

An Appraisal of A Detailed Perimeter Survey of Igwuruta Flood Plain In Greater Portharcourt City of Rivers State

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Abstract

Perimeter survey is the establishment of perimeter points on the surface of the earth and taking bearings between lines or angles between the points, moreover measurement of distance to provide such points with defined coordinate values on a plane surface (X,Y) only. The aim of this work is to ascertain the dimension of Igwuruta flood plain in greater portharcourt city of rivers state. Below are the objectives to achieve the stated aim; to carve out an area of land. Selection of traverse station and marking of the selected station, demarcation of boundary points with bottle cork and nail, to establish boundary points of the study area, to determine the bearings and distances of survey boundaries, to generate the Easting and Northing coordinates of each points, ,to calculate the area of the portion of land, to fix reasonable details within the assigned site using any suitable method of detail fixing, to produce a digital plan of the site under study and to write a comprehensive report. The Perimeter and detail Survey was carried out at Igwuruta flood plain of greater portharcourt city of Rivers state. The survey was carried out in accordance with the third order specifications for a survey operation. The reconnaissance survey was properly carried out both in the office and on the field; this was carried out for proper planning of the survey operation by locating the controls needed for proper orientation, the instrument to be used, and selection of traverse stations and finally, drawing of a sketched diagram of the area under study. The data processing was done so as to reduce the data collected in the field and the necessary corrections were applied so as to obtain the corrected bearings and distances of points relative to one another.

The corrected values were reckoned with in every aspect of computation and also in plotting the plan. The final plan was produced showing the boundary of the traverse, the bearings and distances and also

the details found within the site. The plan was produced in digital format titled plan showing the perimeter and detail survey of the flood Igwuruta flood plain of greater portharcourt city of Rivers state. Finally, a comprehensive report was written on how the practical and field works were carried out.

Keywords: Perimeter, Flood, Boundary, Computation, Traverse, Station

1. Introduction

Perimeter survey is the establishment of perimeter points on the surface of the earth and taking bearings between lines or angles between the points, moreover measurement of distance to provide such points with defined coordinate values on a plane surface (X,Y) only. A perimeter survey cannot be accomplished without a traverse operation, and therefore a traverse is said to be a continuous framework of lines connecting a number of points, the length of lines and their angular relationship to each other being measured. That is, it involved the determination of the bearings and distances of series of connected straight lines from known coordinated points so as to obtain the coordinates of the newly established station. The lines are referred to as LEGS and the points as STATIONS.

There are two types of traverse namely: - closed traverse and open traverse.

CLOSED TRAVERSE: - when the framework forms a closed figure or a polygon (or when the traverse connects two stations whose positions are known), it is known as a closed traverse. Such traverse is easily checked as the survey starts and finishes at a fixed point or points.

OPEN TRAVERSE: - a traverse whose starting and finishing points do not coincide or are not both fixed or known points. This type of traverse is used to survey rivers, roads, railway routes etc. such a traverse can only be checked by sighting some reference points or a well-defined landmark.

Perimeter and detail survey is a type of survey that involves delineation of boundary points on the boundary lines of a property, measurement and location of features in their relative positions, so as to come out with a survey plan showing the details and boundary points properly demarcated.

With this kind of survey one can obtain a property inventory which would consists of the inventory of all the property lines together with a list of the reputed owners and the type and use of building thereon. These data will be plotted on maps as accurately as possible considering the best sources of information. Below are the reasons why this type of survey is required:

- i. It is a survey required from time-to-time so as to update the pre-existing plans and to effect changes where necessary.
- ii. If there is encroachment or a landed property has been encroached, it shows the discrepancy between the adjoining boundaries.
- iii. If the survey is properly carried out it prevents conflicts between land claimers.
- iv. Its end-product is useful for property identification.

The site used was Igwuruta flood plain of greater portharcourt city of Rivers state..

The aim of this work is to ascertain the dimension of Igwuruta flood plain in greater portharcourt city of rivers state.

