Topographic and Cadastral Documentation on a Survey of Industrial Building

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***Abstract*—** *The property subject of this work is located on the territory of Alba Iulia, str. Livezii fn. This paper is considering a topo-cadastral documentation concerning the topographic survey of industrial site Prodimpex SRL in order to obtain building permits, according to Law 453/2001. It identifies the topo-geodetic reference system in which they work, which found both by identifying field, and the County Office of Cadastral, Geodesy and Cartography. Also in the field are identified points of triangulation, which assembled form a network can cover the interest. All based on measurements of the field will be determined radiated coordinates and shape of the plot points. The necessary for executing lifting topographic I stationed about 305 visas to paragraph 306 (points taken from OJCGC), the point I made a 305 supported on both ends of the points made 305-1000-1001-1002 and 307. The points were made notice to points of detail of the plot under study. The work was performed in stereographic projection system 70.*

***Keywords*—** *Land, cadaster, topography, surface area.*

I. INTRODUCTION

Depending on field conditions, apparatus and instruments 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, by methods such as: decomposition into triangles, etc. The angles were measured by the complete series (Horizon flow method). Thus, for the measurement of the observations are □ from the point A to the point P1 and P2, which determines the angle □. Reading AP1 is recorded in the direction C1, and by rotating the device in the topographic effect, C2 reading direction AP1 AP2 closing direction by reading C1. With camera shake in reverse in the second position the telescope obtain readings $\overline{C_1^|}$, $\overline{C_2}$ and $\overline{C_1}$.

Probable values of reading the directions are given averaged:

$$\left(C_1\right) = \frac{C_1 + \overline{C_1}}{2} \ ; \left(C_2\right) = \frac{C_2 + \overline{C_2}}{2} ; \left(C_1^|\right) = \frac{C_1^| + \overline{C_1^|}}{2}$$

The value is used for control.
Mean values reading directions determine the angles:

$$(\omega) = (C_2) - (C_1)$$

In the present work, complete series method has applied it through two sets of observations:

$$\omega_M = \frac{\omega_1 + \omega_2}{2}$$

ω_M - Represents the average of two series;
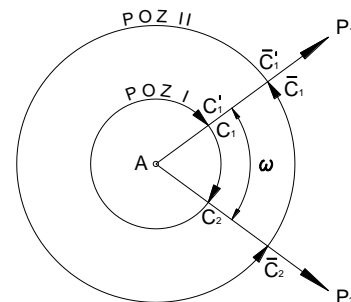ω_1 - First series;

ω_2 - Second series.

Fig. 1. Measurement by the method which is completely angles.

Distances were measured using a tape of steel and a theodolite as follows: - because the distance between points could not be measured with roulette (because of the configuration of the terrain and distances greater than the size roulette), we proceeded to divide the distance between points A and B into two roughly equal sections materializing in field waypoint P.

The materialization in field waypoint P was made as follows: stop with the device at the point A to point B given target, and then the same alignment materialized on the ground at a distance intermediate point P.

With the roulette we measure the slope distance from the top of the device to the point P from the point polygon A and point B and we measure angles with theodolite zenith.
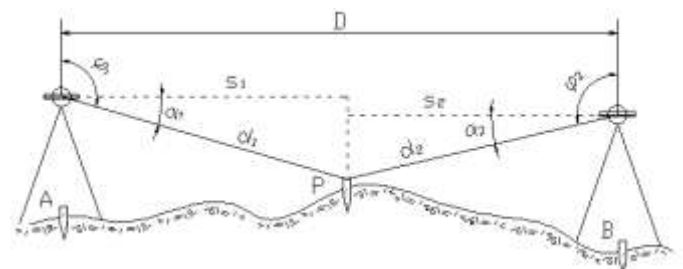

Fig. 2. Measuring distances between points.

$$s_1 = d_1 \cdot \cos \alpha$$
$$s_2 = d_2 \cdot \cos \alpha$$

were:

$$\alpha_1 = \phi_1 - 100^g$$
$$\alpha_2 = \phi_2 - 100^g$$

Calculating the Coordinates of Points

Positioning on maps and plans of the points of triangulation is done by pairs of coordinates (xi, yi).
Point coordinates are given by:

$$\begin{cases} x_B = x_A + S_{AB} \cos \theta_{AB} \\ y_B = y_A + S_{AB} \sin \theta_{AB} \end{cases}$$

In winch:

$$\begin{cases} \Delta x_{AB} = S_{AB} \cos \theta_{AB} \\ \Delta y_{AB} = S_{AB} \sin \theta_{AB} \end{cases}$$

They may have different signs after orientation position in one of four quadrants.

The calculation of the coordinates in the triangular grid requires knowledge of the coordinates (x, y), at least one point, the offset orientations of all sides and length sides.

TABLE 1. The coordinates of the known points.

