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STUDY ON THE PREPARATION OF THE TECHNICAL DOCUMENTATION REQUIRED FOR REGISTRATION IN THE LAND BOOK OF A PROPERTY IN KLADOVO – SERBIA

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ABSTRACT

The study is carried out in collaboration with Serbian students from the MTC, from the Faculty of Agronomy of the University of Craiova and with a company from the same country, in order to make a comparison and analogy between the methods and procedures of surveying used in the two countries (Serbia and Romania). The paper presents a case study conducted in the town of Kladovo in Serbia in which a private property was taken into account, which must be registered in the Land Book. In order to solve all the requirements of such a work, a modern and new method was applied, used more and more in the topo-cadastral surveys, namely the combined method GPS and total station. From the surveys carried out in the field and processed at the office, it is found that the methodologies and working procedures are identical to those used in our country. It is also found that the equipment used is very modern and high-performance, which allowed to obtain a very high precision and a high economic efficiency of the work. In the end, the technical documentation prepared strictly complied with all the requirements of the legal norms imposed in Serbia and was done with great precision, which allowed it to be submitted to the office of the Land Book and the registration of the property studied in it. The significant difference between the technical documentation prepared for this property in Serbia and the documentation made in Romania is the Gauss-Kruger coordinate system in which the boundary points were determined, compared to the 1970 Stereographic system used in our country.

INTRODUCTION

Kladovo is a town located in the eastern part of the Republic of Serbia, in the district of Bor, on the Danube, on one side with the border with Romania and the Danube, and on the other with the Miroc Mountains, 44 ° 36 ′ north latitude, 22 ° 36 ′ east longitude, at an altitude of 45 m. The city is located in the east, at a distance of 256 km from Belgrade and 28 km from Drobeta-Turnu Severin (Braun, J., Kremen, T. and Pruska, J., 2018). To the west it borders the municipality of Majdanpek, to the south and southeast with the municipality of Negotin, and to the north and east with a length of 91 km, the Danube is the state border with neighboring Romania. There are three basic directions that connect Kladovo to the interior of Serbia: from Belgrade, Paraćin and Niš (Maciel, A.Z., et al., 2020).

The relief in the Kladovo area is predominantly hilly and mountainous, except for the easternmost parts belonging to the Vlach-Pontian Plain (the altitude of the municipality varies from 40 m at the mouth of the river Slatina to the Danube, up to 626 m above sea level on Mount Miroč).

Kladovo covers an administrative territory of 630 km^2, with a population of

20,635. The climate is continental, with low rainfall and hot summers, while the winter is long and cold, with snow from November, providing conditions for winter sports (Călina, J. and Călina, A., 2019). Winds are frequent in this area and bring sudden and heavy rains. Kladovo is also a town with rich agrotourism and tourism resources (Călina, A. and Călina, J., 2019, Adamov, T., et al., 2020).

Figure 1. Kladovo sitemap

MATERIAL AND METHOD

Mutual relations between owners in the field of construction, which may be legal or natural persons, are regulated in Serbia by the legislation in the field of construction and the legislation in the field of design of geodetic works in engineering, as follows: (Burghilă, C., et al., 2016)

- Law on Planning and Construction (Official Gazette of the Republic of Serbia No. 72/09, 81 / 09- rectification, decisions 64/10 of the SUA and 24/11, 121/12, 42/13- SUA, 50/13- SUA , 98/13-SUA, 132/14, 145/14); - Law on state investigation and cadastre (Official Gazette of RS, no. 72/09); - Law on expropriation (Official Gazette of RS, no. 55/2013); - Law on agricultural land (Official Gazette of RS, no. 62/06 and 65/08) - Law on forests (Official Gazette of RS, no. 30/10); - Law on waters (Official Gazette of RS, no. 30/10); - Law on standardization (Official Gazette of RS, no. 36/09); - Law on public roads (Official Gazette of RS, no. 101/05). In Serbia, the process of collecting, identifying and implementing changes is initiated at the request of a party or ex officio. In the process of maintaining the real estate cadastre, the restoration of the plot boundaries and the identification of the building are also performed. The modifications of the procedure for maintaining the real estate cadastre are modifications of the real estates and the rights over them, such as: 1) the division of the package outside the construction land; 2) merging the plots outside the construction site; 3) realization of the project of parcelling and correction of the borders on the construction lands; 4) in the process of arranging the border in front of the court; 5) changing the type of land; 6) change of land use and cadastral class; 7) construction and connection of the installation; 8) extension of the facility; 9) reconstruction of the building; 10) removal of an object or part of an object; 11) by changing the use and structure of the installation and its separate part; 12) the change occurred on the installations, which are registered as without construction or occupation authorization; 13) by changing the rights holder or the holder; 14) changing the type of rights and forms of ownership over real estate;

