TOPOGRAPHICAL-CADASTRAL MEASUREMENTS NECESSARY FOR THE EXECUTION OF SEWAGE SYSTEM IN JENA VILLAGE, TIMIS COUNTY, ROMANIA

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Abstract: *The paper is based on results of a land survey to modernize it according to E. U. requirements the work was performed in JENA, TIMIŞ County. This paper is prepared by the methodology in force, performing topographical-cadastral works necessary for the execution of sewage system in Jena village, Timis County, Romania on 2936.00 m length. In this context, what we have studied in our paper is the influence of topography on the rural areas, the way it is applied in these areas, and implicitly its influence on regional development. The stages of the land survey were as follows: - Support survey network, made of the points in the national survey network which stood at the basis of our land measurements; - Determination of the survey network, consisting of all the traversing posts; - Actual planimetric or leveling survey, by determining the position of the characteristic points that define the details of the area. The precision which has to be accounted for, in other words the maximum admitted errors in determining the coordinates of the points found on the contour of the details is of ±15 cm in flat open country. Topographical field works were conducted with total station Leica TC 805 by polygonal course process using the Romanian national geodetic system - Stereographic Projection 1970. Data processing was performed with post-processing software and specific programs of work - TOPOSYS, AUTOCAD. For the preparation of documentation, after the measurements, the data stored in electronic memory of tachymeter - Total Station Leica TC 805 were transferred to the computer memory. Levelling points were determined by polygonal course for geometrical levelling. Processing of surveying measurements was performed with the software TOPOSYS.*

Key words: *geometrical levelling, total station Leica TC 805, polygonal course, topographical-cadastral works.*

INTRODUCTION

The Romanian rural development represent a synthesis of specific research, a opportunity for an appropriate treatment of the whole policy regardless the sustainable and balanced development of mankind, in order to improve its living standard, and also to grow the youth attraction for any kind of profession to the so named *life at the countryside.*

Knowing, researching, improving and developing the rural space means complex activities of vital importance for any country not only by dimensioning the rural space through its area but by the share of the population involve into productive, socio-cultural, habitat and tourism activities. The Rural Space European Chart emphasizing that the rural territory of Europe is about 85% from the whole area and affect direct or indirectly more than half of the European population. In more European countries is stated that the rural, together with all that belong to this term: population, villages, culture, traditions, history, economic and social life, consist the so called *visit card of the country, its national identity.*

For Romania, the rural space, as dimension, structure and functionality has his specific importance. First at all, the dimension of the Romanian rural territory considered by

his share into the Romanian territory and by the rural share of the population consist a basic element in defining the character of this territory as part of the national territory. The Romanian rural territory represent 93,7% from the Romanian territory, and in this territory live nearly half of the country population (approx. 45%).

MATERIAL AND METHODS

In this paper, it has been studied, the influence and the method of topography into the cadastral field for rural areas and implicitly the regional development.

The main steps for the topographic works were as follows:

- The geodetic network made by national geodetic network, the background for the topo-geodesical works;
- Setting the main traverse network, made by the traverse stations;
- Tachimetric field measurements in order to determine the position of specific points from the field.

The requested accuracy, necessary to determine the points coordinate for points that surround the field details is to be considered de ±15 cm in the lower plain zone.

The works were effectuated by using the total station Leica TC 805. Using the total stations, the user obtain simultaneously the angles and the distance, after setting the instrument height and target height. Using also a special menu of coordinates is important because:

- points coordinates (x, y and z) of the points situated on to a route, could be obtained straight in the field by successively determination, the traverse being in fact made by a chain of tachimetric determination;
- the user has a straight control, on the last sight, towards to the closing point of the framed traverse or to the starting point for the close traverses;
- mistakes errors are mostly excluded, because the measurements and the data recording process is made automatically, by using the operator commands, confirmed by the instrument;
- measuring errors, practically reduced to the optical plumed operation and to the target position, are cumulated along the traverse, therefore the final result is highlighted by unclosing the traverse on the final point coordinates.

Points reported itself, is the final operation and is executed automatically and securely in most cases with appropriate and adequate facilities.

Finalizing the plan requires the drawing of the level lines, marking of the toponimy, marking boundaries, expanding the data base (scale, field measurements data, the name of the company, the name of the authorized operator) etc.

The purpose of the work was the execution of Topo-Cadastral measurements to perform the sewage system in JENA village in length of 2936 m.

