The Cadastral Topographic Documentation About Planning and Limit of the Land

Carmen Georgeta Dumitrache

Abstract: ***It identifies the topo-geodetic reference system in which they work, which found both by identifying field, and the Office of Cadastral and Land - ALBA. Also in the field are identified points of triangulation, which assembled form a network can cover the interest. Solving the triangulation network is in a first stage by compensation network angles. This compensation can be done expeditiously "Broniemann" networking simple and less important or "rigor" - or block - respecting "theory of least squares". Following the recommended path, namely "rigorous method" will determine the number and condition equations will be written in proper condition equations (figure, tour the horizon, sides, etc.). The condition equations will be solved by the theory of conditional measurements. Thus this system will be reduced to a normal system of equations. Solving the method is to make successive cuts - Gauss scheme. The calculation will operate in a special protocol for this operation. The resulting data will be reported on the topographic plan of the land, obtaining a boundary of the area studied. The closing surface contour is done by lifting specific details cadaster. From the above mentioned protocol will be calculated surface area, using the calculation analytics. The project ends with some graphics, resulted in a topographic-cadastral documentation appropriate.***

Keywords: Land, Cadaster, Topography, Surface Area

I. INTRODUCTION

The multitude of topographic works to be executed in a certain area requires a system of support materialized in the field by points of triangulation. The interdependence of these points is through networks that are based on the triangle as figure and are determined by measurements of angles, in which case the network is called "triangulation", or EDM, in which case the network is called trilateration.

Table 1 - Note: For efficiency into account, the old names were replaced by points A, B and C.

Point	OLD POINT COORDINATES		
Number	X	Y	Z
A	509365.478	388059.330	244.254
B	510471.219	388363.015	252.211
C	508617.611	389013.670	262.855

In practice, whether known or that is being set up, local triangulation network to be checked or measured and determined. This may be done completely, as if new networks or in part by measuring the angle elements, distances or checks guidelines coordinated. If the network is local triangulation new technology to solve complex will go a stage in succession mandatory. In a first stage consisting of field measurements are measurements of angles and distances (base).

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II. MEASUREMENT AND COMPENSATION THE ANGLES IN STATION

It is an operation of land and consists of measuring geodetic angles in each point of triangulation. For this purpose we use a theodolite precision.

Example: Theo 010 theodolite is a precision device which $p_a = 1^{cc}$ (1^{cc} = smallest division that can read horizontal circle), a device that was checked and rectified.

The method for measuring the horizontal angle geodesic is the "flow method horizon" with the observations in both positions of the device.

The method consists of the following:

- the point is stationary with theodolite station, stalls and focuses on point;
- bring the telescope position I (vertical circle to find in the left rear window); - is aimed at the first point left point B and the scores;
- screw actuated reiterated until it reaches close reading "zero" on the horizontal circle. With drum bringing coincidence bring reading zero reading reversed = 200g. We read in the image reading centralization by B;
- unlock and aimed right next point is P1, is blocked again, the scores. Care should be taken to ensure that once rotated the camera in one hand he brings fine prior to the point, locks and knob are made reticle fine movement point, the scores and did not walk left - right;
- it is brought in coincidence with horizontal divisions circle drum coincidence and the read CP1 ', and aims to unlock and C being done reading scores C'_{C} and further ... to its original position where it reads C 'B. Further readings are in position II apparatus (hoop down the right unit). This basculate telescope theodolite overhead and rotates in the opposite direction clockwise, with 200g target again until B becomes blocked, the scores and read C'_B.

This bascule telescope theodolite overhead and rotates in the opposite direction clockwise, with 200g target again until B becomes blocked, the scores and read C''_B ($C'' = C'_B - 200^g$) then the theodolite rotating in the same direction - counterclockwise - C''_{P1}, C''_C si C''_B.

$$C_B = \frac{C'_B + C''_B}{2}; \qquad C_{P1} = \frac{C'_{P1} + C''_{P1}}{2};$$

$$C_C = \frac{C'_C + C''_C}{2}; \qquad C_B = \frac{C'_B + C''_B}{2}$$

- the difference:

$C_B - C_B = w_\lambda$;

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is the so-called "closing our tour of the horizon" to be distributed visa number (reads), which are three in number.
Correction unit:

$$C_V^0 = \frac{w_\lambda}{3}$$

Anything that gets close correction by changing the sign as such will be corrected:
- visa origin remains fixed: $(C_B) = C_B$;

III. COMPENSATION ANGLES TRIANGULAR GRID

The triangular grid is made up of a series of triangles whose constraint conditions of the network refers to the sum of the angles of each triangle (200 g) in part, the amount of angles around the center point (400g), etc., conditions that may be imposed by the geometrization figure, the offset angles respectively in the network. From measurements of the field resulted in instrument location offset angles that are most likely values of measurement results.

