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Evaluating Geodetic Control Network of Awka Capital Territory of Anambra State for Sustainable Development

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INTRODUCTION

- Survey activities are regarded as the “bedrock of every meaningful and sustainable development”.
- Sustainable development is the development that meets the need of the present without compromising the ability of future generations to meet their own needs.
- The sustainability of any project or environment is dependent on the quality and accuracy of the survey operations. Survey operations must be carried out with utmost accuracy as the first step to achieving sustainable development.

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- Anambra state is one of the South Eastern states of Nigeria. The state lies between coordinates 6°35"E - 7°30"E and 5°40"N – 6°48N. It was created on 27 August 1991 and has an approximate area of 4,844 km² (1,870.3 sq mi).
- In the wisdom of the State Administration at inception, the State Capital Territory 47 GPS Controls were established.
- This was done in order:
 - to unify the surveys,
 - To ensure proper planning and development of the new Capital territory and
 - to ensure orderliness that will propel sustainable development territory.

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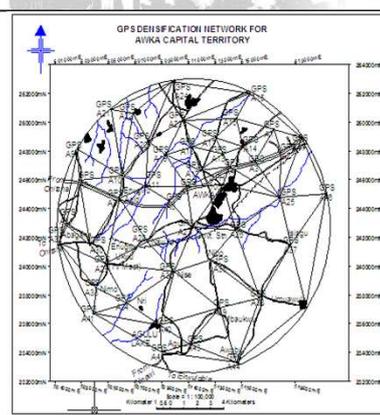
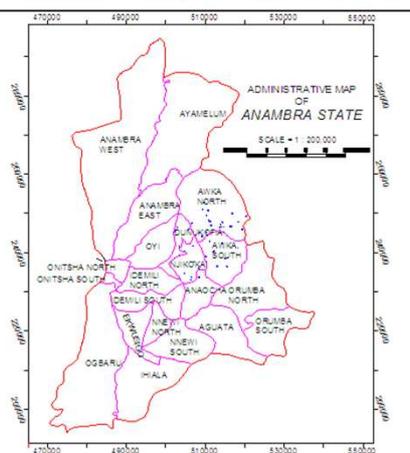
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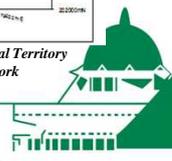




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NEED FOR THE EVALUATION OF THE NETWORK

- The principle of “working from whole to part” indicates that no survey operation should be left hanging.
- Also, the principle of error propagation shows that if the field measurement have errors, then it is inevitable that the quantities computed from them will have errors (Mikhail and Gracie, 1981).
- This, therefore, makes it very necessary for the survey control networks to be evaluated from time to time,

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EVALUATION OF THE CONTROLS

- In order to physically evaluate the network, the control points were visited to ascertain the present physical conditions of the controls.
- in 2008, only twelve (12) of the controls were still in place. These controls were revisited to analyze their present condition.
- Typical among the visited controls were the eight (8) controls along the Enugu-Onitsha Expressway and out of the three controls confirmed to be existing in 2008, none of the controls was found to be existing now.

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S/N	CONTROL POINT	STATUS (2008)	PRESENT STATUS (2012)	REMARK
1.	GPS A1	On ground though shifted	Uprooted and displaced completely	Needs to be re-established
2.	GPS A2	Not on ground	Not on ground	Needs to be re-established
3.	GPS A3	Not on ground	Uprooted and displaced Completely	Replaced by another control from another Network
4.	GPS A4	Not on ground	Not on ground	Needs to be re-established
5.	GPS A5	Not on ground	Not on ground	Needs to be re-established
6.	GPS A6	Not on ground	Not on ground	Needs to be re-established
7.	GPS A7	Not on ground	Not on ground	Needs to be re-established
8.	GPS A8	Not on ground	Not on ground	Needs to be re-established
9.	GPS A28	Fixed	On ground but Defaced	Needs to be Readjusted and Recapped
10.	GPS A35	Fixed	On ground but shifted	Needs to be re-established
11.	GPS A15	Fixed	Fixed (as at the time of submission of this Paper)	Needs to be re-established (has been covered with tar)
12.	GPS A16	Uprooted and Displaced Completely	Uprooted and Displaced Completely	Needs to be re-established.
13.	GPS A27	Fixed	Fixed	Needs to be readjusted
14.	GPS A9	Fixed	Fixed	Needs to be readjusted
15.	GPS A29	Fixed	Fixed	Needs to be readjusted



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Fig. 3a: The Status of GPS A16 (Uprooted)



Fig. 3b: The Status of GPS A29 (Unprotected)

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EFFECT OF THE STATE OF THE NETWORK

- The shoddy state of the Anambra State Capital Territory Control Network has a major effect on the quality of surveys in the state.
- Owing to the costly nature of the Differential GPS, the Surveyors in the State resorted to the use of the Hand-Held GPS Receivers, most times not minding the attendant errors.
- More technically, some of the surveyors and survey assistants do not understand the dynamism of the ellipsoidal datums as configured in the GPS receiver.

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- Nigeria uses the Minna datum which is based on the Clarke 1880 ellipsoid.
- To use the GPS to acquire positional data in Cartesian system requires some configuration and the decimal part of the coordinates are not displayed.
- Also, an on-going research is trying to ascertain the accuracy level of coordinate transformation done by the GPS receivers as against that of some software and programs.
- International Association of Oil and Gas Producers (OGP) (2008), indicated that although the WGS 84 and ED 50 coordinates of the Eiffel Tower share the exact same latitude and longitude values, they do not represent the same physical point on the earth's surface (the yellow dot representing the correct location).

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Fig. 4: Difference in Position with Respect to Datum.
Source: OGP (2008)

- Comparing the difference between the WGS 84 coordinate and the Clarke 1880 coordinates, using the same coordinate values, it was discovered that their physical locations differ by 55meters on the average.

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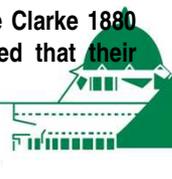


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- Because this control network established for the planning of the SCT is in a devastated condition;
 - Surveys carried out are not connected to approved national origin or connected to physically non-existent controls
 - individual and families demarcate and mortgage landed properties without regards to approved schemes, and
 - buildings are erected with clear disregard to any development control regulations.
- Hence, Slums are being created and therefore giving no sustainable future to the capital territory.

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RECOMMENDATION

- All stakeholders should initiate effort to re-establish the controls as this will improve the quality of survey in the State.
- Controls in vulnerable positions, should be repositioned to prevent destruction in future.
- A law should be enacted by the State Legislature, to protect the indiscriminate destruction of geodetic controls and the re-establishment of the controls when accidentally destroyed.
- The public should continuously be sensitized on the importance of the geodetic controls and the dangers of their destruction.

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- The government should strongly cause the Awka Capital Territory Development Authority (ACTDA) to take-off for the orderliness, consistent and sustainable development of the capital territory
- The government should urgently implement the master plan for Awka Capital Territory if any, and stop developing slums and defeating all principles of sustainable development.

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