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Original Article

Considerations on Topo-Geodetic Works Required for Plotting an Industrial Hall in Apa Commune

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Abstract

This work refers to the topo-geodetic works made for plotting a hall building located in the commune Apa, Someşeni Street, No.16 with the purpose of storing machinery. To achieve the final objectives proposed in this paper, it was necessary topographic survey details otherwise making topographical support for the design and construction. Making accurate and precise measurements involved thickening support network with two new points. However, for plotting field lens needed to draw up plans designed to trace, according to the dimensions set by the construction project.

Keywords: surveying, construction stakeout, staking plan, project construction, construction axes.

1. Introduction

The halls are single level building which close relatively large spaces. Overall, the interior of a hall is limited roof and side walls are completely open, or divided into several openings through rows of pillars. Some spaces may exist inside the walls partitioning, also called interior walls.

Also, depending on the purpose and need to build platforms and galleries may exist at several levels.

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From the point of view of their halls are: manufacturing, storage, garages, hangars, warehouses, etc.

Halls dimensions are determined by their destination, how systems are necessary resolutions inland transport, lighting, ventilation, heating and insulation.

Land application of industrial plants construction projects, for implementation requires making topographical works desk and field. Office work generally comprises terrain preparation of the construction project for the application on the ground.

Road work consists of works tracing the pitch axis construction, objects and details during construction, and installation of measurements of building elements.

Layout works are preceded by topographic survey of the land. In these works are drawn up plans and profiles of the land on the basis of measurements of the pitch.

Apa village geographical area lies in the subunit Plain Satu Mare, on the right bank of the river Somes, subunit which in turn are embedded in the great unity of Someş Plain, with Gutâi Mountains to the east and south hills Codrului.

2. Material and Method

The choice of method of marking to be used is based on several factors: conditions for measuring the degree of injury terrain, obstacles which prevent visas, nature plottings, desired accuracy, existing equipment. Depending on conditions on the ground for drawing points can be used several ways, and that we used in this paper tracing is presented below.

Polar coordinates method is recommended to use in situations where the area is both possible and angular measurements of the distances. This is one of the most widely used methods in practice since it is very efficient and fast. Drawing on the ground point C is done by applying, from point A network plotting, horizontal angle (polar angle) side to the network and the distance D from the project (radius vector). The value of topographic elements to be mapped determined in the preparatory terrain with general relations [1, 3, 5]:

$$tg\theta_{AC} = \frac{\Delta Y_{AC}}{\Delta X_{AC}}; tg\theta_{AB} = \frac{\Delta Y_{AB}}{\Delta X_{AB}} \quad [1]$$

$$\beta = \theta_{AC} - \theta_{AB} \quad [2]$$

$$D = \sqrt{\Delta X_{AC}^2 + \Delta Y_{AC}^2} = \frac{\Delta Y_{AC}}{sin\theta_{AC}} = \frac{\Delta X_{AC}}{cos\theta_{AC}} \quad [3]$$

$$\Delta X_{AC} = X_C - X_A \quad [4]$$

$$\Delta X_{AB} = X_B - X_A;\ \Delta Y_{AC} = Y_C - Y_A;\ \Delta Y_{AB} = Y_B - Y_A \quad [5]$$

