

### **3-D CONTROL BASELINE FOR DEFORMATION STUDIES AT THE IKPOBA DAM**

**EHIOROBO O. JACOB**

Department of Civil Engineering faculty of Engineering

University of Benin, Benin City

E-mail – [jacehi@uniben.edu](mailto:jacehi@uniben.edu)

Phone: (+234) 08032217426, 08023373844

#### **ABSTRACT**

*A network consisting of Braced quadrilateral and central figures with some overlapping diagonals was designed at the Ikpoba Dam site. From this network a braced quadrilateral was chosen as horizontal control baselines while the above quadrilateral together with an adjoining one were chosen as vertical control baseline.*

*From prior estimates, standard error of angular and linear measurement was 1 and 2.5mm respectively. The number of rounds for angular measurement was calculated to be 15 and for linear measurements 8 in both directions. From the above results, the WILD T2 theodolite was chosen for angular measurements while the WILD DISTOMAT DI2000 was used for linear measurements.*

*The zeiss Ni 002 level was used for leveling the two loops in both directions.*

*A rigorous least square adjustment was thereafter carried out for both horizontal and vertical control baselines. The standard errors of angular and linear measurements after adjustments were  $\pm 0.05$  and 0.22mm respectively, while the standard error of the mean were  $\pm 0.02$  and 0.07mm respectively. The standard error for leveling in both directions was  $\pm 6$ mm while the standard error of mean was  $\pm 3$ mm.*

*Using the  $\chi^2$  (chi – square) distribution for our analysis, we found that at 95% confidence, interval  $0.01 \leq \sigma \leq 0.03$  and for linear measurement  $0.05\text{mm} \leq \sigma \leq 0.13\text{mm}$ .*

*From the above we can conclude with 95% certainty that the quality of our work is very high. The result for leveling also shows that quality of results obtained corresponds to that given by 1 order leveling.*

*Thus we can conclude that with good results and choice of suitable equipment and methods, we can get very good results even when we are constrained by Topography.*

Key words: Network, Angular and Linear measurement, Standard error

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