ROUTE SURVEY OF KWARA STATE POLYTECHNIC

A CASE STUDY ROUTE SURVEY OF CLINIC ROUNDABOUT TO AKUO VILLAGE IN KWARA STATE POLYTECHNIC, ILORIN EAST LOCAL GOVERNMENT AREA, KWARA STATE

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DEDICATION

I dedicate this project to my parents, whose love, guidance, and unwavering belief in me have been my greatest motivation.

To my supervisor and academic mentors **SURV. R.S AWOLEYE & SURV WILLIAMS KAZEEM**, your support and encouragement have been instrumental in shaping the success of this work.

Finally, I dedicate this work to everyone who continues to strive for knowledge and growth despite challenges.

CERTIFICATION

I **IYANDA TUMININU RACHEAL** with the Matriculation number **ND/23/SGI/PT/0019** certify that all the information given in this project work was carried out in accordance with the survey Laws, Regulations and Departmental instructions. Submitted to the Department of Surveying and Geo-informatics, Institute of Environmental Science Kwara State Polytechnic, Ilorin, Kwara State, In partial fulfilment of the requirements for award of National Diploma in Surveying and Geo-infomatics.

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CERTIFICATION

This project title “Route Survey of Kwara State Polytechnic, Institute of Environmental Studies, The area cover by this project is part of Institute of Environmental Studies, Kwara State Polytechnic, Ilorin by IYANDA TUMININU RACHEAL with the Matriculation Number ND/23/SGI/PT/0019 meets the regulations governing the award of National Diploma (ND) of Kwara State Polytechnic, Ilorin and it is approved for its contribution to scientific knowledge and literary presentation

________________________ ________________

Surv. R.S Awoleye Date and Sign
(Project Supervisor)

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Surv. Williams Kazeem Date and Sign
(Project Supervisor)

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Surv. R.S Awoleye Date and Sign
(Project Coordinator)

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Surv. I.I Abimbola Date and Sign
(Head of Department)

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External Examiner Date and Sign

ACKNOWLEDGEMENT

I would like to express my profound gratitude to all those who contributed to the successful completion of this project.

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ABSTRACT

A route survey is a specialized type of engineering survey conducted to establish the most suitable alignment for linear infrastructure such as roads, pipelines, and transmission lines. This project focuses on the execution of a comprehensive route survey aimed at determining the optimal path for the proposed road alignment between the Second Roundabout and Akuo. The work involved preliminary reconnaissance, selection and establishment of control points, and detailed topographic data collection along the proposed corridor. Field procedures included traversing, leveling, and chainage marking at regular intervals, as well as the identification and recording of all relevant natural and man-made features that may influence design and construction. Instruments such as the Total Station, leveling equipment, measuring tapes, and ranging rods were employed to ensure accuracy and precision in data collection. The collected survey data were processed, adjusted, and plotted to produce detailed plans and longitudinal and crosssectional profiles of the route. The project not only facilitated the selection of the most feasible and cost-effective alignment but also provided valuable practical training in modern surveying methods and techniques. Ultimately, the findings of this route survey are intended to support subsequent design, planning, and construction activities, ensuring the proposed infrastructure meets technical, environmental, and economic requirements.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Route surveying is an essential component of civil engineering and geospatial sciences that focuses on the determination and planning of routes for transportation and infrastructure projects. These routes include roads, railways, pipelines, power lines, and communication lines. The primary aim of a route survey is to establish the most efficient, safe, and cost-effective path between two or more points, taking into account environmental, economic, and social constraints.

The initial phase of route surveying involves reconnaissance, where general observations are made regarding the terrain and possible obstacles. Surveyors perform this step to identify several viable paths and to eliminate obviously unsuitable routes. Once possible routes are identified, preliminary surveys are carried out to gather more accurate data about topography, land use, soil conditions, and hydrology. This data collection phase often employs tools such as GPS units, total stations, and aerial photographs.

Detailed surveys follow the preliminary work and include cross-sections, longitudinal sections, and alignment designs. This stage is critical because it determines the final route alignment based on field data and engineering analysis. Engineers use this data to prepare maps, profiles, and alignment drawings. These deliverables are vital for construction planning, cost estimation, and environmental impact assessments.

One major consideration during route surveys is minimizing the disturbance to the natural environment. Therefore, engineers often need to collaborate with environmental scientists and government agencies to conduct Environmental Impact

Assessments (EIAs). These assessments ensure the proposed route complies with environmental laws and regulations.

In modern practice, software such as AutoCAD Civil 3D, ArcGIS, and other CAD/GIS tools help in visualizing and analyzing survey data. These programs enhance the decision-making process and facilitate collaboration among stakeholders. The output from these digital tools often includes 3D terrain models, route simulations, and cost-benefit analyses.

Another important aspect of route surveying is stakeholder consultation. During route planning, it is crucial to involve local communities, landowners, and relevant government authorities. Their input can help in identifying social concerns, land acquisition challenges, and other constraints that could impact the project's success.

In conclusion, the introduction and objective phase of route surveying lays the foundation for the rest of the engineering project. A well-conducted route survey reduces construction costs, prevents delays, and ensures a sustainable infrastructure development process.

