TOPOGRAPHIC WORKS FOR PREPARATION OF MAPS BY MAPPING AND SURVEYING, LOTS PLANS FOR THE POSSESSION OF SURFACE 103,68 HECTARES, LAND WITH FOREST LOCATED IN THE MUNICIPALITY CRICIOVA, TIMIS COUNTY

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ABSTRACT

The work describes a case study regarding the method to determine the support network as well as the carrying out of the topographic and geodetic works in connection with the project ***"Execution of maps and subdivision plans for the vesting in possession of the land area of 103.68 ha covered with forest vegetation on the territory of the Criciova Commune, Timis County by means of mapping and topographic measurements".*** *In order to solve all the problems related to such works with maximum efficiency, diligence and precision, modern and high-tech methods and pieces of equipment such as total stations and GPS equipment have been used. Furthermore, in order to obtain results as accurate as possible and to provide stability and high reliability of the solutions found, specialised data processing software such as the Leica Geo Office Combined has been used. The software allows data processing and network compensation at the same time.*

INTRODUCTION

The topographic survey works as well as the drawing up of the specialty project related to the topographic surveys have been carried out by a specialised company from Timişoara, SC BLACK LIGHT SRL, and the beneficiary has been the Town hall of Criciova Commune, Timiș County.

In order to carry out all the operations and topographic surveys as established in the design brief, the following works have been completed: firstly, the land has been rigorously inspected to determine the support network execution method. Then, the station points necessary for the topographic survey have been marked while considering the fact that it is a forest covered area which requires the compliance with the standards applicable to the execution of a support network by means of the GPS technology. At the same time, the method used to carry out the survey and the type of the topographic device used to carry out the topographic survey have also been considered.

MATERIALS AND METHODS

The pieces of equipment used to carry out topographic-geodetic works have consisted of double frequency total stations TCR 1205 R300 and GPS pieces of equipment providing high precision and measurement control.

The advantages of the GPS technology when carrying out topographic works are:

- High precision 1 – 2 cm (coordinates X, Y, H)
- Provides graphic data display
- Provides a high number of tracing operations
- Allows tests to be performed at long distances
- Data can be transmitted directly from the site to the office
- Rapidity and high measurement control

THE TOPOGRAPHIC WORKS PROPOSED HAVE BEEN DIVIDED INTO SEVERAL STAGES

The stages completed for the execution of the objective have been:

Carrying out research in order to obtain the mapping materials and the technical documents recently drawn up on the territory of CRICIOVA Commune, TIMIŞ County from the archive of the City hall of TIMIŞOARA, Town hall of CRICIOVA, National Agency of Cadastre and Land Registration Timiş, Forestry Department Timiş, in order to consider them upon plan reambulation.

Site works:

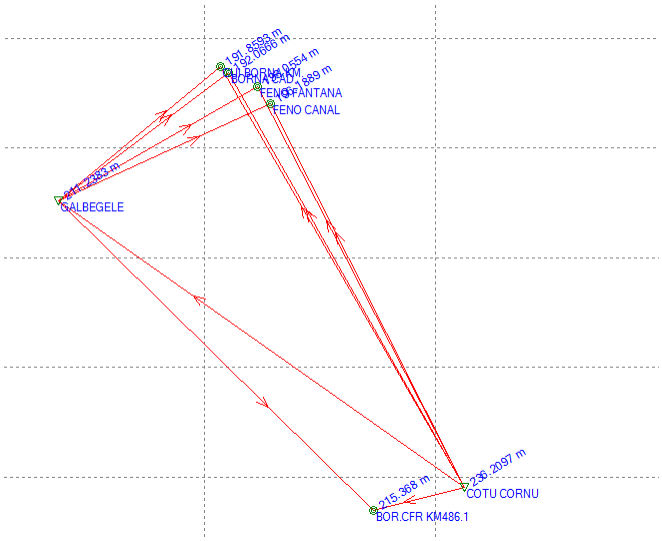
- ⇨ Identify the site, recognise the land and its borders as well as identify the high order support points in the national geodetic network;
- ⇨ Carry out necessary measurements by means of static methods and RTK (Real Time Kinematic) using double frequency GPS equipment LEICA GX1230 GG professional series GLONASS-NAVSTAR;
- ⇨ GPS static measurement sessions have been carried out to determine the parameters for the trans-calculation from the WGS in the national projection system Stereo‘70;
- ⇨ Support points have been determined by means of GPS measurements using the static method (remarks of minimum 2 ore on points) in order to provide very high precision (0.005 m on x, y namely 0.006 m on z). High order points (especially from the same order) have been stationed in the triangulation network which shall provide the required precision and rapidity of the execution.
- ⇨ For the detail measurements, a method combined with the following has been used:
  - GPS RTK (Real Time Kinematic), the fixed GPS reference station shall be placed at the middle of the distance and the GPS RTK receivers shall communicate all the time with the reference station. Since the real time receivers are connected to the reference station, they shall provide a precision of 1-2 cm when carrying out the survey on-site and in the automatic LEICA TPS 1200 total stations.
  - The total station has been used to execute the polygonal courses with the ends resting on the GPS determined terminals in the geodetic networks monitoring crustal thickening compensated by the method of the smallest rectangle; then, the detail points in the interest area have been measured.

