USING MODERN CADASTRAL TECHNOLOGY FOR SWARDS IDENTIFICATION IN CRICIOVA VILLAGE, TIMIŞ COUNTRY, ROMÂNIA

APLICAREA TEHNOLOGIEI MODERNE DE CADASTRU PENTRU IDENTIFICAREA UNOR PAJIŞTI DIN LOCALITATEA CRICIOVA, JUDEŢUL TIMIŞ, ROMÂNIA

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Abstract: *The purpose of the paper is to realize a single survey work of swards from Criciova Timiş Counnty, in order to identify the properties and register them into the land record.*
In order to identify the parcel limits, which is the object of this paper, we proceed in using the GPS ProMark 3 station static module in the station point from the Class II national geodesic network "La Cuciuba" and the "stop and go" module of the station for every parcel corner, later one after downloading activate the possibility of making plans on the whole swards territory of the locality.

Rrezumat: *Elaborarea lucrării are drept scop executarea unei lucrări de ridicare topografică de planimetrie a pajiştilor în localitatea Criciova, judeţul Timiş, pentru identificarea acestora în vederea înscrierii în cartea funciară cu caracter nedefinitiv, în conformitate cu Hotărârea Consiliului Local al comunei. Pentru identificarea limitelor terenurilor ce fac obiectul acestei documentaţii, s-a procedat la ridicarea topografică a zonei, folosind staţia GPS ProMark 3 modulul static în punctul din reţeaua geodezica de stat de ordinul II "La Cucuiba" şi modulul staţiei stop and go pentru fiecare colţ de parcelă, ulterior, după descărcare, realizându-se planuri pe întreg teritoriul de pajişti aferente localităţii.*

***Key words*:** *ProMark 3 GPS, cadastral work, orthophotoplan*
Cuvinte cheie: *GPS ProMark 3, plan cadastral, ortofotoplan*

INTRODUCTION

The harmonious development of human sites, whether they are urban or rural, and also the development of all branches of national economy are strong related with the execution of cadastre works and territory arrangement.

Local Council that manages the swards on the territorial-administrative area will establish on behalf of the majors the responsibility of the swards arrangements and swards exploitation approved by the Local Councils. The management of these surfaces is made by consulting the farmers, and the specialists from the Agricultural and Rural Development Department and Agricultural Consulting Department of County Center.

The lands mentioned as swards, being in the Local Council or farmers associations property are used exclusively for pasture, crops in order to obtain the green mass, seed, protection curtain, zoo pastoral construction, land improvement work to grow up the production potential of swards. The swards also as cadastral point of view must be well delimited marked in the land register as property evidence according to the European Standards of the states member.

These achievements of topography, cadastre, and territory arrangement are important tasks that impose a complex activity, lead and organize by well trained professional staff.

The property right is very important not only for the holder but also for the whole society. Considering this social function, it is logic and necessary that the holder of property right to be stimulates in a rational exploitation of his good by obtaining efficient economical

achievements, preserving it carefully, and using it in his personal interest and also in the interest of the community.

Property represents a social report between two persons in strong connection with appropriation of material goods and production means.

Since the 1865 Romanian Civil Code, define the property right considering the juridical attributes that made up its juridical contents. “Property is the right of somebody to enjoy and dispose of a thing exclusively and absolutely according to the law limits” (art480 Civil Code).

MATERIALS AND METHOD

The purpose of the paper is to execute a topographical survey and site identification work of swards in order to be registered into the land register of Criciova locality, Timiş County.

Criciova Parish is situated in the West side of the country and on administrative point of view it belongs to Timiş County. It is situated in the South-East side, on the right side of the river bank Timiş (fig.1). The mountain river Nadrag is crossing Criciova. The parish is situated at around 16 Km from Lugoj and 80 km. from Timişoara. The total land surface of Criciova is 5051 ha. of which 3021 ha swards and agricultural lands and the rest of 2030 ha consist in woods with glades towards the top of mountains.

Figure 1 The site of Criciova Parish

From juridical point of view the swards belonging to the outside part of human habitat zone of Criciova is in the property of Local Council of the parish and belongs to the Local Commission of the parish.

The beneficiary of the work is The City Council of Criciova, Timiş County.

