PROJECT REPORT

ON

ROUTE SURVEY

OF

OKE-OSE- SENTU ROAD, OFF OLD JEBBA ROAD, ILORIN EAST LOCAL GOVERNMENT AREA, KWARA STATE.

BY

ALADE FLORENCE ABOSEDE

MATRIC NO.: ND/23/SGI/FT/071

BEING A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF SURVEYING AND GEO-INFORMATICS, INSTITUTE OF ENVIRONMENTAL STUDIES.

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF ORDINARY NATIONAL DIPLOMA (OND) IN SURVEYING AND GEO-INFORMATICS, KWARA STATE POLYTECHNIC, ILORIN.

JUNE, 2025

CERTIFICATE

I hereby certify that all the field work and information combined in this project write up were obtained as a result of observation and measurements made by me **ALADE FLORENCE ABOSEDE** with matriculation number **ND/23/SGI/FT/0071** and that the survey was carried out in accordance with survey rules and regulations and departmental instructions.

____________________________ ________________________

ALADE FLORENCE ABOSEDE **DATE**

ND/23/SGI/FT/0071

CERTIFICATION

This is to certify that **ALADE FLORENCE ABOSEDE** with matriculation number **ND/23/SGI/FT/0071** has successfully carried out the survey duties contained therein in this project write up under my instruction and direct supervision.

SURV.ABDULSALAM AYUBA **DATE**
SURV.OGUNTAYO BERNARD

Project supervisors

SURV.AWOLEYE RAPHEAL.S
DATE

Project coordinator

SURV.A.ISAU **DATE**

Head of Department

SURV.OPALEYE J.O **DATE**

External Examiner

DEDICATION

This project is dedicated to the Almighty God for his mercy and for loving guidance **MR and MRS ALADE** who saw me through the pregame.

ACKNOWLEDGEMENT

All glory honor adoration to God Almighty, the gracious one who has given me the opportunity complete my ND programmed. My appreciation goes to my project supervisors in the person of Surv. Abdulsalam Ayuba And Suvr. Benard Oguntayo for their strictly and through supervision. I will like to thank all lecturers of this noble department starting from H.O.D Surv. Abinbola isau, Surv. A. Ayuba, Mr. Bello Felix Diran, Surv. Williams Kzeem, Surv. A.O. Akinyede, and also the Director of special duty in IES Surv. A.G. Aremu and other supportive staff of the department of Surveying and Geo-informatics, Kwara State Polytechnic, Ilorin.

I also express my sincere gratitude to my wonderful parents **Mr. and Mrs. ALADE** for their financial morals support toward the competition of this program. You will reap the fruit of your labour (Amen).

ABSTRACT

This project report contains the reconnaissance, field work, data processing exercise, and every other procedure undertaken in the course of this project which focused on Route Survey which involves acquisition of data for the purpose of road construction design for the road from GT junction to SENTU Road in Oke- Ose Ilorin East local government of Ilorin, Kwara State. The field work involved, reconnaissance, distance measurement with DGPS and, the numbers of intersection point (I.P), benchmark (B.M), using CORS. The acquired data were processed using appropriate formulae. The plans were produced from the processed data at suitable scales both in digital and graphic formats. Finally a project report was written.

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1.0. INTRODUCTION

Surveying plays a vital and a crucial role in the development of any engineering projects such as toad alignment, irrigation project, hydroelectric scheme, tunnels, construction of dams, building construction e.t.c.

Surveying are fundamental tools for gathering information and understanding the world around us. They encompass a wide range of activities, from meticulously measuring and mapping physical landscapes to thoroughly collect data about human opinion attitudes and behaviors. The essence of a survey lies in its systematic approach to acquiring knowledge, allowing for informed decision making and problems solving across various fields.

As its cores, a survey involves the meticulous gathering of data through observation, measurements and questioning. In the realms of engineering, surveys play a pivotal role in planning and designing infrastructure projects. By accurately measuring the terrain and identifying obstacles, engineers can ensure that roads, bridge and buildings are built safely and efficiently. Environmental scientists rely on survey to access the impact of human activities on the environment. Through detailed observation and data collection, they can identify sensitive ecosystem, monitor pollution levels, and develops strategies for sustainable development.

Route survey is a type of geodetic survey. It is an essential component of any linear infrastructure projects from roads and railways to pipeline and power line. This survey provides the critical data necessary for the design, construction, and maintenance of these vital infrastructure elements. Their importance stems from the need for accurate and comprehensive information about the terrain, existing structure and environmental conditions along the proposed route.

Route survey is to gather detailed information about the alignment and elevation of the proposed route. This includes surveying the existing terrain, identifying any obstacles or constraints, and determine the optimal path for the infrastructure. The data collected during the survey is then used to create detailed plans and drawings which serve as the foundation for the design and construction phases.

Route survey play a crucial role in environmental impact assessment. By accurately mapping the terrain and identifying sensitive ecological areas, surveyor can help minimize the environmental impact of the project. This involves identifying potential risks, such as wetlands, endangered species habitat, and cultural heritage sites, and incorporating migration measures into the design and construction process. The important of route survey cannot be overstated, as they provide the foundation for successful and sustainable infrastructure development.

Route survey can be seen as the survey carried out in establishing the horizontal and vertical alignment of a particular area needed for social utilities like highways, railways, transmission lines, pipelines e.t.c. It can also be applied to where an alignment is needed for the rehabilitation or expansion of existing route. It can be said to have the aim and objective of providing information of the arrangements of the terrain, the details on it and the topographical information.

During the planning in route survey, the surveyor should know the specifications which will enable him/her carry out the job accurately, less labour and time consumption in order to ensure the following:

a) Easy communication and transportation network between the communities involved.

b) Acquisition of data which will enable the construction engineer to carry out design on a specific site.

1.1 AIM OF THE PROJECT

The main aim of the project is to gather data of the existing ground level along the proposed route to aid engineering design and construction of the road, and to establish the horizontal and vertical alignment of the road.