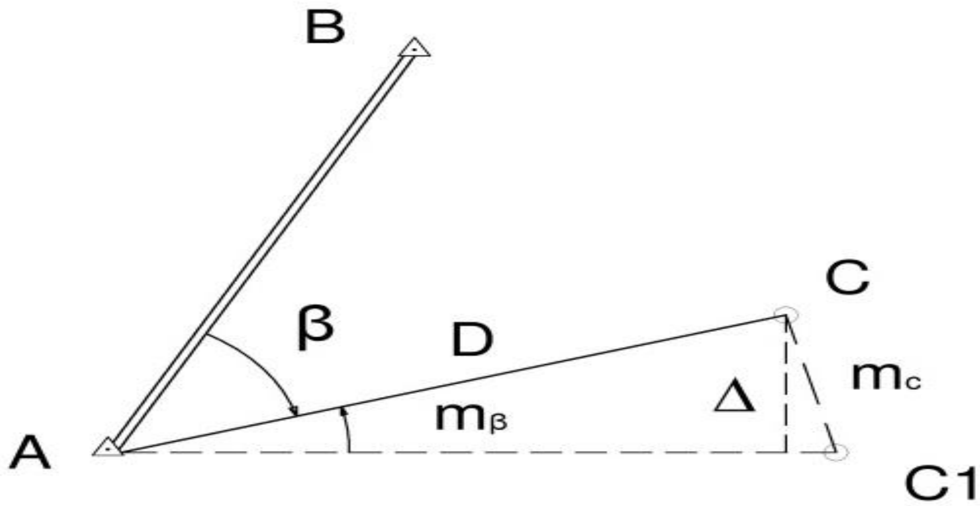

Figure 1. Polar coordinates method

Coordinates of points A and B are known (Fig. 1) (network plotting points) and the coordinates of point C are pointing in the project. Tracing point C is done as follows (Fig. 2):

- Are stationed with the theodolite to A and AB reference to the direction of the angle plot (process mapping, established in the design phase Topographical Engineering was chosen in accordance with the required accuracy stakeout)

Direction thus obtained distance D will apply at the end of it materialized out point.

Plotting control can be performed:

- By drawing point construction from another point of support network (eg drawing point C of the support network points A and B;
- C stake out some other method of marking;
- Comparing the distances and angles between points marked, obtained by field measurement with in the project.

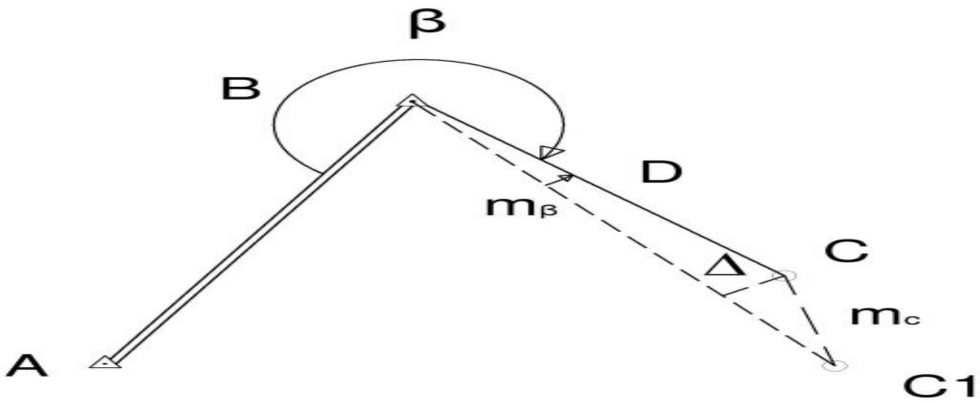

Figure 2. Plotting control

3. Results and Discussions

a) Implementation of the project on the ground

As to geometric axis is defined as an imaginary line that divides an element or an assembly of figure equal parts, creating a line of symmetry on both sides of her route.

Axes construction will be materialized on the ground by mathematical points which is their intersection, so intersection longitudinal axes A, B, C, D, 1,2,3,4,5 transversal axes will generate points A2, A3, ... , D5.

To execute plotting construction, it took some steps forward. It has drawn up a topographic plan which was handed to the designer because it can achieve axis system necessary to achieve the construction. After drawing the grid, it was sent surveyor for it to be able to perform the calculations required for plotting axes construction.

Preparation of project execution terrain comprises:

1) Achieving plotting scale and duplication by bringing the grid drawn by the designer over the topographic plan;

2) Selecting the plotting and calculating the necessary elements. In essence, the preparation of project execution terrain was created based plotting against which to determine the trace elements main minutia. Drawing pins used for Leica total station Tc 407, miniprisma and milestones supplied with the machine.

b) Drawing principal axes and basic method polar coordinates

The outline construction field is applied by characteristic points using one of the methods known to the stakeout network.

This method will draw the main axis I-I, II-II and the basic A-A, D-D, 1-1 and 5-5.

Sketch plotting drawn, points A1, II, A5, I1, I II, I5 will be drawn from station S1, and the points D1, D II, D5, I1, I II I 5 will be withdrawn from station S2.

