International Journal of Sciences, Engineering & Environmental Technology (IJOSEET), 7(4): 43–49, 2022
ISSN 0794-9650

www.repcomseet.org

ROUTE SURVEY FROM AWERE STREAM TO EGBEDA LOOGUN VILLAGE, EDE, EDE SOUTH LOCAL GOVERNMENT AREA, OSUN STATE.

Amoo, Nureni Babatunde[1*], Odeyemi, Felix Gbenga[1], and Abdulraheem, Sharaffudeen[2]

[1]*Department of Surveying and Geo-Informatics, The Federal Polytechnic Ede, Osun State.*
[2]*Department of Surveying & Geo-Informatics, Kaduna Polytechnic Kaduna, Kaduna State.*

[*]Corresponding author: olojaone78@yahoo.com; Tel: +2348069155169

Abstract: This paper describes route survey of a road in Ede ranging from Awere stream to Egbeda village in Ede South Local Government Area of Osun state covering a distance of 4,696 m (4.696 km). Station were selected along the existing route at regular interval. All data were gathered with effective orientation from the controls, method were adopted which involve 3D data acquisition by the combination of traversing and trigonometric heighting using a set of Tersus David Global Navigation Satellite System (GNSS,) Global Positioning System (GPS) and a South Total Station (NTS-352R). Various test such as horizontal collimation test was carried out before the commencement of the work. The final coordinates were used to produce the plans with appropriate scale showing horizontal alignment, profile and cross-sections. Based on the results obtained in this study the survey information obtained will be used to solve route problem of the said area.
Keywords: Alignment, Cross-section, Profile, Route, Traverse

1.0 INTRODUCTION

The importance of route to entire human being and activities cannot be underestimated. The word routes has an important role to play in the transportation system of any country. For good and effective design and control of the route system, there is demand for a close study of human behaviour with an understanding of the limitations of human performance in some varied circumstances of the route environment.

Route surveying is an aspect of Civil Engineering that deals with design and construction of linear works. A location Control which refers to surveys executed for the purpose of acquiring an interest along a linear corridor. A route does not provide construction data as can be developed from a preliminary survey. Rather, a route survey provides information and data pertaining to general location possibilities, feasibility, and probable cost of right of way, construction use and maintenance (https:Scribd.com, accessed Feb. 2022).

The urbanization in the country has a long history in the growth and development of route. Some cities in Nigeria are typical examples of growth and development of route in Nigeria namely Ikeja, Kano, Port Harcourt. Route development starts from a preliminary stage to the finish stage before it becomes mature for use. The surveying aspects cannot be ignored because it is the bedrock of development. Reconnaissance survey is an extensive study that require service and product that adequately locate the planned path of an entire area that might be used for a road. Its purpose is to eliminate those route or sites which are impractical or unfeasible and to identify the more promising routes Mala and Ani, (2017).