1.2 OBJECTIVE OF THE PROJECT

- Determine the optical route
- Gathering accurate data
- Minimize costs and risk
- Ensuring safety and functionality
- Supporting detailed design

1.3 SCOPES OF THE PROJECT

- Reconnaissance survey of the project site
- Office planning
- Preliminary survey (Data collection)
- Detailed survey
- Monumentation
- Data acquisition using Differential GPS

- Data downloading editing
- Data processing and analysis
- Information presentation both hard/soft copies

1.4 PERSONNEL

The personnel involved in the survey are;

NAME	MATRIC NUMBER	ROLE
ALADE FLORENCE ABOSEDE	ND/23/SGI/FT/0071	GROUP LEADER
AWOSENL BOLUWATIFE .O	ND/23/SGI/FT/0072	MEMBER
KAZEEM FARIDAH ENIOLA	ND/23/SGI/FT/0069	MEMBER
MURITALA MUJIDAH KEHINDE	ND/23/SGI/FT/0068	MEMBER
BADMUS FATHIA ARIKE	ND/23/SGI/FT/0070	MEMBER
AZEEZ FARUQ AOMIDE	ND/23/SGI/FT/0060	MEMBER
OLAREWAJU BOLUWATIFE .A	ND/23/SGI/FT/0067	MEMBER

1.5 LOCATION OF THE SITE

The study area is at Sentu – Oke-Ose Road, off Old Jebba road, Ilorin East Local Government Area Kwara State. The length of this project is 5km covered the Latitude (8 32’54.40”)N Longitude(4 39’10.90”)E and Latitude (8 30’52.57”)N Longitude (4 40’55.30”)E.

1.5.1 MAP OF THE SITE LOCATION

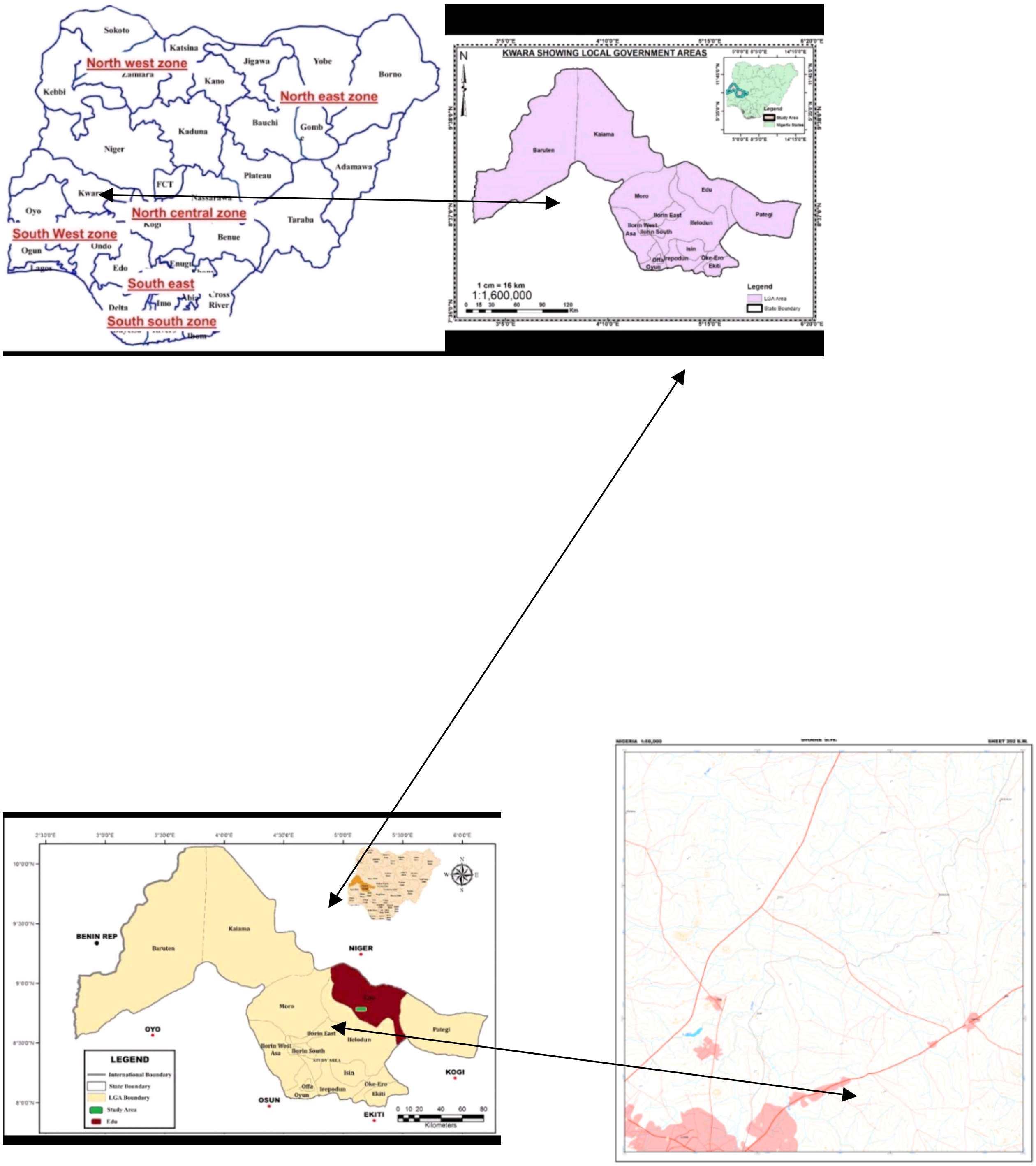


FIG.1.0 Showing Nigeria map, Kwara state map, and topographical map covering the project area .