Control points I1, I II, I5 will be drawn from both stations. Knowing the coordinates of the intersection of the axes data base and trace elements are determined staking out below (Fig. 3, Fig. 4):

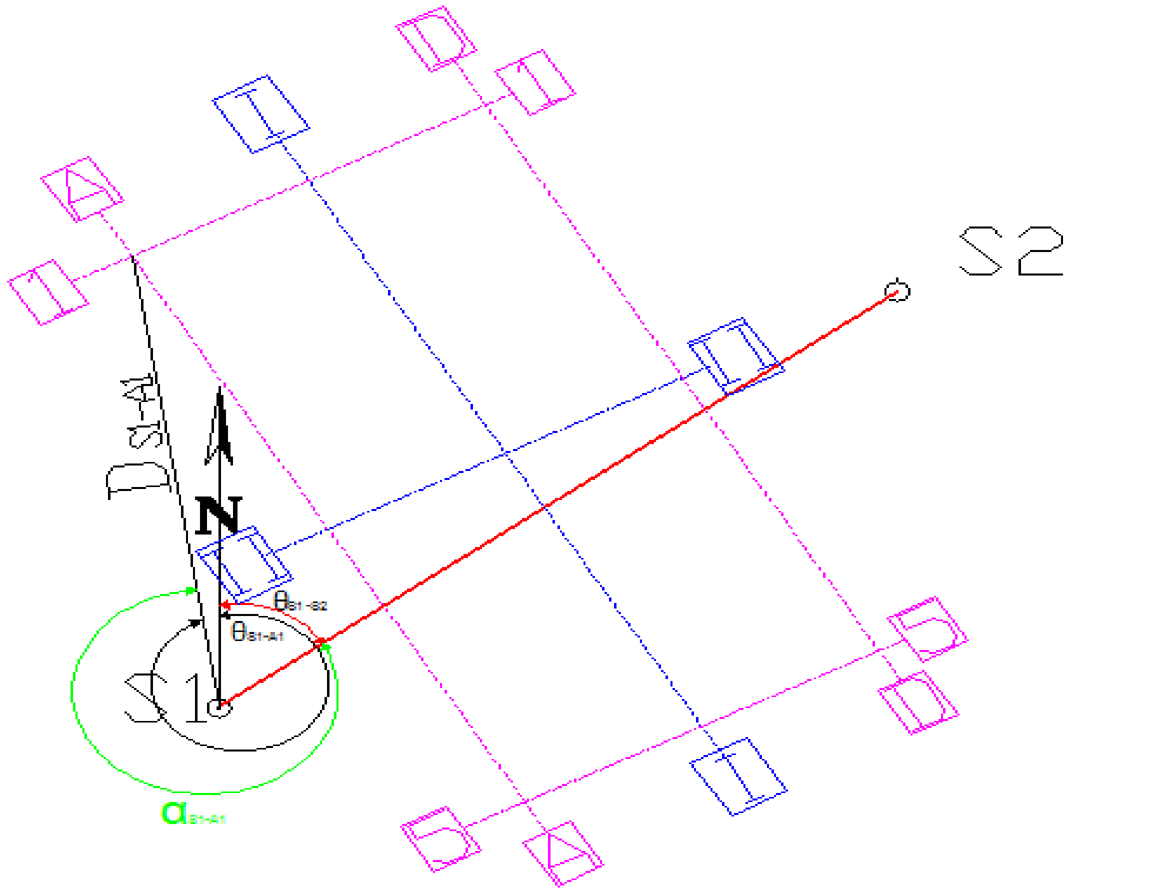

Figure 3. Trace element calculation of station 1

Point	X [m]	Y [m]	θ_{S1-S2} [g.c.cc]	θ_{S1-A1} [g.c.cc]	α_{S2-A1} [g.c.cc]	D_{S1-A1} [m]
S1	**695799.0567**	**365410.3998**				
S2	**695812.3310**	**365427.3770**	**57.7539**	**390.6497**	**332.8958**	**14.641**
A1	**695813.4917**	**365408.2643**				
Point	**X [m]**	**Y [m]**	**θ_{S1-S2} [g.c.cc]**	**θ_{S1-I1} [g.c.cc]**	**α_{S2-I1} [g.c.cc]**	**D_{S1-I1} [m]**
S1	695799.0567	365410.3998				
S2	695812.3310	365427.3770	57.7539	8.3853	350.6314	17.049
I1	695815.9133	365412.6330				
Point	**X [m]**	**Y [m]**	**θ_{S1-S2} [g.c.cc]**	**θ_{S1-AII} [g.c.cc]**	**α_{S2-AII} [g.c.cc]**	**D_{S1-AII} [m]**
S1	695799.0567	365410.3998				
S2	695812.3310	365427.3770	57.7539	28.3259	370.5720	6.339
AII	695804.7455	365413.1124				

