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Digital terrain and detail mapping of part of ABU Phase 2, Kaduna state Nigeria

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Keywords

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Perimeter Survey
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ABSTRACT

The study is focused on the production of a detailed survey map of part of Ahmadu Bello University Zaria Phase II. The coordinate of each detail both natural and artificial features were obtained by total station and then plotted using ArcGIS software. The Perimeter of the study area was first measured and the total area of the study area was measured to be 1.0168ha which was measured from the temporary control points extended from ABU Barda 2553 and ABU Barda 2554. A total of three departments, a lecture hall, manhole, tress, high tension, electric pole and street light etc. were measured. And then finally the detail survey plan was produced for proper documentation and record keeping.

1. INTRODUCTION

A detail surveying is used to determine and locate the feature and improvement on a parcel of land. The word 'feature' here means both natural and man-made structures on a piece of land such as vegetation, types of soil, buildings, land utilities, fences and boundaries, roads, land marks and so on (Chandra, 2008). A detail survey is completed for design and assessment purposes and it's typically required for a council development application although it has many more uses (Fort, 1993).

They are generally carried out using survey equipment such as total stations and theodolites. The data is then carried to the office for analysis and preparation of detail maps known as Digital terrain models, which provide the details that have been collected in the form of a map. These maps are useful for engineers and architects who use them in their designs and plans. The survey should be carried out by a qualified land surveyor who may be assisted by a chainman (Wolf and Ghilani, 2012).

This project entails in providing detailed geospatial data and producing a detailed survey plan of the existing structures and other relating information about the land mass of the study area for proper documentation and further constructions in the study area.

2. METHOD

The flow chart of the procedures and steps taken to achieve the aim and objectives of this project is shown in figure 1.0 below.

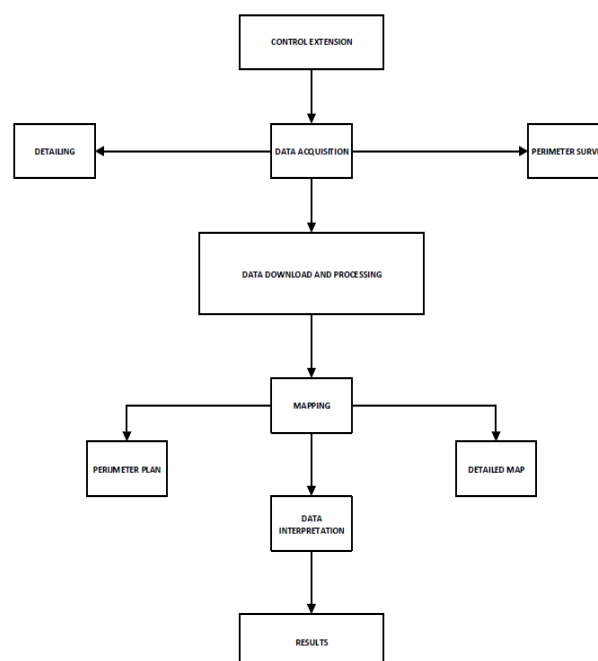


Figure 1. Flow chart diagram of the steps

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2.1. Reconnaissance

It is required for the commencement of any survey work to check the possible alternate route to follow while conducting a survey work. Two control points were found to be inter-visible, and then 5 five control points were extended to the project site. The values of the extended controls are tabulated in table 2.1 below. With a recce diagram of the study as seen in figure 2.1 below.

Table 2.1: Showing values of the extended control point.

S/N	Control point	Easting	Northing
1	ABU Barda 2553	351919.8630	1232564.3370
2	ABU Barda 2554	351792.8190	1232468.1010
3	CP1	351775.7975	1232420.6850
4	CP2	351700.3722	1232230.8660
5	CP3	351625.5602	1231975.2330
6	CP4	351656.2913	1231908.4740
7	CP5	351677.5439	1231555.7010

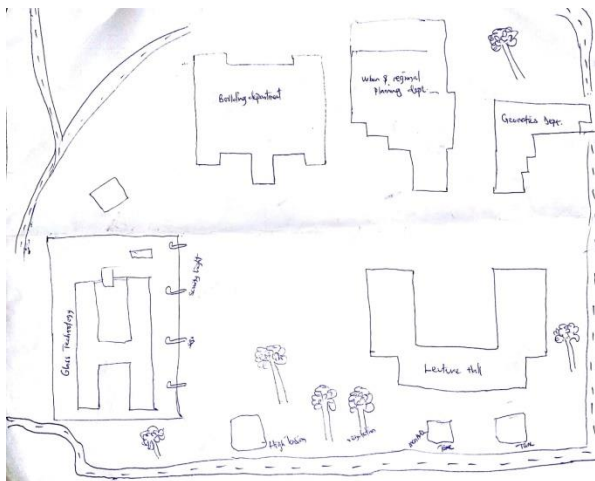


Figure 2.1: Recce diagram of the study area

2.2. Data acquisition

A perimeter survey of part of ABU Phase II was carried out using total station. The closing error is computed from the coordinates of the starting point and that of the last point.