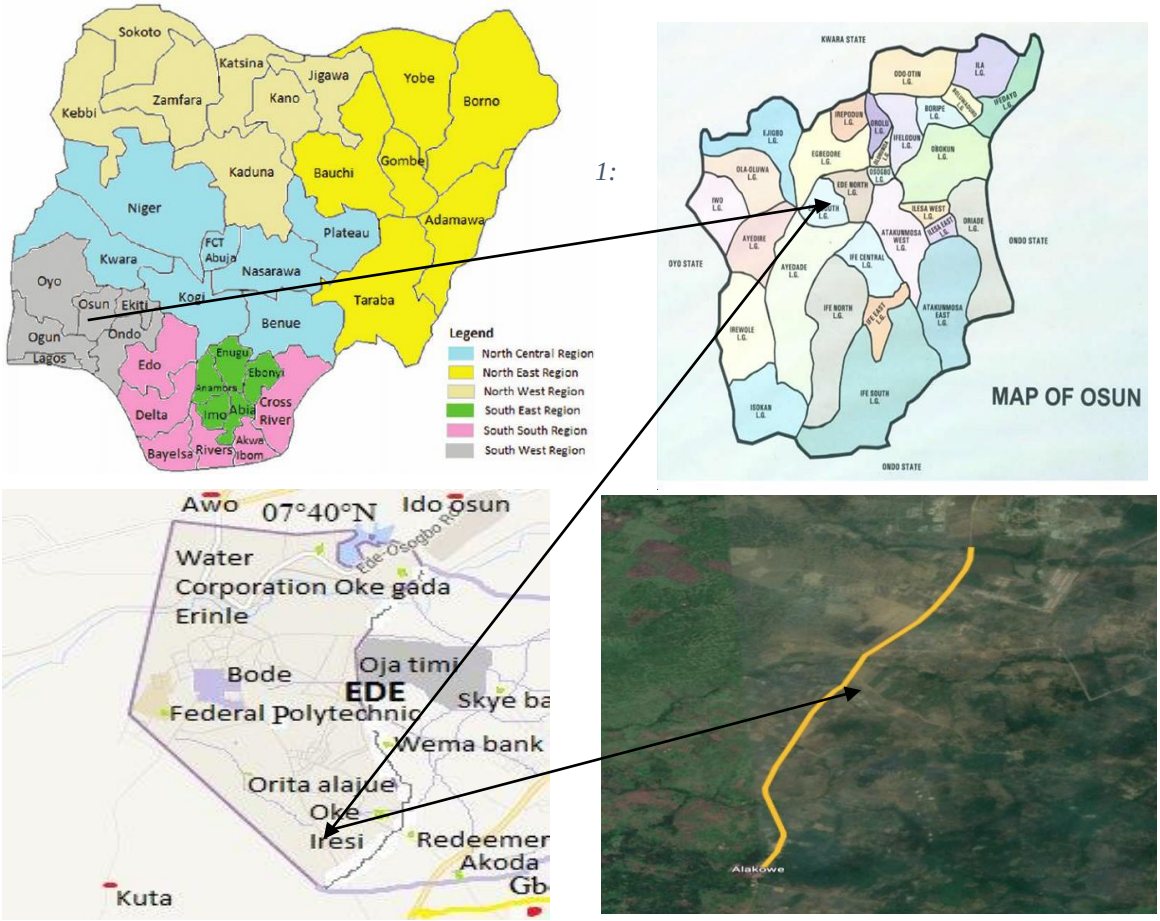
Ghilani and Wolf, (2012) noted that route surveys are usually done with the aim of determining the best route between two terminals and fixing alignment grade and other details along the selected route which consists of the following surveys: Reconnaissance, Location survey and Construction survey. Chandra, (2011). Route surveying which is a branch of Surveying has three different components namely, distances, angle and ceramic.

Engineering surveying which was the main task in this paper defined by different authors (Cushing, 2009; Garber, 2009; Alonso, 2015; Duggal, 2006; Claude et. al., 2020; Dauda et. al., 2019) as the type of survey which is associated with the engineering design. It is required in planning and execution of nearly every form of

construction. The equipment commonly used for this are theodolite, Global Navigation Satellite System (GNSS), Global Positioning System (GPS) and levelling equipment's.

1.1 STUDY AREA

Study area is emanated from Awere Stream to Ebgeda Loogun Village, Ede South Local Government Area, Ede, Osun State. The road connects two tertiaries institution (The Federal Polytechnic and Adeleke University both in Ede) (Figure 1.1). It can be closely mapped to latitude ranging from 7° 43' 50" to 7° 54' 07" and longitude 4° 25' 56'' to 4° 36' 09" with an average elevation of about 269m (883 ft) above mean sea level, covering a total length of 4.69 km (4690 m).



