevation as well as to the location of constructed and natural features such as trees, poles and the entire information is plotted in map format called AS-BUILT.

The As – built map of Honeywell Estate, involve the following procedure.

1. Reconnaissance

2. Traversing

3. Linear measurement

4. Detailing

As-built survey has been an essential element in the development of the human environment since the beginning of recorded history. It is performed to verify that a particular improvement on a parcel of land has been built according to the proposed design plans, specifications and setback requirement. It shows how any field change made during construction fit the overall design of the development. If this As-built data are not obtained, engineers, architect, land planners, clients and other may be misled in assuming that the construction work performed conforms perfectly to the original drawing .It is used to document the size and / or location of an improvement used to aid in the design of addition of buildings, extention, sewer and parking lot expansion. It help landing institution to protect their interest, accurate decision making, updating of information and as a reference material for student ministry and individual.

Due to increase in population, scarcity of houses, political and topographic effect, medium density layout needs As-built survey in order to determine the final location of existing features and the available space for proper planning ,redesigning and expansion. The aim of As-built survey on medium density layout is to produced an As-built plan to ascertain the final location of available detail and available space for further development of the estate by way of expansion. The processes involved in the achievement or the above aim is reported here forthwith.

1.2 STATEMENT OF PROBLEM.

Due to political reason, cost and topographic of the area, errors(instrument, atmospheric, human etc). Medium density layout need As-built survey to determine the final location of existing feature, thus enhances proper use of available space for expansion.

1.3 AIM AND OBJECTIVES

1.3.1 AIM

The aim of this project was to produce an As-built plan of part of Honeywell Estate, off Okeose / Okeoyi road, Ilorin East Local Government Area, Kwara State for the purpose of ascertaining variations of detail as constructed from the design..

1.3.2 OBJECTIVES

This was achieved through the following objectives:

i. Establishing the perimeter using traverse.

ii. Measurement of relative position of the detail within the study area.

iii. Preparation of an overlay plan which facilitated the comparison. To explore the power of computer application software especially in the plan production.

1.4 SIGNIFICANCE OF STUDY.

Production of As-built survey plan of medium density layout will be significant in the following ways: For accurate decision making to the developer for physical planning and further development and/or expansion of the estate. For updating of information and quick retrieval of information for environmental management for the government. As a reference material for student, ministry and individual for further research work. Enhance the knowledge of the student in the area of As-built survey

1.5 PERSONNEL

TABLE 1.1:- Personnel

1	TIJANI DAMILOLA FUNMILAYO	AUTHOR
2	OBAMILA ODUNAYO FUNKE	MEMBER
3	DADA OLUWAFERANMI NATHANIEL	MEMBER

4	TOMOYE PELUMI FAVOUR	MEMBER
5	ADEYINKA GRACE TOSIN	MEMBER
6	IDOWU ABEEB LOLADE	MEMBER
7	OYEWUMI TOHEEB OLANIYI	MEMBER
8	IDRIS OLONA	MEMBER

1.6 STUDY AREA

The study area is part of Honeywell Estate, off Okeose/Okeoyi road, Ilorin East Local Government Area, Kwara State. The study area falls on latitude 58°15'26"N and longitude 2°44'41"E. The area of the project site was found to be 7.18 hectares. The project area is underdeveloped area with features like buildings, roads, trees, electricity lines e.t.c.

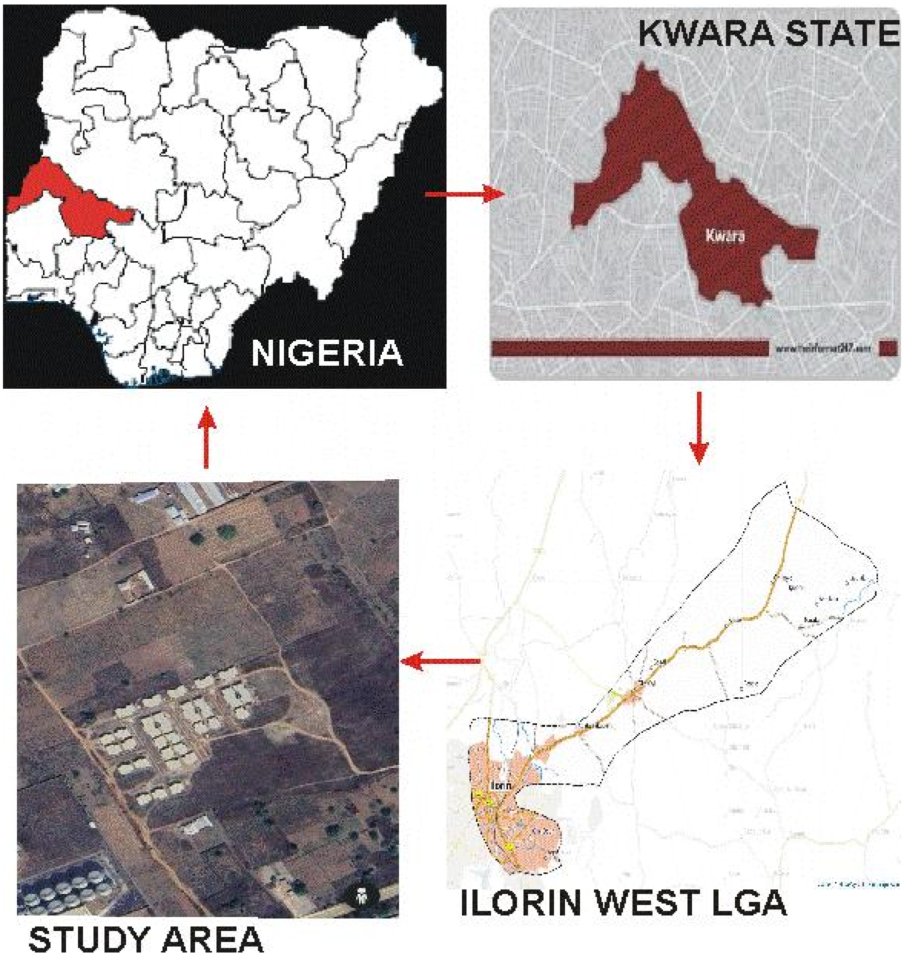

Fig 1.1: Diagram of study area

CHAPTER TWO

LITERATURE REVIEW

As-built surveying is a process that captures the physical dimensions, layout, and placement of a building or structure after construction. Unlike preliminary surveys that focus on design intentions, an as-built survey documents what was actually constructed on-site, accounting for any changes or modifications made during the construction phase. It provides a precise record of the finished state of a project, enabling further planning, maintenance, or legal verification.

