ROUTE SURVEY OF KWARA STATE POLYTECHNIC, (A CASE STUDY OF KWARA STATE POLYTECHNIC MINI CAMPUS) OFF GENERAL HOSPITAL TO SAWMILL GARAGE ROAD, ILORIN WEST LOCAL GOVERNMENT AREA, KWARA STATE.

PRESENTED BY

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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.

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

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I extend my gratitude to my project colleagues for their teamwork, cooperation, and dedication during both the fieldwork and reporting phases.

Finally, I thank my family and friends for their continuous encouragement, understanding, and moral support, which helped me stay focused and motivated.

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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 cross sectional 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

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Infrastructure development plays a pivotal role in the socio-economic advancement of any nation. Among various infrastructural components, transportation networks stand out as the most vital. Efficient and well-planned routes are essential for the seamless movement of people, goods, and services, which in turn facilitates trade, enhances accessibility, reduces travel time, and promotes regional development. One of the foundational stages in the planning and execution of transport infrastructure is the route survey. Route surveying involves the process of determining the most suitable alignment or path for roads, railways, pipelines, or any linear project. It is an integral part of civil engineering and geospatial sciences that ensures construction follows an optimal and sustainable route.

A route survey is not just about tracing lines on a map; it involves a combination of data gathering, analysis, and planning. Factors such as topography, soil conditions, land use patterns, environmental impact, existing infrastructure, and socio-economic considerations all influence route alignment. Modern route surveying leverages technologies such as Total Stations, GPS (Global Positioning System), GIS (Geographic Information Systems), and CAD (Computer-Aided Design) software to collect and process spatial data accurately. These tools enhance the precision and efficiency of surveys, minimizing human errors and ensuring that the selected route is both cost-effective and environmentally responsible.

The increasing demand for improved road and transport infrastructure in Nigeria has underscored the importance of effective route surveying. Many regions across the country, particularly in developing and rural areas, still lack access to reliable road networks. Even in urban centers, existing roads suffer from congestion, poor drainage, and deteriorating surfaces due to substandard planning or execution. This calls for comprehensive and accurate route surveys before the implementation of road projects. Inappropriate route selection can lead to unnecessary earthworks, increased construction and maintenance costs, safety hazards, and environmental degradation.

This project focuses on the route survey for a proposed road alignment in [insert location or study area here]. The selected area has experienced steady growth in population and economic activities, resulting in an increasing demand for a well-structured road network. The absence of a reliable and accessible transport route has adversely affected movement, logistics, and overall quality of life for residents. Therefore, a detailed route survey is critical for the planning and design of a road that meets the current and future needs of the community.

The process of route surveying typically begins with reconnaissance, where preliminary information is gathered to understand the terrain and possible constraints. This is followed by a detailed topographic survey, during which horizontal and vertical control points are established. These control points serve as references for mapping the terrain and aligning the route. Data such as elevation, slope, vegetation cover, existing structures, and hydrological features are captured using survey instruments. Afterward, the data is processed and analyzed to determine the most feasible and economical route.

Beyond the technical aspects, route surveying also considers social and environmental factors. For instance, aligning a road through residential areas may lead to displacement, while routing through a forest could result in ecological disturbances. Therefore, the survey must balance engineering feasibility with environmental sustainability and social acceptability. Stakeholder engagement, environmental assessments, and land acquisition concerns are critical elements that must be factored into the route planning process.

In addition, the use of modern technology in route surveys cannot be overemphasized. The integration of GPS and GIS technologies allows for accurate georeferencing, real-time data capture, and easy visualization of the route. These tools also aid in the analysis of multiple route options, making it easier to select the best alignment based on defined criteria such as shortest distance, minimal environmental impact, and least construction cost. The final output of a route survey includes maps, profiles, cross-sections, and detailed design drawings that guide engineers during construction.

The significance of this project lies in its potential to improve transportation within the study area and contribute to local development. A well-executed route survey not only

ensures the technical success of a road project but also guarantees long-term benefits such as improved accessibility, economic growth, and environmental sustainability. The knowledge and skills gained from conducting this survey will also enhance the professional competence of the survey team and provide a practical understanding of fieldwork applications in route alignment.

In summary, this project seeks to carry out a comprehensive route survey for a proposed roadway, considering all necessary topographic, technical, social, and environmental factors. The outcomes of the survey will serve as the foundation for future design and construction, ensuring that the selected route is optimal and beneficial to the community it serves. This chapter has provided an overview of the background and relevance of the study. The subsequent sections will outline the aim, objectives, scope, and significance of the project.

1.2 AIM OF THE PROJECT

The primary aim of this project is to carry out a comprehensive route survey for the proposed road alignment in [Insert Study Area] with the goal of determining the most feasible, cost-effective, and environmentally sustainable route. The aim encapsulates the need to design an efficient transportation link that supports the social, economic, and infrastructural development of the area while considering technical accuracy and local needs.