2.0 MATERIALS AND METHODS

In actualization of the objectives of this research work the method adopted for this study was based on the principle of surveying which is working from whole to part, aimed at acquiring reliable and accurate data needed for the computation and presentation of information in form of a plan. The methods employed include the following: reconnaissance, test of instrument, selection of stations, control check and data acquisition which include control establishment using Differential Global Positioning System (DGPS) is an enhancement to a global navigation satellite system which provides improved location accuracy, in the range of operation of each system, from the 15 meter nominal GPS accuracy to about 1-3 centimetre and traversing, longitudinal profile, cross section and detailing using Total station, and finally data processing. The schematic work flow is presented in figure 2.1 below.

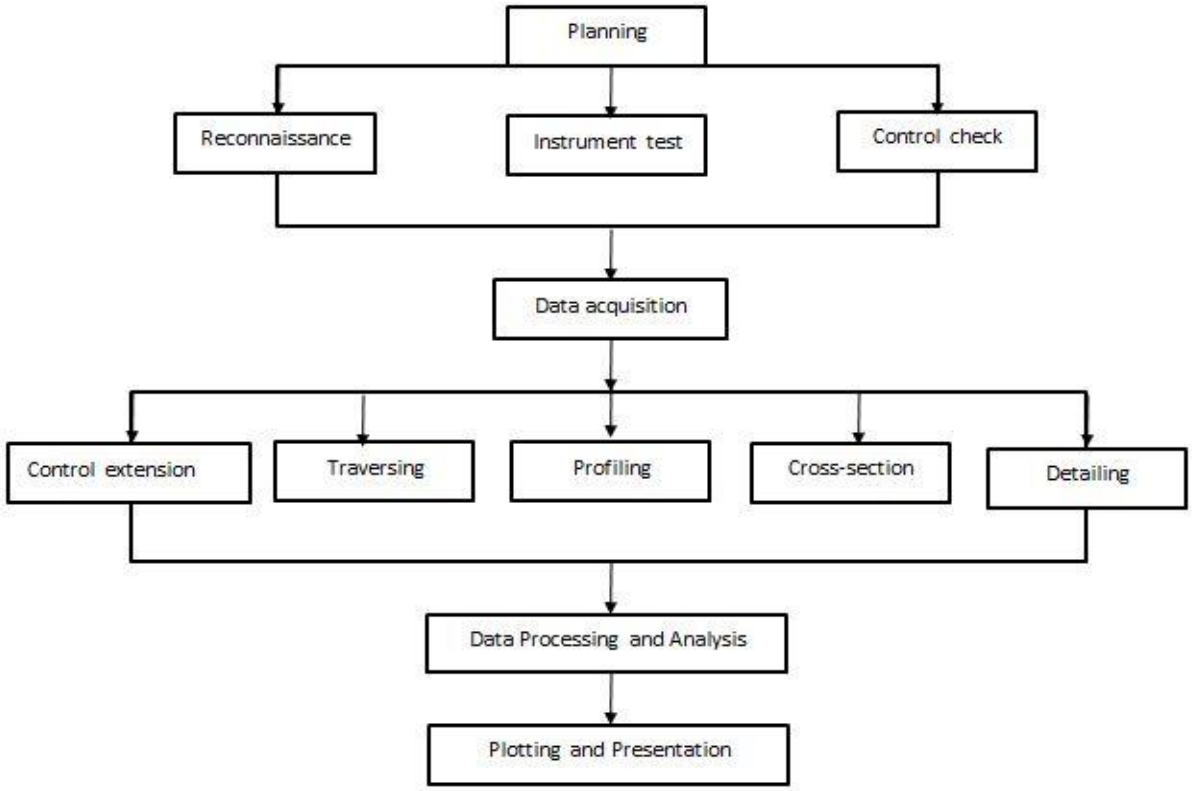


Figure 2.1: Schematic workflow

2.1 Data Acquisition

It entails all activities that involved in collection of data for the success of this research. It was carried out in chronological order using modern digital surveying equipment such that; the established buried beacons were coordinated using Tersus David GNSS GPS to obtain their coordinates, the position of the center line at 20m interval points and cross section at minimum of 3.5m on either sides of the center line were determined using South Total Station NTS-352R, also both natural and man-made features were observed and determined. Three sets of data acquired at each set up (left, center and right) to determine the width of the road while observations were obtained at the last line of sight (chainages and height of points). Temporary bench mark was also established i.e. a standard or point of reference. There were six temporary bench marks BM 1, BM 2, BM 3, BM 4, BM 5, and BM 6. The route survey was closed back at BM 6 to serve as a check.

