

## THE IMPLEMENTATION OF THE GIS PROJECT FOR THE REGINA MARIA- BRAN PARK AND THE PRESENTATION OF THE REFURBISHMENT SOLUTIONS

Lorena MITRICĂ

Scientific Coordinator: Assoc. Prof. PhD Eng. Cristian Cornel TEREȘNEU

Transilvania University of Brasov, Faculty of Sylviculture and Forest Exploitation, 1 Șirul Beethoven, 500123 Brașov, Phone: +40268 418600, Fax: +40268 475705, e-mail: f-sef@unitbv.ro

Corresponding author email: mitrica.lorena@yahoo.com

### Abstract

*The paper aims at mapping the surface for the purpose of implementing the GIS project for the Regina Maria Park, located in Bran, Brasov County, and the presentation of the refurbishment solutions. This paper provides the topographic documentation necessary for the design and the realization of the GIS complex project. In order to achieve this goal, several objectives and stages were followed. For obtaining all the measurement there was used the closed-loop roadside method combined with the radiation method. Additionally, there were made measurements on the field through which all the topographic details existing in the study area were radiated for the purpose of obtaining the topographic plan by which the existing situation in the field was redeemed. The necessary data for the GIS project were also collected from the field. The data obtained from the measurements that took place on the field was processed using specialized software and compensated through different methods. Using these final data all the necessary drawn pieces for completing the paper were obtained. Through the specialized programs, the complex database for the GIS project was created. Achieving these objectives aims at realizing and presenting the solutions for the refurbishment of the Regina Maria – Bran park.*

**Key words:** GIS, geo-topographic measurements, redevelopment.

### INTRODUCTION

Regina Maria Park is situated in Bran, which belongs to Brasov County. It is located in the central area of Bran and represents a wonderful place to walk, built and named in memory of the Queen Mary.

The main purpose of this paper is the realization of the project that comprises the redevelopment of the park and presenting the solutions. For obtaining this project it is necessary to prepare the GIS project by means of measuring methods and geo-topographic projection.

Concerns about the arrangement of parks, green spaces in general existed since ancient times, some ancient peoples having a special cult for this. The paper contains data on the area in the study, field data collected using complex measurements that were possible to be realized with specific equipment.

Finally, the work contains drawn pieces from the measurements, the GIS project and the park redevelopment solutions.

### MATERIALS AND METHODS

The Regina Maria park area, belongs to the commune of Bran, in the county of Brasov, Romania (Figure 1).



Figure 1. Location of the commune of Bran  
The direct measurement method was done by fieldwork using GNSS equipment and the total station. The method of data processing is done

by offsetting it in a classical manner and through the Leica Geo Office and Toposys programs.

GIS methods are applied through georeferencing the plans, GIS analysis and through AutoCad, ArcGis, ArcInfo programs.

## RESULTS AND DISCUSSIONS

To achieve the final goal, there were followed certain phases characteristic of the topographic domain, both specific measurements and complex methods that allow obtaining complete and precise parts.

The identification of the existing cartographic basis in the area was carried out by research on the cadastral plans, maps and the orthophotomap. These exist on the cartographic basis of the cadastre, which provides information of the area that is under study.

In this project, for the identification of the surface studied, the trapezoid was used at the scale of 1: 5,000 from 1973, namely the trapeze L-35-87-Bc-4-IV, which was georeferenced in order to overlap the measurements on the existing plans, on the trapeze (Figure 2).



Figure 2. Trapeze and georeferenced trapeze

For an updated image of the land in the area of interest, we also have the orthophotomap (Figure 3), which has a great amount of visual information. This contains the geometric qualities of a plan (Vorovencii, 2010). In order to carry out the measurements, the ground was analyzed and depending on the situation on there, the measurement method and the necessary equipment were established. Thus the closed-loop method was combined with the radiation method.