1.2 AIM

The primary aim of this project is to conduct a comprehensive route survey from the Second Roundabout to Akuo. This involves the identification, mapping, and analysis of the terrain, existing infrastructure, and possible alignment for road construction or improvement. A route survey is an essential part of transportation planning, ensuring that the most efficient, cost-effective, and environmentally responsible path is selected for road infrastructure development.

This survey will serve as the foundation for future construction, rehabilitation, or upgrade of road networks. The goal is to gather all necessary field data such as elevations, cross-sections, and longitudinal profiles along the designated route corridor. These details will be used for the design and planning stages of the transportation project.

Furthermore, this aim encompasses safety, efficiency, and sustainability. The survey will identify geographical, geological, and human-related challenges that might impact the implementation of the road project. By anticipating these issues early through a detailed route survey, we aim to minimize future delays, cost overruns, and construction hazards.

1.3 OBJECTIVES

To fulfill the overall aim of this project, the following specific objectives have been set:

1. To determine the best possible route alignment from the Second Roundabout to Akuo through detailed field measurements and reconnaissance.
2. To collect accurate topographical data including elevations, ground profiles, and features such as vegetation, water bodies, buildings, and existing utilities.
3. To identify and document physical obstacles or challenges along the route, including hills, valleys, water crossings, or urban infrastructure that could influence route selection.
4. To produce essential drawings and maps including route alignment plans, cross-sections, longitudinal sections, and contour maps.
5. To evaluate alternative route alignments based on collected data, considering factors such as distance, cost, environmental impact, and ease of construction.
6. To provide baseline information for engineers, planners, and construction managers in making informed decisions regarding design and implementation.
7. To ensure all survey activities comply with standard surveying and engineering procedures.

By achieving these objectives, the project aims to produce actionable, high-quality data that will contribute to a reliable and cost-effective route development between the Second Roundabout and Akuo.

1.4 METHODOLOGY

The methodology adopted for the route survey is a combination of desk study, field data collection, and data processing. It consists of several phases:

1. Preliminary Study

   Before the actual fieldwork, a desk review of existing maps, satellite images, and GIS data of the area was conducted. This provided an understanding of the general terrain, existing roads, land use, and potential constraints.

2. Reconnaissance Survey

   A physical walkover of the general route corridor was carried out to visually inspect the terrain and identify the most feasible route options. Photographs, field notes, and GPS coordinates were collected.

3. Control Point Establishment

   Survey control points were established using GPS equipment to serve as a reference for all further measurements. These points were marked permanently on-site and their coordinates recorded.

4. Detailed Surveying

   Using total stations and GNSS receivers, detailed measurements were taken along the proposed route. This included taking readings of horizontal distances, elevations, and angular measurements to produce accurate route profiles.

5. Data Processing and Analysis

   All field data were imported into computer-aided design (CAD) and geographic information systems (GIS) software for processing. This involved plotting route alignments, generating longitudinal and crosssectional profiles, and creating contour maps.

6. Reporting and Mapping

   Finally, all data were compiled into a comprehensive technical report with detailed maps, charts, and route specifications.

This methodology ensures accuracy, efficiency, and comprehensive coverage of all necessary survey elements.

1.5 SCOPE OF THE PROJECT

This route survey project covers the full stretch of the road from the Second Roundabout to Akuo. The scope includes both technical and logistical considerations:

Technical Scope:

- Measurement of horizontal and vertical alignments
- Topographical mapping of the terrain
- Identification and documentation of natural and man-made features
- Environmental considerations such as drainage paths, erosion-prone areas, and vegetation
- Collection of data for road design, including slope, cross-section, and existing structures

Geographical Scope:

- Begins at the Second Roundabout
- Ends at Akuo village or town (based on the regional definition)
- Covers approximately [insert distance here] kilometers of terrain

Limitations:

- The project does not include geotechnical soil testing
- Land acquisition and compensation are beyond the scope
- Only preliminary environmental observations are made; full EIA is not included

Stakeholders Involved:

- Surveying team
- Local authorities and community representatives
- Engineering consultants

This well-defined scope ensures the project is manageable, targeted, and effectively supports future construction planning.

1.6 PROJECT SPECIFICATIONS

Below are the technical specifications and standards that guide the execution of this route survey project:

1. Survey Instruments Used:
   - Total Station (e.g., Sokkia or Topcon)
   - GNSS Receiver (RTK-enabled)
   - Digital Level
   - Handheld GPS for reconnaissance
   - Measuring tapes and ranging rods

2. Accuracy Standards:

- Horizontal accuracy: ±10mm + 5ppm
- Vertical accuracy: ±5mm + 1ppm
- Coordinate system: UTM (Universal Transverse Mercator), Zone [Insert

Zone]

- Datum: WGS 84

3. Route Design Parameters (Assumed for Survey Planning):

- Minimum curve radius: 100m (based on local terrain)
- Maximum gradient: 7%
- Road width: 7.5m (carriageway), 1.5m shoulders on each side

4. Deliverables:

- Topographic map at 1:1000 scale
- Route alignment plan
- Cross-sectional profiles every 20 meters
- Longitudinal profile along centerline
- Digital terrain model (DTM)
- Technical report with findings and recommendations

5. Software and Processing Tools:

- AutoCAD Civil 3D
- ArcGIS / QGIS
- Microsoft Excel
- WPS Office for documentation

These specifications ensure the outputs of the project meet professional and engineering standards and can be directly used for design and construction planning.