The primary purpose of an as-built survey is to create an accurate representation of the final product of construction. Its key objectives include:

i. **Verification:** Ensures that the completed structure matches the design and complies with legal, environmental, and regulatory requirements.

ii. **Documentation**: Provides a permanent, verifiable record of the built environment, which is invaluable for future renovations, repairs, or modifications.

iii. **Design Modifications:** Captures unplanned changes made during construction, often due to unforeseen site conditions, design adjustments, or client requests.

iv. **Facilities Management:** Facilitates the management and upkeep of infrastructure by providing facility managers with accurate, up-to-date information.

v. **Legal and Compliance Assurance**: Assists in verifying that the constructed work meets zoning, permitting, and environmental standards.

As-built surveys can be categorized based on the specific aspect of construction they address. Some common types include:

i. Topographic As-Built Survey: Focuses on capturing the landscape and surface features after construction, including grading, elevation, utilities, and surface structures. Commonly used for site development, roadways, landscaping, and drainage systems.

ii. Architectural As-Built Survey Involves recording the physical layout of buildings, such as walls, windows, doors, ceilings, and structural elements. Essential for verifying architectural designs and ensuring the project aligns with the building permit.

iii. Structural As-Built Survey Captures the structural components of a building, including foundations, beams, columns, and load-bearing walls. Used to ensure that the structural integrity of the building meets the design specifications and safety standards.

iv. MEP (Mechanical, Electrical, and Plumbing) As-Built Survey Focuses on the installation of MEP systems, including HVAC, electrical wiring, plumbing, and fire suppression systems. Ensures that these critical systems are installed according to the design and are compliant with relevant codes.

v. Utility As-Built Survey: Documents the location of underground utilities such as water pipes, gas lines, electricity cables, and sewer systems. Essential for future maintenance, repairs, or expansion of utility networks.

vi. 3D Laser Scanning and BIM As-Built Survey: Involves the use of laser scanning to collect millions of data points from a site to create highly accurate 3D models of the building or structure. These models can be integrated into Building Information Modeling (BIM) systems, enabling better visualization and management of the built environment.

The process of as-built surveying involves multiple steps to ensure that all data is captured and represented accurately. These steps include:

- **Pre-Survey Preparation**

i. Project Review: Surveyors review the original construction plans, designs, and blueprints to understand the expected structure and identify areas that might have been altered during construction.

ii. Scope Definition: The specific requirements of the as-built survey are outlined, including which elements of the structure will be surveyed (e.g., architectural, MEP, utilities).

- **Field Surveying**

i. Site Visits: Surveyors visit the construction site and take precise measurements of existing conditions using specialized surveying equipment.

ii. Data Collection Tools: Various tools are used, such as: Total Stations: Used for measuring angles and distances in the field, GPS/GNSS: Provides accurate location data, especially for large-scale projects, Laser Scanners: Capture detailed 3D point clouds of the site, Drones/UAVs: Capture aerial images and data, particularly useful for large outdoor sites, Photogrammetry: Uses photographs from different angles to create 3D models of the site.

iii. Surveying Precision: Depending on the complexity of the project, surveyors will ensure high accuracy, sometimes at millimeter levels, to document even the smallest discrepancies from the design.

- **Data Processing and Analysis**

i. Data Import: Raw survey data is imported into specialized software (e.g., AutoCAD, Revit, Civil 3D, etc.).

ii. Drawing Creation: The data is used to create as-built drawings or 3D models, which reflect the actual dimensions, layout, and positions of all constructed elements.

iii. Deviation Analysis: The as-built drawings may be compared to the original design to identify deviations and potential issues. Modifications made during construction are clearly highlighted.

iv. Modeling and BIM Integration: For complex projects, data may be converted into a Building Information Model (BIM), which offers more detailed, interactive, and manageable data compared to traditional 2D drawings.

- **Final Documentation and Delivery**

i. Delivery Formats: The final as-built data can be delivered in multiple formats, such as 2D CAD drawings, 3D BIM models, or PDF files.

ii. Review and Verification: The completed as-built survey is reviewed for accuracy by the surveyor or engineering team before being finalized and delivered to the client.

iii. Client Handover: The finished as-built drawings or models are handed over to the client, contractors, architects, or other stakeholders.

As-built surveys are applied across many different fields and industries, offering critical value throughout the construction lifecycle. Key applications include: Construction and Renovation, Facility and Asset Management, Maintenance and Operations: Accurate as-built drawings help building managers maintain and operate a structure, ensuring that systems such as HVAC, plumbing, and electrical systems are properly maintained.. Space Planning: Used in office buildings, hospitals, and other facilities to manage space utilization and plan future upgrades.

As-built surveying is an essential aspect of modern construction and project management, providing an accurate, detailed record of the built environment. With the help of advanced technologies such as laser scanning, GPS, drones, and BIM, as-built surveys have become more efficient and precise, ensuring that the final product aligns with the design, is compliant with regulations, and supports ongoing maintenance and operational management.

By accurately documenting the real-world state of a project, as-built surveys play a key role in minimizing errors, ensuring regulatory compliance, and facilitating future planning and upgrades.

CHAPTER THREE

3.0 METHODOLOGY

The process followed to achieve the expected result is grouped into the following three stages;

Planning

Data acquisition

Data processing

3.1 PLANNING

The following are the methods adopted in carrying out as-built survey of Honeywell estate off oke ose/oke oyi road Ilorin, olrin south local government area

3.1.1 OFFICE PLANNING (RECONNAISSANCE)

This includes the purpose, precision, and accuracy of the survey, the type of equipment used, and the best method engage for the survey carried out. It also involves the decision and collection of instruments needed for the work, acquisition of existing building plans for buildings studied, instrument test, work plan, and acquiring and evaluating of all relevant data used for the project. Other secondary data needed for the study, such as the available coordinates of the control network used, was gotten from the department of surveying and geo-informatics.

Table.3.1 Coordinates of Controls

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

3.1.2 FIELD PLANNING (RECONNAISSANCE)

This starts by visiting the study area to be pre-informed about the state of the site, and to determine the work path, then to ground truth the information obtained during the office recce.