15) acquiring the right of use; 16) by acquiring the rental right; 17) deletion of the owner and registration of the title to the building; 18) determination of servitude; 19) by establishing a mortgage; 20) by changing the order of entry; 21) registration of the purchase right; 22) expiration of the validity of the registration; 23) cancellation or revocation of the document that was the basis for the change of the real estate cadastre; 24) correction of errors, deficiencies and omissions; 25) on the basis of an entry document that does not meet the conditions for the final registration of the right (registration of a pre-registration); 26) by changing the personal data, the status and other data about the holder of the real estate right; 27) by the appearance of a fact regarding the personality of the right holder, ie real estate (note); 28) determining and modifying the house number; 29) by naming or changing the name of the street or square; 30) changing the boundaries, names and identification numbers of space units; 31) by modifying the data from the impact on the value of the cadastral income; 32) by modifying the data on the impact on the market value of the building. The most applied geodetic measurement methods in Serbia that were used in this study are (aspect also presented by Călina, J., et al, 2018): 1) polar method; 2) aerial photogrammetric method; 3) Global Navigation Satellite System (GNSS) Method; 4) laser scanning method; 5) remote sensing method. The choice of the topographic measurement method, when geodetic works are performed for which the preparation of the technical documentation is provided by law, is part of the design solution of the geodetic works, ie of the main project. The choice of the geodetic method in order to carry out the works for maintaining the cadastre of buildings and lines depends on the prescribed accuracy (Călina, J., et al., 2020).

RESULTS AND DISCUSSIONS

In July 2019, it was necessary to carry out some topographic works on the cadastral parcel number 4189 of K.O. Kladovo, in order to develop a cadastral topographic plan, to obtain a use permit for a completed residential business.

The purpose of the work was the topographic survey and the elaboration of the technical documentation for the private property in Kladovo Municipality, 1. Majaj street number 5, in order to be registered in the land book of the building. The topographic survey together with the rest of the documentation is necessary for the registration in the land book of the land from the cadastral parcel number 4189, having the category of residential building use, with an area of 221 sqm.

With the completion of these works, underground power lines, sewerage networks and water supply networks were built. The total length of the electricity network (1E 1) is 15.91 m. The total length of the sewer pipe (F PL 160mm) is 32.56 m. The total length of the water network (V1 PL 50mm) is 29.87 m.

The execution project was drawn up in which the main steps to be performed by a person authorized by the Serbian National Cadastre Agency (authorized natural person or authorized company) for the preparation of a cadastral documentation were completed: - verification of property deeds; - performing measurements; - drawing up the location and delimitation plan, as well as drafting the rest of the cadastral documentation - identification data of the building and of the owners; - submission of documentation to the office of cadastre and real estate advertising; - in the process of maintaining the real estate cadastre, the boundaries of the plot are also restored and the building is identified.

After completing the first two stages, all the data recorded on the measuring instrument were transferred to the computer and displayed on the cadastral-topographic plan, sketches of the

geodetic works and on the graphic display. The data stored in the internal memory of the total station were downloaded to a computer, subsequently being processed using the specialized computer program GEO-SOFT. The coordinates obtained in the Gauss-Kruger system were transcalculated in the WGS 84 BLH system, and transcalculated in Stereo 1970 using the Trans data software 4.01 (procedure also presented by Calinovici, I. and Călina, J., 2008, Sala, F., et al, 2020).