1.7 PERSONNEL INVOLVED

1. Popoola Emmanuel Oluwafemi ND/23/SGI/PT/0024

2. Rabiu Toheeb Morenikeji	ND/23/SGI/PT/0025
3. Iyanda Tunmininu Rachael	ND/23/SGI/PT/0019
4. Omotosho Kabir Hassan	ND/23/SGI/PT/0022
5. Hassan Halimah Asabi	ND/23/SGI/PT/0017
6. Sanyaolu Olamilekan Emmanuel	ND/23/SGI/PT/0023

1.8 STUDY AREA

From second Roundabout Akuo.

1.9 STATEMENTS OF THE PROBLEM

Accurate and reliable data is essential in the design and construction of transportation routes such as roads, railways and pipelines. However, improper route selection and insufficient survey data often result in increased construction costs, environmental degradation and inefficient alignment. In many projects, lack of precise horizontal and vertical alignment information leads to design errors and construction delays. Additionally, without proper identification of control points and topographic features, it becomes challenging to produce detailed engineering drawings needed for road construction. This project addresses the need for a comprehensive route survey that provides accurate data on the terrain, centerline alignment, cross-sections, and elevation profiles using theodolite traversing, leveling techniques, and Electronic Distance Measurement (EDM). The aim is to ensure an optimized, cost-effective and constructible route alignment based on reliable field data.

CHAPTER TWO

2.1 LITERATURE REVIEW

Route surveying is a critical component of engineering and geospatial discipline, focusing on identifying the most suitable alignments for linear infrastructures such as roads, railways, pipelines and transmission lines. Its primary goal is to collect accurate spatial and elevation data for effective planning, design, and construction. This chapter reviews existing literature on route surveying techniques, equipment, stages and their importance in civil engineering projects.

2.2 CONCEPTS OF ROUTE SURVEYING

A route survey consists of systematic operations aimed at determining the alignment of a route and collecting the essential data required for its design and construction. According to Ghilani And Wolf (2012), route surveys are typically conducted along narrow terrain strips and involve both horizontal and vertical measurements. Such surveys demand a detailed study of the terrain to ensure that the selected alignment is safe, cost-effective, and environmentally sustainable.

2.3 TYPES OF ROUTE SURVEYS

Route surveys are generally categorized into three main stages:

- Reconnaissance survey: This initial phase involves a broad inspection of the area to understand the general terrain, identify feasible routes, and gather preliminary data. Visual observations and basic GPS tools are commonly used at this stage.
- Preliminary Survey: This phase involves the collection of topographic and alignment using more advanced tools such as Total Stations and GPS. The objective is to analyse potential routs in detail and evaluate their viability.

- Location Survey: This final stage focuses on selecting and marking the most suitable route on the ground. Accurate measurements are taken, and the collected data is used for the final design and construction process.

2.4 INSTRUMENTS USED IN ROUTE SURVEYING

Various tools and technologies are used during a route survey, including:

- Handled GPS: Captures approximate positions of key features and control points.
- Total station: Provides high precision in measuring horizontal and vertical angles and distances.
- Auto Level or Digital Level: Used for leveling operations to determine elevation differences along the route
- Measuring Tapes and Chains: Suitable for short-distance measurements
- AutoCAD or Civil 3D: Software used to plot data, generate profile and design alignments

2.5 DATA COLLECTION AND PROCESSING

Accurate data collecting and processing are vital for a successful route survey. During fieldwork, data is gathered using methods such as traversing, leveling and GPS. This data is then transferred to a computer for processing and plotting using CAD software. The final outputs typically include route maps, longitudinal profiles, and cross-sectional drawings.

2.6 APPLICATIONS OF ROUTE SURVEYING

Route surveying plays a crucial role in civil engineering and urban planning, with applications in:

- Route and highway design
- Railway alignment
- Pipeline and cable routing
- Drainage and irrigation channels
- Powerline transmission routes

2.7 CHALLENGES IN ROUTE SURVEYING

Common challenges encountered in route surveying include:

- Terrain difficulties: Steep slopes, dense vegetation, and water bodies can obstruct survey operations.
- Instrument errors: GPS or levelling tools may yield inaccurate data due to technical limitations.
- Environmental constraints: Adverse weather, restricted access, and human activities can affect fieldwork
- Data processing issues: Errors in data entry or software use can result in accurate plots and designs

2.8 SUMMARY OF REVIEW

In summary, route surveying is a technical and methodical process that demands precision and attention to detail. The advent of modern technologies like GPS and CAD software has significantly enhanced the speed and accuracy of data collection and analysis. Proper planning, execution and analysis are essential for a successful survey, especially in urban environments such as Adewole Road in Ilorin West, where infrastructure development is vital for socio-economic growth.

CHAPTER THREE

3.0 METHODOLOGY

This involve the method and techniques used to perform particular task. The major method involved in the execution of this project are:- Reconnaissance survey which involved office and field reconnaissance survey, location of the control pillars and check selection or marking of station, test of instrument data acquisition which included: Horizontal and vertical analysis detailing by total station method, data processing and information presentation.

3.1 RECONNAISSANCE

This is the general overview of the practical site. So as to have the overall picture of the nature of the terrain and feature on the site and to make decision on proper planning and execution of the project. It is on essential aspect of planning in surveying which involve preliminary examination of the site by physical inspection.

