

PRESENT ASPECTS OF THE SYSTEMATIC CADASTRAL WORKS CONDUCTED ON CADASTRAL SECTORS FOR THE REGISTRATION OF REAL ESTATES IN THE LAND REGISTER

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Abstract

The topographic measurements and the technical cadastral documents drawn up in time in Romania included several distinct stages. The main differences between them consisted in the society's development requirements at that particular moment and the measuring technologies used. Law on Cadastre and Real Estate Advertising no.7/1996, with the subsequent modifications and completions, created the context for drawing up and implementing the unitary cadastre and land register system. This system includes 3,181 administrative - territorial units as follows: 103 municipalities, 217 cities and 2,861 communes, the latter one with 12,957 villages. At the same time, it was started the National Cadastre and Land Registration Program, estimated to be conducted between 2015 and 2023. The main objective of the program consists in performing systematic cadastral works considering the cadastral sectors in the administrative territorial units, so they can be registered in the land register. The cadastral documents drawn up on cadastral sectors indicate the measured surface as well as the real property right over the real estates. According to the present administrative - territorial organization of Suceava County, its 8,553 km² include 114 administrative – territorial units, of which: 5 municipalities, 11 cities and 98 communes, the latter ones including 379 villages. Our case study tried to point out the real technical and legal situation of two cadastral sectors situated in the unincorporated area of Bilca commune, Suceava County. The two cadastral sectors that were identified and analysed cover 14.5134 ha (cadastral number 243) and 10.0668 ha (cadastral number 254), respectively. The limits of the real estates from the two cadastral sectors mentioned resulted from field measurements and their identification with the legal owners. The limits of the cadastral sectors were indicated on the basic plan sheet, scale 1:5000, nomenclature L-35-04-B-a-3-III and the control area 540.9816 ha.

Key words: systematic cadastral works, land register, technical and legal data base, cadastral sectors and real estate

The introduction of the unitary cadastral and land registration system relies on the provisions of Law 7/1996 and it applies to all cadastral sectors and real estates in the country. The completion of this specialized process leads to the registration of all real estates in the land register and the existence of a cadastral plan.

The integrated cadastre and land registration system covers at national level a total number of 3.181 administrative – territorial units, including: 103 municipalities, 217 cities, 2.861 communes with 12.957 villages (The Statistical Yearbook of Romania, 2017).

The implementation of the National Cadastre and Land Registration Program during its financing period 2015-2023 included the completion of systematic cadastral and land registration works. Once finished, these works continue with the registration and the description of the real estates, either for an entire

administrative – territorial unit, or, only for incorporated or unincorporated cadastral sectors.

The National Cadastre and Land Registration Program was adopted based on the Technical Memorandum the European Union and Romania concluded on November 5th, 2013. It was afterwards ratified by Law 31/2014.

The systematic cadastral works financed by the National Agency of Cadastre and Real Estate Advertisement are completed by the specialized services provided according to the legislation and the technical regulations in force. The funds allocated between 2016-2017 allowed the completion of cadastral works – systematic registration, at the level of both administrative – territorial units and cadastral sectors.

The state of work of systematic registration concluded by September 12th, 2018 indicated their completion in 57 administrative-territorial units from

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20 cities. Simultaneously, it has also been completed the systematic registration for 1,470 cadastral sectors situated in 595 administrative units and 38 cities, respectively (<http://www.ancpi.ro/pnccf/>).

The territory of Suceava County is positioned between 24°57'00" - 26°40'00" east longitude and 47°04'33" - 47°57'31" north latitude. Considering the surface of the territory – 8.553km², Suceava is considered the second city of Romania. Its 114 administrative – territorial units include: 5 municipalities, 11 cities, 98 communes with 379 villages (The Statistical Yearbook of Romania, 2017).

In Suceava County the systematic cadastral registration works have been completed for the entire surface of Moara and Humor Monastery communes. The two basic administrative-territorial units cover 14.0963 ha, the territory of Moara commune being of 4.1891 ha and that of Humor Monastery, of 9.9072 ha, respectively (figure 1).