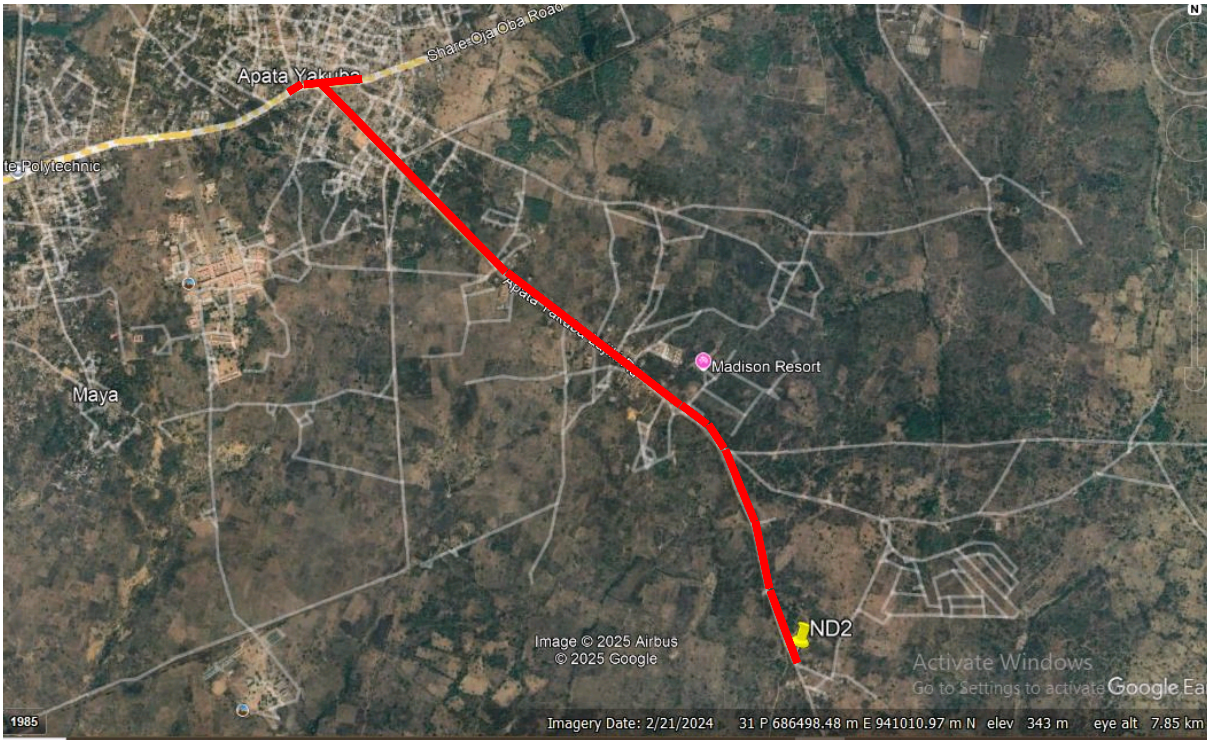


Fig. 1.1 showing the imagery covering the project area

CHAPTER TWO

2.0 LITERATURE REVIEW

Local planning handbook (2015) said routes that follows simple patterns with few turns are easier to understand for transit riders. A network of simple routes makes the whole system easier to use spontaneously with little planning. Routes that do not make a lot of deviations also provide a faster trip for riders and are less expensive to operate for the provider – meaning more service can be provided for the same resources. Communities can support this principle by encouraging development along denser, linear corridors and connecting gaps in the street grid to allow transit to have simple and direct routes in their communities.

Basak N.N (2010), defined surveying as the art and science of determining the relative position of various points or stations on the surface of the earth by measuring the horizontal and vertical distances, angles and taking the details of these point and by preparing a map or plan to any suitable scale.

Route Survey is type of engineering surveying, which provides height along a proposed route with offsets at the both sides of the centerline of the route. This serves the purpose of location, design and construction of the route networks.

Route Survey, therefore, can be explained as a survey made along a line or narrow belt or strip for location, design, and construction of any route of transportation such as highways, railways sewage and oil. It is also very useful in surveys which require the establishment of both vertical and horizontal alignment for cross-country development of utilities.

Surveying is indispensable to the engineer when planning, designing and constructing a project, so all engineers should have a thorough understanding of the limits of accuracy possible in the construct

Engineering surveying, which was the main task in this project, was defined by M. Seedat (2012) as the type of survey which is associated with the engineering design (topographic, layout and as built) often requiring geodetic computations beyond normal civil engineering practice. It is required in planning and execution of nearly every form of construction. The equipments commonly used for this are theodolites, GNSS (GPS) and levelling instruments.

Engineering survey has assumed the goal of dimensioning the physical environment. Greater part of its responsibility is seen from the various types of surveying which are geared towards promoting accessibility, route ways, convenience, economy and spatial delineation of both natural and social environment. He also stated that engineers and surveyors involves in site, surveying are responsible for all aspect of dimensional control on such schemes. According to him, the main purposes of engineering surveying are:

1. To provide large scale topographical map/ plan and other measurement at the concept and design stage. Since this data forms the basis for an entire project, the reliability of the design depends to a great extent on the precision and thoroughness with which the original site survey is carried out.

2. To provide precise framework at the construction stage control from which it is possible to position the works and, most importantly, to ensure that engineering project are built in their correct relative and absolute position (this is known as setting out). In addition to these, data for the measurement of the work is also collected to enable volumes of the material to be estimated during construction.

3. To monitor structural movement on major retaining structure at the post construction stage.

History testifies that transportation is necessary to draw a country, state town or settlement to civilization by making communication among neighbours easier. Various means of transportation exist; they are transportation by air, by land and transportation by water. Land transportations involves by rails, and roads. Road accounts for about 95% of all surface transportation in Nigeria. Road make possible socio-economic and cultural relationship among communities and create avenue for the good and management of the environment.