2.2 Control Establishment (GPS Observation)

A Tersus David GNSS GPS receiver was used in the static survey mode to capture the data on site. Tersus David GNSS GPS was used as the base on control station FPE 052 while Tersus David GPS H70 was used as the rover for the establishment of control at 1 kilometer interval. The reference and rover GPS were later connected to a personal computer, downloaded using Tersus GNSS downloader. Below is the table 2.1 that shows the coordinates of established controls.

Table 2.1: Coordinates of established controls

STATION	EASTING (m)	NORTHING (m)	HEIGHT (m)
PB19004	656186.322	849974.884	269.1526
PB19005	656169.724	849858.911	269.7039
PB19006	656153.338	849702.822	272.0752
OCSD293S	654373.458	845481.808	269.7278
293SA	654431.669	845575.043	282.8974
OCSD291S	654562.640	845956.708	283.9652

Source: Field observation

2.3 Traversing Using Total Station

South NTS-352R total station was used after it was tested and the result was okay for used. The instrument was set on (PB19005) and primary adjustment was carried out i.e. centering, leveling and focusing and a back sight was taken to the second pillar (PB19004), then the instrument was now transited to the first point (PT1) as fore sight. The instrument was now shifted to point (PT1) as the occupied station and primary adjustment was performed and back sight to (PB19005) and fore sight to second point (PT2). This was done repeatedly until the entire section of the route was covered.

2.4 Profiling (Longitudinal Section)

Profiling is the process of determining the elevation of points at a regular interval along a line. It is extremely useful for locating drains, dams, roads and other earth structures (Billiaminu, 2017). It is taken along the complete length of a proposed centerline of the construction showing the existing ground level. The center line was marked at 20m intervals. The beginning station of profile leveling is termed as 0+000. Points at multiples of 1000m from this point are termed as full stations. The levels are observed along the required line with the use of a South NTS-352R total station. Figure 2.2 below shows profile generated

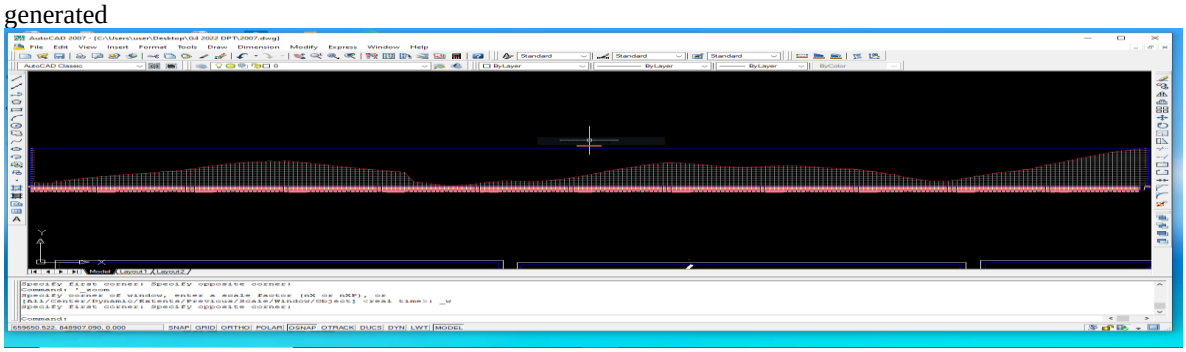


Figure 2.2: Diagram Showing profile generated

2.5 Cross Section

The process of determining the elevation or height of points at perpendicular to the center line of the longitudinal section is called cross-sectioning (Amoo et. al., 2020). In achieving the aim of this paper both profile and cross section leveling were observed simultaneously at every 20m interval where points were marked out at an interval of 3.5m adjacent to the center line marked on the ground till the end of the 4.690kilometre.

