

## THE STAGES OF REALIZATION OF THE GENERAL TECHNICAL CADASTRE ON THE LEVEL OF AN ADMINISTRATIVE TERRITORIAL UNIT

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### Abstract

For obtaining the basic data of the Cadastral Informational System on the level of an administrative territorial unit it is necessary to run the steps and the technical operations of the General Technical Cadastre introduction. For this purpose, were analyzed the technical rules in force, regarding the introduction and execution of General Technical Cadastre and of the Informational Systems by fields activity. From the data of land registers, of General cadastre Informational System, centralized and processed selectively, may result maps and topographic cadastral plans specific to every domain of economic activity. The purposes of these systems consists in providing reliable data about terrains and buildings of all kinds and about their owners or possessors, for evaluate them, for more efficient capitalization, for a fair establishment of taxes etc. For exemplification was chosen the administrative territory of the City of Iasi, pursuing the dynamics of topographic cadastral works of General technical cadastre, for the period between the years 1990 and 2010. So, the cartographic database of the City of Iasi from the year 1989, was modified by establishing the new administrative limits with the neighboring territories, the expand of buildable area, the approval of the regional urban plans, the realization of a new cadastral sectorization, the execution of the field measurements for making new topographical cadastral plans or updating of the old one's. At the same time, based on aero photography, with an aircraft equipped with a digital camera, was obtained the ortophotoplan of the city of Iasi, with a resolution equivalent to the scale 1:500. The update of cadastral data is required for accurate management, from economic and administrative point of view, of the Informational Systems by fields' activity, on the level of each administrative territory. Only by the management of a Cadastral Informational System may be established the real potential of an area, for more efficient administration and exploitation, and could be made the analysis in time of the mode of using the resources, for to be able to talk about sustainable development and environmental protection.

**Key words:** administrative territorial unit, general technical cadastre, cadastral sector, cadastral plot

According to Law no. 7/1996, of cadastre and real estate advertising, republished as amended, the general cadastre is the uniform and mandatory technical, economic and legal system, that realize the identification, the registration, the representation on maps and cadastral plans of all terrains and also of the other real estates from the entire country territory, regardless of their destination and owner.

The object of general cadastre consists in obtaining the data for the administrative territorial units ( communes, cities, municipalities), located within state territory, regardless of the category of use, of economic destination or the public or private domain, to which they belong and of their owners. Based on primary data of general cadastre, can be achieved geographic informational systems specific to areas of activity, each of them containing technical data and specific information,

in accordance with technical standards of achievement and maintenance.

The purpose of general cadastre is to provide updated information in real time, useful for: legal, fiscal and administrative institutions; statistical and management bodies of state; elaboration of territorial systematization, of establishment of land resources, of environmental protection etc.; the protection of state public and private domain; guaranteeing ownership; litigious conflict resolution and reduction; updating the maps and cadastral plans.

Obtaining cadastral plans requires using some modern technologies, in the field faze, on the geometric elements measurement and also in the office faze (calculation), that will became the data base for a Cadastral Informational System.

Only by clear and updated evidence can be answered to the questions generated by the three

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sides (technical, economic and legal) of the general cadastre.

## MATERIAL AND METHOD

For obtaining the basic data of the Cadastral Informational System on the level of an administrative territory, must be executed a series of works on the field, on the office and of editing of the final documents, by following the next stages and technical operations of introduction of general technical cadastre:

- the preparation of the technical project of introduction works of general cadastre;
- the designing, realization and determination of geospatial geodetic network as an integral network to the national system ;
- the delimitation and marking with landmarks of the administrative territory boundaries, outside and inside of the city perimeters;
- the drafting of the aero photography project for obtaining the orthophotoplan;
- the thickening of the support geodetic network of the topographic liftings or of photogrammetric identification;
- the photogrammetric images processing;
- the cadastral zoning and sectorization;
- the execution of field measurements necessary for the preparation of the new topographic cadastral plans or for updating of the old ones;
- the execution of the necessary calculations for determining the coordinates of the support and topographic detail lifting networks;
- the preparation of the original field papers and editing the basic topographic plans and digital topographic cadastral plans;
- the identification on terrain, for each plot, of their owners and possessors;
- the identification on terrain, for each plot, of the use categories and subcategories of the terrains;
- the cadastral numbering and plans equipping with updated use categories symbols;
- the calculation and compensation of areas by cadastral territories;
- the preparation of areas summary by cadastral numbers and administrative territories;
- the cadastral data publishing;
- the preparation and editing of cadastral registers by automatic data processing means and printing devices of output data;
- the cartographic editing of the topographic and cadastral plans, on basic scales;
- the cartographic editing of the overall maps or cadastral plans of the administrative territory;
- the control, acceptance and approval of the general cadastre introduction.