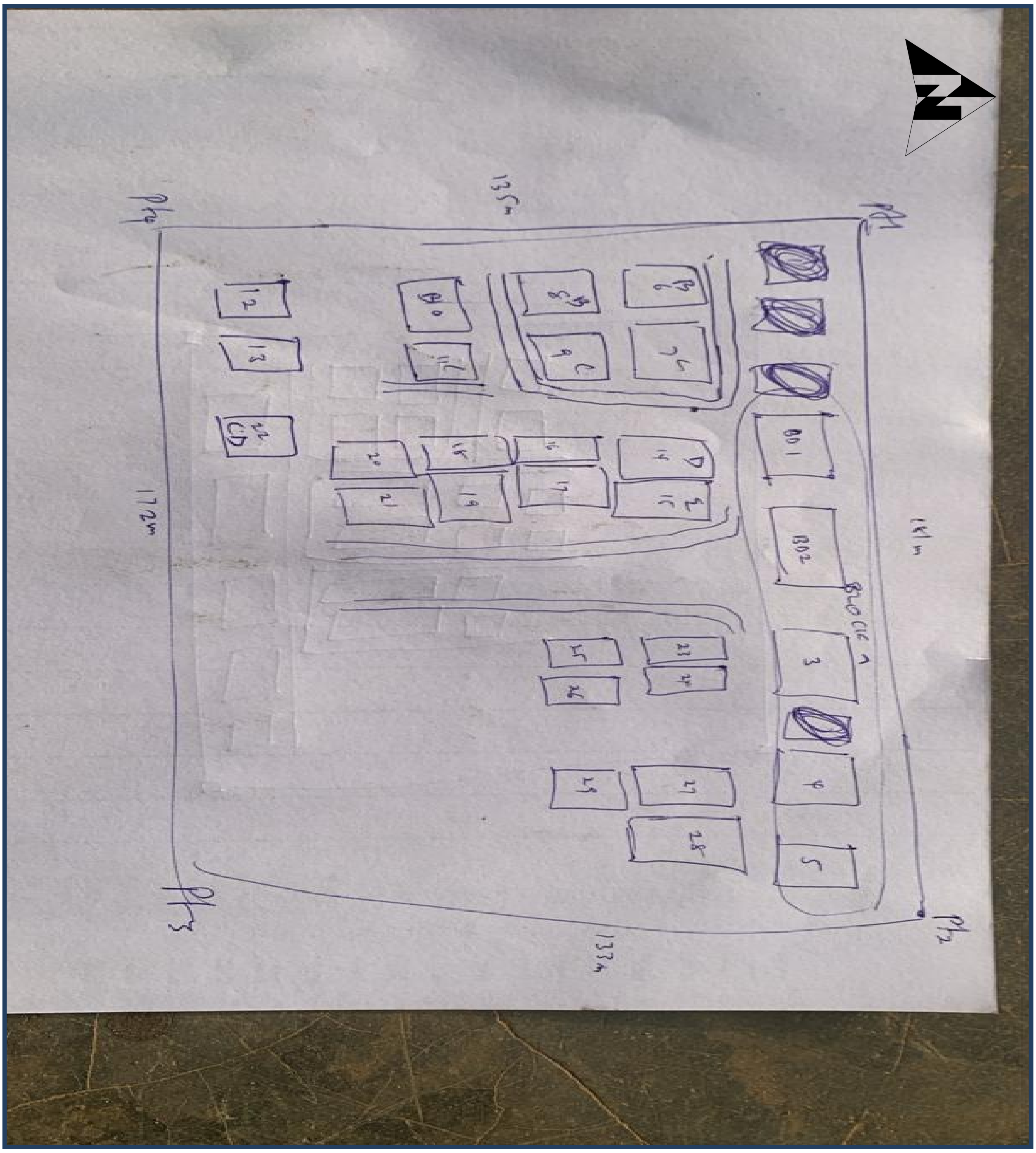

Fig.3.1: Reece diagram of the study area (not drawn to scale)

3.2 DATABASE DESIGN

The design of any database involves three stages namely;

i Conceptual design

ii Logical design

iii Physical design

3.2.1 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 as-built 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; Green serve, Roads, Electric poles, Trees, Water Facilities, Buildings, Football pitch, Streams.

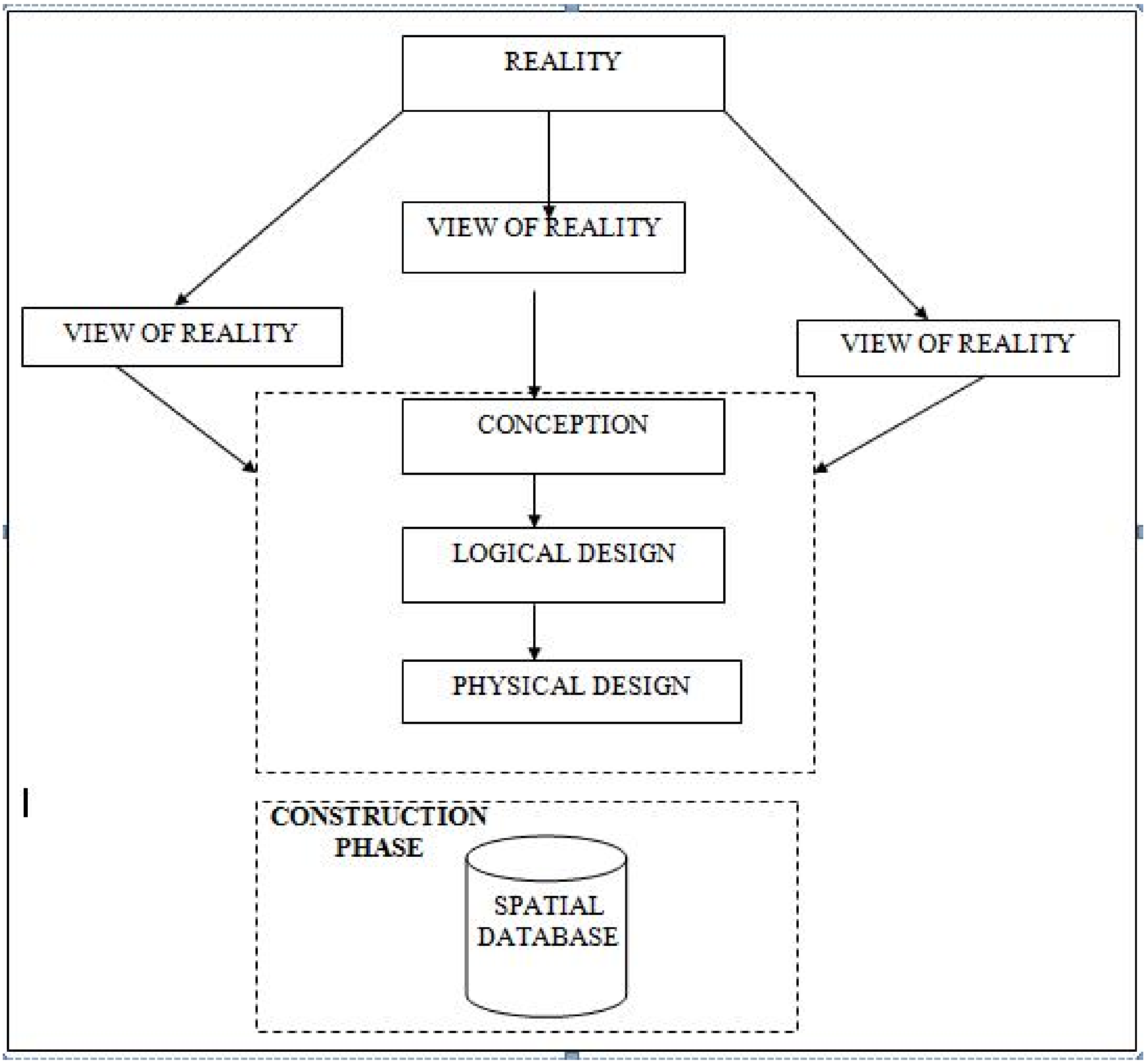

Fig.3.2 Design and Construction Phases in Spatial Database

3.2.2 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:-

i. Vegetation area (polygon)

ii. Roads(line)

iii. Trees(point)

iv. Boundary line (polygon)

v. Buildings(polygon)