Figure 3. Overlap on orthophotomap

During the completion of this paper, for the construction of the lifting network needed to draw up the topographical plan, there was created in the first stage a local support network with arbitrary coordinates. These points were materialized on the ground and placed so that on these points they will lean later station points used in the work for the elevation plan. The determination of that network was done using GPS (Global Positioning System) means using ROMPOS services and also through the pure, cinematic procedure in real time RTK (Chițea and Hanganu, 2013). In order to determine the support network, the existence of 2 permanent GNSS stations, within the RN-GPS network, were identified: Sinaia, Sfântu Gheorghe. The GNSS equipment used in the work is the Leica GPS900 and the RX900 receiver (Figure 4).



Figure 4. The GNSS equipment Leica GPS900

In the second stage of the field measurements, there were established the points of the lift network and materialized on the ground so that

from these points it is possible to recording all topographical details in optimal conditions and to obtain a complete plan.

Direction points are selected directly on the ground after the points of the support network have been identified beforehand. To select the position of the traverse points, a number of principles must be considered (Iacobescu and Barnoiaea, 2010).

Both the points of the support network and the lifting network were materialized on the ground using metallic and appropriately flagged bolts, painted in red.

The Leica TCRM 1103 plus was used to build the lift network, this total station is high-quality equipment that uses advanced technology that allows measurements to be performed easily (Figure 5).



Figure 5. Total station Leica TCRM 1103 plus

The traversing starts at point 1 of the support network of the known coordinates. At this point, has been stationed and the angle 0 was set by means of a visa to the point 2 of the lift network then taken back to the point 7. The derailment continued in the topographical sense. The traversing closed at the starting point, station 1 (Figure 6).



Figure 6. The traverse

The compensation of the data was done by the following methods: classical and rigorous.

The classic, empirical compensation method is a simple and convenient one, but it is less precise, it is accomplished through several steps consisting of offsetting the coordinates of the points according to the non-closings on the guidelines and the relative coordinates of the points. In order to achieve the classic compensation, we use calculation formulas.

The rigorous compensation method is done automatically by Toposys software which allows the processing and compensation of all types of measurements used in geodesy for topping up local geodetic networks. In this, the primary data can be entered as: coordinate lists - fixed points, which contains: horizontal and vertical / zenith angles and distances, quota lists or level differences lists.

This compensation is carried out in several stages.

By means of the two compensations the final coordinates of the traversing points are obtained.

To create the GIS project in the design software used, AutoCAD, it is necessary to create a new project and set the working mode and certain settings related to points, text and so on.

After making these settings, all the points resulting from the measurements are imported, and through the layers, the drawn elements are individualized.

The drawing is then digitized in ArcGIS by linking the corresponding field to the associated layer.

Topology creation and error correction will be done in ArcInfo.

After completing the project in ArcGIS by vectoring, i.e. completing the plan with the details that could not be radiated in the field, the database containing information about the existing graphic entities will be filled in, or additionally fields may be added, deleted or modified.

The GIS software is designed to create, manage, analyze and display all geographic reference information (Tereşneiu and Ionescu, 2011) The GIS product allows us to view, understand, query and interpret from a geographical point of view. The GIS analysis determined the areas occupied by the tree crown projections, the alleys surface, the

number of specimens requiring crowning, the area of the green areas and the areas occupied by the constructions (Tereşneu, 2012).

Finally, the redevelopment is intended to be a major one. In the center of the park is planned to set up a space for organized outdoor concerts, to supplement the number of banks, to introduce many examples of gladioli, decorative plants, playground for children, shops, etc.

## **CONCLUSIONS**

The objective on which this work is structured is the realization of the GIS project, which can be used to get and present the solutions for the refurbishment of the park. In order to achieve

this objective, measurements of elevation of the topographic details were made on the ground and compensations were made for the precise data of the final data used for the GIS project.

## **REFERENCES**

- Chiţea C Ghe., Hanganu, H., 2013: Spatial geodesic technologies. Part II Satellite Surveying (GS).
- Iacobescu, Barnoiaie, 2010, Error Assessment in some special traverses measured with total station.
- Tereşneu, C C., 2012: Automatic data processing of geodetic data 2012.
- Tereşneu, C. C, Ionescu, M., 2011, Infographic for topography and cadastre.
- Vorovencii, I., 2010: Specialty Cadastre, 2010.