The position of a point on the ground may be established if its bearing and distance from another known point is measured. This process may be extended to successive points and the resulting series of connecting lines of which their bearing and distance are known is called traverse. Hence a traverse is a means of providing horizontal control in which rectangular coordinates are determined from a combination of angle and distance measurements along lines joining adjacent stations. These are seen in table 2.2 and 2.3 respectively.

Table 2.2: Showing the coordinates of the perimeter survey

S/N	EASTING	NORTHING	POINT ID
	351919.8630	1232564.3370	Barda 2553
2	351792.8190	1232468.101	Barda 2554
4	351570.467	1231668.678	TP1
5	351655.534	1231654.453	TP2
6	351742.176	1231612.465	TP3
7	351835.824	1231606.95	TP4
8	351895.545	1231560.213	TP5
9	351889.49	1231473.456	TP6
10	351882.678	1231380.932	TP7
11	351836.378	1231352.111	TP8
12	351662.785	1231368.291	TP9
13	351472.891	1231393.991	TP10
14	351485.091	1231487.139	TP11
15	351515.902	1231594.092	TP12

Table 2.3: Traverse Computation

Stn From	Bearing	Distance	DN	DE	NORTHINGS	EASTINGS	Stn To
					1232564.337	351919.863	P1
P1	232 51 21	159.379	-96.236	-127.044	1232468.101	351792.819	P2
P2	195 32 36	829.77	-799.423	222.352	1231668.678	351570.467	P3
P3	099 29 35	86.248	-14.225	85.067	1231654.453	351655.534	P4
P4	115 51 19	96.28	-41.988	86.642	1231612.465	351742.176	P5
P5	093 22 13	93.81	-5.515	93.648	1231606.95	351835.824	P6
P6	128 02 46	75.835	-46.737	59.721	1231560.213	351895.545	P7
P7	183 59 32	86.968	-86.757	-6.055	1231473.456	351889.49	P8
P8	184 12 38	92.774	-92.524	-6.812	1231380.932	351882.678	P9
P9	238 05 54	54.538	-28.821	-46.3	1231352.111	351836.378	P10
P10	275 19 29	174.345	16.18	-173.593	1231368.291	351662.785	P11
P11	277 42 27	191.625	25.7	-189.894	1231393.991	351472.891	P12
P12	007 27 42	93.944	93.148	12.2	1231487.139	351485.091	P13
P13	016 04 14	111.303	106.953	30.811	1231594.092	351515.902	P14
P14	022 36 15	1050.98	970.245	403.961	1231564.337	351919.863	P1
Total							
Distance		3197.799					

Total Area= 10168m² or 1.0168ha

3. RESULTS

The plan of the perimeter survey which is surveyed and found the total area of the study area to be approximately 1.0168ha as seen in Figure 3.1 below.

The coordinates of each feature within the study area were measured and the features includes both natural and artificial features such as buildings, trees, manhole, road, footpath, manhole, high tension, electric pole etc.

The coordinates of each feature were then exported to ArcGIS and shape file of feature is created in ArcCatalog for plotting and then the features were then digitize to give a 2D shape.

The figure 3.2 below shows the detailing of features within the study area where all the features are shown including both natural and manmade features.