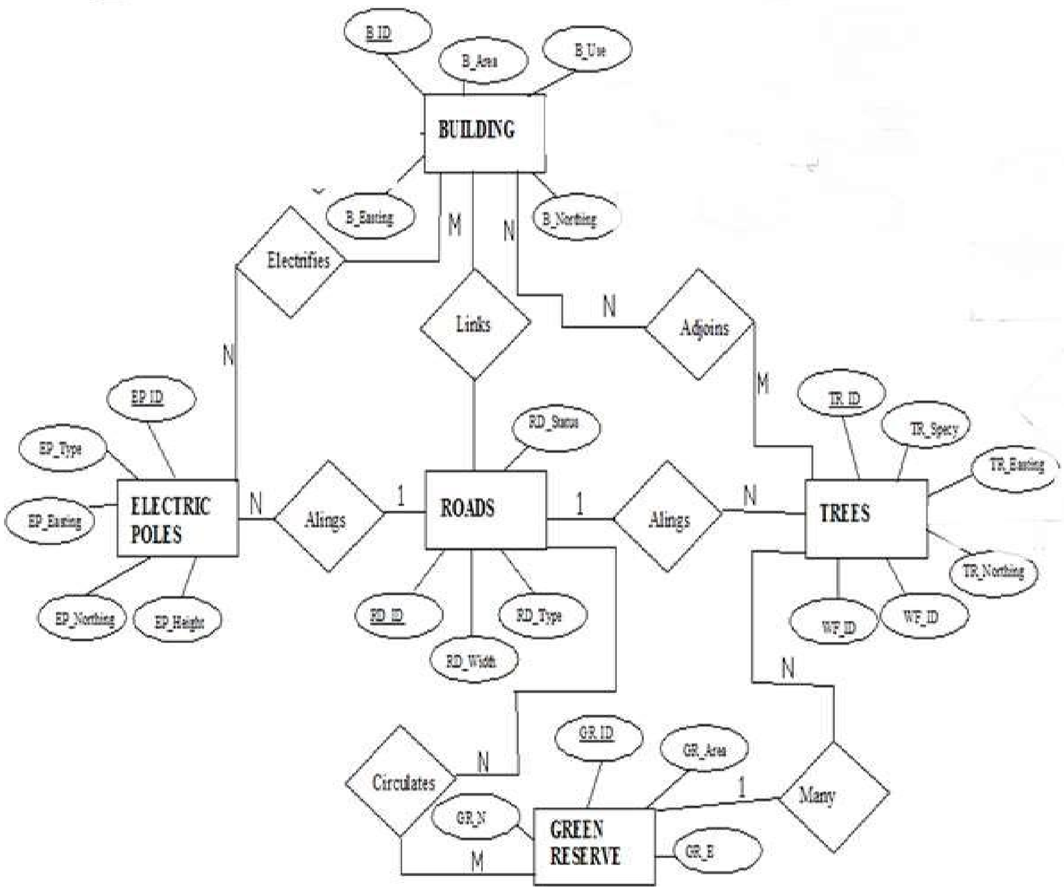

Fig.3.3. E-R Diagram (Entity relationship diagram)

3.2.3 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 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 type is termed an identifier.

Building(B_ ID, B_ Area, B_ Name, B_ Easting, B_ Northing)

Roads(R _ ID, R _ Width , R _ Type, R- Condition, R_ Easting, R_ Northing)

Tree(TR _ ID, TR_ spp, TR_ Importance, TR_ Easting, TR_ Northing)

3.2.4 PHYSICALDESIGN

Table3.2: 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

Table3.3: 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

Table3.4: Trees and its attributes

ENTITY	DESCRIPTION
TR_ID	Tree Identifier
TR_ Spp	Tree specy
TR_E	Tree_ Easting
TR_N	Tree Northing

3.3 EQUIPMENTUSED/SYSTEMSELECTIONANDSOFTWARE

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. 1cutlass

vii. Hand held 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 SOFTWARE COMPONENT

i. Notepad.

ii. Microsoft Excel.

iii. AutoCAD2007

iv. Arc GIS10.2

v. Microsoft Word.

3.4 INSTRUMENT TEST

To ensure the quality of the data, the Total Station employed for this project was tested for vertical index and horizontal collimation errors. These tests also aimed to verify the instrument's efficiency and reliability. The procedure followed is outlined 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). 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.

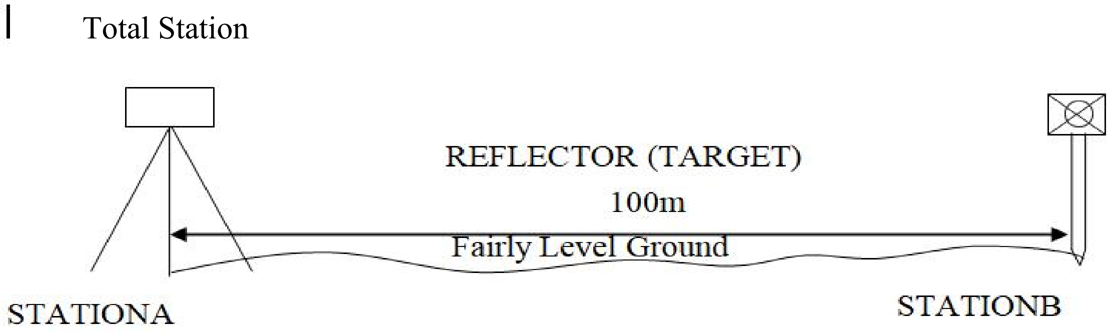

Fig3.4; Horizontal Collimation and Vertical Index error test.

Table3.5: Horizontal Collimation Data

Station	Target	Face	Hz Reading	Difference	Error
A	B	L	38˚42�означ32”		
		R	218˚42‟35”	180˚00‟03”	03”

Source field work

3.4.2 VERTICAL IX ERNDEROR TEST

To perform the test, the Total Station was set up over a known point, and all necessary temporary adjustments were made to ensure proper alignment and functionality. A target was placed approximately 100 meters away, and the instrument was aimed at it. The target was first bisected using the face left position, and the corresponding vertical angle was recorded. The same process was then repeated using the face right position, and the resulting reading was also documented. The recorded values are presented below:

Table3.6: 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 ANALYSIS OF COLLIMATION AND VERTICAL INDEX DATA

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 CONTROL CHECK

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.

Table3.7: 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/KWEAS 5072

Source: office of surveyor general kwara state

Table3.8: 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

Table3.9: TABLE showing the observation result of the control check

STN	SIGHT	FACE	OBSERVEDHZANGLE	REDUCED	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.