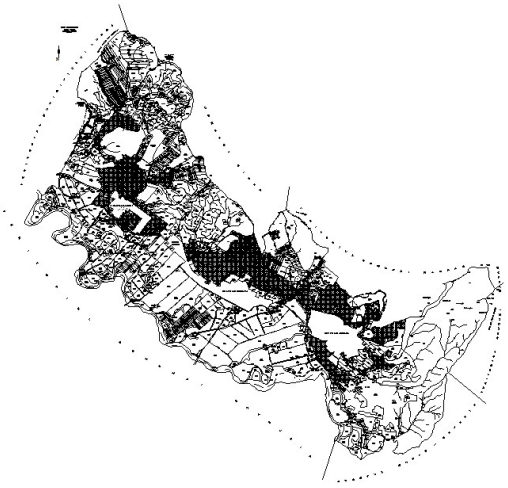

Figure 2. Framing plan at 1:10 000 scale

The parcel is situated in the North side of parish and is having a length of 650m on the North-South direction and approx 2900m on the East-West direction being situated in the close neighborhood of Criciova (fig.2).

In order to identify the parcel limits that represent the object of the paper we proceed at a topographical survey of the area by using the GPS station ProMark3 “stop and go”, extremely helpful in marking the points along the boundary of the parcel by applying the basis of GPS technologies.

Therefore, one module, the static one, was placed in a point of knowing coordinate at the limit of Lugoj city, more concretely in the state geodesic network point “La Cuciuba” where readings are effectuate beginning with 09.00 hour until 17.00 hour.

The second module “stop and go” was deployed into the locality, on the land area where measurements are to be effectuate.

The operations that were made in a station point consist in:

a) Prior beginning the work session the geotopographical points functionality must be ensuring by:

- points recognition;
- ensuring the access and the visibility towards the point;

b) After finishing the recognition operations, marking and ensuring point the GPS work session program is made and basic measurements are starting over:

- installing the GPS aperture:
- aperture transport at the station point;
- installing the tripod;
- installing the antenna on the tripod;
- installing the tripod – the antenna on the point;
- installing the receiver (putting on the batteries);
- installing the antenna on the receiver;
- input the initial data into receiver;
- receiver initializing;
- starting the GPS work session;

- creating the measurements files, with the topographical description;
- finishing the GPS work session at the time mentioned into the program.

We must mention the fact that as in classic network even in the GPS network the principle of passing from a superior to an inferior network order is maintain. In geodesic application three different surface of the Earth are involved. The physic or natural Earth surface is approximate by a geometrical or mathematical surface named ellipsoid and by an echipotential surface named geoid. The classic measurements are determine on the **Krasowski** ellipsoid and the GPS measurements are determine on WGS 84 ellipsoid, which is a geocentric reference ellipsoid and echipotential define by the following parameters: the long semi axe (**a**), the gravitational Earth constant (**GM**), the zonal normalized gravitational coefficient of second degree (**C20**) and the angular velocity of the Earth (ω). Therefore, the international GPS network was create in a unitary system (**WGS 84**), made by permanent stations of high precision coordinate.

The stations of high precision coordinate along our country territory being part of the Class I GPS network are named as GPS permanent stations. Figure 3 shows the GPS points coordinates bought for subsequently measurements of the day.

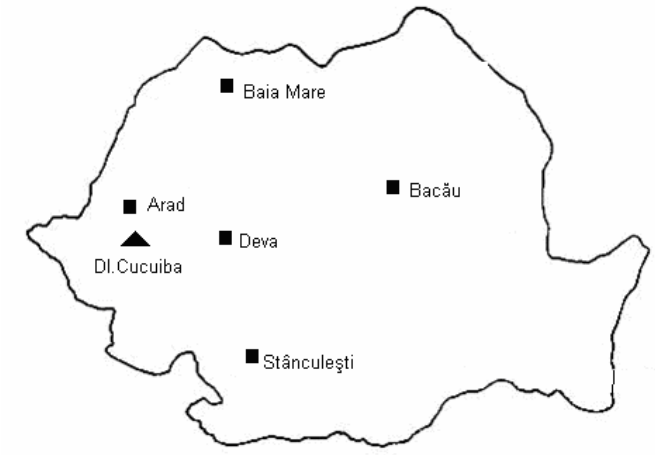

Figure 3. Permanent stations used in swards identification

RESULTS AND DISCUSSION

Initially data processing was executed with the **GNSS Solutions™** and **Geogenius 2.1.** software, concerning the data acquisition process and data processing.

The request precision in data processing is 5cm +/- 2ppm.

