

TOPOGRAPHIC RESIDENTIAL WORKS USED TO BUILDING CONSTRUCTION AND AREAS WITH ANOTHER DESTINATION

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Abstract. *The aim of this study is the placing of a flat block building situated in the urban area of Timisoara municipality. Currently the field has the use category of CONSTRUCTION YARD, according to the Real Estate Register excerpt no. 441376 released by O.C.P.I. Timiş, the building ensemble is located on Eroilor Bulevard from Tisa no. 63 and it's composed by 108 apartments with one, two, three or four rooms, parking spaces and commercial spaces on the ground floor. The proposal consists in the placing of a construction for collective buildings and spaces with another destination (SAD) at the ground floor, underground parking lot (S+P+8E+2Er), the arrangement of the enclosure, car access and fencing, 9th and 10th floors are withdrawn towards the facade, so this specification is required in the exact description of the building's structure. To establish the A, B, C, D axes respectively 1, 2, 3, 4 the total station was used. The building's infrastructure situated below floor level includes the foundations, the structural elements of the basement and the floor above the basement. Once the foundation was built and the concrete floor was poured above the basement, the 0 altitude of the building was reached. In order to reach the building's structure, frames of size 90 x 50, 40 x 80 cm and diaphragms made up from reinforced concrete were used, according to the elevation plan. The building's superstructure contains all the constructive components (vertical and horizontal) situated above the ground floor flooring, including the roof. To achieve the building of this construction there were established 4 topographic terminals, situated on each part of the construction. The construction will be carried out in three steps: Step 1 - ensuring the enclosure, Step 2 - The infrastructure (scalping, excavations and foundations), Step 3 - The superstructure (slab casting works, frames and diaphragms made up from reinforced concrete). The topographical survey were achieved with the GPS GNSS equipment from Trimble R8 series and also the Trimble total station 5503 DRSTD. The unloading of the device was done with Terramodel 10.40 program, the transformation of the WGS 1984 coordinates to Stereografice 1970 coordinates was done with the TransLT program and the data processing was achieved with the TopoLT and AutoCAD 2014 programs.*

Keywords: *GPS Trimble R8, Trimble 5503 DRSTD, Exploatare, GPS, TransDatRO, WGS 1984, Stereografic 1970, TopoLT, ACad*

INTRODUCTION:

According to Law 50/1991 regarding the authorization of construction works, a construction is permitted only if a construction permit is issued. This authorization may be issued at the request of the holder of the title of ownership of a property - land and / or buildings - or another act which confers the right for the construction or demolition. LEGEA NR. 50/1991. Codul muncii. autor Marius-Catalin predut. editura universului juridic. noiembrie 2016, 1*

According to the Design Theme, there were established the following requirements:

At the basement level there will be placed an underground car park, organized in a single fire compartment, with access/exit from the courtyard, also technical areas, and a civil defense shelter.

At the ground floor there will be placed: housing and home stair access, public spaces with destination type SAD (services, offices, retail), with access from Eroilor and also buildings toward the internal courtyard.

Residential units will be placed at higher levels and will function in condominium regime. In the unbuilt outer space there will be built enclosure roads, with auto and pedestrian traffic, parking for tenants, and green spaces for general use.

Technical and constructive features

The building is equipped with civil defense shelter, located in the basement. For its localization it was taken into account the structural conformation of the building and the possibility to ensure specific technical characteristics of civil defense shelters.

When designing the shelter, compliance with the following provision was chased: "Technical rules regarding design and execution of civil defense shelters in the basement of new buildings".

Sizing shelter was done taking into account the number of persons housed wartime (148 people), considering the volume necessary for a person (minimum 2.5 m) and minimum area of 1 sqm allocated per person, the shelter will have an area of minimum 148 sqm.

The access in the shelter will be made by means of an airlock. Entry into the shelter will be done through a buffer room with an area of 3.76 square meters, with crossing goals of 1.80 x 0.80 m and thresholds of 15 cm. Crossing gaps are scanned at an angle of 90 degrees

The shelter will be made with reinforced concrete walls - 40 cm thick, reinforced concrete slab with a thickness of 26 cm, foundations below the walls and reinforced concrete floors. The shelters height will be 2.80 m, and the two rescue outputs arranged on different sides of the shelter will be made of reinforced concrete, thickness of 40 cm. The cover of the rescue output will be tight and carriageable.

The basement

The basement will have a single fire compartment communicating directly with the outside area and 80 parking spaces, of which at least 5% (4 parking lots) will be used by people with disabilities.

The car access to the parking lot will be achieved through an two-way auto ramp.

The building will be equipped with two elevators : for residential access and at the basement level.