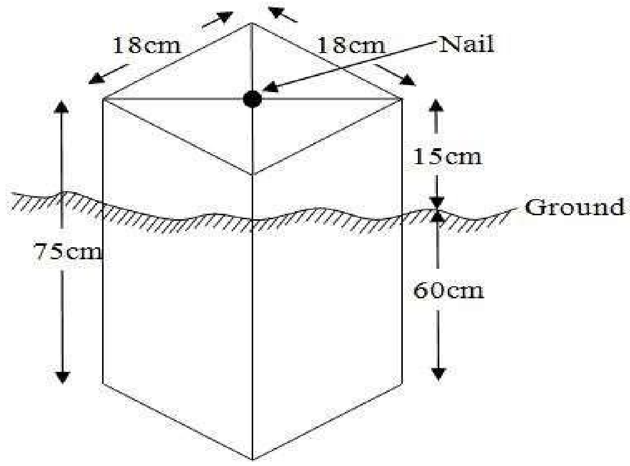

Fig.3.4: Pillar Description

3.7 DATA ACQUISITION

Data acquisition is a fundamental aspect of digital mapping. It involves collecting coordinate data of map features in a format compatible with computers. Various techniques exist for gathering topographical data, and the choice of method depends on several factors, including the data source, available hardware and software, desired level of accuracy, and the manpower involved. In addition to field and laboratory methods, data can also be obtained through social surveys.

In the context of this project, data acquisition refers to the methods and processes used to obtain the necessary data. The acquired data is categorized into two main types: geometric data and attribute data.

PRIMARY DATA SOURCE

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

SECONDARY DATA SOURCE

An imagery of the area was acquired through Updated Google earth; this was used to ascertain the extent of coverage of the project area.

3.7.1 GEOMETRIC DATA ACQUISITION

This involves the acquisition of Nothings, Easting and Height value of features that are present on the project site. In the aspect of this project digital land survey method was adopted.

3.7.2 TRAVERSING

This is a series of connected straight lines, the length and direction of which are determined from measurements. This includes the distance measurement and angular measurements which include horizontal angle and vertical angle between points, whose direction between selected points is determined after some calculations. The total station computed directly the angle and distance measured on the site to determine the coordinates of the point with the aid of the processor. The total station was used to determine the coordinates of the boundary of the project site. The instrument was set on control 'Y' and adjustment (temporary) was done, the instrument was focused at the reflector on point 'X' to set orientation and point 'Z' was observed as the forward station. All other boundary point was observed as the reflector was placed on them.

3.7.3 DETAILING

Detailing entails fixing both natural and artificial feature that exists in the boundary. These include buildings, electric poles, footpaths, culverts, etc. In this project, details were fixed using the total station and its accessories using the ray shooting method.

Here, the ray shooting method was employed to effectively fix the details along the project area. Features such as roads, buildings, storex, etc. were fixed. To achieve this, the total station is set on the transferred point in the project boundary to bisect many edges of details and the reflector was placed at a known station for orientation before positioning it at each corner of the details. The coordinate of each corner is observed and recorded. The details taken include Road, Building, Storex, and Electric poles.

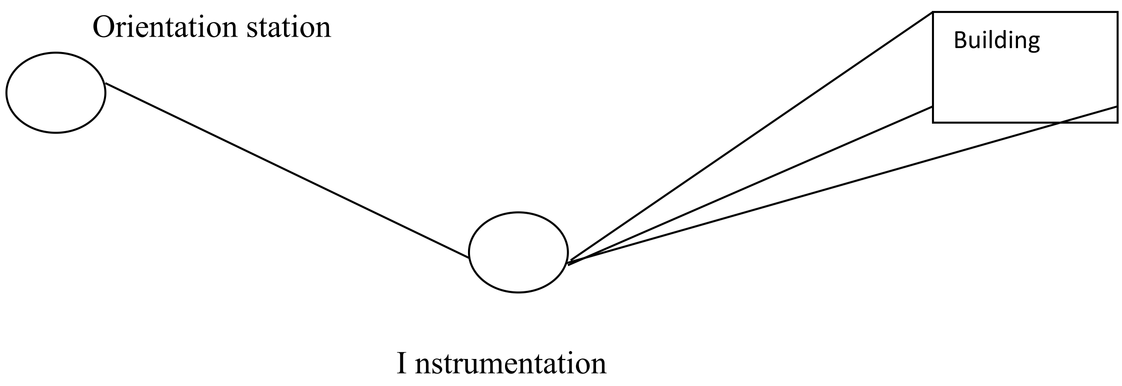

FIGURE 3.5 SHOW THE DETAILING OBSEVATION

3.7.4 ATRIBUTES 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 and around the study area.

3.8 DATA DOWNLOADING AND PROCESSING

3.8.1 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.

3.8.2 DATA PROCESSING AND DATA EDITING

These data were processed using AutoCAD 2007 where the acquired coordinate was plotted, and details fixed to depict the study area, after which were exported to Arc GIS 10.2 where digitizing was done, and the attribute data was used to create a database table in relationship to the details. This data table was queried to provide useful cadastral information.

3.8.3 Spatial Relationships

Spatial relationships are the relationship determined by the location, size, shape, and other features of spatial objects. The most common spatial relationships are distance relationships, direction relationship, and topological relationships.

3.8.4 Overlay of plan

The 2D plan of the building in the study was gotten from the ministry and was captured with a digital camera. After which, the captured image was added into the Arc GIS 10.2 environment as a geo-referenced raster image and the conversion to digital form was done by digitizing, then the overlay was done by putting on the two layers containing both files.

3.9 DATABASE IMPLEMENTATION

This phase involves the creation of the spatial database. Following the completion of the three design stages Reality, Conceptual, and Logical design the database was developed using ArcGIS10.2 software. This process entails integrating and storing both the acquired geometric (graphic) data and attribute data to enable spatial analysis and queries.

A database is an organized and integrated collection of data that is structured for efficient access and use by relevant applications, with data retrievable through various logical operations. Once the attribute table was populated manually via the keyboard, certain attributes such as the areas of settlements were automatically calculated and displayed using specific commands available in ArcGIS10.2.

Arc GIS was also used to link the graphic data with the attribute table, allowing for the execution of spatial queries and further analysis.

3.9.1 DATABASE MANAGEMENT SYSTEMS

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 software package whose function is to manipulate a database on behalf of the user.