Point	X [m]	Y [m]	θ_{S1-S2} [g.c.cc]	$\theta_{S1-I\,II}$ [g.c.cc]	$\alpha_{S2-I\,II}$ [g.c.cc]	$D_{S1-I\,II}$ [m]
S1	695799.0567	365410.3998				
S2	695812.3310	365427.3770	57.7539	45.6944	387.9405	10.793
I II	695807.1670	365417.4811				

Point	X [m]	Y [m]	θ_{S1-S2} [g.c.cc]	θ_{S1-A5} [g.c.cc]	α_{S2-A5} [g.c.cc]	D_{S1-A5} [m]
S1	695799.0567	365410.3998				
S2	695812.3310	365427.3770	57.7539	124.4638	66.7099	8.125
A5	695795.9993	365417.9605				

Point	X [m]	Y [m]	θ_{S1-S2} [g.c.cc]	θ_{S1-I5} [g.c.cc]	α_{S2-I5} [g.c.cc]	D_{S1-I5} [m]
S1	695799.0567	365410.3998				
S2	695812.3310	365427.3770	57.7539	103.3898	45.6359	11.930
I5	695798.4209	365422.3292				

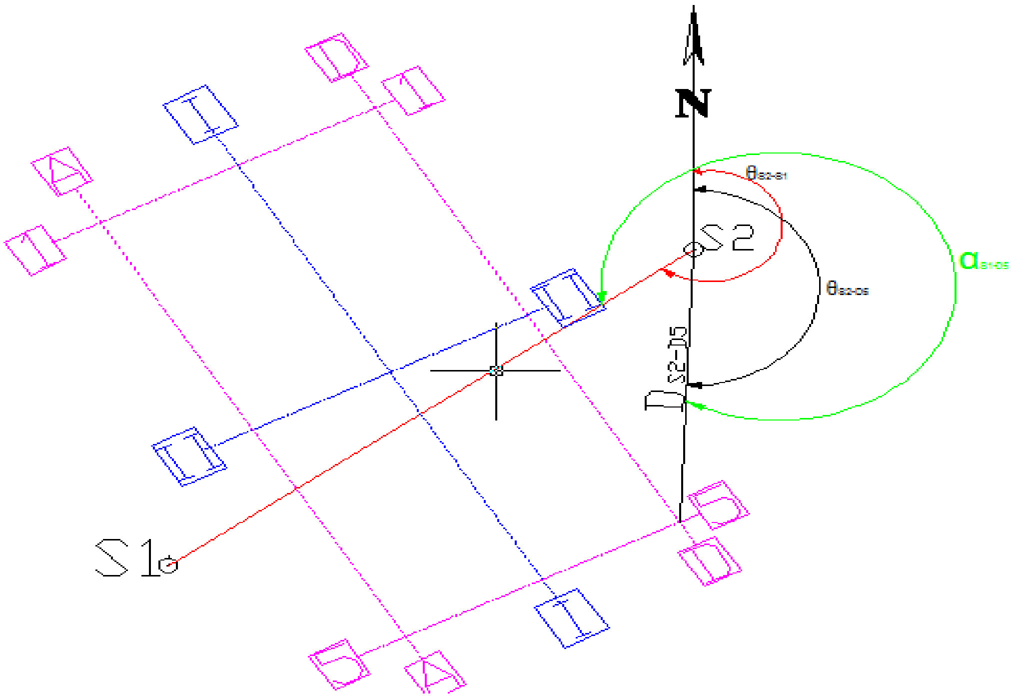

Figure 4. Trace element calculation of station 2

Point	X [m]	Y [m]	θ_{S2-S1} [g.c.cc]	θ_{S2-A4} [g.c.cc]	α_{S1-A4} [g.c.cc]	D_{S2-A4} [m]
S2	695812.3310	365427.3770				
S1	695799.0567	365410.3998	257.7539	203.7588	346.0049	11.519
D5	695800.8425	365426.698				