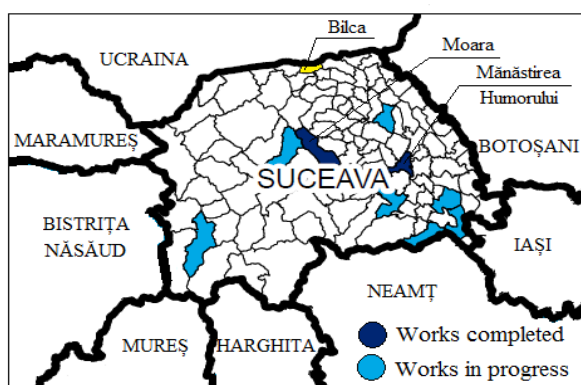


Figure 1 Works of systematic registration of real estates completed on administrative-territorial units (according to ANCPI, 2018)

On cadastral sectors, it has been completed the systematic registration for 10 administrative - territorial units.

At the same time there are other 33 basic administrative territorial units where the systematic cadastral works are in progress (figure 2).

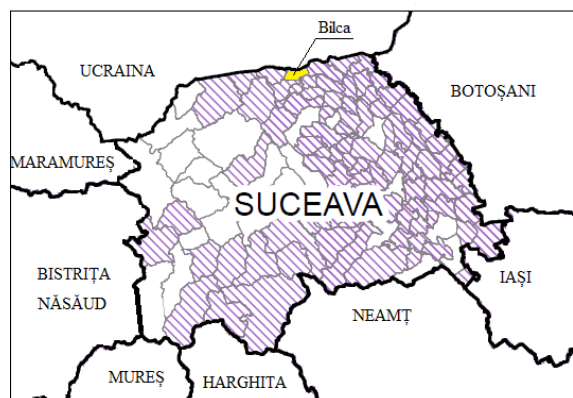


Figure 2 Works of systematic registration of real estates completed and in progress on cadastral sectors (according to ANCPI, 2018)

MATERIAL AND METHOD

For the case study it was considered the administrative-territorial unit of Bilca, Suceava County. The cadastral territory of this commune is situated in the northern part of Suceava County, at the limit of the border state between Romania and Ukraine. Geographically, the territory of Bilca commune is positioned between parallels with 47°53'45" latitude in the south and 47°57'30" in the north and the meridians with 25°41'15" longitude in the west and 25°50'37".5 in the east.

The total surface of 2.000 ha corresponding to the administrative – territory unit of Bilca is mostly situated in the *Dragomirnei Plateau* (geomorphological subunit of *Suceava Plateau*) and a smaller part of it is situated in the Radauti Depression. In this latter case, it was identified only the residence incorporated area of Bilca commune. The graphic database of the two components, *incorporated* and *unincorporated* was obtained, at first, due to the aerophotogrammetric surveys from 1978, edited analogically in 1982. This graphic database was updated in 2006 with the completion of the orthophotoplan, scale 1:10000.

The fund of graphic entities from the orthophotoplan of the administrative-territorial units of Bilca commune included the identification of 504 physical blocks that were assimilated as cadastral sectors. The structure of these blocks includes: 315 agricultural physical blocks, in the unincorporated area, and 189 nonagricultural physical blocks, in the incorporated area. The distribution of the land considering its usage lead to 1,853 ha of agricultural land and 147 ha situated in the incorporated area.

The execution of the general cadastre includes, among others, the following phases: preliminary works, measurements, updating on field information, hand over and advertisement of technical cadastral documents (Boș, N., Iacobescu, O., 2009).

For the primary database and the information on the identification, measurement, registration and representation of real estates on cadastral plans there have been considered two cadastral sectors (agricultural physical blocks), from the unincorporated area of Bilca commune. The two cadastral sectors with the identification numbers of the agricultural physical blocks 243 and 254 included a total surface of 24.5802 ha, agricultural land.

The limits of the cadastral sectors and of the real estates that represented the object of the cadastral works performed and implicitly, of, systematic registration, were established by recognition of the land and identification with legal owners. The completion of specialty works in the two cadastral sectors and the 28 real estates, respectively, included all the on field and in the office phases and technical operations for their systematic registration in the land register.

RESULTS AND DISCUSSIONS

Considering the present requirements in cadastral works, in the past few years it has been initiated the systematic registration of real estates on cadastral sectors. These systematic cadastral works were performed so far at the level of administrative-territorial units and also at the level of cadastral sector or sectors.