For exemplification was chosen the administrative territory of the City of Iasi, pursuing the dynamics of topographic cadastral works of General technical cadastre, for the period between the years 1990 and 2010. So, the cartographic database of the City of Iasi from the year 1989, was modified by establishing the new administrative limits with the neighboring territories, the expand of buildable area, the approval of the regional urban plans, the

realization of a new cadastral sectorization, the execution of the field measurements for making new topographical cadastral plans or updating of the old one's (Huțanu Cr., Nistor Gh., 2010). At the same time, based on aero photography, with an aircraft equipped with a digital camera, was obtained the orthophotoplan of the city of Iasi, with a resolution equivalent to the scale 1:500.

The updating of cadastral data it is required for a fair as possible management, from an administrative and economic point of view, of the Informational Systems by areas of activity, on the level of each administrative territory.

Unfortunately, unlike the majority of the European Union member states, Romania does not features of a land fund general cadastre, containing essential data regarding the technical, economic and legal situation of the real estate from public and private domain, on the level of administrative territory (Dragomir P.I., Haret C., Moraru N., Neuner I., Săvulescu C., 2000).

## RESULTS AND DISCUSSIONS

According to cadastral registers of the Iasi City Hall, in 1989, the area of the inside of the City of Iasi was of 3679 hectares, then, the territory of the City of Iasi was modified, following the next stages (*fig. 1*):

- in 2005, the total area of the City of Iasi was of 9366 hectares, following some modifications regarding the limit of inside and outside of the city;
- in 2007, the inside of the City of Iasi has expended with 2382 hectares, by creating 18<sup>th</sup> areas of expansion, noted with letters from A to S;
- until 2010, the buildable area of the inside of the City of Iasi, has increased by another 248 hectares, by the approval of 37<sup>th</sup> zonal urban plans (ZUP);
- in 2010, the area of expended inside of the City of Iasi reached at 6309 hectares, and the outside area at 3057 hectares, dispersed on 14<sup>th</sup> areas.

By the inclusion of the expended areas and of the ZUP in the old inside of the city, the occupation degree reached at 67.36% in 2010, compared to 39.28% in 1989 (Huțanu Cr., 2012).

Following the completion of cadastral delimitation with the neighboring territories, materialized on the field in over 200 border points, are determined by 1970 Stereographic plane rectangular coordinates and by the cotes from the 1975-Black Sea reference system .

The geodetic network of the territory of the City of Iasi was determined by GPS technology and includes 84 main points, materialized on the field and determined by X, Y, Z coordinates (Sălceanu Gh., Nistor Gh., 2008).

The thickening of the geodetic network with approximately 5000 points, that should insure the necessary density for the execution of detail topographic cadastral measurements, was made by polygonal metric networks. Also, it is regarded to the implementation and completion of technical

and specialty database, on the level of a plot. The territory of the City of Iasi fall into the cartographic representations, on 103 plan sheets, at the scale 1:2000 and on 347 plan sheets, at the scale 1:1000.

