STUDY ON THE PREPARATION OF TECHNICAL DOCUMENTATION NECESSARY FOR THE REHABILITATION AND MODERNIZATION OF ROAD INFRASTRUCTURE IN THE AGRITOURISTIC AREA, GIUBEGA-BĂILEȘTI

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Abstract

The purpose of the study is to carry out a complex and high-precision work necessary for the realization of the first phase of the execution project, after which, based on all the drawn and written parts existing in the project, to carry out the field application of the construction works of the road, as well as control and reception works. The technical documentation produced had to meet all the technical standards of precision and quality imposed by the standards in force, that is why the most modern devices and existing work methods were used for the topographic surveys, which led to obtaining a high economic efficiency. The preparation of the location and delimitation plan of the studied road was made from the absolute coordinates of the support points and details, calculated on the basis of the elevations carried out on the ground, with the help of a high-performance program, which allowed the representation with great ease and accuracy, on a large scale 1: 500, of all the details existing on the land. Based on the completed technical documentation, the file was submitted to OCPI-Dolj, it was approved and entered in the Land Registry. Also, the execution project was carried out and the actual plotting on the ground of the road rehabilitation and modernization works, which will contribute substantially to increasing the safety and accessibility of all tourist reception structures.

Key words: *agrotourism area, technical documentation, modernization*

INTRODUCTION

The study was carried out in Giubega commune, Dolj county, located in the southwest of the historical Oltenia region in Romania, its seat is the municipality of Craiova, having a south-southwest position, focused on the lower course of the Jiu River, from which it takes its name (Jiul de Jos or Doljiu). The territory of the county stretches between 43°43' and 44°42' north latitude and 22° 50' and 24° 16' longitude. The total area is 7,414 km^2 and represents 3.1% of the country's area. From this point of view, Dolj ranks 7th among the administrative-territorial units of Romania. The road network of the county includes three European roads E70, E79, E574, 46 county roads and 117 municipal roads (Bădescu, G. et al, 2017; Călina, A. et al, 2014).

Giubega commune is geographically located in the Băileștiului Plain, a subunit of the Oltenia Plain within the Romanian Plain, in the southern half of Dolj county. The characteristic relief encountered in the administrative territory of the commune is the plain relief (Băileștiului Plain) represented by the medium and high terraces of the Danube, with relative altitudes between 40.0 - 60.0 m, and absolute altitudes between 70.0 - 100.0 m. (Răduțoiu, D. et al, 2018).

Within the Băilești Plain, the villages are large and compact (especially in the northern half of it) and have developed in the contact area between the terraces or using the gentle slopes with southern exposure. The relief of the plain, without large differences in level, with the characteristic climate and soil are particularly favorable natural conditions for the development of the commune and its economy based on agriculture and animal husbandry, both for own

consumption and for the daily supply of vegetable and animal products of the city of Băilești, the commune of Giubega being included in its parish area (Miluț, M. et al, 2014, 2020; Călina J. et al, 2020, 2022).

From the point of view of the relief, the locality is more disfavoured compared to those located in the mountainous and submontane areas, where the varied relief with sculptural forms and unique appearance can attract a larger number of tourists (Adamov, T. et al, 2020; Vladimirescu, M.V., 2012). Although the area is not attractive from this point of view, in the area and especially in the locality more and more rural tourist guesthouses have started to appear and develop (Ciolac, R., et al, 2019). They are focused in particular on leisure and relaxation tourism and the promotion of traditional local gastronomic products, as well as the local specific wine, called zaibăr, from the Băilești-Giubega area, made famous by the incomparable Oltean actor Amza Pelea, born in Băilești (Călina, A. and Călina, J. 2019, 2019; https://primaria-giubega.ro/).

The development of this activity was primarily due to the fact that the local people realized the many advantages arising from the practice of an agritourism and rural tourism activity (Abadi, A. and Khakzand, M., 2022; Solymannejad, R. et al, 2022) as: capitalizing at a higher level of this brand called zaibăr and of local agricultural products, by selling them directly or serving them to tourists at a price closer to their true value (Markovic, N. et al, 2016), the possibility of obtaining additional income from the tourism activity, in addition to the basic ones obtained from the own household (Kubal-Czerwińska, M. et al, 2022), the creation of new jobs and the acquisition of a new qualification in the field of tourism, the preservation of material and immaterial heritage of oltenian traditional village (Iagăru, R. et al, 2016), enriching the level of culture and civilization of this rural area, through relations with tourists from other areas of the country or abroad and others, aspects also reported by other new researchers from the country and abroad (Galluzzo N., 2017, 2021; Călina, J. and Călina, A., 2019).