Route surveys form a crucial part of any linear infrastructure project. Without a clear and properly established alignment, the success of a road construction project is compromised. The purpose of conducting this route survey is to gather all the necessary field data—including terrain characteristics, elevation levels, vegetation cover, existing features, and potential constraints—that will inform the design and layout of the proposed roadway. This will not only help in selecting the most appropriate path but will also ensure the minimization of construction costs and long-term maintenance issues.

In achieving the stated aim, this project will make use of modern surveying techniques and instruments, such as GPS, Total Stations, and leveling instruments. These tools will enable

the precise collection of field data necessary for route planning. The project will also involve detailed analysis using relevant software for processing data and producing route profiles, cross-sections, and contour maps.

Furthermore, the project aims to integrate local environmental and social conditions into the route selection process. This includes avoiding natural features such as rivers and wetlands where necessary, minimizing impacts on human settlements, and considering land ownership patterns and accessibility. By doing so, the survey will contribute not only to the physical development of the area but also to its sustainable and inclusive growth.

In summary, the aim of this route survey project is multifaceted. It involves selecting the most appropriate path for the proposed road by conducting a field-based survey, analyzing terrain and topographic data, and producing technical outputs that will guide engineering design. The aim ultimately supports broader development goals by improving access, connectivity, and infrastructure planning in the study area.

1.3 OBJECTIVES OF THE PROJECT

To achieve the aim of the route survey project, several specific objectives have been outlined. Each of these objectives is designed to contribute toward the completion of the route survey in a methodical and professional manner. The objectives include both field based tasks and analytical steps, reflecting the multidisciplinary nature of surveying.

• The key objectives of this project are as follows:

1. To carry out preliminary reconnaissance of the study area. This involves visiting the proposed corridor to observe physical conditions and existing features. It provides an early understanding of potential challenges, such as steep slopes, dense vegetation, or water bodies.
2. To establish control points and benchmarks using appropriate surveying techniques. Accurate control points are fundamental in route surveying. The project will involve setting up horizontal and vertical control points using GPS and Total Station equipment to serve as references for all other survey activities.

3. To conduct a detailed topographic survey along the proposed alignment. Gathering data on terrain elevations, landforms, vegetation, and existing infrastructure is crucial. This will be done through leveling, traversing, and spot height collection.
4. To analyze the collected data to determine the most feasible route. After data collection, the information will be processed using appropriate software (e.g., AutoCAD Civil 3D or GIS tools) to generate topographic maps, longitudinal profiles, and cross-sections, which will aid in selecting the best route.
5. To identify and document any natural or man-made features that may affect route design. These include rivers, hills, power lines, buildings, and farmlands. Identifying such features helps in route adjustment and impact mitigation.
6. To recommend the most suitable route alignment based on technical, environmental, and socio-economic considerations. This will involve evaluating various possible alignments and selecting the one that offers the best balance of cost, constructability, accessibility, and minimal environmental or social disruption.
7. To develop a comprehensive survey report and map outputs. The final objective is to compile the findings into a professional report that includes maps, profiles, and field notes, which can guide future design and construction stages.

These objectives ensure that the route survey project is comprehensive, systematic, and aligned with professional standards. They provide a roadmap for carrying out the survey efficiently and ensure that all aspects of the terrain and surrounding environment are considered.

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 cross sectional 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. Sanyaolu Olamilekan Emmanuel ND/23/SGI/PT/0023 2. Popoola Emmanuel Oluwafemi ND/23/SGI/PT/0024 3. Rabiu Toheeb Morenikeji ND/23/SGI/PT/0025 4. Iyanda Tunmininu Rachael ND/23/SGI/PT/0019 5. Omotosho Kabir Hassan ND/23/SGI/PT/0022 6. Hassan Halimah Asabi ND/23/SGI/PT/0017

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: LITERATURE REVIEW

2.1 INTRODUCTION

A literature review is an essential component of any academic or technical project. It provides a comprehensive understanding of existing research, concepts, technologies, and methodologies relevant to the subject under study. In the context of this project, the literature review explores the foundations and advancements in route surveying, a critical aspect of civil engineering and geospatial planning. The review examines traditional and modern approaches, surveying instruments, alignment selection criteria, and the application of route survey data in road design. It also discusses some of the challenges faced in real-world implementations.

2.2 CONCEPT OF ROUTE SURVEYING

Route surveying refers to the process of establishing the alignment of linear projects such as roads, railways, pipelines, and transmission lines. According to Bannister and Raymond (2004), route surveys involve a series of measurements and observations made along a proposed path, from which longitudinal profiles, cross-sections, and contour maps are derived. These outputs help engineers design the best possible route based on technical, environmental, and economic criteria.