Figure 2. Framing in the area of the building

Table 1

Coordinates of points in the WGS84 system (B, L, H)

Station	Coordinates B [m]	Coordinates L [m]	Elevation H [m]	Station	Coordinates B [m]	Coordinates L [m]	Elevation H [m]
P1485	7628607.909	4941673.711	47.294	19	44 36 29.02944	22 36 56.94293	88.123
NT2	44 36 28.66759	22 36 56.50629	89.112	20	44 36 29.02948	22 36 56.93363	89.708
1	44 36 28.75839	22 36 56.18303	88.978	21	44 36 29.15903	22 36 56.89078	89.079
2	44 36 28.66103	22 36 56.53509	89.061	22	44 36 29.03098	22 36 57.31052	89.507
3	44 36 28.48578	22 36 57.17090	89.225	23	44 36 29.15166	22 36 57.53048	89.522
4	44 36 28.43496	22 36 57.35517	89.275	24	44 36 29.68461	22 36 57.70188	89.556
5	44 36 28.58105	22 36 57.45143	89.401	25	44 36 29.79361	22 36 57.91648	89.51
6	44 36 28.62020	22 36 57.42299	89.477	NT3	44 36 29.75580	22 36 57.80000	89.551
7	44 36 28.76602	22 36 57.57534	89.616	NT1	44 36 28.49204	22 36 57.14105	89.28
8	44 36 28.78517	22 36 57.54785	89.618	26	44 36 29.26200	22 36 56.87454	89.487
9	44 36 28.84080	22 36 57.34611	89.589	27	44 36 29.61622	22 36 57.08570	89.407
10	44 36 28.63917	22 36 57.24128	89.352	28	44 36 29.71824	22 36 57.18931	89.06
11	44 36 28.73126	22 36 56.77147	89.2	29	44 36 29.81387	22 36 57.28194	89.217
12	44 36 28.81325	22 36 56.61224	89.2	30	44 36 29.96747	22 36 57.29169	89.217
13	44 36 28.86430	22 36 56.77593	89.342	31	44 36 29.74024	22 36 57.67648	89.586
14	44 36 29.00075	22 36 56.74502	89.268	32	44 36 29.78943	22 36 57.52060	89.316
15	44 36 29.01426	22 36 56.72712	89.299	33	44 36 29.85505	22 36 57.30726	89.105
16	44 36 29.09655	22 36 56.38371	89.211	34	44 36 29.93548	22 36 57.40687	89.216
17	44 36 29.10186	22 36 56.41379	89.177	35	44 36 29.90237	22 36 57.53017	89.165
18	44 36 29.02895	22 36 56.93888	88.244	36	44 36 29.84848	22 36 57.73668	89.232

Table 2

Coordinates of points in the Gauss-Kruger system

Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]	Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]	Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]
P1485	7628608	4941674	47.294	12	7628678	4941655	48.018	25	7628707	4941686	48.33
NT2	7628676	4941650	47.93	13	7628682	4941657	48.16	NT3	7628704	4941684	48.371
1	7628669	4941653	47.795	14	7628681	4941661	48.086	NT1	7628690	4941645	48.099
2	7628677	4941650	47.879	15	7628681	4941661	48.117	26	7628684	4941669	48.305
3	7628691	4941645	48.044	16	7628673	4941664	48.029	27	7628688	4941680	48.226
4	7628695	4941644	48.094	17	7628674	4941664	47.995	28	7628691	4941683	47.879
5	7628697	4941648	48.22	18	7628685	4941662	47.063	29	7628693	4941686	48.036
6	7628696	4941649	48.296	19	7628686	4941662	46.942	30	7628693	4941691	48.036
7	7628700	4941654	48.435	20	7628685	4941662	48.527	31	7628701	4941684	48.406
8	7628699	4941654	48.437	21	7628684	4941666	47.897	32	7628698	4941685	48.135
9	7628695	4941656	48.408	22	7628694	4941662	48.326	33	7628693	4941687	47.924
10	7628692	4941650	48.171	23	7628698	4941666	48.341	34	7628695	4941690	48.035
11	7628682	4941652	48.018	24	7628702	4941682	48.376	35	7628698	4941689	47.985
								36	7628703	4941687	48.052

Table 3.