The purpose of the work was to prepare the topo-cadastral documentation, in order to register the road in the Giubega township in the Land Register, to obtain the construction permit, followed by the subsequent realization of the technical project, with the aim of its rehabilitation. The road section is located at the intersection of Magnoliei street and Florin Firan Street (https://primaria-giubega.ro/), it appears in the inventory of the Giubega municipality with the following neighborhoods:

NORTH	on the north side it borders private properties
EAST	in the eastern part, Mircea cel Bătrân street adjoins Florin Firan Street
SOUTH	in the south, Mircea cel Bătrân street borders private properties
WEST	on the west side, Mircea cel Bătrân street adjoins Magnoliei street

The total surface resulting from the measurements is 3428.21 m^2. The realization of rehabilitation and modernization works are necessary to ensure operational safety and to avoid periodic maintenance and repair costs, as well as to improve connections with nearby cities. Through these operations, accessibility to the agritourism area and implicitly to the various rural or agritourism guesthouses becomes easier and without any risks for tourists. Accessibility in the area is a very important asset in attracting tourists to a certain area, a phenomenon also recorded by other researchers in their agritourism studies (Ciolac, R., et al, 2019; Abadi, A. and Khakzand, M., 2022;

Solymannejad, R. et al, 2022; Călina J. et al, 2020, 2022).

MATERIAL AND METHODS

From the point of view of carrying out the topographical works, the topographical specialist must pay special attention, because within this project it is necessary to go through all the stages that are the basis for the creation of the technical documentation, including both the field work, but especially the office work (Barazzetti, L. et al., 2010; Upadhyaya, A., et al, 2022.). In this sense, the topographic survey of the road was carried out in the Stereographic Projection System 1970 with the Black Sea 1975 reference plan, with the Leica TS 06 total station, whose accuracy is $\pm 05^{cc}$, which involves determining the points that delimit the road, as well as determining the points of detail necessary to draw up the location and delimitation plan, having elevations, neighbourhoods, distances, as well as the highlighting of all the elements encountered in the field (Bădescu, G. et al, 2017; Pop, N. et al, 2019).

A. The documentation stage consisted of obtaining information from the Dolj Land Registry and Real Estate Publicity Office on geodetic networks, orthophoto plans, but also from the Giubega town hall on whose territory the road is located.

B. The measurements were carried out in the Stereografic 1970 projection system, and the elements necessary to draw up the location plan with the station were measured on the ground with the LEICA TS 06. The geodetic network of thickening and lifting was carried out in such a way as to ensure the number of points required for the measurements topographical and cadastral details.

In order to draw up the geodetic network of support and thickening, from the ground, a traverse supported at the ends on known points, two landmarks of known coordinates and sides with known orientations, with visas on signals from the church in the locality and the nearby hill, from which later, the topographical details were collected. When making the traverse, the following conditions were respected: the traverse points must be located in areas protected from destruction; there must be visibility between adjacent traverse points; waypoints should be chosen as close as possible to the detail points to be measured (Doneus, M., Neubauer, W., 2005; Li, D. et al, 2009).

The field operations carried out consisted of: marking the travel points; drawing up the sketch of marking and description of the points; measurement of road sides; measuring vertical angles; measuring horizontal angles (Mihai, D. et al, 2015; Sala, F. et al, 2020).

When raising the details, the polar coordinates method was used, which allows obtaining some characteristic points, measuring the orientation and distance from a point of known coordinates (Călina, A. et al, 2015; Herbei, M. V., & Sala, F., 2020).

RESULTS AND DISCUSSIONS

In order to carry out the documentation stage, we traveled to obtain information from the Dolj Cadastre and Real Estate Publicity Office on the geodetic networks, orthophotoplans, but also from the Giubega town hall on whose territory the road is located (Figures 1,2) (https ://primaria-giubega.ro/).