It is an operation done to the actual survey exercise.

The reconnaissance survey involve two accept namely

i. Office planning ii. Field reconnaissance

3.1.1 OFFICE PLANNING

Office planning which could be termed as office reconaissance involved knowing the types of instrument, purpose, specification and accuracy required of the survey to be carried out these lead to the chosen of appropriate equipment and method to be employed also costing of the survey operation was done in the office.

Information related to the given project area was collected from various sources, such as project supervisors, department Ilorin. The coordinate (x,y,z) of the initial and that of the three control point used for orientation where all obtained.

TABLE 1.0: Shows the Coordinates of control point used.

STATION	NORTHING (m)	EASTING (m)	HEIGHT
PT01	946624.430	679060.142	357.133
PT02	946620.733	679038.328	357.131
PT03	946612.715	679960.109	357.135

Source: Project supervisor

3.1.2 FIELD RECCONIASSANCE

The project sit was visited by all the group member to have the true picture of the site for the better planning and excursion and to locate the control pillar for the necessary orientation of the study area, why the boundaries where marked with nails and bottle cover driving into the ground for the proper identification of this intersection points.

The three control pillars where founded within the study area the end product of this field reconnaissance is the sketch or recci diagram which are show below.

3.2 EQUIPMENTS USED/SYSTEM SELECTION/SOFTWARES

The instrument used for execution of the project are listed below

- **EQUIPMENTS USED**

Total station

Reflector

Ranging pole

- Steel tape
- Wooden pegs
- Nails
- Field book
- **SYSTEM SELECTION**
  - Laptop Hp
  - Printer

SOFTWARE

- Civil cad 2014
- Micro soft Excel 2015
- Micro soft word 2015
- Note pad 2015
- Mts downloading software

3.3 INSTRUMENT TEST

Having collected the instrument to be used, the following test were carried out on total station instrument to ascertain the proper working of condition of the instrument test.

TEST OF TOTAL STATION AND CONFIGURATION

The total station (South 1205R) used was tested to ensure that is line of sent was perpendicular to trunion axis, this test is called collimation test. The test was set on a point and the temporary adjustment i.e centering leveling, focusing after this target was equally set on another point and leveled the target was bisected on above face left and face right on the instrument why both the horizontal and vertical reading on each faces where read and booked respectively. **TABLE 1.1 Shows The Result of Instrument Test.**

STN	SIGHT	FACE	HORIZONTAL	VERTICAL	DIFFERENCE	DIST(m)
A	B	L	$116^0$17"40"	49^0 00' 20"		

	B	R	296^{0}18”00”	268^{0}52’ 20”	180^{0}00”20”	50

Horizontal collimation error = 180^{0}00’ 20” - 180^{0}00’ 20”

Difference = 00^{0}00”20” -2

= 00^{0}00”20”

Vertical collimation error = 360^{0}00”00” - 359^{0}59”40”

= 00^{0}00”20” ÷ 2

Difference = 00^{0}00”10” i.e

misclosure = 30^0

Where N = 1

Hence the allowable misclosure = 00^{0}00’ 30”

3.4 CONTROL CHECK

The excess of carry out this operation was to ascertain the reliability of all the control to be used for the project because these will go along the toward determining the accurate of the project, the checked involved base Northing,

Easting and height the instrument was set up on control 1

i. (KWPT02) and all the necessary temporary adjustment performed on it. The target at back station (KWPT01) was bisected and reading was obtained. The telescope was pointed to face station (KWPT03) and bisected the reading also recorded.

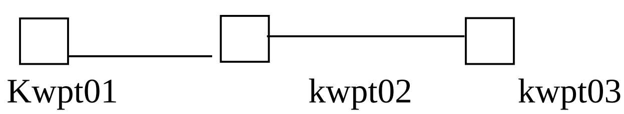

TABLE 1.2: Control check (control 1)

STATION	NORTHING	EASTING	HEIGHT	REMARK
KWPT01	946624.430	679060.142	357.133	OBSERVED
KWPT01	946624.400	679060.138	357.131	ORIGINAL
DISCREPANCY	ΔN=0.030m	ΔE=0.004m	ΔH=0.002m	

TABLE 1.3: Control check (control 2)

STATION	NORTHING	EASTING	HEIGHT	REMARK
KWPT02	946620.733	679038.328	357.140	OBSERVED
KWPT02	946620.723	679038.320	357.135	ORIGINAL
DISCREPANCY	DN=0.010m	DE=0.008m	ΔH =0.005	

TABLE 1.4: Control check (control 3)

STATION	NORTHING	EASTING	HEIGHT	REMARK
KWPT03	946612.715	679960.109	357.135	OBSERVED
KWPT03	946612.707	679960.102	357.133	ORIGINAL
DISCREPANCY	DN=0.008m	DE=0.007m	ΔH =0.002	

3.5 DATA ACQUISITION

Data acquisition begins with the physical phenomenon or physical property to be measured. Example of this include temperature light intensity, distance from one point to another etc. regardless of the type of physical to be measured must first be transformed into a unified form that can be sampled by a data acquisition system. A data acquisition system is a collection of software and hardware that let y measure or control physical characteristics of something in the real world.

3.5.1 GEOMETRIC DATA

These started at chainage 0+000. Three existing control point where used KWPT01, KWPT02, KWPT03 and there where establish side the road.