Point Number	Coordinate	
	X	Y
305	510221.932	391166.543
306	510252.963	391172.926
307	510001.672	391145.983

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.

The 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.

Drafting Topographical Plan with AutoCAD

Drafting topographical plan (report) was made with AutoCAD 2004, which is a computer aided design system.

A first step is to set the workflow of AutoCAD through a dialog, the parameters gives us compatibility with topographic works
- Setting of measuring angles in grads and precision (number of decimal places);
- Direct measuring angles will be set in clockwise (direct sense);
- We will set the north direction of the plane which will correspond to the Y axis;
- Finally will establish its plan work surface.

Coordinate Input Methods

The ability to place points (topographic) accurately is very important. The position of a point can be specified either on the screen with a mouse or other pointing device or the command line by entering coordinates from the keyboard that point. When placed points, AutoCAD uses a Cartesian or rectangular dimensions. When using this coordinate system standard points are located in three-dimensional space, mention the distance that is from the original set and the sense

that measured the distance, along the three axis perpendicular to each other: axes X, Y and Z.

The origin is considered to be the point of coordinates (0, 0, 0).

The figure below illustrates such a coordinate system. In this case, only two dimensions are shown, the Z-axis is directed upward perpendicular to the page. If we are not interested than planimetric drawings, AutoCAD coordinate system will be presented in this way.

The pairs of coordinates (4,6) indicates a point in relation to the origin, at a distance of four units in the X axis, in a positive sense, and 6 units along the Y axis, also in a positive sense.

The use of Absolute Coordinates

The absolute rectangular coordinates are always measured starting from the point of origin (0,0,0). In AutoCAD, the absolute coordinates can be specified by typing in the values of X, Y and Z, separated by commas, such as: X, Y points in the two-dimensional space; X, Y, Z points in the three-dimensional space. If the gap is positive to home, do not need to use a plus sign (+) when you enter coordinates.
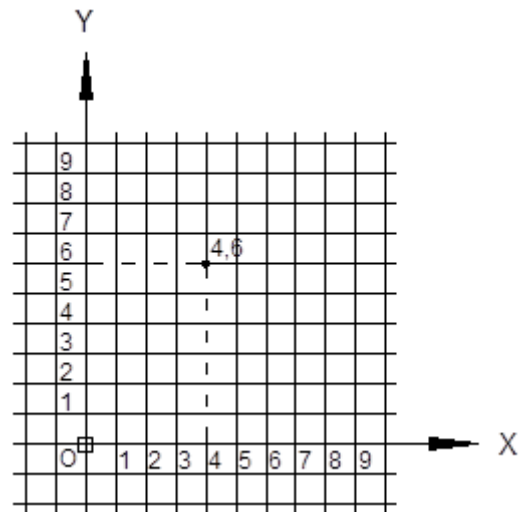

Fig. 3. Coordinate system in AutoCAD.

This does not apply if the gap from the original negative, in which case you need to put a negative sign (-) in front of its value (eg -2.3 or if dimensional, 4 -6, 3).

Absolute polar coordinates of the two-dimensional coordinates treats all input values as an offset to the origin - point coordinates 0.0 - but this gap must be specified in the form of a distance and an angle.

These two values - distance and angle - must be separated by 'less than' (<) without insert spaces before or after it: distance<angle.

TABLE 2. Inventory of coordinates (radiated points).

Point Number	X	Y	Z
1	510215.530	391129.898	245.417
2	510212.641	391159.268	245.205
3	510208.705	391161.659	245.200
4	510200.852	391141.807	244.680
5	510210.290	391142.182	245.263
6	510211.009	391132.870	245.381

7	510211.246	391129.036	248.120
8	510179.584	391160.610	245.239
9	510171.628	391160.154	245.249
10	510170.538	391160.073	245.222
11	510164.148	391159.736	245.235
12	510176.357	391142.452	245.270
13	510179.257	391144.415	245.280
14	510181.481	391141.006	246.428
15	510182.872	391127.669	245.722
16	510177.401	391132.444	245.497
17	510169.707	391141.889	245.270
18	510166.014	391142.006	245.286
19	510162.956	391150.652	245.205
20	510164.273	391130.938	246.258
21	510152.872	391150.568	-
22	510152.515	391158.513	-
23	510144.447	391158.174	-
24	510153.740	391166.153	245.271
25	510153.849	391163.113	245.328
26	510127.836	391157.517	245.152
27	510121.726	391157.115	245.142
28	510132.143	391148.805	245.191
29	510129.803	391124.735	245.296
30	510120.527	391150.930	245.151
31	510120.147	391156.629	245.096
32	510110.914	391156.396	245.078
34	510100.460	391162.926	245.137
35	510077.407	391154.948	245.108
36	510062.758	391153.335	245.293
37	510060.705	391157.566	245.073
38	510047.832	391160.016	245.065
39	510051.738	391147.059	245.084
40	510052.677	391131.182	245.134
41	510049.774	391126.150	245.188
42	510065.102	391120.997	245.420

TABLE 3. Inventory of coordinates (plot point of land).