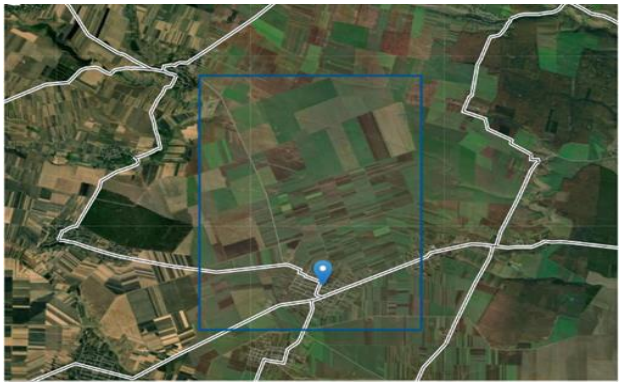

Figure 1. Giubega commune map

Figure 2. Location of works

The actual realization of the documentation consisted of drawing up a support network, using a supported traverse from the station point S2000 (landmark 508) of known coordinates with the orientation visa on the Măgura Verde signal (3000) and the station point S2001 (landmark 302) of known coordinates, with orientation visa on the Giubega Church signal (3001). The device was stationed at station S2000 (landmark 508) of known coordinates from where the signal from S3000 Măgura Verde was targeted (Figure 3). The S3000 Măgura Verde orientation was entered into the device, aiming then at the S1001 point, recording the horizontal direction, distance and vertical angle on the device. Next was stationed point S1002 from where was aimed back at point S1001 and forward at point S1003. The procedure was repeated until the last station point S2001 (landmark 302) from where point S1003 and the signal from the Giubega Church (3001) were aimed back.

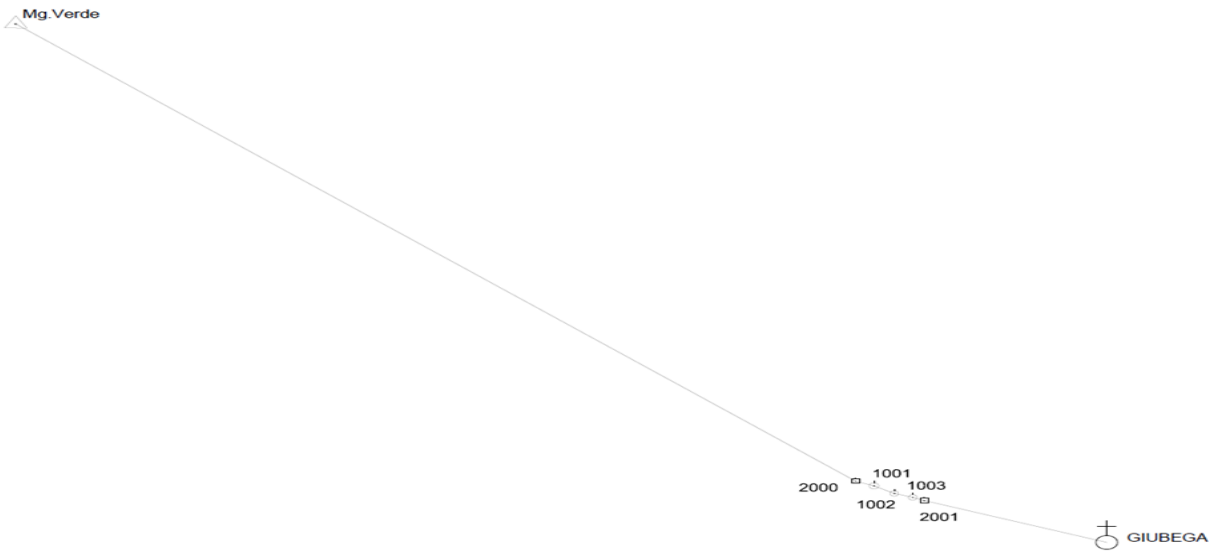

Figure 3. Sketch of the support network

For the topographic surveying of the elements in the field, a supported traverse on points of known coordinates and sides with known orientations, combined with the polar coordinates method, was carried out. Thus, the traverse was based on two landmarks with known coordinates, with the route consisting of points 2000-1001-1002-1003-2001, and the signals on the Giubega church and Măgura Verde, with known coordinates, were used as orientation points. For greater accuracy, the reduced distances to the Stereographic 1970 projection plane were calculated - first the reduced distances to the ellipsoid were determined with the formulas:(Langhe, S., Herbei, M. and Sala, F., 2020).