Ground floor

- Four spaces for other purposes (SAD) each with separate accesses

- 1 room apartment

- 4 apartments with two rooms

- 1 apartment with three rooms

Floors 1-8

- 3 room apartment

- 7 apartments with two rooms

- 1 apartment with three rooms

Floors 9-10 (withdrawn)

- 1 room apartment

- 2 bedroom apartments

- 4 apartments with three rooms

The building structure is made of slab type foundation of reinforced concrete, floor slab thick type, pillars and reinforced concrete diaphragms, with closures of ceramic blocks of

masonry with vertical holes of 25 cm. The height between the floor and ceiling of the underground car park is 2.80 / 3.37 m and the home level is 2.65 m height.

The height of the building is +27,63, +33,63, as against the 0,00 - ground floor.

Systematized land level, near the pedestrian traffic, is at -0.65 compared to ground level - 0.00.

MATERIALS AND METHODS

The devices used in this project were:

TRIMBLE 5503 DR total station

The Trimble 5503 Direct Reflex (DR) servo-driven Total Station gives you access to highly productive methods for every measuring situation. Built on Trimble technology established in the highly successful 5600 series the 5503 is a totally reliable and productive solution for all of the conventional total station applications. With advanced servo operation the 5503 will increase the general productivity by 30% over mechanical instruments and an even more dramatic improvement in stakeout work. The 5503 DR Standard EDM opens up a new world of measurement applications. Objects that were previously difficult or impossible to measure with a prism can now be measured with a minimum of effort. Visible property boundaries and corners can be measured without gaining land access. Overhead cables, tunnels, bridges, quarry faces, stockpiles, buildings, and elevations can all be measured quickly, easily and safely. The 5503 DR enables you to measure up to 70 m (230 ft) to a 90% reflective Kodak Gray Card and 5,000 m (16,400 ft) with an accuracy of $\pm(2 \text{ mm} + 2 \text{ ppm})$ to a single prism. The 5503 DR also incorporates a coaxial laser pointer which is eye safe, even when observed through the telescope.

In order to achieve the measurement, we have used the following methods: retro intersection and forward intersection.

The principle forward intersection, consists in old stationing points (known coordinates), including both old points and new points whose coordinates we want to determine. Analytical process will be used.

It should be noted that these new point coordinates, are only provisional. It is recommended to perform more measurements than is strictly necessary, which are subsequently introduced into a processing program. http://www.geotrade.hu/2*

Retro intersection method put into practice with Trimble total station DR 5503 consists in stationing on an unknown coordinates point, aiming on a known coordinates point to determine the coordinates of the point which is stationary.

TRIMBLE R8 GPS system

Through advanced Trimble 360 tracking technology and a comprehensive set of communication options integrated into a flexible system design, this integrated GNSS system delivers industry-leading performance in a rugged, compact unit. Supports signals from all existing and planned GNSS constellations and augmentation systems. It is now possible for surveyors to expand the reach of their GNSS rovers into areas that were previously too obscured, such as under trees and in dense urban areas.

In order to achieve the GPS measurements we used the RTK method (Real Time Kinematic) using the reference station from Timisoara - TIM1_2.3. Measurement engine used is a Smart Track type, which acquire satellites within seconds. The antenna is dual frequency, type GX1230 with SmartTrack and supports GLONASS signals, GPS and GALILEO L15. Trimble GPS R8 has QWERTY keyboard and touch screen and it's able to directly visualize the measurement on the field, as you would see them at the office. Raw data can be imported

directly from the GPS R8, but for this import-export we used the Trimble Data Transfer Utility. The GPS reference system is WGS 84 (World Geodetic System).

The transformation of raw data from ETRS89 system to STEREO'70 was made with TransDatRO application, and then reporting points in AutoCAD using TopoLT program, a program that operates under ACAD's platform.

The coordinate transfer from the ETRS'89 reference system to Stereografic'70 system was done using TransDat 4.01 produced by A.N.C.P.I.

GNSS permanent station used to make measurements - Timisoara - TIM1_2.3, RTCM-Ref 0000 with the following coordinates:

Table 1

GNSS permanent station used to make measurements

COORDONATE ELIPSOIDALE – ETRS89					
Denumire Statie permanenta	Clasa	B[m]	L[m]	He[m]	
Timisoara (TIM1_2.3)	A	45° 46' 47.65271" N	21° 13' 51.46281" E	154.7278 m	
COORDONATE STEREOGRAFICE 1970					
Denumire Statie permanenta	Clasa	X(m)	Y(m)	Z(m)	
Timisoara (TIM1_2.3)	A	482495.226	207132.378	111.33	

Ellipsoidal coordinates that can be processed in the program are those obtained by connecting to the national geodetic

From the planimetry point of view (coordinates X and Y) accuracy is satisfied, all the points have been obtained with an accuracy between 2-4cm below the setpoint (5cm X and Y coordinates);In terms of altitude, the shares obtained by GPS measurements also met the setpoint : 3-5cm.