Jena village is situated on the South-East part of the Timis County near the border with Caras-Severin County (figure 1), at around 22 km. From Lugoj along the road and railway road Timisoara - Bucuresti.

As geographic site, Jena has 22^{o} East longitude and $45,7^{o}$ parallel as North latitude being situated in a plain zone; it has a nice Criciova hills overview, hills that are situated in the North, North-West part of the village. At a small distance, at the lower part of these hills, is the Timis valley with his wide meadow, around 1-2 Km. Until the Gavojdia village, the village hearth basis has heights around 20 – 30 m. Resembling the Timis river stream the mountain terrace has a level difference of about 8-12m. The slope from the front of the terrace has a 10-14 ^{o} slope. On the bottom of the terrace it can be find, from place to place micro depressions where the water caused serious problems leading to periodical soil swamp. The erosions valley

wide varies from several meters to 200-300 m. On these terraces is situated Jena village, with perpendicular streets framing rectangular cvartal, typical for plain sites. (Figure 2).

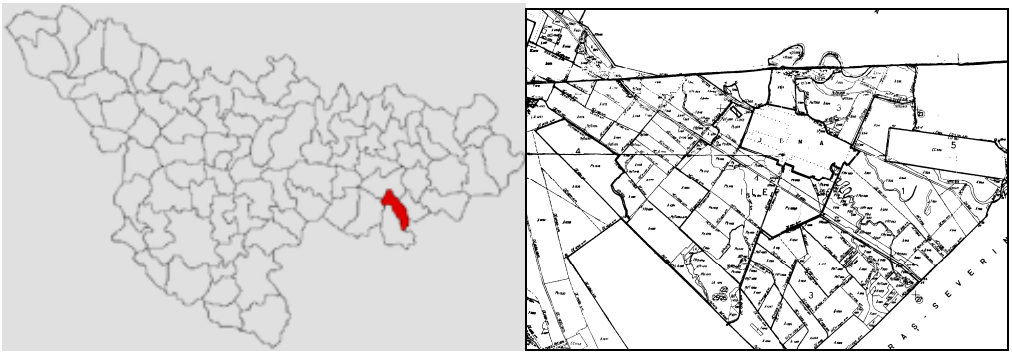

Figure 1.The position of Jena commune, inside Timis County

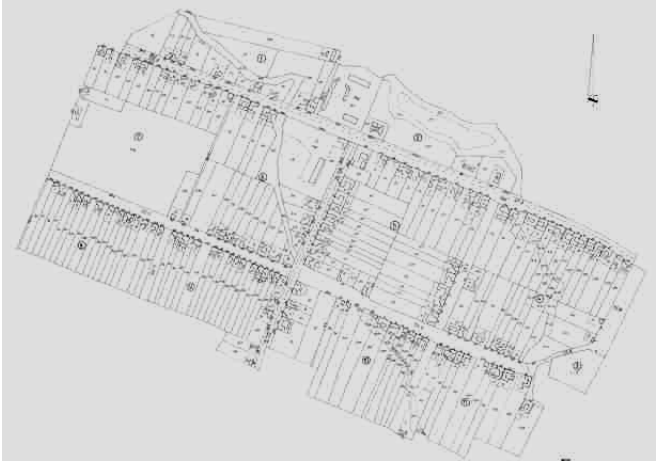

Figure 2. Jena commune

RESULTS AND DISCUSSIONS

The topographic works were made by using the total station LEICA TC 805 in the national geodesic projecting-system Stereographic 1970 by tachimetric traverse using as starting point BORNA CSA Nr.121 by sighting the Orthodox Church GĂVOJDIA and as closing point BORNA P37 and sighting point Orthodox Church JENA (table 1).

Table 1

Points coordinates used by the traverse

POINT DESCRIPTION	X[m]	Y[m]	H[m]
Orthodox Church GĂVOJDIA	461118.670	267984.990	
C.S.A. mark #.121	460462.390	270917.950	144.390
P37	459719.953	272533.444	147,356
Orthodox Church JENA	459900.470	272184.47 0	

The traverse was developed along the village streets (figure 3).

The data processing has been made by post processing software using specific software -TOPOSYS, AUTOCAD.