Good transportation, in and of itself, will not assure success in the marketplace, as the availability of transportation is a necessary but insufficient condition for economic growth. However, the absence of supportive transportation services will serve to limit or hinder the potential for a nation or region to achieve its economic potential. Thus, if a society expects to develop and grow, it must have a strong internal transportation system consisting of good roads, rail systems, as well as excellent linkages to the rest of the world by sea and air. Thus, transportation demand is a by-product derived from the needs and desires of people to travel or to transfer their goods from one place to another. It is a necessary condition for human interaction and economic competitiveness. (Garber 2009)

Transportation has contributed immensely to the economic development of the world in terms of:

1 Migration of people

2 Movement of goods and services

3 National integrations

4 Division of ideas and technology.

Most of the roads we ply were as a result of the application of route survey, for example:

right of way (ROW) and acquisition survey was carried out by Setraco Nigeria Limited on Abuja-Keffi road (52

Dentata and Sawoe Nigeria limited were responsible for that of Jibiakaro Namoda-Gusau road (161km), some of the survey instruments stated above were also used. This was done to determine: the extent of the area that is needed for expansion of the road, the details of all the properties and buildings that fall within that area, knowing the details of owners of such properties for the payment of compensation for the right owner and also it aid in determining an estimate of the amount to pay as compensation (Idemudia, 2007).

Route surveying, being an aspect of engineering work is a survey that starts from the design and ends after the construction stages and it could be explained as the survey carried out in establishing the horizontal and vertical alignments of a particular area needed for social utilities like highways, railways, transmission lines, pipelines and canals. (Mikhail 2001).

In conclusion, according to Ghilani and Wolf (2006), Route survey are made to plan, design and construct highways, railroads, pipelines and other linear projects. They normally begin at one control point and progress to another in the most direct manner permitted by field conditions.

According to Uren (1994), a longitudinal section provides information only along the canter line of a proposed project, for works such as pipeline, which usually are only of a narrow extent in the form of a trench cut along the surveyed canter line, a longitudinal section provides sufficient data for construction to be planned and carried out. As for cross sectioning, this is essential because once any new road formation or construction is proposed, it is certain to involve cut and fill, then there is urgent need to define the limits of both before construction starts. A useful convention is that of the width of cross sections of the road has to be marked with pegs. This is done purposely to indicate the extent of the new route to be constructed.

In a route survey, representations of the actual course of the survey and of the plane horizontal features (including the terrain, if necessary) on both sides of it within the limits of direct visibility are plotted on a mopboards using methods of instrument surveying (plane-table, tachometric, and aerial photo topographic surveying) or exploratory surveying.

For small projects involving widening or minor improvement of an existing facility, the survey may be relatively simple and may include only the obtaining of sufficient information for the designer to prepare plans and specification defining the work to be done. For more complex project involving multilane highways on new locations, the survey may require a myriad of details, including data from specialist in related field to determine the best location, to prepare plan, specification and estimates for construction and to prepare deed description and maps for appraisal and acquisition of the necessary right of way.

In order to plan and perform the survey needed to acquire these types of data, the surveyor must be familiar with:

1 The geometry of horizontal and vertical curves and how they are used in the route alignment procedure
2 The methods of acquiring terrain data utilized in the route design procedure
3 The procedure followed in processing terrain data to obtain earthworks volumes
4 Establishing on the ground a system of stakes or other markers, both in plane and elevation from which measurement of earthworks and structure can be taken conveniently by thee construction force
5 Given line and grade as needed either to replace stakes disturbed by construction or to

reach additional points on the structure itself

6 Making measurement necessary to verify the location of completed parts of the structure (the as-built survey) and to determine the volume of work actually performed.

New developments in equipment such as electronic surveying system, and laser equipped alignment instrument provide powerful tools which have many applications in these areas. The detailed methods employed on these surveys vary greatly with the type, location and size of structure and with the preference of the engineering and construction organizations. Much depends on the ingenuity of the surveyors so that the correct information is given without confusion or needless effort.

Finally, after reviewing different survey jobs that have been done by different authors on the topics, it’s obvious that route survey carried out from GT Junction to Sentu Junior Secondary School Road covered 5km. It was carried out using Differential GPS connected to the CORS which helps to ensure precise geospatial data collection. The CORS help to reduce the need for setting up temporary base stations along the route, saving time and resources while ensuring consistent accuracy over large distance.

CHAPTER THREE

3.0 METHODOLOGY

This can be termed as a set of methods and principles used to perform a particular activity. For the activities to be successfully performed, proper planning is very important. This involves development of a work plan showing how goals and objectives are to be accomplished. Hence, planning is one of the essential factors for the effective project execution and management. Proper planning was taken for the execution of this project and this involved;

1. The choice of the most appropriate techniques for carry out of the project
2. Selection of equipment used
3. The design of a monitoring scheme that really helped in achieving the required accuracy for the project, starting from reconnaissance to the final product of the project.

3.1 RECONNAISSANCE

This is an important and first aspect in any survey project carried out to obtain the general view of the study area in terms of the nature of the terrain and to adequately plan the best ways to the set aim and objectives of the project. The importance of reconnaissance to any survey work of any size and nature cannot be over-emphasized. Experience has proved that time spent in carrying out a good reconnaissance is not a wasted time since it contributes to the quick execution of any survey exercise and promotes easy survey work. Reconnaissance simply connotes the summation of all activities preceding the actual execution of a survey job. It involves taking a general study or view of an area of operation with a view of knowing how best the operation is to be carried out in terms of energy and time. As this project was concerned, the reconnaissance was carried out in two stages.

The two stages of reconnaissance are;

i. Office planning
ii. Field planning

3.1.1 OFFICE PLANNING

Office planning is also known as office reconnaissance. It is a vital component of route surveying, enabling surveyors to gather existing data and information before conducting fieldwork. This process involves a thorough review of available resources, including maps, aerial imagery, and existing reports.

3.1.2. FIELD PLANNING

The field reconnaissance was first carried out before the actual operation. This aspect involved site visitation to the project site by all the group members to have a pre-requisite knowledge of how it looks and how the field operation will be carried out.