Below are the objectives to achieve the stated aim:-

- i. To carve out an area of land.
- ii. Selection of traverse station and marking of the selected station.
- iii. Demarcation of boundary points with bottle cork and nail.
- iv. To establish boundary points of the study area
- v. To determine the bearings and distances of survey boundaries.
- vi. To generate the Easting and Northing coordinates of each points.
- vii. To calculate the area of the portion of land.
- viii. To fix reasonable details within the assigned site using any suitable method of detail fixing.
- ix. To produce a digital plan of the site under study.
- x. To write a comprehensive report.

The listed below exercises were carried out for the successful execution of the work:

- i. Reconnaissance.
- ii. Boundary demarcation of the study area.
- iii. Perimeter traversing.
- iv. Detailing.
- v. Field reductions and computations.
- vi. Plan production.
- vii. Report writing.

2. Literature Review

2.1.Reconnaissance

This is the general overview of the practical site so as to have the overall picture of the nature of the terrain and the features on the site and to make decisions on proper planning and execution of the study. It is an essential aspect of planning in surveying which involves preliminary examination of the site by physical inspection. It is an operation done prior to the actual survey exercise. This was carried out in two phases, the office planning and the field reconnaissance. In the office planning phase, crucial information about the study area was obtained which involved the gathering or collation of all the relevant information about the practical site and the choice of instrument to be used, the purpose and accuracy required of the survey exercise, the controls to be used whose coordinates were obtained from the GIS Lab unit of the office of the surveyor general, Rivers state. The data obtained i.e. the coordinates of the control pillars used for orientation are as shown in the table below:-

Tabel 1. Coordinates Of The Existing Ground Controls Used

STATION	NORTHING(m)	EASTING(m)
RVC 04	52213.864	27721.542

RVC 05	52654.183	27753.542
RVC 06	52427.041	27747.542

Source: - GIS Lab unit of the office of the surveyor General Rivers state

After which, the field reconnaissance was embarked upon, which involved visiting the site, locating the controls to be used for the orientation of the study. Before the boundary stations were selected, the practical site was first walked over in order to have a thorough view or examination of the ground so as to carry out the study more economically in terms of time and energy. The three controls used are: RVC 04, RVC 05, and RVC 06 which were found within the study area. For proper selection of the boundary stations, the following factors were taken into consideration: the positions and shape of the boundary, intervisibility of the consecutive stations selected, location of the stations only on firm ground and well secured places.

2.2.EQUIPMENT USED

Below is the comprehensive list of the equipment used for the successful execution of the practical study:-

- i. One Total Station and its tripod stand (SOKKIA)
- ii. One Reflector.
- iii. Nails and bottle corks.
- iv. One plumb bob.
- v. Field books and other stationeries.

3. Research Methode

This involves the methods and techniques used to carry out the study. The methods involved are: - reconnaissance survey which involved office and field reconnaissance survey, location of the control pillars and checks, selection and marking of stations, test of instrument, data acquisition which included:- perimeter traversing, detailing, data processing and information presentation.

3.1. Data Acquisition

This was embarked upon immediately after the decision-making stage i.e. the reconnaissance survey exercises. This entails all the activities carried out in the field with the aid of the Total Station and other equipment. Test of instrument was done to ascertain the working condition of the instruments, the reliability of the controls to be used for orientation were affirmed, and perimeter traversing was done to acquire the angular and linear measurements while detailing was carried out to fix all natural and artificial features within the site.

3.2. Test Of Instruments

Before the execution of any survey operation that requires the use of instruments, it is required to test the instruments to be used so as to ascertain if they are in good working condition or not. In the light of

this, the instruments collected from the department's instruments' store were all tested so as to ascertain if they are fit for the practical study or not.

3.3. Collimation Test

After checking the configuration of the total station and inputting the desired setting of the parameters under the menu, it was necessary to determine the calibration error of the total Station. These include the horizontal collimation and vertical index error. This was carried out so that the instrument can correct subsequent angle face observations, thereby reducing the possibility of collimation error. The following steps were taken in order to determine the calibration error.