Figure 3. Traverse sketch

For preparing the documentation, after the field measurements, the recorded data into the total station LEICA TC 805 were transferred into the computer memory. After processing the data the following parameters were obtained:

Data : 2006-04-15 16:55:51
Sistem de coordonate : X -> NORD
Unitatea de masura a directiilor: Centezimal
Unghi vertical : Zenital
Metoda de masurare a distantelor: Orizontala
Reducere la nivelul marii : DA
Coeficient de scara : 1.000000
Drumuire
Prima statie : CSA121 punct cunoscut, orientat
Ultima statie :P37 punct cunoscut, orientat
Puncte calculate : 13
Lungimea totala[m]:3456,,33
Eroare neinchidere directii [gr]: 0.0058
Corectie directii [gr]: 0.0006
Eroare neinchidere coordonate X[m]: -0.545
Eroare neinchidere coordonate Y[m]: -0.688

The point heights were determine by altimetry traverse. For processing the altimetry measurements TOPOSYS software was use.

The topo-geodesical software TOPOSYS version 4 is a dedicated software, that is having an increase functionality, offering routines for processing the field data measurements

using Windows environment as main operating system, with wide possibilities for graphic and alphanumeric data management onto MS-Access.

By using the export facilities of TOPOSYS software *.DXF (***D***ata E***x***change ***F***ile), file format use by CAD software's, after processing the field measurements by using specific integrated media as AUTOCAD and LISCAD the following documents were achieved :

- The situation plan 1: 1000 scale
- The topographic network 1: 1: 1000 scale
- Situation plan with heights 1: 1000 scale (figure 4)

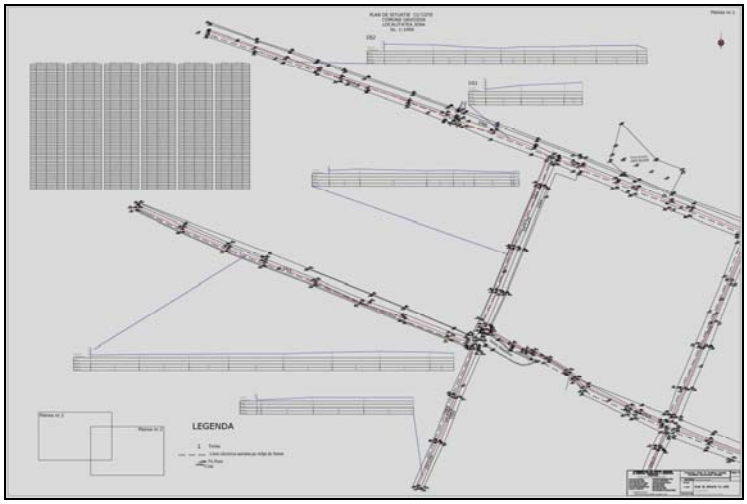

Figure 4. Situation plan containing heights, scale 1: 1 000

- Situation plan containing streets 1: 200 scale
- Section of Cadastral plan for Jena village 1:5000 scale
- Framed area 1: 10000 scale

CONCLUSIONS

It is worth noting that, due to modern technology, the elevation works are performed by simplified technical procedures, which do not require any supplementary effort from the part of the operators. Also due to advances in technology, the time required by these procedures is much reduced.

Lately, the topo-geodesic methods have practically replaced all the traditional survey methods, as they have the advantage that, on the one hand, they present a highly efficient planimetric survey, and on the other hand, they allow of electronic inventorying of the work performed.

It is estimated that the already remarkable performance of the global positioning systems will develop in the future towards obtaining even higher precision than the one they have at present, in a shorter time and with lower costs. This will be especially beneficial for the geographic information systems (GIS) (because they will provide easier obtaining of field data, which is the main problem of the present systems), more precise location of SSP – permanent test surfaces in the works related to inventorying.

The expansion of the use of electronic computers has determined, among other things, the development of a new type of representation of geographical phenomena, namely the

digital map, which represents the accessible variant on the computer, used on a large scale in various fields of activity: technical, economic, social and scientific as well.

The data recorded with the help of GPS devices use a universal system for expressing coordinates (e.g. U.T.M.). However, because in our country the system in use is 1970 Stereographic projection system, there appear computation problems when we speak of direct integration of the data gathered with GPS devices.

Ground surveys, which are recommended and performed on smaller areas, are still representative in volume. Due to their precision and efficiency, the newly-developed devices are undoubtedly superior to traditional ones.

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