2.6 Detailing

Detailing means fixing and determining of relative position of features (both natural and artificial) existing on both sides of the road along the survey route in the site. Feature fixed are buildings (completed and uncompleted), electric poles, trees, swamps, plantations, existing roads, wall fences, and so on. They were fixed with the South NTS-352R total station and its reflector. Ray method was adopted.

After the total station was set on a station, performed the orientation, then the details were picked by placing reflector by the side of such features alongside where its fall along the cross section interval and observing with the instrument to the positioned reflector. Figure 2.3 below shows the diagram how details were fixed.

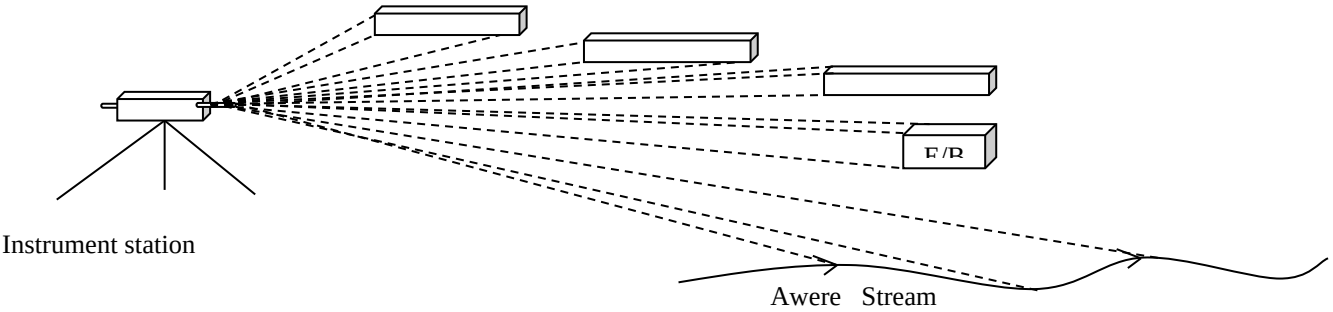


Figure* 2.*3: Diagram showing how details were fixed at site

2.7 Data Processing

Data processing involves post-processing of the downloaded data from the Tersus David GNSS GPS receiver using the GNSS software and South NTS-352R total station using its processing software. After successfully downloading 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 and cross-sections show its shape and orientation.

Table 2. 2 below shows some of the data observed at site.

Table 2.2: Showing some of data observed at site

STATION	EASTING (m)	NORTHING (m)	HEIGHT (m)
P1	655297.137	848444.922	266.429
P2	655299.083	848443.019	266.082
P3	655301.314	848441.120	266.023
P4	655288.117	848426.981	265.604
P5	655289.451	848425.458	265.468
P6	655291.836	848423.437	265.472
P7	655293.436	848436.456	266.447
P8	655297.430	848433.537	266.430

Source: Field observation

3.0 RESULTS AND DISCUSSION

The processed data were plotted using AutoCAD Civil 3D 2018 version and AutoCAD Land Dev. 2009 to generate the boundary, road alignment, longitudinal profile and cross-section.

3.1 Detail Plan

The essence of carried out a detail plan is to locate all features on land both natural and artificial structures. Geometric information is also shown on the detail plan making a true representation of the land mass for easy understanding of the route.

3.2 Longitudinal Profile

Longitudinal profile is a plan showing the altimetric differences of one trajectory or two concrete points, which demonstrate different slopes and distances. It provides a true picture of the terrain and decisions of where to cut or fill was determined. It characterizes average slopes and depths. It provides information such as the grade percent, tangent points, existing level and formation level using scale 1:5000.

3.3 Cross-Sections

Cross-section determine the elevations of a series of points lengthwise along a definite path. It is use to determine the elevation of points on a succession of lines running at right angles. The cross-section parameters were used to generate the area and hence, volumes of earthwork in cut and fill analysis using scale 1:500. Below are figure 3.1 and 3.2 show both horizontal alignment and longitudinal section and cross section.