The compensation angle may be expedite network (Broniemann), or rigorous. Expedite compensation method is obsolete, but it is very suggestive. In multi-phase high incubate method, namely: Phase I - the sum of the angles of each triangle is equal to 200 g; the potential difference is distributed equally to each angle of the triangle. Phase II - the sum of the angles around the pole to be equal to 400g; the potential difference is equally distributed in angle with the tip of the pole. At this stage strike a balance between each triangle, the angle of correction is applied to the opposite sign pole, the half, the other angles of the triangle (the outline). Phase III - "condition sides" consists in writing the equation of sides, which is a ratio of the products of the sinus angles of the outline, in a direction (P) and the other (PP), any closers the condition P> Pp apply negative angles appears, and vice versa if Pi <p. rigorous method consists in representing homogenous bloc. This equation calculates the required number of conditions, then writing and solving equations condition block system of equations.

A. Error Writing Equation (Equation form)

1,2,3, … ,15 = mesure angles;
$v_1, v_2, v_3, \dots, v_n$ = angles corrections;
(1), (2), … ,(15) = angles probable values
(1) $= 1 + v_1$
(2) $= 2 + v_2$
……
$(15) = 15 + v_{15}$

- Figure equations for conditions:

(1) + (2) + (11) = 200^g

Become: $1 + v_1 + 2 + v_2 + 11 + v_{11} - 200 = 0$

So: $v_1 + v_2 + v_{11} + \omega_1 = 0$ $\omega_1 = 1 + 2 + 11 - 200$ $\omega_1 = +6^{cc}$

$v_3 + v_4 + v_{12} + \omega_2 = 0$ $\omega_2 = 3 + 4 + 12 - 200$ $\omega_2 = -6^{cc}$

$v_5 + v_6 + v_{13} + \omega_3 = 0$ $\omega_3 = 5 + 6 + 13 - 200$ $\omega_3 = -1^{cc}$

$v_7 + v_8 + v_{14} + \omega_4 = 0$ $\omega_4 = 7 + 8 + 14 - 200$ $\omega_4 = +1$

$v_9 + v_{10} + v_{15} + \omega_5 = 0$ $\omega_5 = 9 + 10 + 15 - 200$ $\omega_5 = -+4^{cc}$

Table 2 - Error Writing Equation

Angle Number	Angle Value
1	62.25.37
2	58.80.27
3	36.62.00
4	63.30.12
5	64.14.79
6	53.86.37
7	61.52.89
8	61.06.76
9	55.41.58
10	62.25.37
11	78.94.42
12	80.07.82
13	81.98.83
14	77.40.36
15	81.58.57

- Equation for the condition of center:

$(11) + (12) + (13) + (14) + (15) = 400^g$

Become: $11 + v_{11} + 12 + v_{12} + 13 + v_{13} + 14 + v_{14} + 15 + v_{15} - 400 = 0$

$v_{11} + v_{12} + v_{13} + v_{14} + v_{15} + \omega_6 = 0$

Where: $\omega_6 = 11 + 12 + 13 + 14 + 15 - 400$: $\omega_6 = 0$

- Equation conditions sides:

$$\frac{\sin(1)\cdot\sin(3)\cdot\sin(5)\cdot\sin(7)\cdot\sin(9)}{\sin(2)\cdot\sin(4)\cdot\sin(6)\cdot\sin(8)\cdot\sin(10)} = 1$$

Become:

$$\frac{\sin[1+v_1]\cdot\sin[3+v_3]\cdot\sin[5+v_5]\cdot\sin[7+v_7]\cdot\sin[9+v_9]}{\sin[2+v_2]\cdot\sin[4+v_4]\cdot\sin[6+v_6]\cdot\sin[8+v_8]\cdot\sin[10+v_{10}]} = 1$$

This condition unlike previous ones is not linear; therefore sided equation is obtained by linearization of the geometric conditions. This effect is used in the second linearization methods: using the logarithmic function, or by the natural functions.

IV. PLANIMETRIC NETWORK SUPPORT

Thickening network triangulation means determining new points in order to increase the density of known points of a given surface. For the development of the angular intersection triangulation method is used and the method of polygonal paths.
The polygonal routes method is the method to determine the coordinates of new points based on measurements of angles and distances.

The geometric angles and distances are defined sequence of points linked form polygonal.