The coordinates of the points in the stereo system 70

Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]	Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]	Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]
P1485	348083.3	310906.2	47.294	12	348158.4	310884.6	47.305	25	348187.8	310914.2	47.617
NT2	348154	310882.1	47.216	13	348159.8	310888.3	47.447	NT3	348186.7	310911.6	47.658
1	348157	310875.1	47.082	14	348164.1	310887.7	47.373	NT1	348148.1	310896	47.385
2	348153.7	310882.8	47.165	15	348164.5	310887.3	47.404	26	348172.1	310890.8	47.592
3	348147.9	310896.6	47.33	16	348167.3	310879.8	47.315	27	348182.8	310895.8	47.513
4	348146.2	310900.6	47.381	17	348167.4	310880.5	47.281	28	348185.9	310898.1	47.166
5	348150.7	310902.9	47.507	18	348164.8	310892	46.349	29	348188.8	310900.3	47.323
6	348151.9	310902.3	47.583	19	348164.8	310892.1	46.228	30	348193.5	310900.6	47.323
7	348156.3	310905.8	47.722	20	348164.8	310891.9	47.813	31	348186.3	310908.9	47.692
8	348156.9	310905.2	47.724	21	348168.9	310891.1	47.184	32	348187.9	310905.5	47.422
9	348158.7	310900.8	47.695	22	348164.6	310900.2	47.613	33	348190.1	310900.9	47.211
10	348152.6	310898.3	47.457	23	348168.2	310905.1	47.628	34	348192.5	310903.1	47.322
11	348155.7	310888	47.305	24	348184.6	310909.4	47.662	35	348191.4	310905.8	47.271
								36	348189.6	310910.3	47.339

The measurement was performed by the method of polar coordinates, and the instrument was electro-optical LEICA TCRA 1201 (Mihai D., et al., 2014,), starting from the existing polygon network, for which data were obtained from the Service of Cadastre Real Estate Kladovo

On the cadastral plot number 4189 str. Kladovo 1. Maja no.5, there is a residential building - office building number 2 (GF + 1), with a total area of 221 sqm.

Underground lines were built in the electricity network, sewerage network and water supply network which were

measured with GPSRX1250; (method also presented by Pop, N., et al., 2019).

The total length of the electricity network (1E 1) is 15.91 m.

The total length of the sewer pipe (F PL 160mm) is 32.56m.

The total length of the water supply network (V1 PL 50mm) is 29.87m. The coordinates of the underground lines in the electricity network, the sewerage network and the water supply network that were measured with GPSRX1250 and were entered in tables 4 and 5.

Table 4

Coordinates of points in the WGS84 system (B, L, H)

Station	Coordinates B [m]	Coordinates L [m]	Elevation H [m]	Station	Coordinates B [m]	Coordinates L [m]	Elevation H [m]
5	44 36 29.70570	22 36 57.21717	89.131	15	44 36 29.09671	22 36 56.38390	89.212
6	44 36 29.71568	22 36 57.19840	89.141	18	44 36 29.00088	22 36 56.74498	89.272
7	44 36 29.71012	22 36 57.20233	89.141	21	44 36 28.73126	22 36 56.77152	89.202
8	44 36 29.18008	22 36 56.90325	89.081	22	44 36 28.86436	22 36 56.77612	89.342
9	44 36 29.19231	22 36 56.86322	89.142	23	44 36 28.82070	22 36 56.83931	89.292
10	44 36 29.16564	22 36 56.87019	89.032	28	44 36 28.62030	22 36 57.42290	89.481
11	44 36 29.16361	22 36 56.87649	89.052	29	44 36 28.76589	22 36 57.57525	89.621
12	44 36 29.02891	22 36 56.93897	88.241	NT3			