Point	X [m]	Y [m]	θ_{S2-S1} [g.c.cc]	θ_{S2-I4} [g.c.cc]	α_{S1-I4} [g.c.cc]	D_{S2-I4} [m]
S2	695812.3310	365427.3770				
S1	695799.0567	365410.3998	257.7539	270.6798	12.9259	5.978
IID	695809.5887	365421.850				

Point	X [m]	Y [m]	θ_{S2-S1} [g.c.cc]	$\theta_{S2-I\,II}$ [g.c.cc]	$\alpha_{S1-I\,II}$ [g.c.cc]	$D_{S2-I\,II}$ [m]
S2	695812.3310	365427.3770				
S1	695799.0567	365410.3998	257.7539	269.3811	11.6272	10.972
I II	695795.9993	365417.9605				

Point	X [m]	Y [m]	θ_{S2-S1} [g.c.cc]	θ_{S2-D4} [g.c.cc]	α_{S1-D4} [g.c.cc]	D_{S2-D4} [m]
S2	695812.331	365427.377				
S1	695799.057	365410.400	257.7539	333.3964	75.6425	11.781
D1	695818.335	365417.002				

Point	X [m]	Y [m]	θ_{S2-S1} [g.c.cc]	θ_{S2-AII} [g.c.cc]	α_{S1-AII} [g.c.cc]	D_{S2-AII} [m]
S2	695812.331	365427.377				
S1	695799.057	365410.400	257.7539	315.1737	57.4198	14.948
I1	695804.746	365413.112				

After completing the plotting, the axes follows the diagonals length checking so that the pitch length measured diagonals must be equal to an error of 1-2 cm. These can be determined through calculation and if this condition is met, we believe that drawing was correctly executed.

c) Transmission of fencing points

In this project, we chose the fence to be discontinuous form of beacons. Buoys must be located roughly in the extension of each shaft, 2-3 m where excavation work is performed. They are made of two vertical stakes, beaten into the ground, and a fixed transverse horizontal plank on them.

On these boards will score the points that define the axes construction nails, which are able to be reconstructed at any time through the laying of wires staking. In this way, the points being raised off the ground are protected from destruction, ensuring successful tracing continuity (Fig.5).

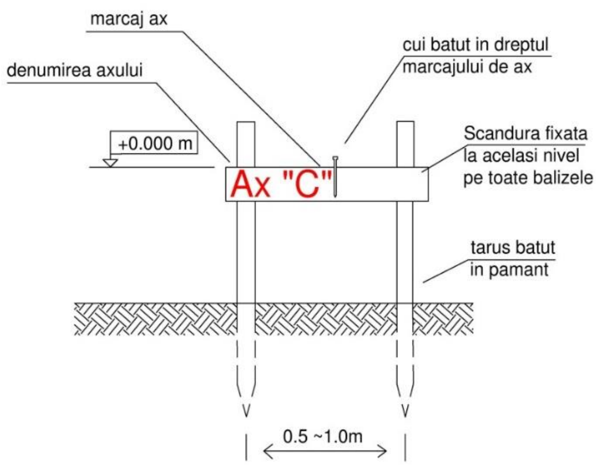

Figure 5. Fencing points

Before the materialisation of the shaft beacon requires that the upper edge of each plank of the beacons to be brought in the same horizontal plane. This edge will be assigned quota ± 0.00 m, operation performed by geometric leveling.

4. Conclusions

The importance of terrestrial measurements increased significantly with the development of society, they came to be dependent on achieving a practical purpose, linked to economic activity and scientific purposes related to determining the shape and size of Earth.

To achieve accurate and precise topographical surveying work is necessary to note first topographic elements of the terrain, so that later we might know the measuring angles and distances, and processing methods observations.

All this will help us to achieve the best results with increased efficiency and in a short time. Through this study we have reached the conclusion that the usefulness of measuring instruments modern and indispensability of software with which data are processed and graphics as computing, not least is very important to know the techniques of measurement and calculation.

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