During the visit, the control points planned to be used were marked, the reconnaissance facilitated the planning and carrying out of the actual survey as it was taking into consideration, the possible problem that are likely to be encountered, how such problems can be overcome or reduced to the barest minimum.

3.2 FIELD PREPARATION

This involved the operation carried out before the actual observation. The operation involved marking of chainages which is done at 25cm interval.

3.3. MOMENTATION

Temporary bench mark (TBM) were established and coordinated along the entire route of the project, which were meant to serve as controls for establishing Centerline chainage, setting out of curve and other road features during the actual construction.

The position of these beacons were selected in such a way that they are intervisible to each other, not too far from the proposed road and considerable number of Centerline can be set out from them.

The property beacon used were precast with dimensions 18cm square by 75cm in length. 65cm of the precast beacon was buried beneath the surface and 10cm above. This was done in compliance with the specification of cadastral survey regulations as specified in CAP 425 law of the federation of Nigeria. The property beacon was made of concrete mixture of ratio 3:2:1 of sand, granite and cement. The iron rod protruding at the center of the beacon formed the station mark.

The numbering was done serially from the beginning to the end of the proposed road and were prefixed with the identification number KP ND11 001

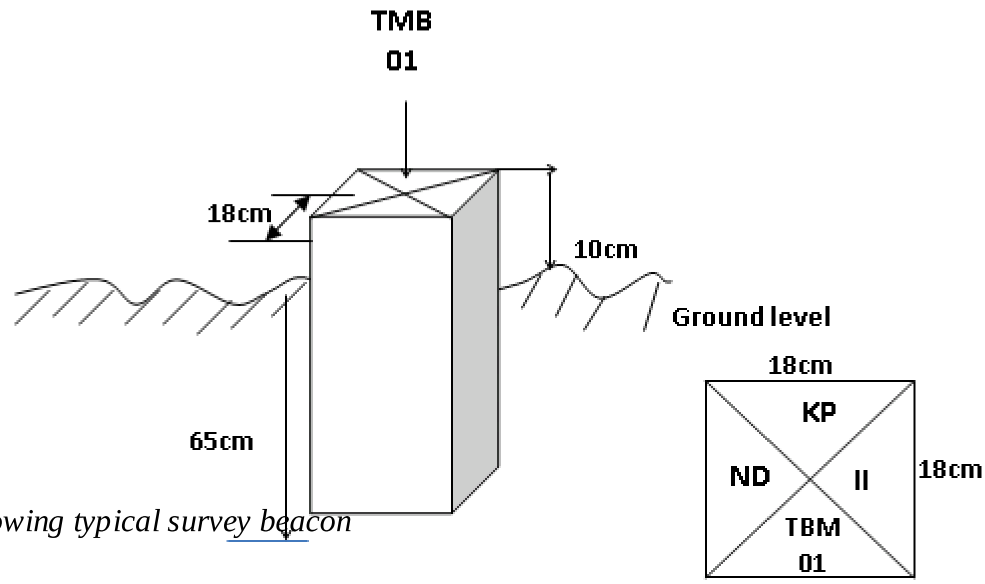


Fig. 3.0 Showing typical survey beacon

3.4. EQUIPMENT USED

3.4.1 HARDWARE USED

i. Differential GPS

ii. Handheld GPS

iii. Linen tape

iv. Power supplies

v. Nails and bottles cork

vi. Hammer

vii. Cabling and connectors

3.4. 11. SOFTWARE USED

i. AutoCAD/ CivilCAD 2014

ii. Microsoft office (word and excel)

iii. Notepad

3.5. METHOD USED

CORS TECHNOLOGY

CORS stands for (Continuously Operating Reference Station). It is a type of GPS or GNSS (Global Navigation Satellite System) station that:

1. Collects and transmits GPS/GNSS data continuously.
2. Provides real-time corrections to improve the accuracy of GPS signals.

CORS are used to enhance the precision and reliability of GPS positioning for various applications, including surveying, mapping, navigation, and more.

How you use a CORS with a data logger when collecting survey data:

How to Use a CORS with a Data Logger

1. Set Up Your GNSS Receiver & Data Logger

- Mount the GNSS antenna securely on your survey pole or tripod.
- Connect your data logger/controller to the GNSS receiver. The data logger is usually a handheld device or tablet used to configure settings and record data.

2. Configure the CORS Connection

- On the data logger, enter the CORS network settings:
- Enter the username
- IP address & port of the CORS provider.
- You'll need mobile internet (, hotspot) on your data logger or receiver to access the CORS network in real time.

3. Select Correction Service Type

- Choose RTK corrections (Real-Time Kinematic) if you want live centimeter-level accuracy.
- Some systems also allow post-processing (PPK), where you log raw data and apply CORS corrections later.

4. Start Receiving Corrections

- Once connected, the GNSS receiver will start applying correction data from the CORS.

- The data logger will show “Fixed RTK” or “Float RTK” status, indicating correction quality.

5. Begin Surveying & Logging Points

- Move to the points you want to survey.
- Use the data logger to record positions, adding descriptions, codes, or attributes as needed.
- Each recorded point will have high-precision coordinates

6. Save & Export Data

- After collecting your points, you can export the data (CSV, DXF, shapefiles, etc.) from the data logger for further use in GIS, CAD, or mapping software.

In Simple Terms:

The CORS sends corrections to your rover via the internet.Your data logger controls the receiver and records corrected point data.