Table 5

Coordinates of points in the Gauss-Kruger system

Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]	Station	Coordinates Y [m]	Coordinates X [m]	Elevation H [m]
5	7628691.20	4941682.67	47.95	15	7628673.20	4941663.51	48.03
6	7628690.8	4941683	47.96	18	7628681.22	4941660.71	48.09
7	7628690.9	4941682.8	47.96	21	7628681.97	4941652.40	48.02
8	7628684.6	4941666.3	47.9	22	7628681.99	4941656.51	48.16
9	7628683.7	4941666.7	47.96	23	7628683.41	4941655.19	48.11
10	7628683.9	4941665.9	47.85	28	7628696.40	4941649.26	48.30
11	7628684	4941665.8	47.87	29	7628699.67	4941653.82	48.44
12	7628685.5	4941661.7	47.06	NT3			

Table 6 shows the coordinates of the radiated points with the help of which the total land area was calculated and the location plan of the building located in Kladovo Municipality, 1.Maj street number 5, cadastral parcel number 4189 was drawn up.

For greater accuracy and to obtain more relevant scientific results, the team of specialists applied a combined method by which the coordinates of the characteristic points of the building and the technical-urban networks were determined in three projection systems: 1- The coordinates of the points in the system WGS84 (B, L, H) (tab.1.), 2- Coordinates of points in the Gauss-Kruger system (Tab.2.) - the national coordinate system in Serbia and Coordinates of points in the Stereo system 70 (Tab.3.) - the national coordinate system in Romania. Comparing the three results obtained, it was found that the values obtained fully fall within the required standards of accuracy and strictly comply with all legal

requirements and technical rules imposed on such works. Based on the coordinates determined very precisely, the location and delimitation plan was drawn up at a scale of 1: 200 (fig.2.), Which was used as a basic part in the registration of the building in the Land Book (method also used by Sui D., 2014).

Table 6

Calculation of building and residential building areas

Building area				Residential building area			
Point no.	Coordinate points on the contour		Side lengths D (i, i+1)	Point no.	Coordinate points on the contour		Side lengths D (i, i+1)
	X (m)	Y (m)			X (m)	Y (m)	
17	310887.315	348164.508	14.662	1	310891.055	348168.869	0.700
31	310900.797	348158.745	10.429	8	310891.347	348169.505	17.642
32	310905.150	348168.222	21.567	5	310898.746	348185.520	3.634
33	310914.247	348187.777	4.312	4	310900.271	348188.818	1.389
34	310910.331	348189.582	4.855	42	310900.873	348190.070	5.118
35	310905.824	348191.387	2.906	41	310905.512	348187.908	3.761
36	310903.136	348192.491	2.724	40	310908.907	348186.289	1.809
37	310900.625	348193.547	11.754	3	310909.412	348184.552	21.942
38	310895.770	348182.843	11.880	2	310900.187	348164.643	10.062
39	310890.792	348172.056	8.310				
S (4189) = 470.18 sqm P = 93.399 m				S (4189) = 234.37 sqm P = 66.057 m			