1. The instrument was mounted on station marked A, and all temporary adjustments carried out on it (i.e. centering, levelling, focusing and elimination of parallax).
2. Calibration was selected under the menu structure to display Horizontal collimation and Vertical index error.
3. The cursor was scrolled to highlight Horizontal collimation and OK was pressed. The reflector at the other end of the line was aimed and bisected taking note of the point of intersection of the prism then measure button was pressed. Then, the message "change sight target" was displayed.
4. After that the instrument was transited, the reflector prism was aimed at again and the Measure button was clicked. The new and old values were displayed. The new value was accepted because the instrument has been in constant use from time to time.

Both the horizontal circle readings and vertical circle readings were read and recorded for the two faces.

Table 2. Horizontal Circle Readings And Vertical Circle Readings

STATION	SIGHT	FACE	H.C.R	DEDUCTION	V.C.R	SUM
	PEG B	L	280° 20' 40"		091° 36' 40"	
PEG A	PEG B	R	100° 20' 30"		268° 23' 10"	
				180° 00' 10"		359° 59' 50"

$$\text{HORIZONTAL COLLIMATION ERROR} = 180^\circ 00' 10'' - 180^\circ 00' 00''$$

$$= 00^\circ 00' 10''/2$$

$$= 00^\circ 00' 05''$$

$$\text{VERTICAL COLLIMATION ERROR} = 360^\circ 00' 00'' - 359^\circ 59' 50''$$

$$= 00^\circ 00' 10''/2$$

$$= 00^\circ 00' 05''$$

New Horizontal Collimation Error = 05"

New Vertical Collimation Error =

Old Horizontal Collimation Error = 06''
06''

Old Vertical Collimation Error =

According to the project specification, the minimal allowable limit = $30''/\sqrt{n}$ where n is the total number of station. The number of station is 1. Therefore, $30''/\sqrt{1} = 30''/1 = 30'' * 1 = 30''$.

After the observation and reduction, the error was within the minimal allowable limit, which is 30''. From the collimation error obtained it can be concluded that the instrument is in good working condition.

3.4. Control Check

This is a prerequisite exercise for any controls to be used for orientation, the controls has to be checked through series of observations on the control pillars so as to ascertain their stability and reliability both linearly and angularly. Moreover, the accuracy of any survey operation depends on the controls used for orientation. The Total Station was used in theodolite mode, i.e. to obtain bearings and distances in lieu of X and Y coordinates.

The instrument (Total station) was set up over a control station marked RVC 05 ensuring that the tripod stand of the instrument was firmly fixed to the ground in order to avoid instability of the instrument on the ground. The instrument was also firmly clamped to the tripod stand and every necessary temporary adjustment (centering, levelling and focusing) were properly carried out. Having done this, the instrument (total station) was turned towards the reflector prism held vertically over the control station marked RVC 04. The reflector at the backstation (RVC 04) was bisected on face left. The horizontal circle reading obtained was recorded as L1. The instrument was then turned towards another control station RVC 06 on the same face. The readings were read and recorded as L2. The instrument was thereafter transited and the control station marked RVC 06 was focused and bisected at face right. The readings obtained were recorded as R2. Finally, the instrument was turned to the control station marked RVC 04 at the same face, bisecting the target on the station and readings obtained were recorded as R1. Distances were measured from RVC 05 to RVC 04 and from RVC 05 to RVC 06 and readings were recorded in the field book. The results of the observations are as shown below:-

Table. 3 Controls Check Observations

STATION	FACE	SIGHT	HORIZONTAL	VERTICAL	DISTANCE
	L1	RVC 04	54° 05' 30''		
RVC 05	L2	RVC 06	250° 15' 20''	90° 05' 30''	29.622m
	R2	RVC 06	70° 15' 10''	269° 54' 40''	
	R1	RVC 04	234° 06' 00''		68.782m

Table 4. Deduction Of The Control Check Observed Angle

STATION	FACE	SIGHT	HORIZONT AL	DEDUCTI ON	MEAN	DISTAN CE
	L1	RVC 04	128° 20' 10''			
RVC 05	L2	RVC 06	250° 15' 20''	121° 55' 10''		114.925m
	R2	RVC 06	70° 15' 10''	121° 55' 10''		
	R1	RVC 04	308° 20' 00''		121° 55' 10''	144.103m