Office works:

- ⇨ GPS measurement processing: is carried out by means of a specialised software LEICA GEO OFFICE COMBINED with the following calculation options:
  - L1/L2 processing;
  - Datum & Map transformation;
  - Design & Adjustment;
- ⇨ Drawing up of the subdivision plans according to the tables for the vesting in possession issued by the Real Estate Local Committee;
- ⇨ Drawing up of the subdivision site plan for the entire area under study;
- ⇨ Drawing up of the plans according to the protocols on the vesting in possession;
- ⇨ Drawing up of the related cadastre documents (upon work completion), in compliance with the requirements of Order no. 634/13.10.2008

— regarding the endorsement of the Regulation on the contents and method of drawing up the cadastre documents with the purpose of recording them in the Land Book.

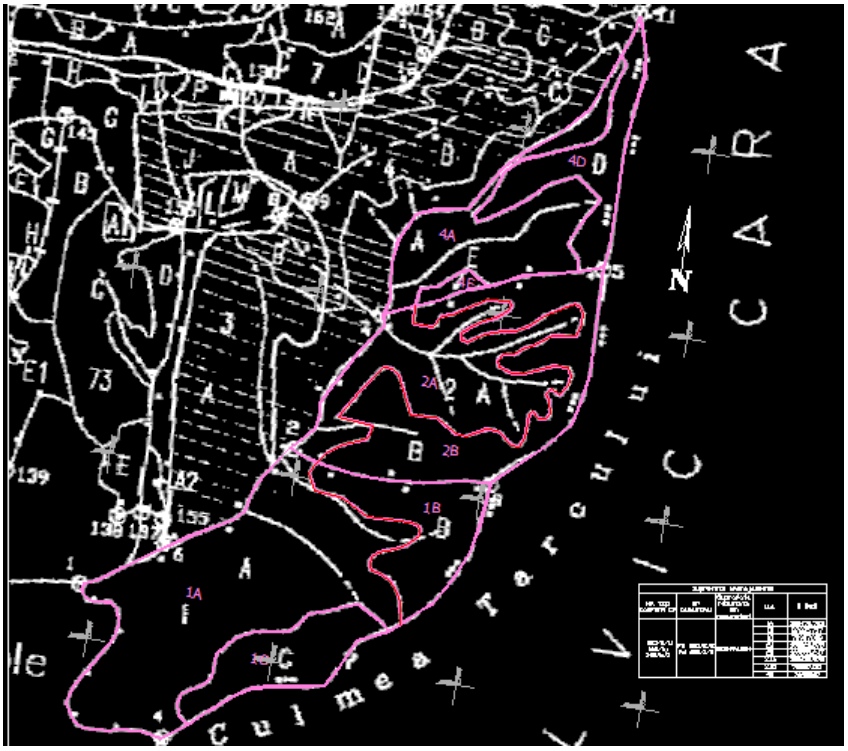
GPS NETWORK SCHEME



RESULTS

Running no.		Coordinates	Corrections	Precision
BOR.CFR KM486.1	Latitude	45° 30' 15.79194" N	0.0000 m	0.0020 m
	Longitude	22° 09' 35.97659" E	-0.0004 m	0.0020 m
	Height	215.3656 m	-0.0024 m	0.0020 m
BORNA CAD.	Latitude	45° 35' 35.35291" N	0.0001 m	0.0023 m
	Longitude	22° 07' 04.89404" E	0.0001 m	0.0023 m
	Height	192.0669 m	0.0003 m	0.0023 m
COTU CORNU	Latitude	45° 30' 32.78600" N	-0.0001 m	0.0015 m
	Longitude	22° 11' 10.27571" E	-0.0002 m	0.0015 m
	Height	236.2102 m	0.0005 m	0.0015 m
CUI BORNA KM.	Latitude	45° 35' 39.63642" N	0.0002 m	0.0023 m
	Longitude	22° 06' 56.81850" E	0.0001 m	0.0023 m
	Height	191.8596 m	0.0003 m	0.0023 m
FENO CANAL	Latitude	45° 35' 12.18484" N	0.0002 m	0.0023 m
	Longitude	22° 07' 48.82692" E	0.0001 m	0.0023 m
	Height	196.1892 m	0.0003 m	0.0023 m
FENO FANTANA	Latitude	45° 35' 24.52342" N	-0.0006 m	0.0024 m
	Longitude	22° 07' 35.58349" E	0.0001 m	0.0024 m
	Height	193.0563 m	0.0008 m	0.0024 m
GALBEGELE	Latitude	45° 34' 01.43057" N	0.0002 m	0.0012 m
	Longitude	22° 04' 08.27804" E	0.0002 m	0.0012 m
	Height	211.2385 m	0.0002 m	0.0012 m

SITE PLAN OF THE SURVEYED AREA



CONCLUSIONS

- ⇨ The topographic and geodetic surveys carried out by modern methods and pieces of equipment have generated very low measurement errors which have perfectly complied with the admitted tolerance ranges and have provided a very high efficiency of the work execution.
- ⇨ The automatic data processing has been carried out using specialised software Leica Geo Office Combined, allowing the processing and network compensation at the same time, which has generated accurate results and high stability and reliability of the solutions proposed.
- ⇨ Based on the absolute coordinates of the points, the site plan has been drawn up at the scale of 1: 5000 and faithfully provides all the on-site details especially for this type of works.

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