A good DBMS must provide the following functions:

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

3.9.2 DATABASE MAINTENANCE

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

i. Computer compatible tape reader

ii. Magnetic tape

iii. Optical disc and compact disc

3.9.3 BACK COMPUTATION Table

TABLE 3.10 SHOWS THE BACKWARD COMPUTATION

STN FROM	BEARING ° ‘ ”	DIST (m)	△ N	△ E	X	Y	STN TO
					683827.457	946283.854	PL1
PL1	66 1 55	303.145	123.146	277.005	684104.462	946407.843	PL2
PL2	149 46 46	192.751	-166.555	97.017	684201.479	946241.288	PL3
PL3	155 17 55	50.039	-45.426	20.985	684222.464	946195.862	PL4
PL4	249 25 28	312.969	-109.990	-293.005	683929.459	946085.872	PL5
PL5	332 44 31	222.713	197.982	-102.002	683827.457	946283.854	PL1

3.9.4 AREA COMPUTATION

TABLE 3.11 SHOWS Area Computation

Double Latitude	Departure	Multiplier
123.99	-277.00	-34,345.23
123.99		
247.98		
-166.55		
81.43	97.02	7900.34
-166.55		
-85.12		
-45.43		
-130.55	20.98	-2738.94
-45.43		
-175.98		
-109.99		
-285.97	-293.00	83,789.21
-109.99		
-395.96		
+197.98		
-197.98	-102.00	20,193.96
+197.98		
0.00		

Total Area = {(-34,345.23--2738.94) + (7,900.34+83,789.21+20,193.96)}/2

Total Area = {(-37,084.174) + (111,883.51)}

Total Area = 74,799.336/2

Total Area = 37,399.668 SQ MTS

4.5 LINEAR ACCURACY COMPUTATION

Linear Accuracy = 1 / {[SQRT (change in Northing) 2 + (change in Easting) 2 / Total Distance

Linear Accuracy = 1 / {SQRT [(0) 2 + (-554) 2] / 1081.954

Linear Accuracy = 1 / {SQRT [306916]} / 1081.954

Linear Accuracy = 1 / 554 / 1081.954

Linear Accuracy = 1 / 0.512036

Linear Accuracy = 1: 0.5

CHAPTER FOUR

4.0 RESULTS, ANALYSIS, AND DISCUSSION

GIS stands out from other information systems due to its powerful spatial analytical capabilities particularly overlay operations, buffering, spatial search, topographic analysis, and neighborhood and connectivity functions. These capabilities enable GIS to answer fundamental questions related to location, conditions, trends, routing, patterns, and modeling by manipulating and analyzing spatial data. In this project, the primary analyses conducted included overlay operations, topographic analysis, and spatial searches.

4.1 TESTING OF DATABASE

This is the test carried out to determine whether there exists a relationship between data modeled about entities in a spatial database as well as putting in to test its retrieval capabilities.

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 was used in order to produce information required 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:-

i. Architectural planning

ii. Building overlay

iii. The above listed queries are shown

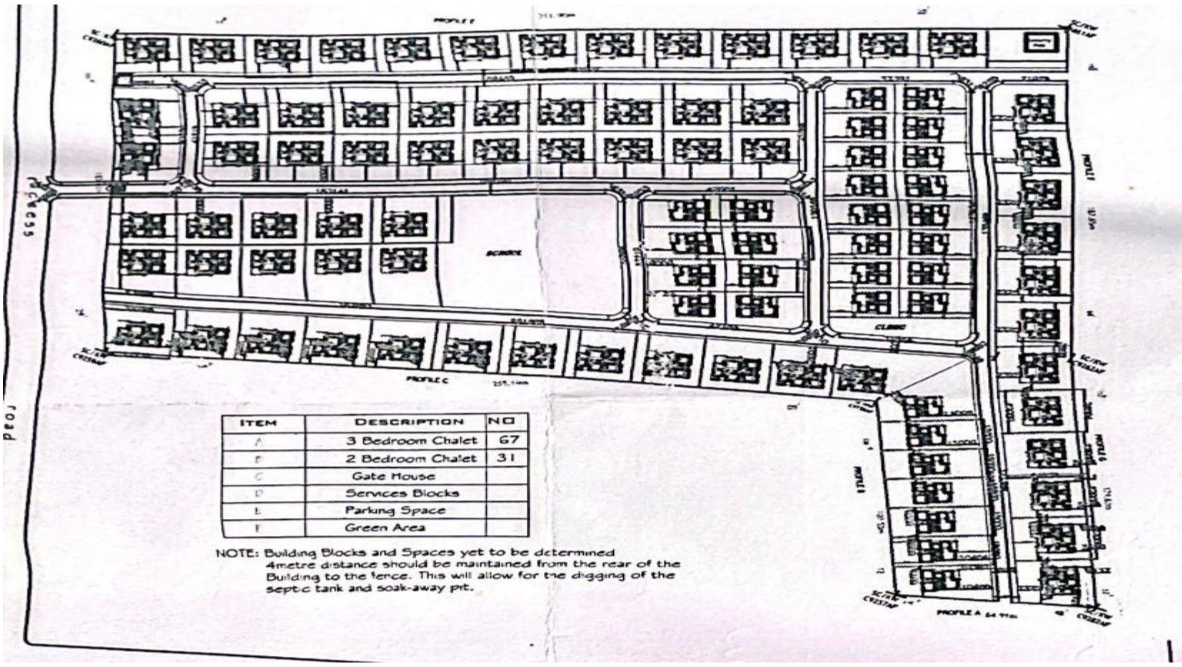

Fig4.1. showing the 2d plan architecture structure of the building

Note: - the 2d plan of the building in the study was gotten from the owner of the Honeywell estate and was captured with a digital camera. after which, the captured image was added into the Arc Gis10.2 environmental as a geo-referenced raster image and the conversion to digital form was done by digitizing then the overlay was done by putting on the two layers containing both files

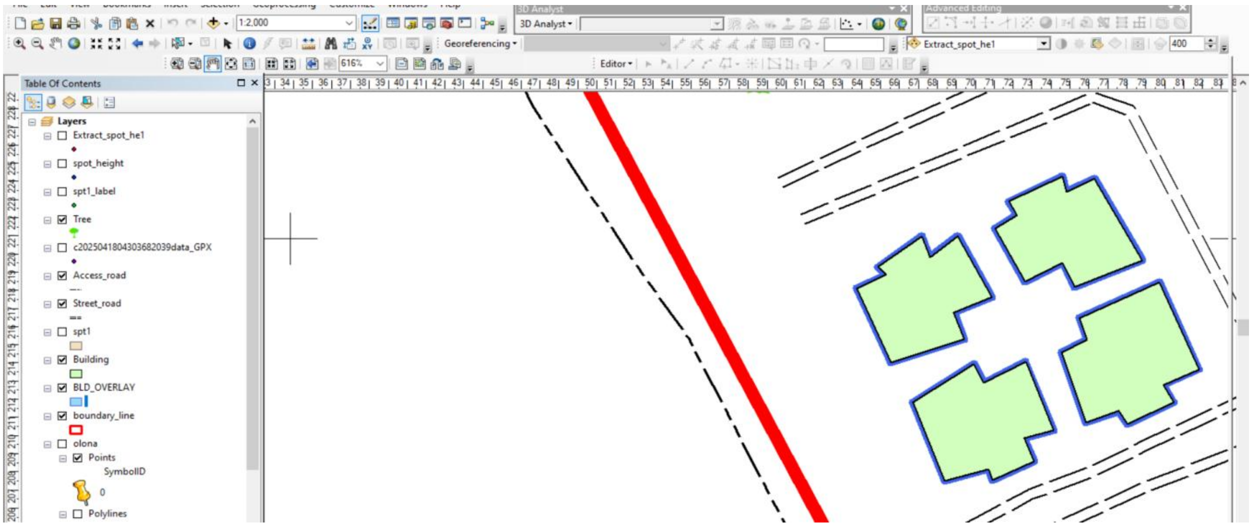

Fig4.2: showing overlaid of all building in block A

Discussion of result (building overlay block A)

The blue line represents observed edges of the building while the black line represents the digitized edges of the building. It was noticed that the existing building archive design is the same with what we observed in field.