Table 5. Back Computation Of The Control Used

STN FROM	BEARING	DIST (m)	$\Delta N(m)$)	$\Delta E(m)$	NORTH ING (m)	EASTIN G (m)	STN TO
					720583.89 1	543891.54 2	RVC 04
RVC 04	72° 19' 59''	144.0 99	43.73 1	137.30 3	720627.62 2	544028.84 5	RVC 05
RVC 05	130° 24' 42''	114.9 20	- 74.50 0	87.501	720553.12 2	544116.34 6	RVC 06

The observed angle at RVC 05 (between RVC 04 and RVC 06) is 196° 09' 30''

- Bearing (a) from RVC 05 to RVC 06 = 130° 24' 42''
- Bearing (b) from RVC 05 to RVC 04 = 252° 19' 59''

Computed angle (θ) = bearing (b) – bearing (a)

Computed angle (θ) = 252° 19' 59'' - 130° 24' 42''

Computed angle (θ) = 121° 55' 17''

Angular discrepancy = computed angle – observed angle

Angular discrepancy = 121° 55' 17'' - 121° 55' 10'' = 00° 00' 07''

Measured distance from RVC 05 to RVC E 04 = 144.103m

Computed distance from RVC 05 to RVC 04 = 144.099m

Linear discrepancy = measured distance – computed distance

Linear discrepancy = (144.103 - 144.099) m = 0.004m

Measured distance from RVC 05 to RVC 06 = 114.925m

Computed distance from RVC 05 to RVC 06 = 114.920m

Linear discrepancy = measured distance – computed distance

Linear discrepancy = (114.925 - 114.920) m = 0.005m

With the deductions and comparison done above, it has been ascertained that the control pillars are in their right positions both linearly and angularly and can be therefore be used for the practical study.

3.5. Field Observations

The field operations commenced as the following operations were carried out.

Traversing

Perimeter Survey By Traversing (Using Total Station)

The type of traverse adopted for this study was closed traverse. It involves both angular and linear measurements alongside detailing.

Angular Measurement

After the control check has been carried out properly, the instrument was set up over a station marked RVC 06 and all the necessary temporary adjustments were carried out on it. A reflector was held vertically over the backstation and the forestation which the former was RVC 05 and the latter being PEG A.

Having switched on the Total station, and setting the parameters, the reflector at RVC 05 which was the backstation was focused and bisected; the bearings were read and recorded in the fieldbook. The telescope of the instrument was directed towards the forestation (PEG A) the target on the station was bisected and the readings were also read and recorded.

Then the instrument was moved to the next instrument station marked PEG A, then necessary temporary adjustment were carried out on it and the necessary parameters such as the station coordinates, the back station coordinates were all inputted, the reflector prism held previously over the station marked RVC 05 was moved to the station marked PEG B. The same procedure was repeated in terms of observation and the data acquired. Thereafter, the instrument was moved to stations marked; PEG B, PEG C, until the last station, PEG N was reached and the same procedure was repeated then the traverse was closed on the control station marked RVC 06.

Linear Measurement

The linear measurement technique adopted was done using the EDM component of the Total station. The linear measurement was done alongside the angular observation had been made. The linear distance measurement commenced between the traverse lines of the station marked RVC 06 and PEG A. The same procedure was repeated at every instrument station until the last traverse line was measured. Hence, all the measurements recorded and the necessary corrections was done within the EDM component of the Total station to obtain the true horizontal distance.

Detailing

This stage involved fixing of the natural and artificial features that existed on ground into record in order to give the survey more value. This was carried-out using the total station and as such necessary details within the site were relatively fixed, the coordinate of each details were duly measured and recorded. The same procedure was repeated for all other details till the last detail was fixed.

Data Processing

Here, the all the data obtained from the field observations and measurements were duly processed. The processing done were: bearing reduction, forward computation, back computation, area computation and linear accuracy. Below are brief explanation on how the above mentioned processing were carried out and their results.