The points from thicken the geodesic network were determine in three and four vectors from the permanent station from Romania.

After data were processed using **GNSS Solutions™** and **Geogenius 2.1** software the following deviations were achieve:

- standard deviation of base determination:

dx=1.7 mm,dy=5.3 mm.

- standard deviation of points determination:

dx=2.8 mm,dy=6.0 mm.

The coordinate system computation from WGS 84 coordinate system into Stereografic'70 was made by **TopoSys 4.4**., software finally obtaining the coordinates of the point along the parcel boundary (fig. 4).

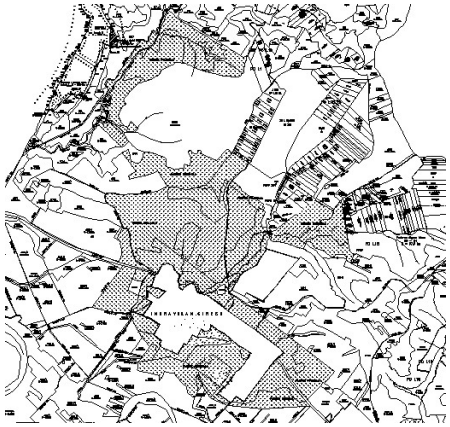

Figure 4 Cadastral plan obtained after GPS survey scale 1:5 000

The points coordinated were verified by overexposure on othofotoplan and the admitted tolerance was achieved (fig.5).

Figure 5. Overexposure on othofotoplan

In order to execute the topographic works it is necessary a number of 4-6 known coordinates points to surround the working area and situated at distance of 3 to 10 km. These points must to ensure the correspondence between the WGS84 system and Stereo 70 system, in order to compute the points coordinate from WGS 84 to Stereo 70. The field measurements are static executed and if we have a minimum of three GPS receivers that ensure the best conditions concerning the relative positioning as follow:

- minimum four identical satellites, receive simultaneously in three or more available points;
- the **PDOP** value, as precision measuring value for the satellites geometry must be under 5;
- observation time minim one hour for the points of the network;
- observation time must be minimum 15 minutes for fotogrammetric landmarks.

In AutoCAD software the points were joint according to the terrain draft and the following documentation was achieved:

- the draft of the network with station point description;
- point description;
- situation plan with identification;
- points coordinated inventory in coordinates projecting system Stereo 70;
- extract of Cadastral plane of Criciova parish;

The documentation has been achieved in 3D coordinate system in digital format on optical support and also plotted on appropriate paper format.

CONCLUSIONS

The GPS topographic determination for cadastral works can be done when we already have a national GPS network, but also in the case when we do not have such a network. We will referred on the second case when, due to the fact that the National GPS geodesic network is still under construction.

The necessities of making cadastral plans impose us to realize in field conditions the growing of the geodesic network, imposing especially to create the fotogrammetric networks. On bough cases the GPS technologies is advantageous. This advantageous consist in:

- the visibility between the network points and fotogrammetric marks are not necessary;
- the geodesic landmark is not necessary;
- all fotogrammeric marks has the same precision;
- the outstanding technical efficiency.

Today, GPS is in such stage of evolution that we can speak about a geodesic revolution.

The outstanding performance for the commercial receivers and the high precision make this system to be in top when we are talking about the wide variety of geodesic works.

The Global Positioning System named *NAVSTAR* is a radio satellite system which is used to accomplish military purpose and also civil purpose.

The Global Positioning System allows obtaining navigation information 24 hours during the whole day.

GPS allows establishing the position, direction and velocity for the transport vehicle as a precise time coordination, thanks to sending the exact mean time and cosmos satellite position.

LITERATURE

1. BARLIBA, L., *Topografie*, Editura Solness, Timisoara, 2005.
2. BREBU P., MILONICI, Z., BARLIBA, L., , *Sistemul de Pozitionare Geodezic* , Editura Politehnica, 2004.
3. MICLEA, M. , *Cadastrul şi cartea funciară*, Editura All Bucureşti, 1995
4. NEUNER, J., *Măsurători Terestre-fundamente*, Volumul I, Instrumente şi metode de măsurare, Editura Matrix Rom, Bucureşti, 1995.
5. xxx., LEGEA nr.7/1996 *Legea cadastrului imobiliar*, Monitorul Oficial nr. 61 / 1996, Bucureşti, 2006.
6. xxx., Manualul de utilizare - *GPS Surveymg System GePoS Experience* –ZEISS.