The job commercial by setting up the instrument (South 205R) on KWPT 01 and all temporary adjustment where performed and instrument was oriented by the following procedures:-

- Setting up (centering, levelling, elimination of parallax).

- The instrument was powered on.
- "MENU" was pressed (The following was set on the instrument).
- "JOB" was click
- File folder was click
- Automatic data was set by the instrument
- Data capture was click (the first coordinate was input then the height instrument was measured with a steel tape and was also input on the instrument)
- Save
- Esc was pressed in order to go back to the back sight to check the control point.

On the back sight input was clicked and the reflector was mounted on the back sight KWPT02 and observation is taken.

Having perfectly done the telescope was turn bisect the reflector on the center line of the road which 25meter to the occupied station (KWPT01) measured was clicked the reflector was moved to the left edge of the road and observation was taken and also to the right edge of road and measured was taken.

3.5.2 TRAVERSING

Traversing may be defined sequence of connected straight lines whose direction and distance was been measured that is, it involved the determination of the bearing and distance of series of connected straight line from know coordinated point so as to obtain the coordinate of the newly established station. This includes the following.

3.5.3 SPOT HIGHTING

The total station was used in conjunction with reflector stand to execute this task. The procedure is as follows

 The total station was set up on a point (point A) with a known coordinate (Northing, Easting and Height).

All the necessary temporary adjustment were out on the instrument the height of instrument was measured using steel tape and recorded. The telescope was directed to the target and bisect on point B for orientation. The telescope was turned clockwise to the target which has been placed at every 5meter to the edge or the road both left and right of edge road.

3.5.4 DETAILING

These is refer to as the man-made (artificial and natural feature on the ground) within the project site which are determine and obtain by using a total station and finally represented with a suitable scale on plan. The position of details with the project area was fixed using total station. The reflector man move the reflector to the edge of interest details. Such as (building, electrical pole, trees) and the telescope was directed to the reflector were the three edges of the building were picked and recorded and the position of details like electric pole were field.

3.5.5 ATTRIBUTE DATA

These are the name given to a particular building block, street or road of a the study area i.e

Below shows the lost of the attribute collect from the site.

BID	-	Building
EP	-	Electric pole
DR	-	Drainage
LF	-	Left side of the road
RT	-	Right side of the road
ACC.RD	-	Access Road Name.

3.6 DATA DOWNLOADING AND EDITING

After the completion of all earth works. Data were downloading with aid of total station SD card, the data were downloaded into the computer via SD card using the South-TS software inserted into computer and go to CD card and downloading, copy and data from CD card down to system (computer) and was later saved in excel for further editing.

3.6.1 EDITING

Excel is used in data editing, NOTEPAD is also part of software used in editing data.

The following procedure were followed

- Highlight the column A
- Go data and select the data
- Click on comer and click on select - The data was now selected.
- Copy and paste and editing NOTEPAD
- Go to format and click on replace
- And save on NOTEPAD
- Then go to CIVILCAD
- Go to format and set the unit. Then the data was put in to load from text file: EXP and click on paste.
- Select on open
- Click on refresh
- Click on Z enter
- Click on E enter
- And data was displayed

3.7 DATA PROCESSING AND REPORT ANALYSIS

After the downloading of the acquired data from the field through cable then software civil 2012 and AUTOCAD 2007 was used to plot the horizontal alignment and longitudinal profile and where prepared in a proper and acceptable way here, the project area was visualized using sketched obtained after plotting to guide against omission of feature representing by data.

3.8 PROCESSING OF DATA BASE MANAGEMENT

The input data are proceed via data base management system (DBMS) which comprise of a set of program which manipulation and maintenance data in the data base.

3.8.1 DATA SECURITY

For a data to be move and easily secured if the user supposed to have and knows his/her password.

The computer room must be out of bound to authority's user by copying the data base file and program file and program files into compact disk.

3.8.2 DATA INTEGRITY

Integrity of the data base most be ensured at all times and care must be taken while inserting data and updating the data base.

3.8.3 DATA MAINTANCE

The quality of data base depend, on its currency and fitness for us as a decision support system and most therefore be kept to data the integrity must be maintained.

CHAPTER FOUR

4.0 ANALYSIS AND INFORMATION PRESENTATION

From the results of observation and computation the information was presented in digital form, the digital plan produced using the coordinate computed. The plotting was done by using coordinate.

After plotting the control coordinate the coordinate of details and spot high were also plotted in rectangular system and all feature were seen to appear in their appropriate relationship.

The digital plan showing all details and that showing the spot height and contour were produced by AUTOCAD and SURFER.

Preparing script file with note pad (Bold)

i. Launch notepad

ii. Tape P line and press enter iii. Enter co-ordinate of all point on different line iv. Repeat the first coordinate of lose boundary. v. Click file menu vi. Click on save as.

Running the script in AUTOCAD

i. Launch AUTOCAD

ii. Click format, click unit in the unite dialogue box, select desired option such as precision, direction, unit etc and then click Ok.

iii. Add layer by selecting the layer, repeat for all other and click Ok.

iv. Select tools menu v. Select run scripts vi. In the run scripts dialog box, search for your script file and click Ok.

vii. Press escape, type 2 and press enter (200m) viii. Type E and press enter key (extend) the polygon is displayed.