The points resulting from conversion, from the WGS 1984 system to STEREOGRAFIC 1970 reference system were reported in Autocad, for pooling points and drafting the plan of situation.<http://www.trimble.com/>,3*

LEICA SPRINTER 150(M) / 250M Leica Sprinter Electronic Levels

The Sprinter 150 covers almost all construction applications. It automatically determines your delta height. Enter your benchmark, measure the backsight B, measure the foresight F and the result will be displayed instantly.

The Sprinter 150M and 250M are the perfect tools for advanced construction levelling tasks. Store up to 2'000 measurements, download and transfer them for further calculations to Excel® to a PC via USB. The delta height calculation and programs line levelling, cut & fill and monitoring facilitates your levelling jobs significantly. The 0.7 mm accuracy of the 250M and the monitoring program allow machine and construction subsidence measurements.

RESULTS AND DISCUSSIONS

In order to execute the work, a surveying was done using the projection system WGS 1984 on the cadastral plot number 441 376 (Fig. 1) in order to develop a case plan 1: 1000 scale according to the technical norms in force, coordinates which have been transformed with

TransDat4.0 in Stereographic 1970 coordinates, and reference system is BLACK SEA, 1975 – 0 altitude.



Figure.1 C.F. 441376

For measuring and plotting the building was established a network of seven terminals coordinate stereograph 1970 (Fig. 2, Fig. 3), subsequently due to reduced visibility were added another two terminals.

After the building was raised some terminals have become impracticable and to continue drawing we had to use reflective targets for topography (Figure 4), which are located in different buildings and electricity poles in the area.

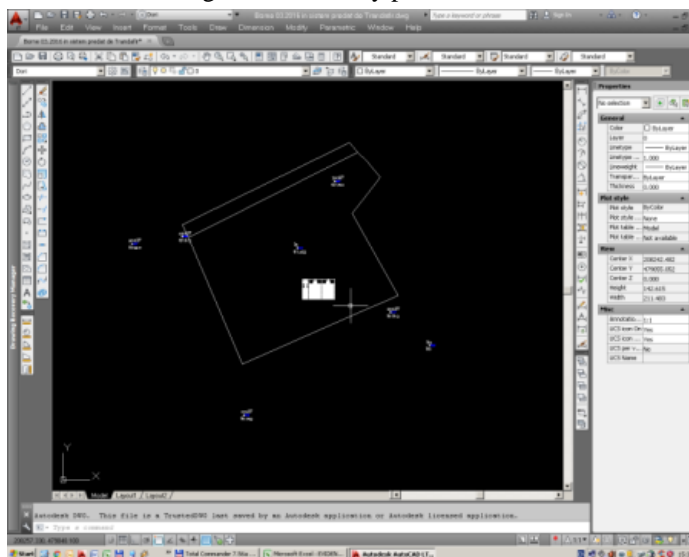


Figure. 2 Network Terminal

Nr. Pct.	X [m]	Y [m]
BO	479034.184	208284.913
B1	479068.155	208238.818
100ST	479009.974	208220.243
200ST	479045.754	208271.235
300ST	479091.420	208251.948
400ST	479072.125	208198.770
500ST	479069.605	208181.332

Figure. 3 Stereographic Coordinates 1970



The Trimble 5503 DR total station data download was done with the Terramodel 10.40 program, after this procedure the measured points were introduced in AutoCAD2014. Once introduced in AutoCAD, I performed the polyline order to form the outline of the building and the property limit (Figure 5)

Next I made an analysis in terms of comparing data from total station measurements and data from architect and designer of the building (fig. 6,7).

Figure. 4 Topographic Targets

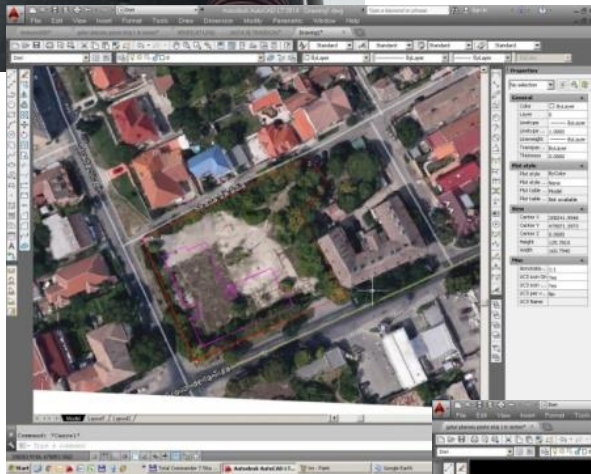
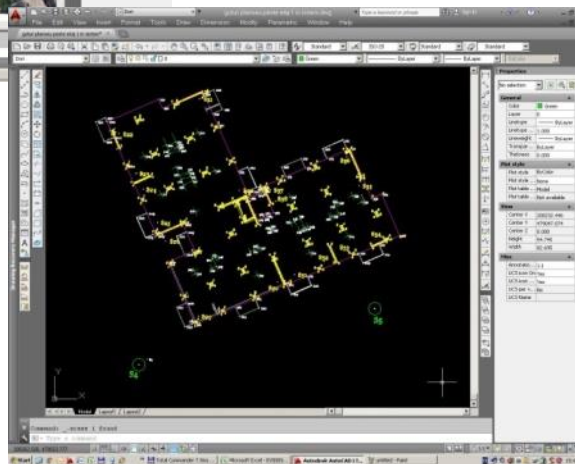