Computations

This involved the reduction of bearings, forward computation, back computation and area computation. Below is a brief explanation of each processes:

Reduction Of Bearings

The forward bearing of every lines were deducted from the observed angle and the initial bearing of the control used. The Back computation of the control used was done to get its bearing. The back bearing of that line which was the initial bearing was added to the observed angle to give forward bearing i.e. Back bearing + observed angle = forward bearing. If the sum is greater than 360^0 , then 360^0 was subtracted from the result. To obtain the back bearing of the next line; if the forward bearing is less than 180^0 , then 180^0 was added to it, else 180^0 was deducted from it.

The last deduced bearing was compared with the initial bearing of the line which should be the same. But this resulted into a discrepancy of $00^000'25''$ which was the obtained angular misclosure. This misclosure obtained was distributed cumulatively to the observed bearings so as to obtain the corrected bearings.

The formula used was:-
$$\frac{\text{misclosure} \times \text{individual no of station}}{\text{Total no of stations}}$$

Forward Computation

The forward computation was done using a traverse computation sheet attached to this report and the coordinate adjustment was carried out using TRANSIT RULE of adjustment. In this process the final coordinates of every point were generated using corrected forward bearing and the true horizontal distances. The formulae used are:

$$\Delta N = L \cos \theta$$

$$\Delta E = L \sin \theta$$

Where ΔN = latitude, ΔE = departure, L = Horizontal distance and θ = corrected bearing

To obtain the coordinates of PEG A (E_{PEGA} , N_{PEGA}) from a known point RVC 06, (N_{RVC06} , $E_{\text{RVC 06}}$), the following formulas were used:-

$$N_{\text{PEGA}} = N_{\text{RVC 06}} \pm \Delta N_{\text{PEGA RVC 06}}$$

$$E_{\text{PEGA}} = E_{\text{RVC 06}} \pm \Delta E_{\text{PEGA RVC 06}}$$

The same procedure was consequently used to obtain the coordinates of other points relative to the previous one. The coordinates so obtained were uncorrected coordinates. So they were corrected using TRANSIT rule of adjustment to obtain the final corrected coordinates. However, before corrections were applied to the uncorrected coordinates, the linear accuracy was computed to ascertain whether it met with the expected accuracy of a third order job.

Linear Accuracy

The linear accuracy was calculated using the formulae:-

$$\frac{1}{\sqrt{(\Delta N)^2 + (\Delta E)^2}} \sum L$$

Where;

ΔN = misclosure in Northing coordinates.

ΔE = misclosure in Easting coordinates.

$\sum L$ = Total distance.

Therefore, the values for the above parameters were extracted from the forward computation sheet as written below:

$\Delta N = +0.013$, $\Delta E = +0.031$, $\Delta N^2 = 0.000169$, $\Delta E^2 = 0.000961$, $\Delta N^2 + \Delta E^2 = 0.00113$, Total distance = 848.170m,

$$\sqrt{\Delta N^2 + \Delta E^2} = 0.03361547263$$

The linear accuracy was calculated as below:

$$\begin{aligned} & \frac{1}{\sqrt{(0.013)^2 + (0.031)^2}} \frac{1}{848.170} \\ &= \frac{1}{\sqrt{0.00113}} \frac{1}{848.170} \\ &= \frac{1}{0.03361547263} \end{aligned}$$

$$\begin{aligned} & \frac{848.170}{1} \\ & \hline & 25,231.53577 \\ & = 1: 25,231.53577 \approx 1: 25,000 \\ & \text{Expected linear accuracy} = 1:5,000 \\ & \text{Obtained linear accuracy} = 1:25,000 \end{aligned}$$

Therefore, the obtained linear accuracy confirmed that the accuracy obtained was within the allowable limit.

Coordinate Adjustment Using Transit Rule Of Adjustment

Correction to each station's Northing coordinates was calculated using the formulae:-

$$= \frac{\text{Total Northing Misclosure}}{\text{Total Arithmetic sum of latitude}} \times \text{Sum of latitude of the line.}$$

Final coordinates of Northing = uncorrected Northing coordinate + correction per station.

Correction to each station's Easting coordinates was calculated using the formulae:-

$$= \frac{\text{Total Easting Misclosure}}{\text{Total Arithmetic sum of departure}} \times \text{Sum of departure of the line.}$$

Final coordinates of Easting = uncorrected Easting coordinate + correction per station. Attached to this report is the forward computation sheet.