Fixing details

i. Select spot height layer or details layer on the object properties bar.
ii. Select format unit iii. Select direction other-pick angle iv. Select P line tools

4.1 LONGITUDINAL SECTION

These are section which follow some particular line of defining a part of a new construction and are usually run along the centre lines of a proposed work such as new roads, pipelines railways etc. the particular line may consist of a straight line connected by curves this longitudinal section was done for this project so as produce on paper the existing was done for this project so as produce on paper the existing ground profile along a particular line.

4.2 VERTICAL SECTION

Vertical sections are straight up and down or 90^0 from horizontal. There are two shot taken at the same distance or station when a vertical section is taken.

4.3 APPLICATION OF PRODUCT

Horizontal Alignment of the road

Used to determine and calculating horizontal curve that is the corner of road/

Vertical section

- Elevation along the centerline of the road that is profiling
- It is used determine the volume of cut and field
- It is used to determine the introduction of grade (slope).

1. The product generated can be use to cost the construction fee for the job by the users.
2. The horizontal and vertical curves can be determine through the product.

3. The volume of earth-work can be easily determine through the product, which enable the engineers to determine the type and source of material such as borrow-pit.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Route Survey

The route survey was conducted to evaluate and analyze the proposed path for a transportation project. The primary objective was to gather data regarding the topography, environmental conditions, infrastructure, and potential challenges along the route. This involved the use of modern surveying techniques, such as GPS and GIS, to collect accurate measurements and detailed mapping of the terrain.

Key aspects of the survey included:

- Geographical Analysis: The terrain's physical characteristics, including slopes, elevations, and natural features, were thoroughly examined to identify potential challenges.
- Environmental Impact: Environmental factors such as protected areas, vegetation, and wildlife habitats were assessed.
- Existing Infrastructure: A detailed survey of roads, bridges, and utilities helped determine potential conflicts with the proposed route.
- Land Ownership and Legal Considerations: Land rights and legal boundaries were reviewed to avoid legal complications.

- Cost Estimation and Feasibility: Preliminary cost assessments were made, considering terrain challenges and infrastructure needs.

Overall, the survey provided vital data to support informed planning and engineering design decisions.

5.2 Conclusion

The route survey has successfully provided a comprehensive understanding of the proposed alignment. It identified key factors such as terrain characteristics, infrastructure challenges, environmental concerns, and legal boundaries that could influence the project.

The survey results confirmed the route's general viability but also highlighted areas requiring further investigation or modification. This ensures better project planning, minimizes risk, and supports efficient resource allocation.

In conclusion, the route survey forms a strong foundation for proceeding to the design and implementation stages of the project with greater confidence and strategic insight.

5.3 Recommendations

1. Route Optimization

   Adjust the alignment to avoid difficult terrain and minimize environmental impact.

2. Environmental Protection Measures

   Apply mitigation strategies to protect sensitive ecosystems, including buffer zones and erosion control.

3. Community and Stakeholder Engagement

   Involve local communities and stakeholders early in the planning to address concerns and gain support.

4. Geotechnical Investigation

   Conduct detailed soil and sub-surface studies to ensure structural integrity and safety.

5. Infrastructure Coordination

   Coordinate with relevant agencies to manage interference with utilities and public services.

6. Regulatory Compliance

   Adhere strictly to all legal and environmental regulations at every project stage.

7. Budget and Resource Planning

   Develop a detailed and flexible budget based on survey data, including contingencies.

8. Continuous Monitoring

   Monitor environmental and construction impacts throughout the project lifecycle.

ID	EASTINGS	NORTHINGS	Elevation
C1	679964	946753.1	357.368
C2	679963.5	946724.6	357.962
C3	679957.2	946709.7	358.567
C4	679948.3	946699.7	358.819
C5	679938.3	946686.4	358.654
C6	679941.1	946665.7	356.633
C7	679947.2	946658.3	355.579
C8	679959.8	946641.6	353.871
C9	679958.5	946624.2	352.777
C10	679959.5	946603.2	352.517
C11	679971.3	946600.7	352.13
C12	679974.7	946624.4	352.261
C13	679977.8	946645.9	353.655
C14	679987.2	946660.3	354.464
C15	680004.8	946671.8	354.676
C16	680025.2	946674.8	353.942
C17	680051.3	946672.4	353.826
C18	680057	946680.6	353.722
C19	680011.5	946683	354.636
C20	679998.1	946689.7	355.487
C21	679985.9	946703.5	356.333
C22	679976.4	946718.7	356.948
C23	679972.8	946730.6	357.154
C24	679972.7	946752.5	357.073
C25	679929.8	946682.3	358.972
C26	679870.7	946685.2	358.228
C27	679781.2	946688.4	349.667
C28	679708.4	946689.8	355.523
C29	679639.3	946691.9	353.779
C30	679585.6	946695.6	355.247
C31	679491.5	946699.9	357.036
C32	679394.2	946701.1	359.694
C33	679333.2	946702.1	359.467
C34	679273.5	946705.1	361.621
C35	679231.6	946706.6	360.463
C36	679203.2	946706.5	359.894
C37	679169.7	946707.7	360.433
C38	679137.9	946709.1	359.982
C39	679077.8	946713.8	360.103
C40	679037.9	946712.3	358.725