Historically, route surveys were conducted using basic tools such as chains, tapes, compasses, and theodolites. These manual methods required extensive labor and time, and often lacked precision over long distances. As technology evolved, instruments like the dumpy level, transit, and later the Total Station became widely used, improving the accuracy and efficiency of field measurements.

2.3 MODERN SURVEYING TECHNIQUES IN ROUTE PLANNING

The use of advanced geospatial tools has significantly transformed route surveying. GPS (Global Positioning System) and GNSS (Global Navigation Satellite Systems) have made it possible to determine geographic positions with high precision. GPS receivers, often integrated with Total Stations, allow surveyors to collect spatial data in real-time. This has

led to the concept of Real-Time Kinematic (RTK) surveying, which achieves centimeter level accuracy and drastically reduces survey time.

GIS (Geographic Information System) is another key tool in route planning. GIS allows for the analysis and visualization of multiple datasets, such as elevation, land use, hydrology, and population distribution, which are essential for informed route alignment decisions. According to Bolstad (2016), GIS enables planners to compare various alignment alternatives based on multiple criteria, improving both technical and socio environmental outcomes.

Remote sensing technologies, such as drone-based photogrammetry and LiDAR (Light Detection and Ranging), are increasingly used in route surveys to capture high-resolution topographic data, especially in difficult terrains. These technologies are advantageous in terms of area coverage, speed, and safety, especially in areas prone to flooding, landslides, or thick vegetation.

2.4 ROUTE SELECTION CRITERIA

The process of selecting an optimal route is influenced by several factors. These include topography, land use, environmental sensitivity, soil type, and socio-economic impact. According to Chandra and Agrawal (2010), the best alignment is one that combines the shortest path with minimal construction cost, least disruption to existing land use, and the highest level of safety and accessibility.

In practice, engineers and planners must evaluate multiple potential alignments using a combination of field data, satellite imagery, and design software such as AutoCAD Civil 3D or InfraWorks. Digital Elevation Models (DEMs) and terrain analysis are commonly used to identify slopes and elevation changes that could increase earthworks or construction difficulty.

In urban settings, additional factors such as traffic patterns, proximity to utilities, and future development plans play a major role in alignment decisions. Meanwhile, in rural or greenfield areas, environmental conservation and land acquisition issues become more

prominent. Thus, modern route surveys must integrate both engineering and environmental data to propose feasible routes.

2.5 APPLICATION OF SURVEY DATA IN DESIGN AND CONSTRUCTION

The outputs of a route survey—longitudinal profiles, cross-sections, alignment maps, and coordinate data—form the basis for subsequent design and construction activities. These deliverables help in estimating cut-and-fill volumes, drainage planning, pavement design, and construction staking. Without accurate survey data, road projects risk design errors, cost overruns, and safety issues.

Moreover, route surveys are also used during the construction stage to monitor progress, verify alignment, and set out features like culverts, curves, and junctions. The data is often archived for future maintenance and expansion projects.

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	SIGH	FACE	HORIZONTAL	VERTICAL	DIFFERENCE	DIST(m)

	T					
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.

Kwpt01 kwpt02 kwpt03

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		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		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		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

The route survey project undertaken in [Insert Study Area] aimed at identifying the most suitable and sustainable alignment for a proposed road that will enhance connectivity and socio-economic activities within the region. The project incorporated several phases, beginning with a comprehensive understanding of the study area, followed by reconnaissance, field data collection, control point establishment, data analysis, and final alignment selection. Each phase was critical in ensuring the accuracy and reliability of the survey results and the practicality of the selected route.

In Chapter One, the groundwork was laid by introducing the topic, stating the aim and objectives, and discussing the scope and significance of the project. The study highlighted the crucial role that route surveys play in infrastructure development, particularly in planning roads and other linear structures. The personnel involved and the geographical extent of the project were also presented, giving the study a well-defined context.

Chapter Two presented a detailed literature review, exploring the theoretical and historical perspectives of route surveying. It examined existing works on surveying techniques, technologies used in route surveys (such as Total Stations, GPS, and GIS), and the application of survey data in route design. This chapter helped establish a strong academic foundation for the methodology and decisions taken in the later parts of the project.

Chapter Three detailed the methodology, including the instruments used (like dumpy levels, GPS devices, ranging rods, and Total Stations), the procedures for reconnaissance, control point establishment, leveling, and traversing. It also discussed data processing using AutoCAD and other software to produce alignment drawings, profiles, and cross sections. The methods were selected based on best practices in the field and the specific conditions of the study area.

Chapter Four focused on the results and analysis, where data collected during the field survey was presented in charts, maps, and tables. Profiles of the proposed alignment, contour maps, and other outputs were analyzed to evaluate the feasibility of the route. Several factors such as slope, elevation differences, existing physical features, and land use patterns were considered before finalizing the proposed alignment. This chapter demonstrated how the integration of field observations and technical analysis leads to informed decision-making.