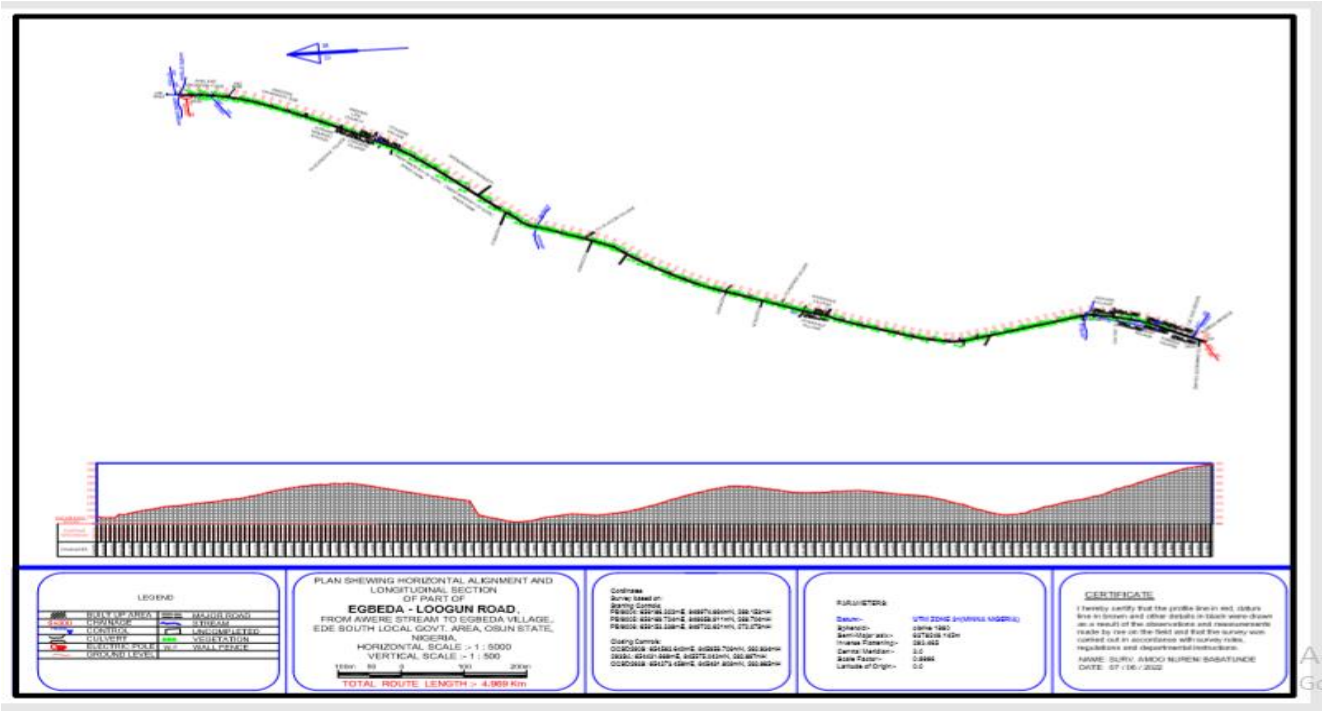


Figure 3.1: Diagram showing both horizontal alingment and longitudinal section

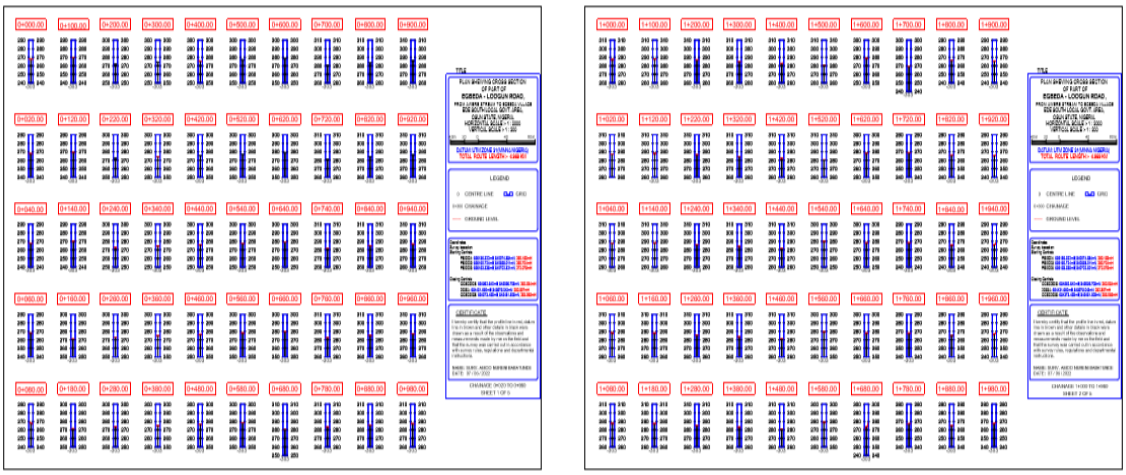


Figure 3.2: Diagram showing Cross section

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Route survey is very essential in the design of road. The route survey from Awere stream to Egbeda Loogun Village, Ede, Ede South Local Government Area was carried out in accordance with Survey rules, specifications and regulations. The accuracy of route survey goes a long way to determine the success of the computation and design of the road. The data acquired, cross-section plan and longitudinal plan of the exercise were achieved and the result can therefore be used for planning and setting out purpose during construction stage.

4.2 Recommendations

Below are the recommendations for this study:

i. The data acquired and plan will serve as a platform for re-designing the route in future.
ii. The concerned authority or bodies should use project like this as a source of revenue generation by contacting the people or tiers of government concerned to contract out the project.
iii. This will improve the relationship and communication between the villagers along this route.

REFERENCES

Alonso, V. (2015). Effect of Urbanization on Road. Pp 35-37.

Amoo, Nureni B., Akinola, Theophilus G., Odeyemi, Felix G., Bamidele, Wasiu B. & Adedotun, Nurudeen A. (2020). Route Survey of a Road Linking Aule to Ibule-Soro (Profile, Cross- qsection and Volume of Earthork in Akure, Ondo state. 12th International Conference on Sciences, Engineering and Environmental Technology (ICONSEET). The Federal Polytechnic Ede, Osun state.