CHAPTER FOUR

4.0 DATA PROCESSING AND RESULT ANALYSIS

This stage involves downloading of the acquired data on field from the digital equipment to the personal computer for further processing. The data obtained were downloaded using a data transfer cable. After successfully downloaded of those data, they were edited using Microsoft Excel and Notepad Software which made it possible to easily import the edited copy into AutoCAD for drafting and designing. The coordinate obtained were in X, Y, Z format which were used for plotting the route's longitudinal profile

4.1. DATA DOWNLO1ADING

1. The instrument was connected to the personal computer via downloading cable, the corresponding software was launched and the instrument port was selected.
2. All the folders on the instrument were displayed. The folder containing the data for the group was then copied and pasted on another folder already created on the local drive of the personal computer.
3. The folder was launched and the file containing the data was opened with notepad application.
4. The results were in the format; Point ID, Easting, Northings and Height. The downloaded data were edited in Notepad, Microsoft Excel and scripts were prepared in Notepad in order to be plotted in AutoCAD.

4.2 DATA PROCESSING

Data processing is a critical component of route surveys, enabling the transformation of raw data into usable information for design, analysis, and decision-making. Route surveys involve collecting vast amounts of data, including topographic information, environmental factors, and infrastructure details.

The data processing stage involves several key steps, including data cleaning, transformation, analysis, and visualization. Data cleaning removes errors, inconsistencies, and outliers, ensuring the accuracy and reliability of the data. Data transformation converts the data into suitable formats, while data analysis applies algorithm

The downloaded data from the equipment was further edited using Microsoft Excel and Notepad, the final edited copy was saved as text file containing X, Y, Z coordinates of all points observed in the field.

4.3 RESULT ANALYSIS

The results were analyzed so as to check the accuracy of the job by comparing the result obtained with the minimum allowable error acceptable for this order of survey job in accordance with survey rules and departmental instructions.

4.3.1 LONGITUDINAL /HORIZONTAL ALIGNMENT PROFILE

1. In CivilCAD environment, Road menu was clicked and HORIZONTAL ALIGNMENT chosen
2. Options button was clicked in the appeared dialogue box and Define section was then clicked to choose the section format and the distance between the sections. Format 2 was chosen and the distance between sections was taken to be 25m.
3. Having chosen these options, OK was clicked twice.
4. Pick tool was selected from the right pane dialogue box to pick the intersection points (IP), and appropriate radius values of curve was given to each IP as specified by the client.
5. Apply button was then clicked to effect all the given parameters on the drawing. On each IP position, information about the IP is been displayed. Such information are; IP number ,X coordinate, Y coordinate, Radius of Curve, Length of curve, Deflection angle and so on.

4.4 INFORMATION PRESENTATION/ PLAN PRODUCTION

The data acquired were processed into plan for visual presentation with AutoCAD CivilCAD. The visual display graphical information in AutoCAD was printed as hardcopy of the plan. The longitudinal section and profile were plotted.

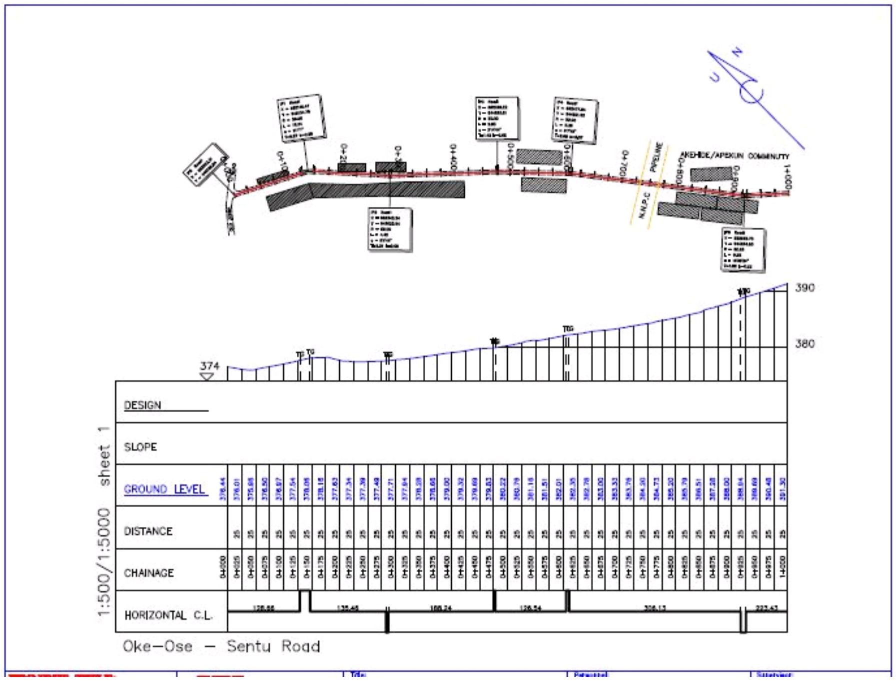


Fig. 4.0 showing the Profile and Longitudinal Section from Chainage 0+000 – 1+000