The Order 979/2016 of the National Agency of Cadastre and Real Estate Advertisement regulates the phases for the organization, operation and reception of systematic cadastral works. The completion of the final technical cadastral documentation and of the legal documents of the real estate leads to the opening of the land register.

a. Cadastral delimitation and framing of Bilca territory

For the identification of both cadastral sectors and real estate limits with the purpose of making cadastral measurements, it was used the existent cadastral documentation, scale 1:5000 and the orthophotoplan for the administrative territory of Bilca, scale 1:10000.

The administrative territorial unit of Bilca, Suceava County has, from cadastral point of view, five border territories. Its present cadastral delimitation included the following borders: North, Romania's state border with Ukraine; East, Frătăuții Noi commune, South, Gălănești and Vicovu de Jos communes; West, Vicovu de Sus commune (*figure 3*).

The cadastral sectors (physical blocks) from the territory of Bilca commune were cartographically framed, on the graphic representation of 13 geodetic trapeziums (plan sheets), scale 1:5000 (Moca, V., et al., 2013).

The spatial distribution of the 504 cadastral sectors (physical blocks) is represented on 12 trapeziums including two or more basic administrative units. The trapezium with nomenclature L-35-04-B-a-3-III and the control area of 540.9816 ha included only the representation of the cadastral sectors from the territory of Bilca commune.

The technical documentation drawn up for a cadastral sector, according to the provisions of Law 7/1996, with all the subsequent amendments and completions is made using the Stereographic projection system -1970. The areas of the geodetic trapeziums, scale 1:5000, obtained using the geographic coordinates of the four corners are used as control surfaces for the calculation and compensation of surfaces on cadastral sectors.

The control surfaces used in the calculation and compensation of the areas on cadastral sectors are considered not-deformed in the 1970-Stereographic projection plan. The two cadastral sectors from the unincorporated area of Bilca commune, identification number for the agricultural physical blocks 243 and 254, were cartographically positioned in the trapezium L-35-04-B-a-3-III. The documentation of cadastral works included drawing up the cadastral plan and the data sheet of the real estates, based on the existent borders (*figure 3*).

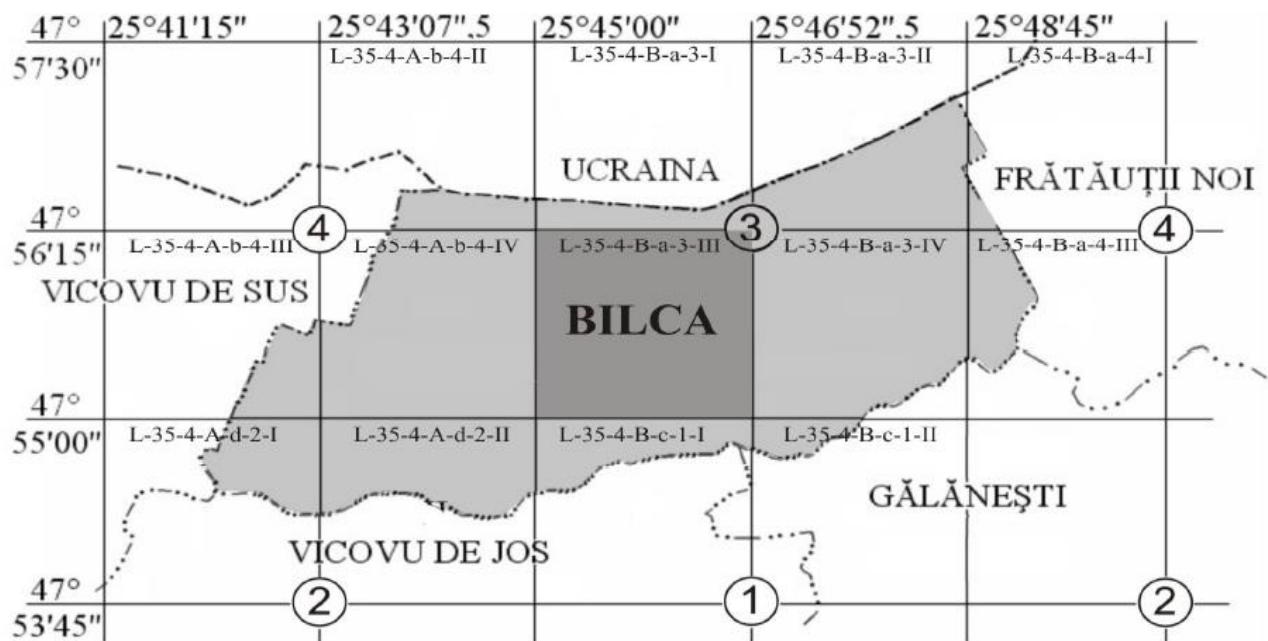


Figure 3 Cadastral delimitation and framing on geodetic trapeziums of the administrative-territorial unit of Bilca, Suceava County, scale 1:5000

b. The execution of topographic measurements and drawing up the cadastral plan

Based on the methodology of collecting the primary technical data the systematic cadastre it was first established the geodetic support network.