Overall, the project successfully achieved its aim of identifying an efficient, cost-effective, and sustainable road alignment through a structured and methodical approach. The project not only applied theoretical knowledge to a real-world problem but also demonstrated the importance of integrating technical data, environmental factors, and socio-economic considerations in route planning. The skills and techniques applied in the course of this project can be replicated or adapted for similar surveys elsewhere.

5.2 Conclusion

The route survey conducted for the proposed road in [Insert Study Area] provides a comprehensive example of how geospatial and engineering principles can be effectively applied to address infrastructural development needs. Through a combination of fieldwork, data analysis, and route design, the project has identified a viable alignment that balances technical, environmental, and economic factors. The process involved careful planning, precise measurement, and critical evaluation, all of which are hallmarks of professional surveying practice.

The project began with the recognition of the need for improved transportation infrastructure in the area. The lack of accessible and well-maintained roads has long hindered economic activities and reduced the quality of life for local residents. In addressing this need, the route survey aimed to determine a path that minimizes earthworks, avoids unnecessary environmental damage, and connects key points in the most efficient manner.

The implementation of modern surveying instruments and techniques played a significant role in enhancing the accuracy and efficiency of the project. Tools such as GPS and Total Stations enabled the survey team to capture high-precision data that were crucial for mapping terrain features and elevations. These tools ensured that the selected route was not only feasible on paper but also practical on the ground. The use of AutoCAD and GIS software further added value by providing detailed visual representations of the proposed route and facilitating easier interpretation of the data.

An important conclusion that emerges from this project is the central role of preliminary investigations and data collection in successful infrastructure development. Without accurate surveys and thoughtful route alignment, road construction projects are likely to suffer from cost overruns, structural failures, and negative social or environmental consequences. Hence, the route survey serves not just as a technical requirement but as a strategic planning tool.

Furthermore, the project highlights the importance of considering socio-environmental impacts in engineering design. The alignment process consciously avoided sensitive areas such as farmlands, wetlands, and densely populated regions. This approach demonstrates a commitment to sustainable development, ensuring that road construction does not come at the expense of community well-being or environmental integrity.

In conclusion, this project has successfully demonstrated the importance and application of route surveying in civil engineering. It has delivered a technically sound and socially responsible outcome that can serve as the basis for detailed engineering design and eventual construction. The knowledge and experience gained from this project are valuable assets for future endeavors in both academic and professional contexts.

5.3 Recommendations

Based on the findings and experiences obtained during the execution of this route survey project, several recommendations are offered to guide future route survey projects and infrastructure planning processes:

1. Integration of Advanced Technology: Future surveys should incorporate more advanced technologies such as drone-based aerial photogrammetry and LiDAR. These tools provide high-resolution topographic data over large areas quickly and with minimal human error. The integration of such tools will improve accuracy, reduce labor, and enhance decision making.

2. Comprehensive Stakeholder Engagement: It is recommended that local stakeholders, including community leaders and landowners, be involved in the route selection process. Their local knowledge can help identify potential issues early, such as land ownership conflicts or cultural sites, which might not be visible during physical surveys.

3. Periodic Training for Survey Personnel: Continuous professional development is crucial for survey teams. Training on the latest equipment, software, and data interpretation methods ensures high-quality output. Institutions and companies should invest in regular workshops and certification programs for their personnel.

4. Environmental and Social Impact Assessment (ESIA): While this survey focused on technical alignment, future projects should be complemented with detailed environmental and social assessments. This ensures that road construction does not negatively affect ecosystems or displace communities without compensation or planning.

5. Development of a Centralized Geospatial Database: Establishing a geospatial database that stores previous and ongoing survey data can be very beneficial. Such a database will reduce redundancy in data collection and serve as a planning tool for future infrastructure projects.

6. Route Design Optimization: It is advisable to analyze multiple alignment alternatives before selecting a final route. This includes comparing alignments based on distance, construction cost, ease of access, and environmental impact. Decision-making should be supported with multi-criteria analysis.

7. Monitoring and Updating Survey Data: In areas where development is rapid or where natural features change due to erosion or urbanization, survey data should be updated periodically. Keeping data current ensures that subsequent design and construction works are based on reliable information.

8. Policy Implementation and Enforcement: Government agencies responsible for infrastructure should enforce policies that mandate thorough surveys before project approval. This will enhance project sustainability, reduce budget overruns, and improve public satisfaction.

In conclusion, while this route survey has achieved its goals, the recommendations provided here are aimed at improving future projects. A combination of technological, institutional, and environmental best practices will ensure that route surveys contribute meaningfully to sustainable development and national progress.

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