Point Number	X	Y	Z
1	510215.530	391129.898	245.417
2	510212.641	391159.268	245.205
3	510208.705	391161.659	245.200
8	510179.584	391160.610	245.239
9	510171.628	391160.154	245.249
10	510170.538	391160.073	245.222
11	510164.148	391159.736	245.235
22	510152.515	391158.513	-
23	510144.447	391158.174	-

26	510127.836	391157.517	245.152
27	510121.726	391157.115	245.142
32	510110.914	391156.396	245.078
35	510077.407	391154.948	245.108
36	510062.758	391153.335	245.293
42	510065.102	391120.997	245.420
29	510129.803	391124.735	245.296
15	510182.872	391127.669	245.722
7	510211.246	391129.036	248.120

Calculating and Setting Large Surface

The area that represents the numeric size of these correspondent surface contour, expressed in units of the surface of the conventional system used in the area (m2, 1 would = 100m2, 1ha = 1000 would = 10000 m2). The calculation of the area or the determination is made on the basis of the elements of analytical, numeric, graphs, or documentary checks at their disposal, results of measurements carried out in the field.

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

and

$$S = \frac{1}{2} \sum_{i=1}^{n} y_i \left(x_{i-1} - x_{i+1} \right) \quad .$$
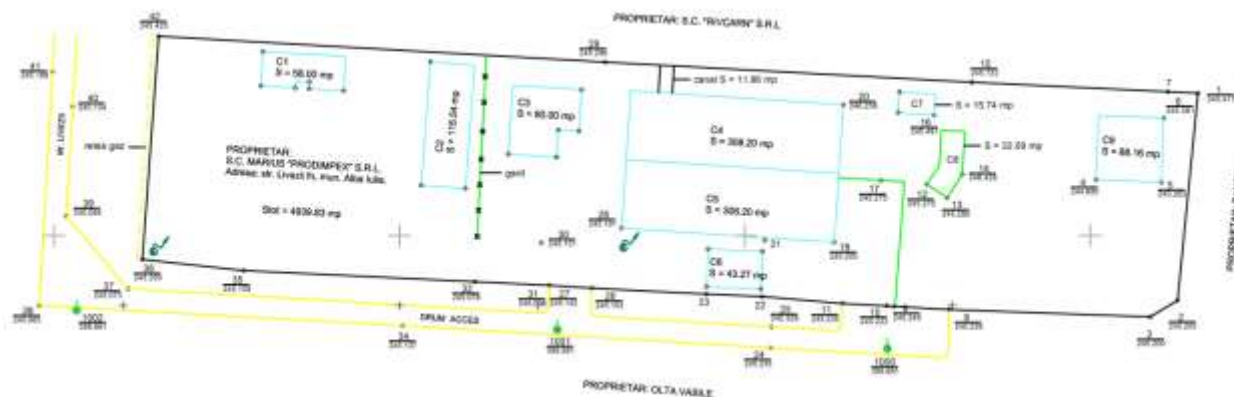
The result will be the same.

Establishing the areas will determine the following areas: - *surface of the enclosure (ST); -*built area (Sc); -*area concerned networks (Sr); -*area concerned the transport roads (St); -*free surface (SL). The surface of the enclosure (ST) is the sum of the areas of land which is located in the assets of a company with share capital of the state.

It will take into account and other areas of land of the company with state capital (which have constructed or objectives laid down for the possible developments in the outside of the enclosure).

The built area (Sc) is the sum of the surfaces of the definitive occupied by buildings, construction, engineering and construction of special equipment and technology for the storage, transport facilities and the BGC (made with one or several levels of closed, totally or partially or fully open.

The area concerned (Sr) networks, in the enclosure, means the sum of the areas occupied by external networks having functions and technological facilities, located in the underground (free or in the BGC (CH), (on the stands), for example: industrial water pipes, the housekeeper (drinking water), the drainage pipes (water, industrial waste and rainwater); the pipes for different thermal agents (water, steam), the technological agents or heating of constructions;

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gas pipelines; Pipelines for the transport of materials pneumatic or mechanical powdery; cables and electrical leads, etc as a result of the solutions of general plan and the prescriptions of the laws in force, intended for any developments.

II. CONCLUSION

The resulting data will be reported on the topographic plan of the land, obtaining a boundary of the area studied. Closing surface contour is done by lifting specific details cadastral. With the aid of pairs of coordinates (x, y) is calculated on the surface area of use category using various methods. The project ends with some graphics, resulted in a topographic-cadastral documentation appropriate.

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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