For this purpose, it was used the *GPS* (Global Positioning System) measuring technology and the *GNSS* double frequency receivers (Global Navigation Satellite System), *SOUTH S82T* type (Moca, V., et al., 2011). At the same time, there were also used the *ROMPOS* service (*Romanian Position Determination System*) and the *RTK* method (*Real Time Kinematic*), which ensures the planimetric positioning with geodetic accuracy.

The Carlson *SurvCE* software and the *ROMPOS* – *RTK* service helped obtaining the plane rectangular coordinates of the geodetic support network, in the official 1970-Stereographic projection system. The topographic measurements on cadastral sectors and real estates require adding to the points of the national geodetic support network *GPS* – *GNSS*, the necessary optimal density (Păunescu, C., et al., 2015).

The elevation of the topographic points situated on the limits of cadastral sectors with identification numbers 243 and 254, and of the included real estates was made using the points of the geodetic support network. For this it was applied the radial traversing method. On the detailed measurements it was used the *Leica Geosystems TC-705* total station.

The topographic measurements made and validated for the case study of the two sectors were used at drawing up the cadastral plan, first digitally and then, analogically, scale 1:1000. The planimetric report of the points of topographic survey also included the rectangular network with the side of 100 m.

The cadastral sector no. 243 was registered in the cadastral technical documents according to the situation found on field. For the identification of this sector there were determined the plane rectangular coordinates of the 17 points situated on the unfenced limit of the geometric contour, in order 1, 2, 3, ..., 16, 17.

On the surface corresponding to the cadastral sector no.243 there have also been identified and numbered with arabic figures the official symbols of land usage categories, a number of 24 real estates in the following order: 1P, 2A, 3A, ... , 23F, 24A (figure 4).

According to the legislation in force, it is mentioned that the position of the 24 real estates that is registered in the technical cadastral documents is presumed to be in accordance with their real technical and legal situation.