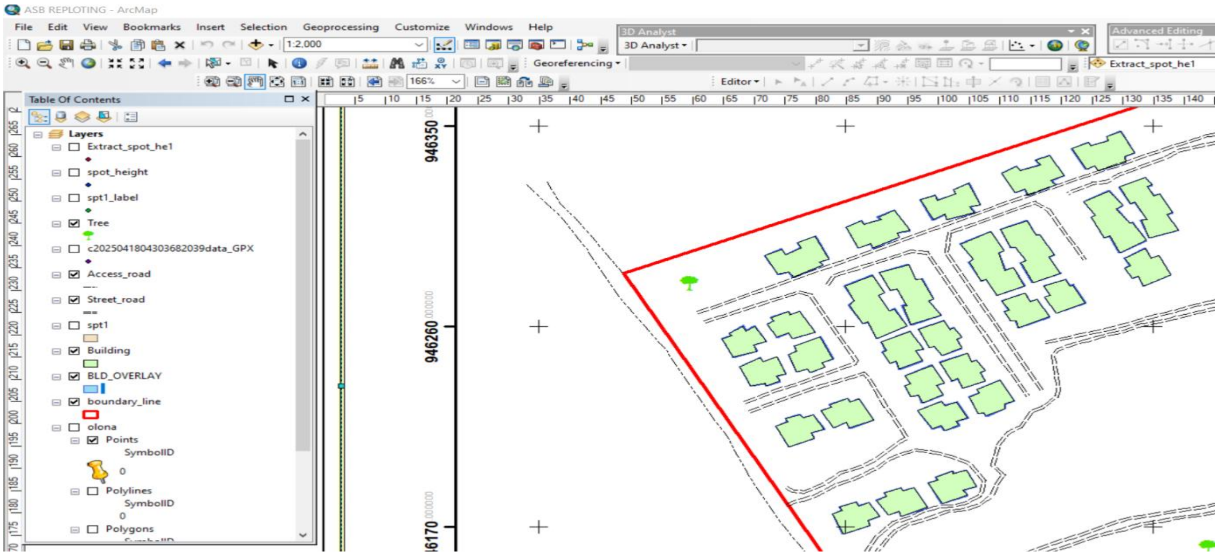

Fig 4.3: showing overlaid of all building of all block

Discussion of result (building overlay of building in all block)

The blue line represents observed edges of the building while the black line represents the digitized edges of the building. It was noticed that the existing building archive design is the same with what we observed in field. But some road paramount with existing architecture lay out while some not paramount, and all of the building shows in architecture plan are not built in land.

Figure 4.4 Shows the Height of Drainages

This height shows in the figure 4.4 above is the height of drainage were measured in sight with total stations

CHAPTER FIVE

5.0 COST ESTIMATION, SUMMARY, RECOMMENDATION AND CONCLUSION

5.3 COSTING ANALYSIS

Costing Analysis for As-Built Survey of Honeywell Estate

S/No	Item	Cost (₦)
1	Instrumentation and Rent	15,000.00
2	Supervisor	30,800.00
3	Technologist	22,783.67
4	Technician (7 persons)	106,323.77
5	Basic Equipment	46,027.61
6	Transportation	46,027.61
	Subtotal	266,962.66

Beaconing Materials

Item	Cost (₦)
5 Beacons @ ₦5,000	25,000.00

Beaconing/Emplacement Phase

S/No	Item	Cost (₦)
1	Technician (7 persons)	106,323.77
2	Transportation	46,027.61
3	Basic Equipment	46,027.61
	Subtotal	193,378.99

Data Acquisition Phase

S/No	Item	Cost (₦)
1	Technologist	22,783.67
2	Technician (7 persons)	106,323.77
3	Basic Equipment	46,027.61
4	Transportation	46,027.61
	Subtotal	221,162.66

Data Processing & Manipulation

S/No	Item	Cost (₦)
1	Technologist	113,918.35
2	Technician (7 persons)	531,618.85

3	Personal Computer	230,138.05
4	Consumables	69,645.00
	Subtotal	945,320.25

Information Presentation & Analysis

S/No	Item	Cost (₦)
1	Supervisor	92,400.00
2	Technologist	68,351.01
3	Technician (7 persons)	318,971.31
4	Personal Computer	138,082.83
5	Consumables	41,787.00
	Subtotal	659,592.15

Comprehensive Report Writing

S/No	Item	Cost (₦)
1	Principal Surveyor	154,000.00
2	Technologist	113,918.35
3	Technician (7 persons)	531,618.85
4	Personal Computer	230,138.05
	Subtotal	1,099,320.25

Total Cost = ₦3,410,737.00

5.1 SUMMARY

The project report outlines a detailed methodology for conducting an as-built survey of Honeywell Estate using a Total Station. The main objectives are to accurately document the final horizontal and vertical positions of all constructed features, create a comprehensive georeferenced plan, verify compliance with design plans, and provide a spatial database for future management.

The methodology covers three phases Pre-Fieldwork, Fieldwork, Post-Fieldwork, The report also specifies the hardware and software to be used, the personnel involved, quality control measures, safety considerations, and the final deliverables, which include digital and hardcopy as-built plans, data files, and the comprehensive survey report.

5.2 RECOMMENDATION

For a student undertaking an as-built survey for their final year project, my general recommendations are geared towards maximizing the learning experience, ensuring a manageable scope, and producing a valuable and accurate output:

Start Small: Don't try to survey an entire estate or a very complex structure. Choose a smaller, well-defined area or a single building/feature within the school or a nearby accessible location. This will make the project more feasible within the time and resource constraints of a student project.

Ensure you have a solid understanding of basic surveying principles, including control networks, traversing, resection, coordinate systems, and error propagation.

Learn Data Processing Techniques: Familiarize yourself with surveying software for data download, processing, adjustment, and coordinate transformation. Understand the purpose of each step. Develop a clear and well-documented methodology before going to the field . Focus on Accurate Data Acquisition, Regularly communicate with your project supervisor and seek their guidance on your methodology, fieldwork, and data processing.

Embrace Challenges: As-built surveys can present unexpected challenges. View these as learning opportunities.

By focusing on a manageable scope, understanding the fundamentals, meticulous planning, accurate data acquisition, thorough processing, and comprehensive documentation, you can make your as-built survey final year project a valuable and rewarding learning experience.