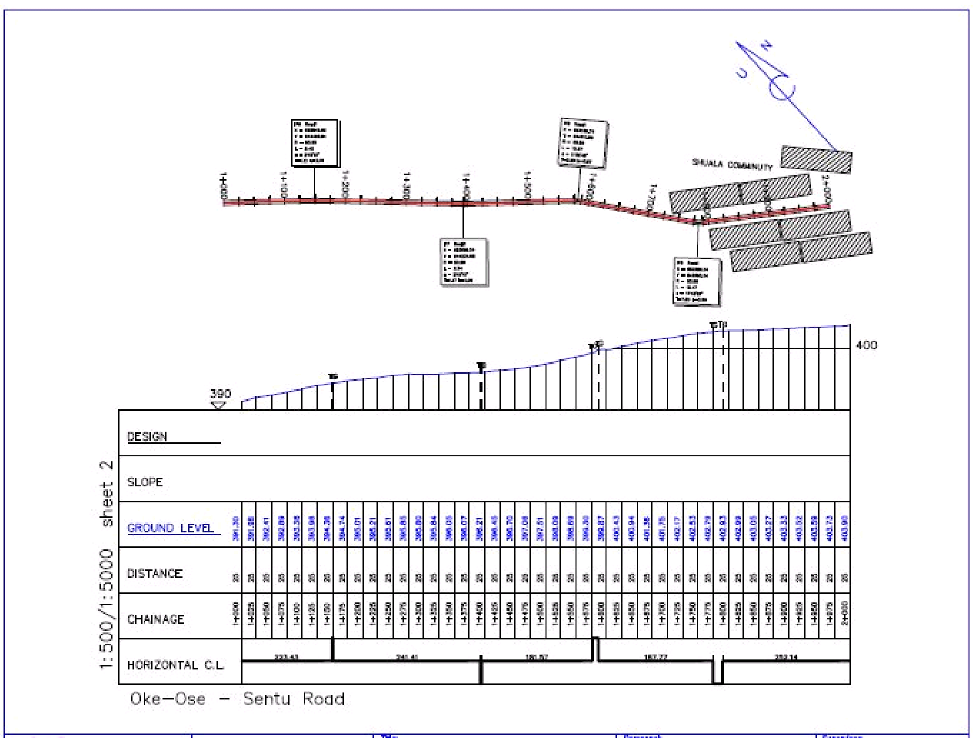
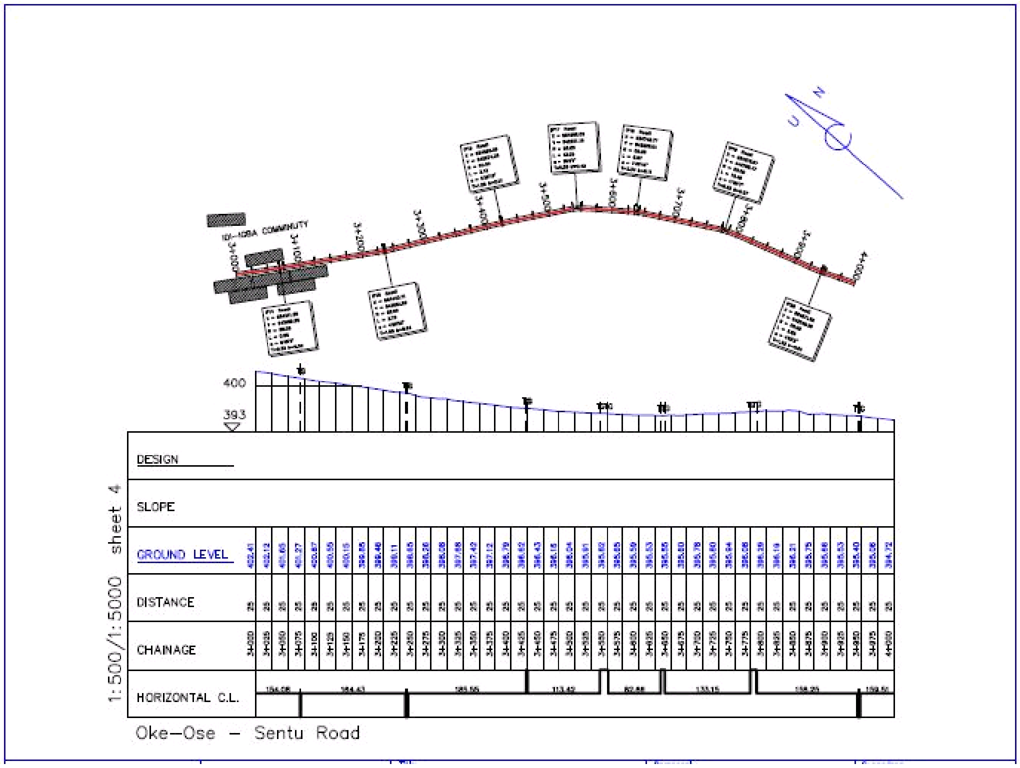


Fig. 4.1 showing the Profile and Longitudinal Section from Chainage 1+000 – 2+000



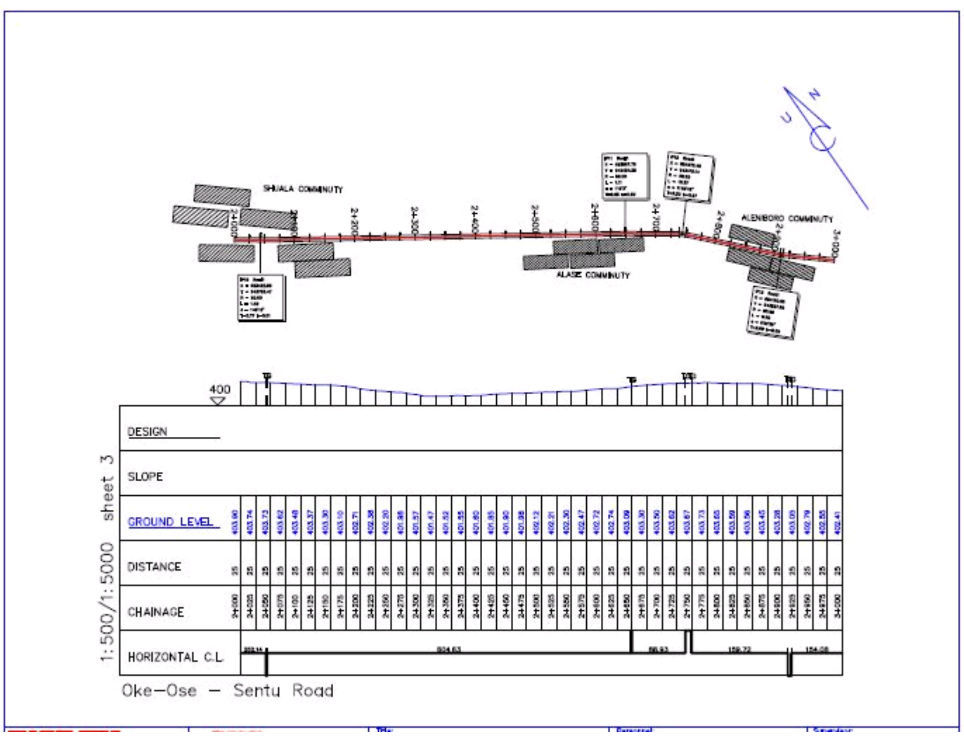


Fig. 4.3 showing the Profile and Longitudinal Section from Chainage 3+000 – 4+000