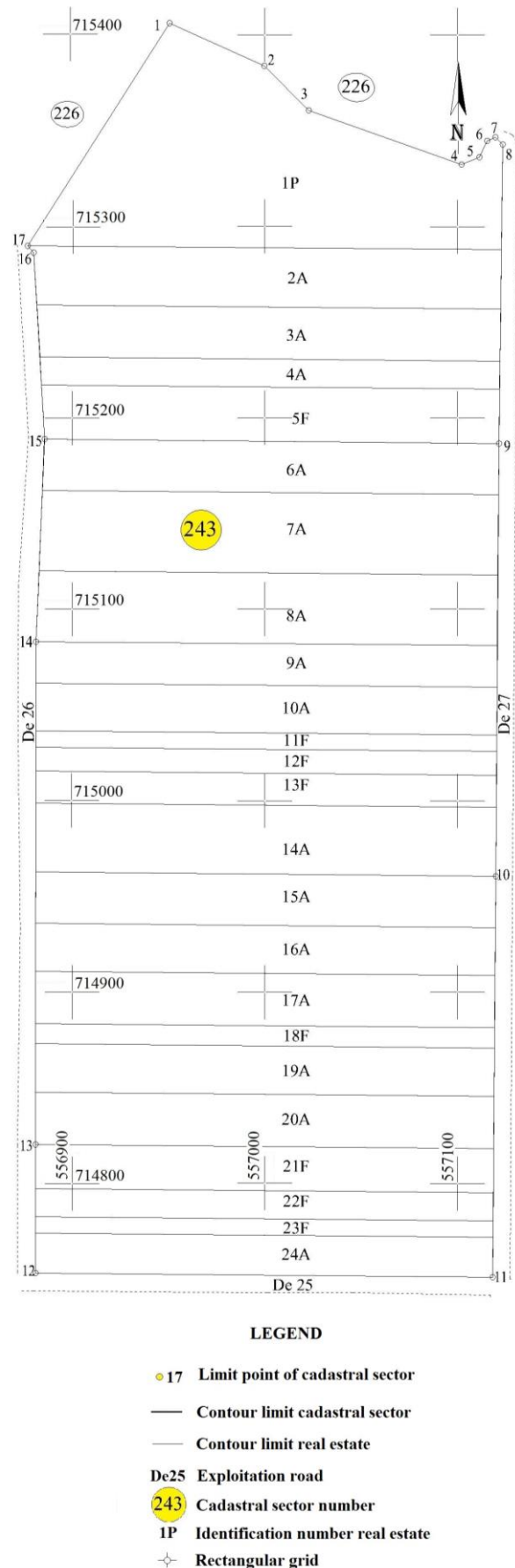


Figure 4 Cadastral plan for sector no. 243 from Bilca administrative – territorial unit, scale 1:1000

The cadastral sector no. 254 that includes the hydrotechnical drawings of the agricultural drainage field of Bilca was registered in the systematic cadastral database, according to the situation on field. The detailed cadastral measurements made for the draining field consisted of identifying the following limits of the cadastral sector and the existent real estates:

- The limits of the cadastral sector;
- The limits of the real estates;
- The limits of the drainage collector canal;
- The subsurface layout of collector drains;
- The subsurface layout of drain line;
- The position of manholes.

For the cadastral sector no. 254 there were identified 8 points that indicate the limits of the sector and of the real estates.

The underground drainage layout of the drains was marked with 42 points (figure 5).

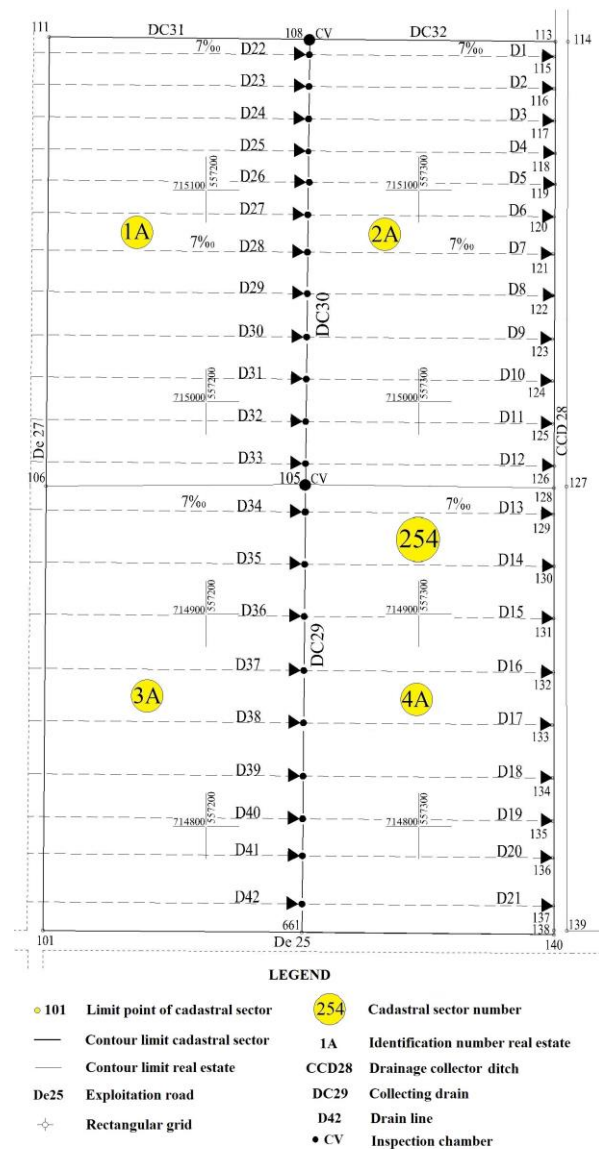


Figure 5 Cadastral plan for sector no. 254 the experimental field agricultural drainage in Bilca, scale 1:1000

c. The identification of measured surfaces on cadastral sectors

The surface of the cadastral sector no. 243 has been established, based on the real facts found on field, depending of the rectangular coordinates (X, Y) of the 17 points situated on the unfenced limit of the geometric contour. In the technical cadastral documentation is to be registered the measured surface of 14.5134 ha (table 1).