C41	678999.7	946713.7	357.113
C42	678963	946715.1	358.92
C43	678943.5	946714	360.007
C44	678923	946713.9	359.344
C45	678898.3	946715	357.001
C46	678851.3	946719.1	354.906
C47	678796.3	946718.3	353.422
C48	678759.8	946717.6	350.127
C49	678716.4	946718.9	348.668
C50	678662	946721	348.148
C51	678638.4	946715	346.906
C52	678621.8	946705.6	346.585
C53	678588.3	946683.9	347.166
C54	678554.5	946659.9	348.842
C55	678545	946647	349.854
C56	678510	946628.6	348.713
C57	678468.5	946603.2	348.894
C58	678433.4	946577.8	350.366
C59	678398.6	946551.7	351.422
C60	678362	946523.7	350.13
C61	678326.3	946495.8	348.907
C62	678281.8	946459.5	348.395
C63	678241.9	946414.6	348.929
C64	678217.3	946380.2	345.946
C65	678189.7	946337.7	343.072
C66	678162.3	946295.1	344.842
C67	678136.9	946260	344.621
C68	678106.8	946218.1	342.438
C69	678079.5	946190.1	341.44
C70	678047.2	946161.1	339.118
C71	678014.8	946136.8	337.645
C72	677963.6	946089.5	341.988
C73	677931.7	946063.3	340.114
C74	677889.1	946031.3	337.701
C75	677842.1	945998.5	336.041
C76	677794.2	945965.7	335.168
C77	677727.8	945921.4	330.225
C78	677655.8	945884.2	329.975
C79	677606.3	945859.4	327.096
C80	677520.4	945806.7	324.362
C81	677452	945779	322.305

C82	677369.2	945743.5	317.513
C83	677316.3	945713	314.578
C84	677233.7	945661.7	311.035
C85	677184.1	945627.7	313.347
L1	679925.8	946677.7	358.807
L2	679896.4	946679.3	359.188
L3	679861.7	946680.2	357.489
L4	679787.2	946681.7	350.436
L5	679778.3	946677	349.491
L6	679774.1	946671.7	349.173
L7	679770.1	946651.1	349.468
L8	679769.7	946635.9	349.964
L9	679760.9	946638.1	348.797
L10	679762.9	946667.6	347.723
L11	679761.9	946673.6	347.379
L12	679758.7	946677.9	347.41
L13	679755	946680.9	347.963
L14	679747.6	946682.7	349.29
L15	679731.4	946684.8	352.178
L16	679684	946685.1	355.392
L17	679667.8	946685.7	354.578
L18	679663.5	946682.3	353.995
L19	679660.3	946678.7	353.545
L20	679657.8	946671.3	352.932
L21	679652.3	946655.1	351.869
L22	679649.4	946643.2	352.017
L23	679641.5	946645	352.217
L24	679649	946675.6	353.061
L25	679649.4	946681	353.382
L26	679647.5	946684.5	353.609
L27	679644.9	946685.9	353.62
L28	679640	946687.1	353.488
L29	679629	946687.5	354.034
L30	679531.1	946692.7	356.384
L31	679457.6	946693.8	358.792
L32	679402.9	946693.1	359.27
L33	679340.9	946696.1	358.94
L34	679285.4	946699.5	360.868
L35	679268.4	946700.7	361.304
L36	679240.1	946700.9	360.395
L37	679194.8	946701.3	359.431

L38	679145.1	946703.3	359.41
L39	679082.5	946708.1	359.932
L40	679033.4	946707.8	358.329
L41	678966.6	946709.4	358.914
L42	678913.6	946709.5	358.806
L43	678891.5	946711.2	356.572
L44	678853.6	946713.5	354.941
L45	678824.4	946713.5	354.604
L46	678790.1	946713.8	352.762
L47	678731.1	946714.1	348.927
L48	678700	946715.3	349.081
L49	678681.1	946715.8	348.955
L50	678670.7	946715.6	348.717
L51	678658.6	946715.6	348.361
L52	678648.6	946712.8	347.828
L53	678632.4	946707.5	347.168
L54	678616.2	946697.1	346.745
L55	678597	946684.2	347.205
L56	678568.5	946665	348.727
L57	678549.6	946646.9	349.866
L58	678547	946642.2	350.103
L59	678540.2	946639.2	350.2
L60	678527.3	946631	349.774
L61	678517	946626.3	349.249
L62	678502.5	946619.4	348.654
L63	678484.3	946607.2	348.654
L64	678443	946579.4	350.266
L65	678386.1	946536.9	351.012
L66	678338.5	946497.1	349.352
L67	678284.2	946451.9	348.227
L68	678241.5	946406.1	348.302
L69	678219.5	946374	345.29
L70	678185	946322.2	342.873
L71	678147.8	946267.8	344.618
L72	678111.5	946216.3	342.19
L73	678093	946197.2	341.556
L74	678064.2	946170.7	340.063
L75	678028.7	946142.6	337.86
L76	678024.6	946137.7	337.742
L77	678022.3	946133.1	337.746
L78	678037.6	946121.1	339.132