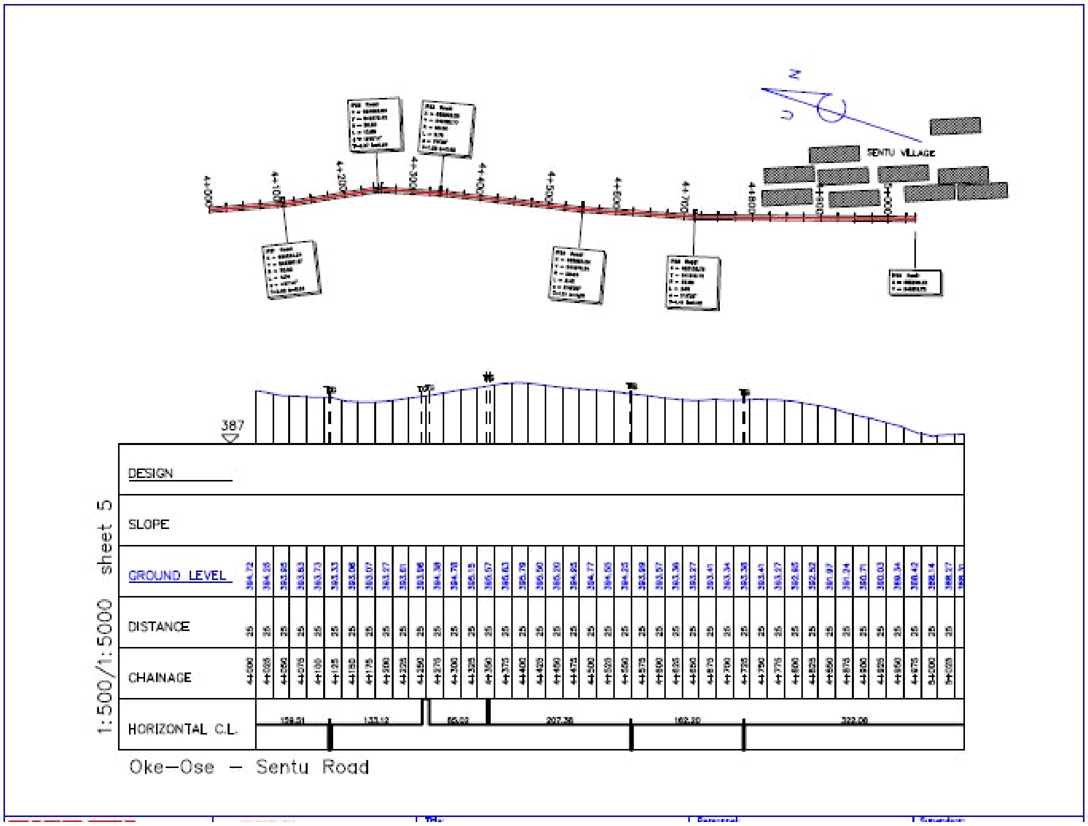


Fig. 4.4 showing the Profile and Longitudinal Section from Chainage 4 +000 – 5 +025

CHAPTER FIVE

5.0 SUMMARY, PROBLEM ENCOUNTERED, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The aim and purpose of this project was to carry out route survey of Oke-Ose - Sentu Road, off Old Jebba road Ilorin East. We started with reconnaissance which involved Office Planning and Field Planning. Reconnaissance entails total planning and usually visitation to study area to get familiarize to the site. The instrument used was examined to make sure that it is in good working condition. The raw data obtained from the field work were downloaded into a computer system using downloading cable and later process using software (CivilCAD). The processed data were used for the production of digital plan using a suitable sale in order to appreciate the work done so far and to make the work understandable to others.

5.2 PROBLEM ENCOUNTERED

The following problem were encountered when project is going on

- ❖ The movement of the masses and vehicle from one place to another along the selected road for the project was a great problem which had an effect on the rate at which the operation was carried out.
- ❖ There’s poor mobile network coverage in some areas
- ❖ There’s no instrument to be used from the department, we need to rent instruments outside in order to execute our project

- ❖ Accuracy decrease distance from the CORS station. Interference from vegetation or buildings which also affect signal quality.

5.3 SOLUTION TO THE PROBLEMS

Optimize station placement: Choose CORS stations that are strategically located for optimal coverage and accuracy in your survey area.

Use higher-quality receivers: Employ survey-grade GPS receivers that are more robust to interference and capable of maintaining high accuracy. Implement error detection and correction techniques: Utilize post-processing techniques or real-time kinematic (RTK) methods to minimize errors.

5.4 CONCLUSION

The goal of this project was successfully achieved in which all operation was carried out in accordance to survey rules and regulation and high data integrity was ensured. Moreover, this project has broadened my knowledge in carrying out route survey within an area and a good background in surveying operation. CORS systems are a valuable tool for route surveys, providing accurate, reliable, and efficient positioning solutions. With their ability to deliver centimeter-level accuracy and streamline survey workflows, CORS systems are becoming increasingly important for a wide range of surveying and mapping applications. The survey plan of selected location (GT Junction to Sentu Junior School)was finally produced showing the alignments and levels.

5.5 RECOMMENDATION

Using CORS in route surveys offers significant advantages in terms of accuracy, efficiency, and cost-effectiveness. By leveraging this technology, surveyors can achieve higher quality results while reducing project timelines and expenses.

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APENDIX

	X	Y	Z
Base_0	937113.1383	671374.3384	290.1564
PT1	945199.3114	682040.6186	376.7882
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