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For the present work, we have developed a closed loop polygon supported the point P0, point rigorously determined and compensated in the geodetic network and orientation known.

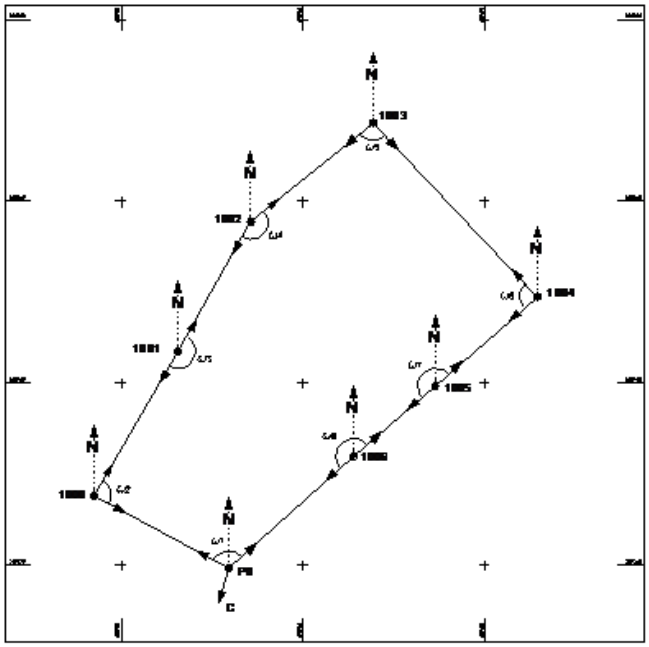

Figure 1 - Thickening network triangulation sketch visas

Table 3- Inventory coordinate - planimetric support network

Pct.	Nord(X)	Est(Y)
P0	509348.968	389229.644
1000	509368.939	389192.539
1001	509408.581	389215.696
1002	509444.233	389235.654
1003	509471.587	389269.192
1004	509423.713	389314.357
1005	509399.207	389286.299
1006	509379.812	389263.83

A. Lifting Planimetric Details

Depending on field conditions, equipment and tools at its disposal, access to the fulcrum and points of detail can be chosen different methods of lifting the details; by "details" understanding landforms, tectonic accidents, systematization of the area, construction of roads, bridges, civil, industrial, broken down into specific elements, such as changes in alignment, borders, fences, slope changes, corners of buildings, etc. reduced to "landmark" as characteristic element.

The position in the plane of the topographic point can be determined by methods such as abscissa and ordinate method, the linear and angular intersections methods, the method of the pole and the method of direct lifting of the boundaries, contour plots, lands, etc., by methods such as: decomposition into triangles, etc.

Regardless of the method, the processing result is reported in terms of topographical measurements by the pair of planar coordinates (xi, yi), or polar elements (polar angle, polar distance), etc. Report points on the topographical plan is available to the system the pair of rectangular coordinates x, y materialized on the board by the crosses grid lines or nominated by their values.

It consists of two rods perpendicular and fixed together at right angles. The length of the struts is 10 cm, as the distance between the grid lines. Thus, for a scale of 1: 2000 in which the corresponding rods 10 cm in length of 200m reality, the gradation is yes 0 - 200 per 10 cm of the ruler. So to 1: 1000, grading is from 0 - 200m on the 10 cm of the slat from 0 to 100, and for 1: 500, the gradation to the 10 cm of the slat is from 0 to 50 m (1: 5000 to 1: 500, etc.).

The surface size calculation

The area size is presented as the surface bounded by the contour number, expressed in units of area of the conventional system used in the area (m2 1AR = 100m2, 1ha = 1000ar = 10000m2).

The calculation or determination of the area is based on numerical elements, analytical, graphical and scripting the available results of measurements in the field. The area is calculated based on the coordinate inventory available by applying the analytical method, the most accurate method, whose formulas are:

$$S = \frac{1}{2}\sum_{i=1}^{n} x_i \left(y_{i+1} - y_{i-1}\right);$$

And

$$S = \frac{1}{2}\sum_{i=1}^{n} y_i \left(x_{i-1} - x_{i+1}\right) \quad .$$

V. CONCLUSION

Offset angles was used to determine the orientation of the offset and length of the sides of the triangulation network, knowing the previous works topo-geodetic coordinates of a point at least, orientation and length of a side. These items were derived coordinates of points on the network.

All based on measurements of the field was determined a new infill points using one of the methods recommended in this case: the method intersection in front, side, back, trilateration etc. Share one of the points will be deducted by geometric leveling based on measurements. Once created based support ground contours in the study create the "lift" (implementation plan) method closed loop.

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