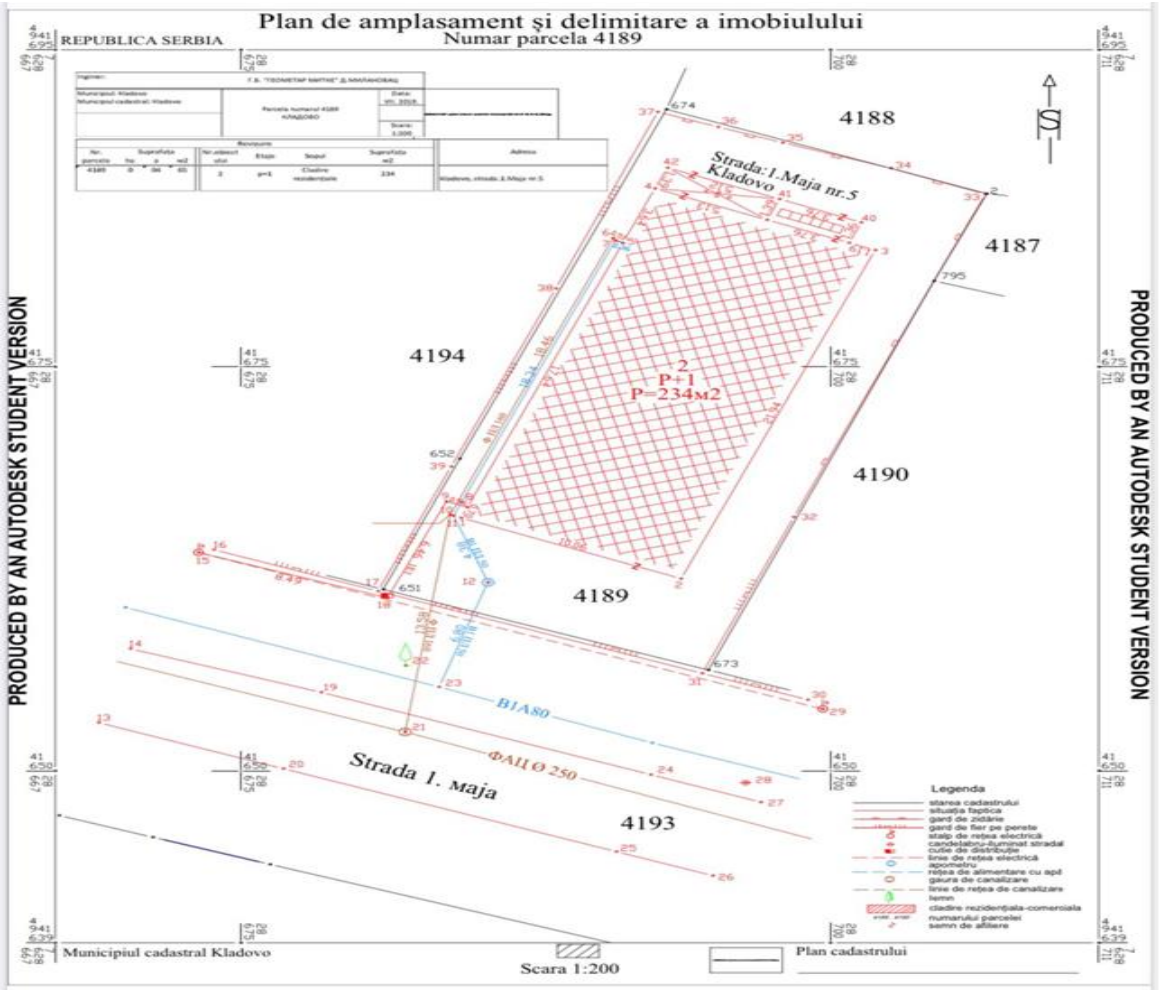

Figure 3. Location and delimitation plan at a scale of 1: 200

CONCLUSIONS

Given the need for the existence of cadastral documentation for the preparation of any act of disposition of buildings (apartments, exclusive land as well as individual access, land and construction) located in Serbia, the vast majority of cadastral documentation prepared by authorized personnel is for registration in the land book. In addition to this type of cadastral documentation, documentation can be made for the repositioning of buildings for which there is cadastral documentation and which are registered in the land register, registration of newly built or unregistered buildings in the land register, detachment or attachment of land, apartments as well as documentation for expropriation.

Also, in most cadastral systems in the world there is a very good protection of property rights. In most cases, the state is responsible for the shortcomings caused by an erroneous registration. Cadastral systems include both cadastral data and land book records-rights but also restrictions and liability. Studies have shown that reforms are underway in most countries and that the tax service is an important point in the reform process. Other criteria such as reducing data access time, improving the efficiency of the system and the appearance of the multiscope cadastre show the efforts made in order to facilitate the interaction with the system.

Starting from these desideratums, the cadastral documentation was prepared through which the identification, measurement, description, registration of the building and its representation in both analog and digital format, together with the Geo Srbija application, provided by the Geodetic Authority of the Republic of Serbia. The documentation prepared in this paper was made at a very high scientific level because a state-of-the-art and high-performance topographic equipment was used, and the methods of data collection and processing used were the newest, with an innovative character. The specialists who participated in the paper were very well prepared from a professional point of view, both in Serbia and in Romania, which led to significant scientific results, which can be used as a model of good practice in land and cadastre measurements, both in Romania and in Serbia.

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