Back Computation

The corrected coordinates of the stations were used to obtain the final latitudes, final departures, distances and bearings. Latitudes and departures were obtained by subtracting the preceding corrected coordinates from the next one and then taking into consideration was their signs. Their latitude (ΔN) and departure (ΔE) were used to compute their final bearings and distances from these formulae:-

$$\Delta N = N_2 - N_1 \quad (N_1 = \text{Initial Northing while } N_2 = \text{Next Northing})$$

$$\Delta E = E_2 - E_1 \quad (\text{Difference in initial and next easting})$$

$$\text{Bearing} = \tan^{-1}(\Delta E / \Delta N)$$

$$\Delta N = \text{change in Northing}$$

$$\Delta E = \text{change in Easting}$$

$$\text{Brg} = \text{Bearing} = \theta$$

$$N = \text{Northing coordinate of a point}$$

$$E = \text{Easting coordinate of a point}$$

It should be noted that the latitude and departure of each line dictates the quadrants and the actual bearing of the line. For instance:

Where: ΔN was positive and ΔE was positive, then the bearing was taken as θ

ΔN was negative and ΔE was positive, then the bearing was taken as $180^\circ + \theta$

ΔN was negative and ΔE was negative, then the bearing was taken as $180^\circ + \theta$

ΔN was positive and ΔE was negative, then the bearing was taken as $360^\circ + \theta$

The distance of each traverse leg was computed using the formulae:-

$$\text{Distance} = \sqrt{(\Delta N)^2 + (\Delta E)^2}$$

Attached to this report is the back computation sheet.

Area Computation

The area computation was done using double latitude method and checked using coordinate method.

Table 6. Using Double Latitude Method

$\Delta N(m)$	$\Delta E(m)$	PRODUCT (+VE)	PRODUCT (-VE)
-72.427	× 23.522		1703.627894
-72.427			
-144.854			
-62.125			
-206.979	× 24.205		5009.926695
-62.125			
-269.104			
-15.712			
-284.816	× 35.152		10011.85203
-15.712			
-300.528			
3.175			
-297.353	× 66.273		19706.47537
3.175			
-294.178			
26.948			
-267.23	× 54.009		14432.82507
26.948			
-240.282			
6.268			
-234.014	× 22.480		5260.63472
6.268			
-227.746			

59.547			
-168.199	× -13.976	2350.749224	
59.547			
-108.652			
14.472			
-94.180	× 10.230		963.4614
14.472			
-79.708			
21.313			
-58.395	× 2.779		162.279705
21.313			
-37.082			
52.056			
14.974	× -17.063		255.501362
52.056			
67.030			
33.931			
100.961	× -14.566		1470.597926
33.931			
134.892			
3.705			
138.597	× -40.646		5633.413662
3.705			
142.302			
-15.301			
127.001	× -45.258		5747.811258
-15.301			
111.700			
-55.850			
0.000	TOTAL	2350.749	76342.232

$$2A = 76342.232 - 2350.749$$

$$A = \frac{73991.500}{2}$$

$$A = 36995.700\text{m}^2$$

Area in Hectares was calculated thus:-

$$A = \frac{36995.700}{10000}$$

$$A = 3.6995700 \text{ hectares}$$

$$A = 3.700 \text{ hectares}$$

Table 7. Using Co-Ordinate Method (As A Check)

NORTHINGS(m)	EASTINGS(m)	L. H. S	R. H. S
720523.539	544069.895		391975760858.473
720451.112	544093.417	392032114363.443	391958905505.999
720388.987	544117.622	392010145828.696	391967793345.352
720373.275	544152.774	392001665635.100	391994843591.772
720376.450	544219.047	392040857204.769	392057250715.122
720403.398	544273.056	392081491911.931	392099570485.759
720409.666	544295.536	392112353650.631	392148176461.333
720469.213	544281.560	392105696849.559	392145984026.349
720483.685	544291.790	392145477583.661	392164955065.366
720504.998	544294.569	392155356798.607	392195291146.840
720557.054	544277.506	392154663371.975	392201464161.883
720590.985	544262.940	392172500647.779	392192984527.789
720594.690	544222.294	392161678892.420	392155368090.698
720579.389	544177.036	392131082561.539	392092363821.250
720523.539	544069.895	392045552512.394	
		5489350637812.500	5489350711803.990