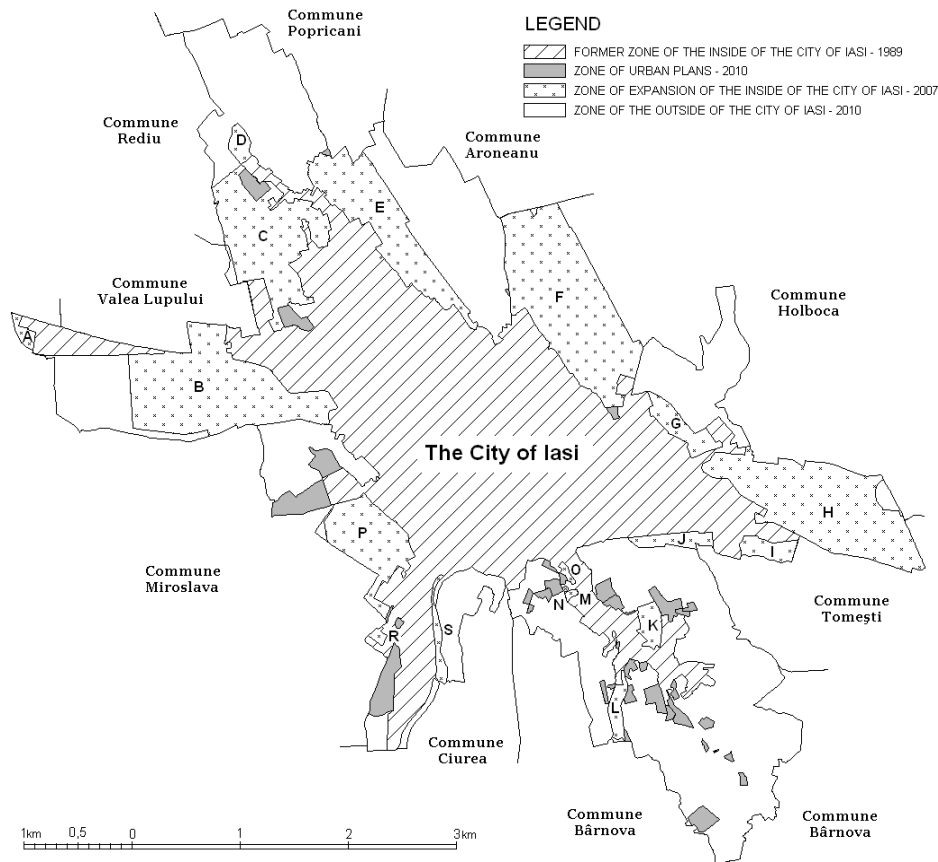


Figure 1 The map of the areas of the inside and the outside of the City of Iasi

In the present, Iasi City Hall has a digital cadastral plan, obtained by aero photography made in May, 19<sup>th</sup> 2006 by an aircraft equipped with a Leica Geosystems digital camera. For obtaining an ortophotoplan, with a resolution equivalent to scale 1:500, the flight was made at a height between 1250 and 1300 m. The entire area of the City of Iasi, of approximately 10000 hectares, was covered by 9 bands, the flight direction being South-East-North-West. For accomplishing all the graphical requirements regarding the cadastral activity, the ortophotoplan has undergone the specific rectification process, to bring the X, Y plane coordinates in the 1970 Stereographic projection system, taking in account deformation parameters specific to the area, and the altimetrical coordinates (Z) in the 1975 Black Sea Reference System (Sălceanu Gh., 2009).

The photogrammetric identification was designed taking in account the configuration of the 9 flight bands, to make a uniform distribution of the 47 photogrammetric identification points on the whole area of flight necessary in the aero

triangulation stage. For the photogrammetric identification points to be determined with an accuracy of  $\pm (10-15 \text{ cm})$ , were made polygonal metric roads starting from the points of the Main Network of the City of Iasi, with Leica Geosystems Total Station, and from the measurements compensation with Toposys software of TopGeocart Company, approved for this type of work.

Aero triangulation was made with software from Leica Geosystems, because digital image data are automatically processed, depending on the connection and control points from the ground. The efficiency of the method of processing in block with auxiliary data consists in using an equipment of measuring the takeover station coordinates, such as GPS, and a navigation platform such as INS (Inertial Navigation Systems), providing data necessary in calculation of transformation parameters and aero triangulation compensation.

Due to succession of cadastral delimitation, from 2005, with neighboring territories and to

changing of the inside limit of the City of Iasi, by expansion of the buildable area, it was required a new cadastral sectorization of the territory of the City of Iasi, made in 2007.

For preparation of digital cadastral plan was used the software of digital stereo-restitution from Leica Geosystems, because the precision of graphical data is superior to the analogical stereo-restitution. So, the planimetric and altimetric elements of the cadastral plan are given by point, linear and polygonal entities, represented in three dimensions. Also, are attached descriptive files that contain type of entity, perimeter, area, length and number of component vectors (defined by absolute rectangular coordinates  $X, Y, Z$ ).

The digital cadastral plan returned on scale 1:500, in 1970 Stereographic Projection System, made by orthophotoplan vectorization, must contain all the elements necessary for cadastral works such as: the points of support and lifting geodetic network; the network of railways and roads; hydrographic network; identifying elements of administrative territorial units; the limits of administrative territories, of property bodies and constructions; use categories; buildings addresses from inside of the city etc.

### CONCLUSIONS

The achievement of Cadastral and Real estate Informational System, on the level of

administrative territorial units of counties and of the entire country will be accompanied by works of maintenance and continuous updating, to avoid the expiration of information from specific databases.

The database of Cadastral Informational System must become a viable and useful support in decision-making process for preventing the chaotic expansion of habitable zones, for rational use of agricultural land through the works of regional planning, identification of new land resources etc.

### REFERENCES

- Dragomir P.I., Haret C., Moraru N., Neuner I., Săvulescu C., 2000** – *The topographic works in cadastre. Guide*, Publishing Matrix Rom, Bucharest.
- Huțanu Cr., 2012** – *Use of digital technologies in activities of realization and exploitation of the general and agricultural cadastre*, The doctoral thesis, Technical University „Gh. Asachi” of Iasi.
- Huțanu Cr., Nistor Gh., 2010** – *The current state of rehabilitation end modernization of geodetic and topographical networks*, Scientific Works, Agronomics Series, The 53 volume, No. 1 U.S.A.M.V. Iasi, p. 100-105.
- Sălceanu Gh., 2009** - *Contributions to the achievement of Geographic Informational System for Urban Real Estate Cadastre of a city*, The doctoral thesis, Technical University „Gh. Asachi” of Iasi.
- Sălceanu Gh., Nistor Gh., 2008** - *Implementation of GIS technology in achieving the Urban Real Estate informational System of a city*, RevCAD Cadastre Magazine, No.8, „1 Decembrie 1918” University of Alba Iulia, p. 25-34.