Table 1

Point no.	Rectangular coordinates		Distances (m) D(i, i+1)
	X (m)	Y (m)	
1	715406.255	556950.538	54.02
2	715383.865	556999.698	32.79
3	715360.598	557022.805	84.18
4	715332.301	557102.084	9.99
5	715336.291	557111.241	9.42
6	715344.743	557115.410	4.55
7	715346.556	557119.578	5.55
8	715342.708	557123.573	156.07
9	715186.653	557121.489	226.16
10	714960.496	557119.879	209.59
11	714750.913	557118.293	237.23
12	714753.073	556881.069	67.32
13	714820.393	556881.049	262.73
14	715083.125	556881.249	105.80
15	715188.833	556885.748	97.61
16	715286.283	556880.178	4.68
17	715289.809	556877.102	137.67
Total measured surface = 145,134 m ²			
Sector perimeter = 1,705.36 m			

The surface of the cadastral sector no. 254 that includes the drawing of the agricultural field prepared for agricultural drainage was established in a similar manner. There were taken into consideration the 8 points of rectangular coordinates (X, Y) situated on the border of the geometric contour of the cadastral sector.

In the technical database corresponding to the systematic registrations is to be registered the measured surface of 10.0668 ha (table 2).

Table 2

Point no.	Rectangular coordinates		Distances (m) D(i, i+1)
	X (m)	Y (m)	
101	714750.779	557123.420	209.534
106	714960.309	557124.735	211.534
111	715171.637	557123.316	122.273
108	715170.792	557248.585	115.888
113	715169.802	557364.469	210.514
128	714959.290	557363.638	210.567
140	714748.723	557363.751	118.604
661	714749.742	557245.151	121.735
Total measured surface = 100,668 m ²			
Sector perimeter = 1,320.650 m			

d. The identification of measured surfaces on cadastral real estates

The surfaces obtained from the plane rectangular coordinates (X, Y) of the points identified on the limit of the real estates have been verified and compensated on the control surface of the cadastral sectors.

For the surface corresponding to the cadastral sector no. 243 there have been identified on field and measured 24 real estates. At the same time, it was collected the textual information on the land use category (table 3).

Table 3

Card with surfaces on cadastral real estates

No. of cadastral sector	No. of cadastral real estate	Measured surface (ha)	Land use category
243	1P	1.7134	Pasture
	2A	0.7500	Arable
	3A	0.6500	Arable
	4A	0.3500	Arable
	5F	0.6700	Hayfield
	6A	0.6300	Arable
	7A	1.0000	Arable
	8A	0.8800	Arable
	9A	0.5200	Arable
	10A	0.6000	Arable
	11F	0.2000	Hayfield
	12F	0.3000	Hayfield
	13F	0.4000	Hayfield
	14A	0.8600	Arable
	15A	0.6400	Arable
	16A	0.6000	Arable
	17A	0.6500	Arable
	18F	0.2500	Hayfield
	19A	0.6000	Arable
	20A	0.6500	Arable
	21F	0.5500	Hayfield
	22F	0.3500	Hayfield
	23F	0.2000	Hayfield
	24A	0.5000	Arable
Total measured surface = 14.5134 ha			

On the agricultural land from the cadastral sector no. 254, prepared for drainage with underground pipes there have been identified 4 real estates. The technical database includes the areas of the real estates that were verified and compensated on the total surface of 10.0668 ha (table 4).

Table 4

Card with surfaces on cadastral real estates

No. of cadastral sector	No. of cadastral real estate	Surface measured (ha)	Use category of land
254	1P	2.5762	Arable
	2A	2.4434	Arable
	3A	2.5678	Arable
	4A	2.4824	Arable
Total measured surface = 10.0668 ha			

The systematic recordings completed at cadastral sector will include in the land register only the surfaces that resulted after the on field measurements. For the cadastral registration of the 28 real estates that resulted from the present case study, the land register will include the areas presented in tables 3 and 4.

The development and preset use of the information system **e-Terra** ensures the continuity of the registration of real estates in the land register and the standardization of cadastral works and systematic registration and national level.

CONCLUSIONS

The technical cadastral documentation for the systematic registration on sectors consisted of drawing up the cadastral plan and the data file for the surfaces on real estates.

The systematic registration of real estates in the integrated cadastral and real estate system is only accomplished based on the surfaces of the real estates that resulted from the field measurements.

The surfaces measured on sectors and cadastral real estates were positioned and compensated on the control area of 540.9816 ha of the geodetic trapezium for cartographic framing, scale 1:5000.

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