Figure.5 The building with the pillars and diaphragms

Figure.6 The outline of the building and the property limit



CONCLUSIONS

- This Work is done in order to achieve collective housing;
- The construction has the following regimen B+GF+ 8F+2w;
- By using the applied colors on the façade, the volumetric assembly will increase;
- Taking into consideration the facts described at the constructive regime paragraph, the objective lacks sources that cause emissions of fumes or artificial fog;
- The works to be done to achieve the investment will not affect adjoining buildings located on the plots;
- Unfolded built aryl is 8971.87 sq.m.

BIBLIOGRAPHY

- BADEA GH., Cadastru general, Editura Conspress, București, 2005
- CIOLAC V., RITT C., BERAR T., Soem aspect concerning the use of electronic statiob in special work conditions, Buletinul USAMVB Cluj-Napoca, pg. 270-272, 2002
- CRISTA FL. ET ALL, 2013, Changing quality of maize grain following mineral fertilizers application, Current opinion in Biotechnology
- IMBREA FLORIN,2011, Proiectele de cercetare în domeniul agriculturii în parteneriat public-privat– provocări privind managementul și finanțarea, Agrobuletin Agir An III,
- IMBREA FLORIN,2011, Cercetarea agricola mai aproape de ferma, Agrobuletin Agir An III, nr. 1 (8),
- RADULOV ISIDORA ET ALL, 2009, Soil chemical future modification after long and intensive mineral fertization, Analele Universitatii din Oradea, Fascicula protecția mediului, Nr. 14
- POPESCU C., Cadastru general, Inregistrarea sistematică a imobilelor, Editura Eurostampa, Timișoara, 2015
- HERBEI M., ULAR R. – Întocmirea și redactarea hărților și planurilor topografice, ed. Dalami, Caransebeș, I.S.B.N.978-973-1717-42-5, 2011:
- POPESCU C., POPESCU G. - Indrumator pentru elaborarea unui proiect de cadastru – Aspecte teoretice si practice-, Editura EUROBIT, Timisoara 2015, pg.195, ISBN 978-973-132-276-6;
- A SMULEAC, C. POPESCU, F. IMBREA, G. POPESCU, L. SMULEAC - Topographic and cadastre works for the establishment of an animal farm with NPRD funds, measure 121, Varadia, Caras-Severin county, Romania, 16th International Multidisciplinary Scientific GeoConference SGEM 2016, SGEM Vienna GREEN Extended Scientific Sessions, SGEM2016 Conference Proceedings, ISBN 978-619-7105-79-7 / ISSN 1314-2704, 2 - 5 November, 2016, Book 6 Vol. 7. 685-692pp, DOI: 10.5593/SGEM2016/HB63/S12.088
- ȘMULEAC, LAURA; ONCIA, SILVICA; IENCIU, ANIȘOARA; BERTICI, R.; ȘMULEAC, A.; MIHĂIESC, V., Influence of anthropic activities on ground water in Boldur, Timis county, Romania, Research Journal of Agricultural Science, Vol. 46 Issue 2, p370-375. 6p., 2014
- ȘMULEAC LAURA, SIMONA NIȚĂ, ANIȘOARA IENCIU, ADRIAN ȘMULEAC, DICU DANIEL - Topographic survey for the monitoring of the impact of the Brua/Rohuat pipe on water flow in the irrigation system at Fântânele, Arad County, Romania, SGEM2016 Conference Proceedings, ISBN 978-619-7105-81-0 / ISSN 1314-2704, 2 - 5 November, 2016, Book 3 Vol. 3, 333-340, 2016
- LUMINIȚA LIVIA BĂRLIBA, C. A. POPESCU, C. BĂRLIBA, *Elemente de cadastru* - Note de curs și lucrări practice, Editura Eurobit, 2013.
- *** LEGEA NR. 50/1991. Codul muncii.autor marius-catalin predut.editura universului juridic.noiembrie 2016
- *** [HTTP://WWW.GEOTRADE.HU/](http://www.geotrade.hu/)
- *** [HTTP://WWW.TRIMBLE.COM/](http://www.trimble.com/)
- *** [WWW.LEICA-GEOSYSTEMS.US](http://www.leica-geosystems.us)