5.3 CONCLUSION

This methodology report provides a comprehensive and systematic framework for conducting an accurate and reliable as-built survey of Honeywell Estate using a Total Station. By rigorously adhering to these detailed procedures, employing experienced and qualified personnel, and utilizing appropriate and well-maintained equipment, the project is assured to yield precise spatial data. This data is essential for effective estate management, facilitating future development, ensuring compliance with design specifications, and providing an invaluable record of the constructed environment.

REFERENCE

Al-Nuaimy, W., Huang, Y., Chandler, J. H., & Zhu, M. (2001). Automatic reconstruction of building roofs from LIDAR data. ISPRS Journal of Photogrammetry and Remote Sensing, 56(3), 195–203. https://doi.org/10.1016/S0924-2716(01)00040-7

Burrough (2006) - This is a reference to an author named Burrough who provided a definitionof Geographic Information System (GIS) as a tool for collecting, storing, retrieving, and analyzing spatial data.

Charles (2012) - This is a reference to an author named Charles who discussed the importance of asbuilt maps with larger scales and digital map products for better planning.

Sharma E. O. (2006) - This is a reference to an author named Sharma who discussed the value-added capabilities of GIS in organizing and analyzing spatial data.

Onuigbo, Zita, Gbedu, Pious, & Samaila (2015) - This is a reference to multiple authors who discussed the use of GIS in analyzing asbuilt data and deriving land information systems.

Odo, Idhoko, Oha, Okoro, & Okafor (2015) - This is a reference to multiple authors who discussed the evolution of GIS as a technology for spatial decision making using geographic and attribute data.

Sturman, Brian; Wright, Alan. "The History of the Tellurometer" (PDF). International Federation of Surveyors. Retrieved 20 July 2014.

Kahmen, Heribert; Faig, Wolfgang (1988). Surveying. Berlin: de Gruyter. p. 9. ISBN 3-11-008303-5. Retrieved 10 August 2014.

APPENDIX

A	E	Z	REMARK
917077.357	726052.265	466.361	A1
917056.108	726040.409	465.352	A2
917072.805	726060.179	466.071	A3
917051.593	726048.197	465.159	A4
915053.0600	726038.880	465.080	B1
917042.186	726032.737	464.667	B2
917048.469	726046.528	465.308	B3
917037.732	726040.501	464.865	B4
917038.766	726031.025	464.532	C1
917028.020	726024.815	463.986	C2
917034.505	726038.812	464.651	C3
917023.621	726032.673	464.293	C4
917025.865	726020.798	463.798	D1
917017.815	726016.481	463.581	D2
917018.546	726030.204	464.084	D3
917012.381	726026.919	463.880	D4
917018.197	726010.815	463.403	DRAINAGE
917041.543	726024.149	464.746	DRAINAGE
917074.177	726042.012	466.174	DRAINAGE
917080.541	726052.044	466.457	DRAINAGE
917069.807	726070.461	466.161	DRAINAGE

917095.850	726017.412	466.896	A1
917095.810	726010.527	466.609	A2
917082.355	726034.474	466.728	A3
917074.478	726029.992	466.393	A4
917095.812	726001.694	466.308	B1
917095.812	725994.695	466.004	B2
917070.365	726027.738	466.253	B3
917062.474	726023.368	466.830	B4
917095.928	725974.880	465.193	C1
917096.021	725967.849	464.904	C2
917045.048	726013.696	465.070	C3
917037.177	726009.264	464.603	C4
917096.929	725931.892	463.179	D1
917097.235	725924.856	462.858	D2
917007.799	725991.856	463.093	D3
917000.000	725987.045	462.697	D4
917103.817	726008.505	467.031	Drainage
917092.494	726030.854	466.935	Drainage
917076.298	726036.311	466.424	Drainage
917055.363	706024.862	465.404	Drainage
917021.068	726005.573	463.499	Drainage

	Building CD		
917004.843	725996.779	462.820	a
916997.068	725992.188	462.340	b
916998.502	726007.570	462.805	c
916991.889	726004.993	463.021	d
917077.357	726052.265	466.361	A1
917056.108	726040.409	465.352	A2
917072.805	726060.179	466.071	A3
917051.593	726048.197	465.159	A4
915053.0600	726038.880	465.080	B1
917042.186	726032.737	464.667	B2
917048.469	726046.528	465.308	B3
917037.732	726040.501	464.865	B4
917038.766	726031.025	464.532	C1
917028.020	726024.815	463.986	C2
917034.505	726038.812	464.651	C3
917023.621	726032.673	464.293	C4
917025.865	726020.798	463.798	D1
917017.815	726016.481	463.581	D2
917018.546	726030.204	464.084	D3
917012.381	726026.919	463.880	D4
917018.197	726010.815	463.403	DRAINAGE

917041.543	726024.149	464.746	DRAINAGE
917074.177	726042.012	466.174	DRAINAGE
917080.541	726052.044	466.457	DRAINAGE
917069.807	726070.461	466.161	DRAINAGE
917057.181	726089.631	466.699	A1
917035.756	726078.137	465.664	A2
917053.016	726097.826	466.539	A3
917031.261	726086.501	465.391	A4
917032.494	726076.368	465.536	B1
917022.047	726069.781	464.957	B2
917028.248	726084.646	465.277	B3
917017.119	726078.969	464.914	B4
917048.331	726110.610	466.458	Drainage
917051.116	726101.126	466.440	A1
917029.677	726089.536	465.571	A2
917046.948	726109.387	460.530	A3
917025.277	7260097.689	460.610	A4
917026.233	726087.772	465.397	B1
917015.438	726081.930	464.904	B2
917021.812	726095.734	465.371	B3

917010.693	726091.024	464.922	B4
917002.471	726092.888	464.701	Drainage
917021.141	726103.313	465.400	Drainage
917038.138	726111.877	466.081	Drainage
917013.401	726106.348	465.232	Drainage
917024.013	726112.045	465.604	Drainage
917039.909	726127.173	465.516	Drainage
917071.486	726062.584	466.377	A1
917050.126	726050.925	465.566	A2
917067.128	726071.063	466.994	A3
917045.752	726059.413	466.017	A4
917046.918	726049.362	465.353	B1
917036.305	726043.590	464.843	B2
917042.606	726057.660	465.853	B3
917031.798	726051.854	465.559	B4
917032.858	726041.654	464.688	C1
917022.034	726035.727	464.373	C2
917028.253	726050.015	464.347	C3
917017.221	726044.702	464.812	C4
917017.246	726033.107	464.040	1
917010.602	726030.314	463.746	2

917012.387	726046.502	464.562	3
917004.360	726042.253	464.266	4
917060.568	726074.673	466.620	Drainage
917030.236	726059.223	465.423	Drainage
917001.534	726043.767	464.102	Drainage
916998.512	726049.158	464.112	Drainage
916034.047	726068.345	465.453	Drainage
917053.140	726078.458	466.307	Drainage
917059.031	726091.415	466.686	Drainage
917054.211	726099.820	466.555	Drainage