COMPARATIVE STUDY IN ADJUSTMENT OF TRAVERSE

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Abstract
This paper presents a comparative study between the coordinates that result by measuring with a Total Station, precision 5^{cc}, and the coordinates obtained by using classical calculation.
Measurements were made in the compilation of cadastral documentation necessary for obtaining provisional registration of a number of land ownership in the Land Registry.
The results of measurements and errors were within the tolerances allowed by regulation.

Keywords: network, precision, compensation, tolerance.

1. INTRODUCTION

The study of topographic measurements errors, by knowing the sources that generate them and their effect on the results, by knowing the compensation of accidental errors and exclusion of the identified systemic errors, after choosing an efficient work method and assuring the required precision of the equipment, generating a maximum working efficiency.

2. MATERIAL AND METHOD

In order to achieve the target of the job, it is chosen as a measurement method, a method which consist in measuring the horizontal angles between the alignments that compose the network, the lengths of the alignments, details to the radial points (horizontal and vertical angles, lengths).
During the measurements, a SOUTH NTS-350 total station was used, which is produced by South Surveying, and which uses a dual optical fiber system of sending and receiving the signal, having a better quality and performance. In the measurement of the distances, the workstation used a 3mm+2ppm precision.
In order to make the job, it was necessary to consider the building as a emplacement on the work site, identify the network support point and picketing of the network stations.

Figure 1. Zone positioning ortofotoplan

A supported network was measured (figure nr. 2), which is composed of 9 stations, starting in CSA 35 while pointing Church Retevoiesti, and closing on CSA 36 while pointing Vf. Goila. From the 784, 785 stations, there were measured the detail points in order to obtain the building limits. The distances between the network stations, was measured with a 30 meters roulette, totaling 1766.6 meters.

The surface and the distances between the boundary points were calculated by using the coordinates of the points. The measurements were verified in the field book, by comparing the coordinates of the pointed points from the station and the distances that were obtained out of coordinates to the distances obtained by measuring directly with the roulette.

For the achievement of the proposed study , after measuring with Total Station South, the obtained data on measuring the basic geometry elements: horizontal angles, vertical angles, and sloping distances, have been singly register in a field book; Classical compensation was made using these dates.

In the same time, the Total Station had register and calculates the reduced distance and level difference. The measurements were made in horizon tour.

The geometric elements were register with the Total station and after that the microprocessor made on the base of the incorporated program, a series of topo-geodetic application.

The Total Station South's soft is specilsed in topography and cadastre. Also, it has a good communication with the PC's terminals. The obtained data on the field were processed and organized in ASCII files (American Standard Code for Information Interchange), and the graphic side in DXF (Drawing exchange format) files; Processing was made with a CAD program.

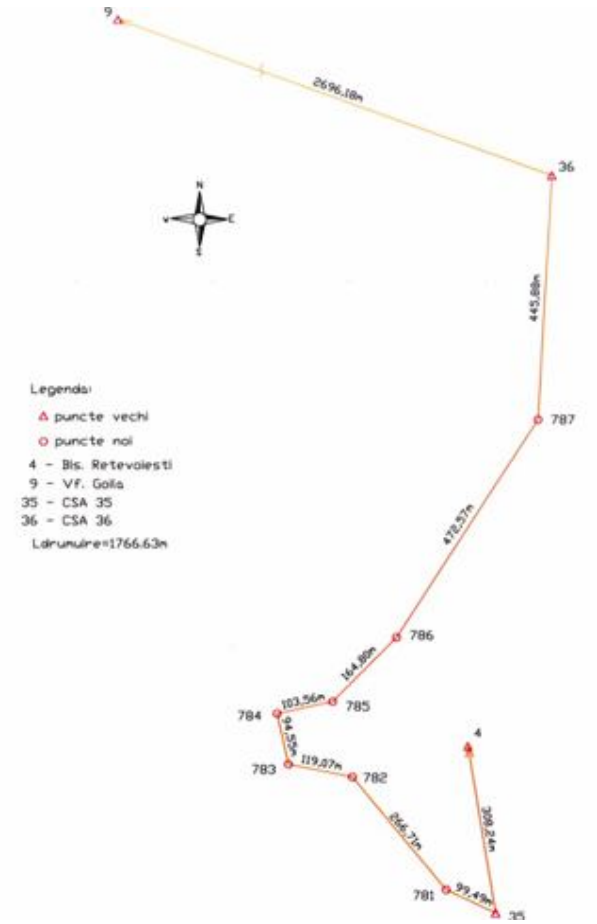

Figure 2. Supported network points sketch

By compensating the orientations, the route's geometry can change. The imprecise angles and orientations of the support points, influence the entire compensation.

3. RESULTS AND DISCUSSIONS

Concerning the definitivation of points position, the precision with Total Station (precision of the angles and distances) increased. On the field there were instruments with great performance in measuring angles, with precisions of de ± 1^{cc}; ± $0{,}2^{cc}$. For distances, the classical instruments had a lower precision that was in connection with the field declivity; ± 1- 2cm for 100m or ± 20-30cm for 100m.

Total Stations allow those "balanced determinations", with the accuracy and / or equivalent errors in measuring angles and distances, leading to equal weight determinations.

Now days, a Total Station provides an accurate reading angles between ± 1^{cc} and ± 10^{cc}, and for distances ± (5mm 2 ppm), corresponding values.

Total station or intelligent in our country currently has a dominant position, being used almost exclusively in landscape work. It' s use is motivated by the high measurement accuracy for distances and angles, the short time measuring, reducing and even eliminating personal errors, displaying and storing data in memory, software applications field.

Working only with 2 decimal at the distance reducing, there were no differences between the two methods.

Deviations between points varies between - 6cm and + 4,6cm on X axis and
between - 3,8cm and + 7,2cm o axis Y.

The problem change when we talk about surfaces.

Surface resulting from classical compensation is bigger with 3 square meters for a total of 1767sqm, compared with the surface obtained from the Total Station software compensation.

4. CONCLUSIONS

Calculation accuracy is higher when we use the classic compensation of the network. Differences in the calculation of areas, depend on the model of thetotal station, anf also it's software. At the South total station the differences are: minus 1 sqm to total area of 390 sqm;

The quality of measurement results is directly proportional to the precision of measurement;

Total stations have, by design, the latest developments in fine mechanics, optics, microelectronics and informatics, which is improving continuously. Some models are replaced in less than two years;

The efficency with total station is much higher. The compensation part is resolved l directly in the field, which drastically reduce working time.

The Total Station makes numbering lintings that stand at the base of the digital plans. The station has a program that allows registration on the ground of coordinates X, Y and Z of points that are then transferred into the computer. Latest achievements, such as the Joint Smart Station, meet in the same device a total station and a dual-frequency GPS receiver, thereby increasing the accuracy of executing topographical risening and increased efficiency in carrying out surveying work;

The process of calculating the land surface is in modern viw, fully automated; Worh field that is necessary to execute a cadastral map, is running by rules approved by ANCPI. At each point of the paper presented, the deviations were within the rules imposed by regulation;

There is currently a huge amount of work that runs, that is somehow imposed by the property dealing to specify the legal position of the buildings. This requires work with total station;

The diversity of modern equipment used by professionals, leads to different results from the areas of data processing. Importantly, measurements and errors must be within tolerances required by regulation;

Any modern state needs a functioning system of property assessment, which can monitor the market transactions, supporting growth and ensuring the final integration of the tax system.

Specialist land must be a consummate professional, who must enjoy the authority and credibility with law enforcement agencies and beneficiaries. Such a position is gained through a continuous training and experience, with knowledge of new technology. Must be responsible and honest.

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