$$\text{AREA} = \sum \text{L.H.S} - \sum \text{R.H.S}/2$$

$$\text{AREA} = 5489350711803.990 - 5489350637812.500$$

$$\text{AREA} = 73991.481$$

$$A = 73991.481/2$$

$$A = 36995.700\text{m}^2$$

Area in Hectares was calculated thus:-

$$A = \frac{36995.700}{10000}$$

$$10000$$

$$A = 3.6995700 \text{ hectares}$$

$$A = 3.700 \text{ hectares}$$

Table 8. Result Analysis

S/N	OPERATION	FORMULA	RESULT EXPECTED	RESULT OBTAINED	REMARKS
1.	Collimation test	Horizontal collimation	00° 00' 30"	00° 00' 05"	ACCEPTABLE
2.		Vertical collimation	00° 00' 30"	00° 00' 05"	ACCEPTABLE
3.	Angular accuracy	$30''\sqrt{n}$	00° 02' 00"	00°00'25"	ACCEPTABLE
4.	Linear Accuracy	$\frac{1}{\sqrt{(\Delta N^2 + \Delta E^2)}}$ Total Distance	1: 5,000	1:25,000	ACCEPTABLE
5.	Area	Double latitude and checked using coordinate method	Igwuruta flood plain of greater portharcourt city of Rivers state.	3.700 hectares	ACCEPTABLE

4. Result and Discussion

Data presentation

The end product of this work was the graphical representation of the processed field data of the surveyed area which was drawn to a suitable scale using the AUTOCAD Land Companion Enabled Map 2009 software. The digital graphical representation of the study area was done as stipulated to survey rules, regulations and departmental instructions, i.e. the boundary lines in red, the pegs in blue, and all other details in black. Scale 1:2000 was used to plot the plan, while the key plan showing the connections was also plotted with a scale 1:2000 on an A3 paper size.

Summary

The Perimeter and detail Survey was carried out at Igwuruta flood plain of greater portharcourt city of Rivers state..

The survey was carried out in accordance with the third order specifications for a survey operation. The reconnaissance survey was properly carried out both in the office and on the field; this was carried out for proper planning of the survey operation by locating the controls needed for proper orientation, the instrument to be used, and selection of traverse stations and finally, drawing of a sketched diagram of the area under study.

The data processing was done so as to reduce the data collected in the field and the necessary corrections were applied so as to obtain the corrected bearings and distances of points relative to one another.

