Topographical Survey Work and Stakeout of an Agroindustrial Building from Periam Village, Timis County

Luminița Livia BÂRLIBA^{1*}, Costel BÂRLIBA¹ and Adrian ȘMULEAC¹

¹Department of Rural Development and Environmental Engineering, Banat University of Agricultural Sciences and Veterinary Medicine "King Mihai I" Timisoara, Romania

^{*})Corresponding author, e-mail: liviabarliba@yahoo.com

BulletinUASVM Horticulture 73(2) / 2016

Print ISSN 1843-5254, Electronic ISSN 1843-5394

DOI:10.15835/buasvmcn-hort:12274

Abstract

The main objective of the project was to achieve a topographic survey works and mapping of an agro-purpose storage for vegetables and fruits produced by the existing farms from the village.

The work theme includes achieving of cadastral plans base on a 1/5000 scale, using measurements for all studied locations and land cadastre units. GPS technology used in thickening RGNS, namely the determination of network support, lead to the lifting of all topographical stake out of the contour points. (Bârliba L, *et. al.*,2004),

After that, the points were used as starting points for execution the tracing of the surface construction with the support of a total station.

For topographical survey a V82 South GNSS receiver was used with two frequencies and 7 channels which allows RTK positioning in real time together with a permanent topographic station nearby Timisoara (TIM1.2.3). After overlapping the situation plan and plan developed by an architect, the stakeout of industrial building's foundation with Leica Total Station 1205+ was done through the dedicated "Stakeout" software.

Topographical works generally pursue two base objectives: the topographical survey completed by a digital representation of a small land area and staking-out the construction building respectively implementing the projects on the ground (Bârliba Luminița Livia, *et. al.*,2005). This paper demonstrated that it is possible to achieve the optimal time of all field and office operations with precision and accuracy parameters required by the topographical laws and rules.

Keywords: *DXF Generate, Leica Geo Office Combined, Topographical works*

INTRODUCTION

The paper starts from the premise that countryside youth is an extremely important resource for their communities. Through this project, they can receive support to develop a private family business. The topography used to materialize the projects has an important role, and this is achieved with topographical tools and methods.

This paper has as a purpose to increase and develop the economy of the Periam village by building fruit storages.

Fruit warehouse will have a socio-economic impact on the village by creating new jobs; village

development by accessing new European funds; infrastructure development; trade development.

Also carrying fruit storage hall leads to the possibility of further development of the entire area through: rehabilitation projects of terrestrial communications paths; sewage network projects; modernization projects of drinking water and industrial; gas network projects.

Through the projects mentioned above we aim to include the Periam village in the current European standards.

Placing a project must consider that the requirements proposed by the General Urbanistic Plan (PUG) and Zonal Urbanism Plans (PUZ). For

projects that have constructions, the Urbanism certificate must be presented.

The stakeout for the Periam village warehouse is very favorable because there are numerous facilities in the area (near the groves of trees, open space to extend and its easy access to road in the area). Most of them are located on slopes exposed to the south, southeast and southwest, which makes the sunlight and atmospheric circulation favorable for plantations.

MATERIALS AND METHODS

This paper has important role to help the designer and especially the recipient in order to build an agro-industrial halls. The location of the building is planned outside Periam village due to the numerous facilities.

The investment location is in the southern urban part of Periam village, Timis County on DJ 639.

The parcel with cadastral number LL568 /1 is part of the fruit growing farm, owned by S.C. Pomtim S.R.L. Periam with the neighbours: at NORD: Periam's built-up area, Cv31-DE7 and Cv31-Cc30; at WEST: Periam's built-up area Cc514; at EAST: LL568 / 2; at SOUTH: De570. The land is the subject of topographical works and is bordered by a concrete fence on the west and north sides.

The surveying used to achieve the objective includes the measurements taken, processing and materialization them. In order to execute work was a GNSS South V82 receiver with two-frequency and 7 channels was used that allowed the positioning of both methods: the static method and real-time kinematic method or RTK process. So, it was necessary to use data from the permanent station near Timisoara (TIM1.2.3). For the tracing execution a Leica total station TCR 1205+ was used due to it being a high quality device ideal for construction work.

Topographic surveying for the situation plan was done in the field using a total station Leica TC 1205+. Topographic elevation of the detail points was achieved in 2 station points numbered S1 and S2 determined by GPS-Rompos through one session of 20 minutes each, respectively by 1,200 registrations (each of an interval of one second), evidenced by metallic bolts platforms of concrete surrounding the investment and from which were measured detail points. To achieve true-to-plan a number 184 points have been cancelled from the

situation in the field. Measurements were made in about 3 hours by a team of three people. Situation plan was drawn in order to check and correct the investment place on the ground. Determining GPS network points was performed with a receiver Rover V-82 South using the Permanent Station TIM 1 Timisoara.

RESULTS AND DISCUSSION

After transferring the data (electronic card with field data) from the device to computer via cable and data transfer software, data has been downloaded as a file with the extension. FBK.

Whereas the determination of the station points was done by GPS methods and topographic survey of the detail points was conducted with total station directly with stereographic 1970 system and a master plan of Black Sea from 1975 (Dragomir I.P., 2001). So it was no longer necessary to calculate sideshot x, y and z. Transferring and importing data from electronic card was made with the software provided by Leica named "Combined GeoOffice Leica" (Fig.1.).

The processed data were transferred in AutoCAD 2012 and after that it was sent directly to draw up the plans.