L79	678046.6	946114.7	339.809
L80	678043.2	946108.2	339.81
L81	678013.5	946129.7	338.018
L82	677982.4	946100.5	341.396
L83	677938.7	946062.6	340.366
L84	677849.8	945998.4	336.039
L85	677747.8	945928.4	330.921
L86	677725.7	945911.7	330.079
L87	677716.2	945892.5	330.382
L88	677709.7	945872.7	330.964
L89	677704.6	945874.5	330.968
L90	677717.1	945906.2	330.003
L91	677712.6	945909.2	329.914
L92	677696.3	945897.8	329.729
L93	677621.3	945859	328.326
L94	677537	945810.9	325.111
L95	677506.2	945797	323.607
L96	677445.7	945770.4	321.784
L97	677383.1	945743.2	318.39
L98	677327.7	945712.3	315.254
L99	677267.4	945676.4	311.843
L100	677188.2	945624.3	313.226
R1	679924.2	946688.3	359.598
R2	679898.3	946688.1	359.595
R3	679879.6	946688.4	358.793
R4	679849.4	946688.5	356.99
R5	679817.1	946690.4	354.317
R6	679780.3	946691.6	349.578
R7	679746.1	946692.2	350.309
R8	679714.6	946693.3	355.041
R9	679693.5	946693.3	356.568
R10	679667.6	946695.2	355.777
R11	679638.3	946696.2	354.012
R12	679602.6	946697.6	354.502
R13	679574.2	946698.9	355.32
R14	679525.7	946701.3	355.843
R15	679488.3	946703.5	357.076
R16	679454.5	946704.2	359.58
R17	679406.8	946705.3	359.764
R18	679346	946705.2	359.309
R19	679321.2	946706.3	360.128

R20	679292.7	946707.2	361.131
R21	679271.4	946708	361.878
R22	679253.8	946708.7	361.351
R23	679231.6	946709.7	360.695
R24	679210.6	946709.7	360.013
R25	679187.8	946710.2	360.761
R26	679154.6	946711.1	360.282
R27	679134	946712.2	360.144
R28	679107	946714	360.158
R29	679084.5	946716	360.199
R30	679066.9	946715.8	360.069
R31	679049.9	946714.4	359.512
R32	679006.4	946715.6	357.331
R33	678972.7	946717.3	358.323
R34	678955.9	946716.7	359.202
R35	678939.7	946716.2	360.018
R36	678911.1	946717.3	357.998
R37	678892.2	946718.5	356.259
R38	678881.6	946721	355.231
R39	678855.8	946722.4	354.81
R40	678838.9	946723	354.996
R41	678813.7	946721.7	354.9
R42	678788.1	946721	352.901
R43	678770.6	946721.6	351.318
R44	678726.9	946721.2	348.728
R45	678698.4	946723.5	348.445
R46	678668.4	946724.7	347.986
R47	678648.3	946720.7	347.202
R48	678635.3	946717	346.494
R49	678622.5	946710.1	346.26
R50	678610.2	946702.4	346.093
R51	678595.6	946692.4	346.373
R52	678579.7	946681.9	347.332
R53	678567.2	946672.2	348.222
R54	678558.9	946666.7	348.401
R55	678552.1	946661.1	348.703
R56	678548.7	946656	349.08
R57	678543	946650.1	349.559
R58	678536.8	946646.1	349.853
R59	678524.8	946639.8	349.326
R60	678505.2	946629.6	348.401

R61	678479.6	946612.6	348.201
R62	678429.9	946579.7	350.239
R63	678403	946558.5	351.194
R64	678339.7	946509.8	349.195
R65	678300.8	946479.7	348.723
R66	678279.9	946465.2	348.553
R67	678259.4	946441.1	349.608
R68	678239.4	946418	349.208
R69	678218.7	946391.6	347.253
R70	678203.7	946366.5	343.926
R71	678169.3	946315.8	345.356
R72	678150	946284.9	345.809
R73	678122.4	946247.1	343.864
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R75	678054.5	946171.7	339.78
R76	678008.6	946136.4	337.865
R77	677972.1	946100.8	341.493
R78	677941.8	946075.2	340.658
R79	677913.7	946052.7	338.914
R80	677877.5	946025.4	337.235
R81	677840.8	946000.8	336.115
R82	677772.1	945954.4	333.427
R83	677731.2	945927.3	330.387
R84	677673.9	945896.6	329.239
R85	677589.8	945853.6	325.851
R86	677513.2	945812.1	324.367
R87	677399.7	945760.9	318.95
R88	677365.1	945747.3	317.122
R89	677291.1	945702.9	313.546
R90	677184.8	945633.5	313.132

References

Afolayan, J. O. (2012). Principles of route surveying and design. Spectrum Books Ltd.

Bannister, A., Raymond, S., & Baker, R. (1998). Surveying (7th ed.). Pearson Education Limited.

Chandra, A. M. (2006). Higher surveying (2nd ed.). New Age International Publishers.

Federal Ministry of Works and Housing. (2001). Highway manual part 1: Design. Federal Republic of Nigeria.

Kavanagh, B. F., & Slattery, D. K. (2014). Surveying with construction applications (8th ed.). Pearson.

Ogunjimi, O. O., & Fasina, A. (2015). Application of GPS in road alignment and route survey in Nigeria. Nigerian Journal of Surveying and Geoinformatics, 2(1), 56-63.

Uren, J., & Price, W. F. (2010). Surveying for engineers (5th ed.). Palgrave Macmillan.

Wikipedia contributors. (2023, May 10). Route survey. In Wikipedia.

https://en.wikipedia.org/wiki/Route_survey