Billiaminu, W. (2017). Route Survey at Olorun-nla Village, Atiba Local Government Area, Oyo State.

Cuhing, G.E., Titus, T.N., Soderblom, L.A. & Kirk R.L. (2009). THEMIS High-Resolution Digital Terrain: Topographic and Thermophysical Mapping of Gusev Crater, Mars. *Journal of Geographicaal Research E: Planets.*

Chandra A.M. (2008). Plane Surveying Second Edition, New Age International (P) Limited, Publishers. Pp. 2 Limited, New Delhi.

Claude, W., Matthias, K., Antonin, D., & Basil, S. (2020). Surveying and Analyzing Mode and Route Choices in Switzerland 2010- 2015.

Dauda, W. A., Bulama, A.A., & Lawal, R. (2019). Perimeter Survey of Level II Army Hospital Damaturu, Yobe State, Nigeria. International Journal of Environmental Design and Contruction Management, 10 (4) 12.

Duggal, S.K. (2006). Elementary Surveying, Tata McGraw-hill Publishing Company Limited, 4th Edition.

Garber, N.J. (2009). Traffic and Highway Engineering 4th Edition, University of Virginia, USA.

Ghilani, D. Charles & Paul, R. Wolf (2012). Elementary Surveying: An introduction to Geomatics. Publisher: Pearson Prentice Hall, 2012. 13th Edition Pp 117-128.

(https:Scribd.com, accessed Feb. 2022)

Mala, B. Gutti & Ani, A. Musa (2017). Setting out of Curves and Route Surveying for a Road, University of Maiduguri, Borno State, May, 2017.