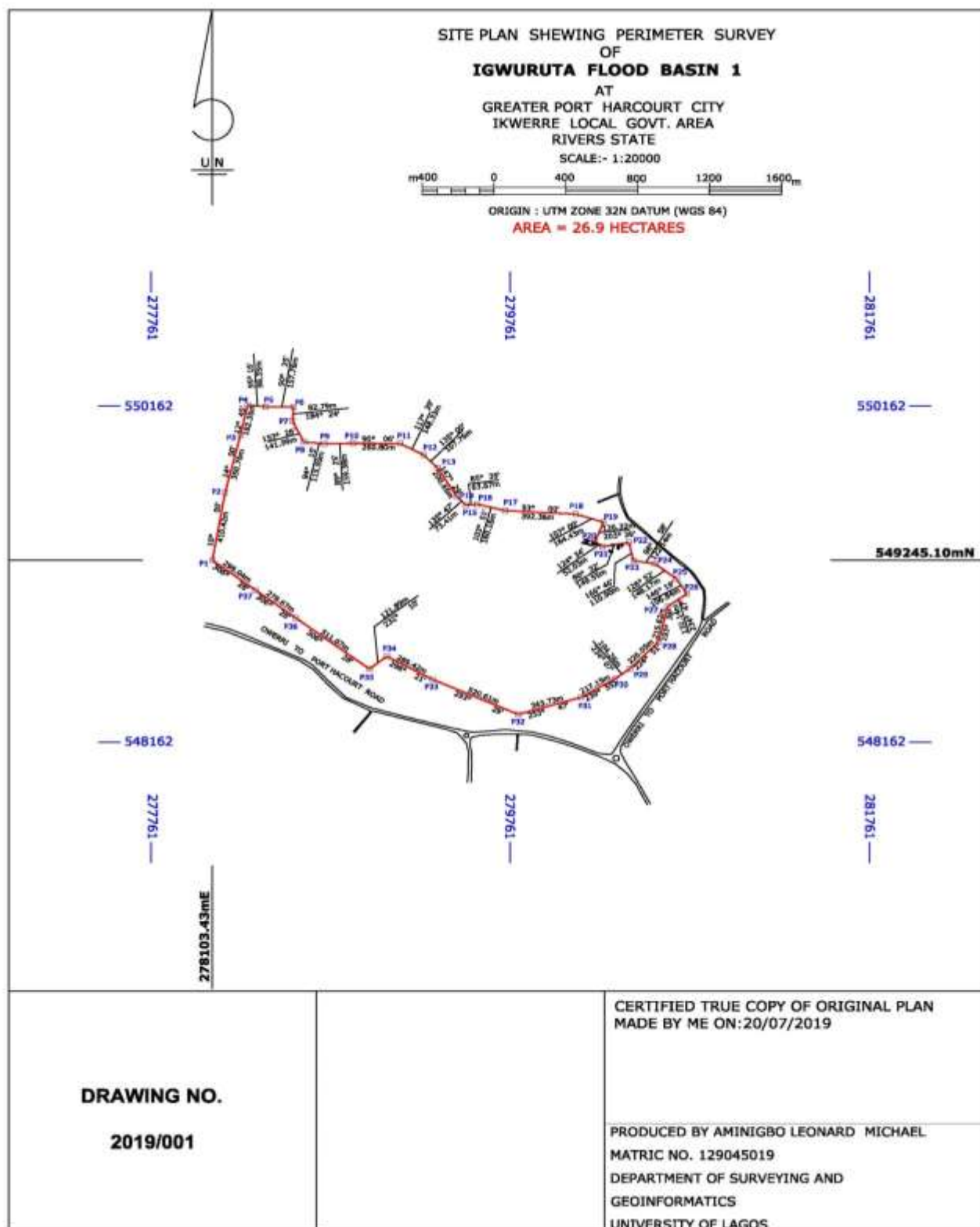
The corrected values were reckoned with in every aspect of computation and also in plotting the plan. The final plan was produced showing the boundary of the traverse, the bearings and distances and also the details found within the site.

The plan was produced in digital format titled plan showing the perimeter and detail survey of the flood Igwuruta flood plain of greater portharcourt city of Rivers state.

Finally, a comprehensive report was written on how the field works were carried out.

Problems Encountered

The major challenges faced during the execution of this study was the delay in the release of instrument due to its insufficiency, this contributed to the delay in completing the fieldwork. Furthermore, on getting to the site, some selected points were not intervisible due to some obstacles; hence the some critical points were selected so as to carry out the study effectively.



5. Conclusion

The comparison of the expected accuracy and the obtained results analyzed above, conformed to the required accuracy of a third order survey job, hence, the aims and objectives were achieved.

Having carried out the perimeter and detail survey of the study area, the new features as well as the old ones have been properly detailed. Finally, the end-product of the survey operation being a perimeter and detail survey plan was produced in digital form.

Consequently, the result of this practical study could be used in creating a functional database of the various land use types and also the plan produced could be used as base plan which can be referenced for future studies.

From the problems encountered, experience and knowledge acquired during the execution of the work, the followings are recommended:

- i. Application of computer programming should be fully implemented so as to enable data processing exercise more efficiently and faster.
- ii. Surveyors should be well saddled in the use of softwares like AUTOCAD, MATLAB, ARCGIS and the likes, so as to ease the problem of data processing, analysis and presentation.
- iii. The use of digital instruments such as Differential G.P.S, Digital Level, and E.D.M. should be encouraged
- iv. Property inventory could be created which could be referenced to by the school, any individual or the government for planning.

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