To achieve this study multiple sketches were drawn: No.1 Situation plan - 1: 1000 scale, plan on which the overlap was with the foundation plan provided by the designer with the condition of respecting the construction distances governed by "urbanism certificate" and "Proposed situation plan" and endorsed with the initials "them unchanged ". It was also ready "table stake" and "Documentation for stakeout axes". Coordinates between the axes were entered in the total station directly. Also for the actual documentation the following sketches were attached : sketch no. 2: overlapping axes plan investment situation plan - 1: 1000 scale (Fig. 2) sketch no. 3: axes plan of the groundwork - scale 1: 200 and sketch no. 4: location plan of the area.

Before achieving the stakeout it was necessary to do the following works in the field: to obtain the necessary documentation, to establish existing landmarks on the ground and binding method of tracing these parts, that support network; to determine how the parts support network densification required to apply the project; to make the calculation, after the project, inclined and horizontal distances, angles and horizontal and

Fig.1. Data processing using “Leica Geo Office Combined”

Fig.2. Sketch 2. Overlap project on the topographic survey

vertical differences in level required to implement the project in kind; to make the organization work of the project by implementing it on the ground, to draw up the general plan of tracing milestones, working drawings on the ground, all project data required for application to the land; to establish means of verification, inspection and acceptance of the work of staking.

From S1 station the following points between the axes were traced, respectively A1 and A13 main axis “A” using the program “Stakeout” set in polar mode into the total station menu. From this points total the other points between the axes were traced, either on the alignment or raising to 100 degrees perpendicular to the transversal axes. Points were materialized with wooden pegs and spikes on individual beacons (wooden structure consist of two pillars on which rests a board of 50-70 cm longer than the width of the foundation, located in the main points, materializing axes or building walls (Fig. 3), (for these planks lead

attached to wire was used) on three sides of the investment and continuous beacon on the north side, along the fence surrounding the property.

When the design and execution of the axes tracing were considered the following areas: major axes, I-I and II-II, arranged symmetrically in relation to the building, ground base axes which makes the outline of the building and the side axes belonging to the foundation from inside of the building and arrangement axes of pillars (Fig. 3).

Final marks for marking the points required for the establishment of the construction horizontal plan were used as landmarks levelling, giving them the levels from for building vertical side of the construction. The main lines and basic items were related to construction network giving them the coordinates.

The materialization of the main axes of the building was done by planting usable metal bolts throughout the duration of the execution

Fig.3. Construction axes of the fruit warehouse

Fig.4. Materialisation of the topographic survey points

of construction and other points outlined were materialized in the field using stakes (Fig. 4).

Finally, the diagonals of the future warehouse were checked through direct measurements with the 50 m tape. The difference found is 2 mm and the work was considered good because it fits into the specified tolerances (Collections of standards,1997) and as a result was signed by the parties (designer specialty - surveyor, general designer, builder, and that the project supervisor of the beneficiary) "Documentation of stake out" and Documentation of staking out the fruit warehouse"

After digging into the foundations (isolated) and pouring concrete for equalization, it was passed to fix the position of carcasses with anchor bolts (Fig. 5). For this operation two devices were used, one for longitudinal axis and the other for transversal axis so that it could be checked the

distances using the total station HD (reduced distance to the horizon).

Finally between the axes, up to 3 mm difference was discovered, the work is considered to be within the specified tolerances and as such was signed by the parties.

CONCLUSION

The GPS system is the simplest and safest for the recruitment of geodetic surveying. Regardless of the method or process it is used relative positioning or differential, in which a known point or more has been install to a fixed receiver, and in new points, one or more mobile receptors, which is moving in every designed points.

GPS system opportunities have to be privately distinguished. We frequently use geodesic triangulation points of various orders, that are still materialized on soil and accessible. Positioning the points into the 1970 Stereo system but carried on

Fig. 5. Position of carcasses with anchor bolts

another base and the offset is not comparable to GPS measurements, resulting in a inhomogeneous network support.

In conclusion, classification of surveys in geodesy through the GPS system is a possibility being generally valid, with good results in terms of accuracy and efficiency, and consequently recommended to do works in large areas without points and support network in the area.

The execution of works on land surveying engineering (stake-out, surveying, drawings) by using total stations is necessary to take into account that:

- all devices should be checked and repaired knowing the appropriate standard to be placed in the allowable tolerance at stake-out;
- reflection device used in tracing operation have to be checked and be equipped with spherical plumb levels;
- before staking, check the position and planimetric points from the support network of that drawing;
- tracing points must be made with greater precision: sheet metal, bolts, bolt cleat or other precision elements etc .;

- any survey must be accompanied by verification operation immediately after stake-out the measured points. In particular, check the elements that result from topographic survey.

For the purposes of verification works during the execution stage will take the conservation and protection of the traced points and also the points that has been carried out drawing and it will be taken measures to verify the position of the elements of construction as project execution plan.

REFERENCES

1. Bârliba L, Calinovici I (2005). Topografie, Editura Solness, Timișoara, 2005.
2. Bârliba Luminița Livia, Brebu Pavel, Zlatan Milonjic (2004). Sistem de poziționare geodezic, Editura Politehnica Timișoara.
3. Dragomir I P (2001). Măsurători Terestre-fundamente, Volumul II, Topografie inginerească, Editura Matrix Rom, București.
4. Collections of standards (1997). Construcții, Vol. I, Măsurători terestre, Editura Tehnică, București.