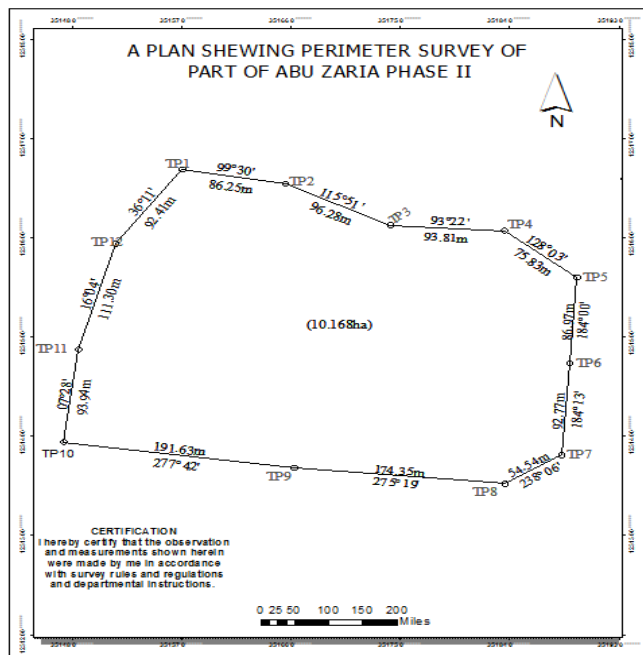


Figure 3.1: Plan showing perimeter survey of part of ABU phase II

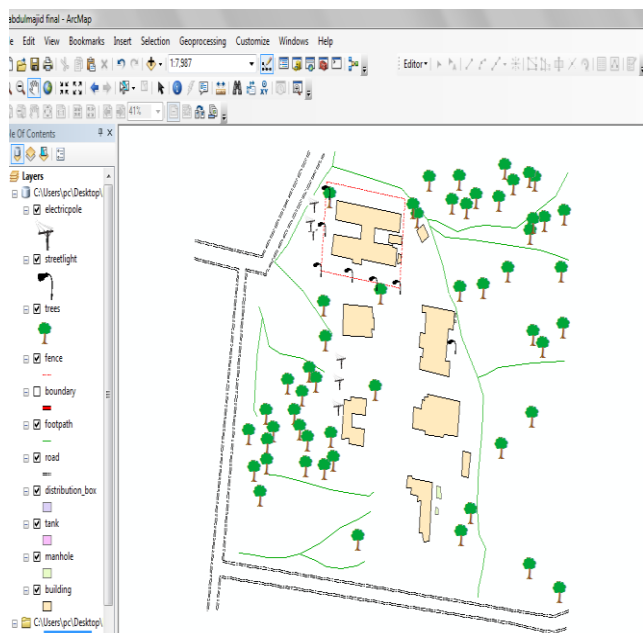


Figure 3.2: Showing detailing of the Study Area.

Below shows the final survey plan of the study area which shows the detailing of each feature which includes the road, trees, boundary (perimeter of the study area), water tank, street light, distribution box, electric pole, manhole and buildings.

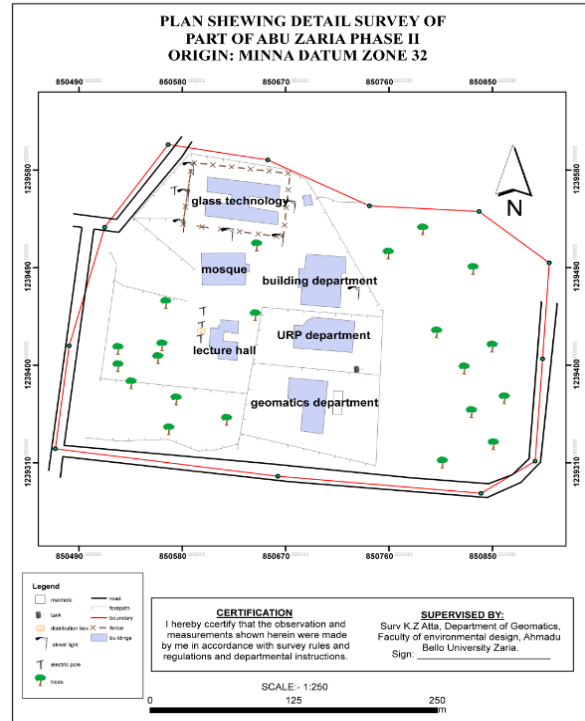


Figure 3.3: shows the final detail plan of part of ABU Phase II

4. DISCUSSION

A total of 1.0168ha was measured from the perimeter survey as the total area of the study area (ABU phase II) and also all the detail both natural and artificial features within study area were identified which includes a total of 4 departments which are; department of glass and silicate technology, department of Geomatics, department of urban and regional planning and Building department and also one lecture hall, a building close to glass technology, manhole, vegetation, road, security light and high tension were both identified and the coordinate of were measured as seen in figure 3.2. The final detail map of the study area was produced in accordance with survey rules and regulations as shown is figure 3.3

5. CONCLUSION

This project work which is sited at Ahmadu Bello University Zaria Phase II covers the perimeter survey total of area of 1.0168ha was measured and also the coordinate of all the details both natural and artificial features within study area were identified and measured where the details includes a total of four (4) departments i.e. department of glass and silicate technology, department of Geomatics, department of urban and regional planning and Building department and also one lecture hall, a building close to glass

technology, manhole, vegetation, road, security light and high tension were both identified and measured.

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