Table 1. Elements measured during supported traverse

Station	Targeted point	Distances (m)	Zenith angles	Horizontal directions
Landmark 508(2000)	Magura Verde(3000)	0	$99^g\ 20^c\ 34^{cc}$	$345^g\ 34^c\ 88^{cc}$
	1001	72.11	$99^g\ 97^c\ 50^{cc}$	$124^g\ 45^c\ 65^{cc}$
1001	Landmark 508(2000)	376.901	$99^g\ 87^c\ 30^{cc}$	$324^g\ 45^c\ 65^{cc}$
	1002	346.377	$99^g\ 02^c\ 25^{cc}$	$134^g\ 13^c\ 07^{cc}$
1002	1001	362.570	$99^g\ 01^c\ 50^{cc}$	$334^g\ 13^c\ 07^{cc}$
	1003	407.748	$98^g\ 40^c\ 55^{cc}$	$120^g\ 25^c\ 76^{cc}$
1003	1002	407.748	$101^g\ 44^c\ 15^{cc}$	$320^g\ 25^c\ 76^{cc}$
	Landmark 302 (2001)	207.982	$99^g\ 50^c\ 64^{cc}$	$126^g\ 43^c\ 88^{cc}$
Landmark 302(2001)	1003	207.982	$100^g\ 29^c\ 22^{cc}$	$326^g\ 43^c\ 88^{cc}$
	Giubega Church (3001)	393.843	$100^g\ 99^c\ 40^{cc}$	$122^g\ 24^c\ 51^{cc}$

$D_{elipsoid} = \sqrt{\frac{D^2-(H_B-H_A)^2}{(1+\frac{H_A}{R})(1+\frac{H_B}{R})}}$, where R = Gauss means radius = 6378956,594 m.

The deformation of the lengths in the 1970 Stereographic projection was also calculated with the formulas:

$$\Delta D = \frac{s^2}{4R_0^2} - \frac{1}{4000}$$

$$s = \sqrt{(500000 - x_m)^2 + (500000 - y_m)^2}$$

$$= \sqrt{(500000 - 293591.1055)^2 + (500000 - 372152.16155)^2} = 334256.733\text{m}$$

$$\Delta D = \frac{334256.733^2}{6378956{,}681} - \frac{1}{4000} = 0{,}0001751\text{m}$$

where x_m, y_m are the provisional average coordinates of the points at the ends of the measured distance, and R_0 is the radius of curvature of the ellipsoid for the central point of the projection.

The reduced distance to the Stereographic 1970 projection plane was calculated with the formula:

$$D_{st70} = D_{elipsoid} * \Delta D + D_{elipsoid}$$

Reduced average distance on the Stereographic 1970 projection plane:

$$D_{st} = \frac{(D_{stA-B} + D_{stB-A})}{2}$$

In table 2, the final absolute coordinates of the station points are recorded.

Table 2. Coordinate inventory of known points

Point no.	X (m)	Y (m)
S2000	293656.889	372026.048
3000	296320.378	368942.374
3001	293300.402	372947.372
S2001	293544.256	372278.219

Table 3. Coordinates of support points determined by the traverse method

Point no.	X (m)	Y (m)
1001	293629,7754	372093,3266
1002	293585,3409	372167,9214
1003	293562,9426	372235,6437

The detail points were determined by the polar coordinates method. From stations S2000 and S2001, all detail points were targeted, recording horizontal directions, distances and vertical angles. The standard deviation for determining a point must not exceed: ± 10 cm in urban areas and in extra-urban areas ± 20 cm in flat areas, ± 30 cm in collinear areas, ± 50 cm in mountain areas. For the surveying of planimetric details, it was also stationed points S1001, S1002, S1003, from where

the distances from the support points to the detail points (road intersections, canal section points, etc.) were measured. With the help of the coordinates calculated during the supported traverse, the absolute coordinates of the detail points were determined, which were recorded in table 4.

Table 4. The coordinates of the detail points

Nr. Point	X [m]	Y [m]	Z [m]
4415	293600.820	372003.880	120.39
4416	293601.620	372004.510	120.40
4417	293601.970	372005.020	120.29
4418	293602.110	372004.660	120.11
4419	293602.300	372004.210	120.44
4422	293604.350	371992.640	120.66
4423	293600.920	371990.830	120.61
4424	293612.640	371997.050	120.48
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7720	293687.650	372040.060	121.04
7721	293685.400	372042.420	121.27
7722	293682.980	372044.060	121.34
7723	293680.890	372046.020	121.19
7724	293679.470	372048.230	121.26
7725	293678.970	372047.410	121.29
7729	293676.320	372031.480	121.01
7730	293680.490	372033.790	121.06
7929	293593.885	372002.864	120.40
1	293586.158	372191.064	120.27
16	293542.163	372046.453	177.11

Based on the calculated absolute coordinates of the points, the location and delimitation plan of the road was drawn up, using the AutoCad 2014 program, in dwg format (Kolbe, T. et al, 2011), at a scale of 1:500.

The points were represented using the TopoLT application, from where the program was configured and the 1:500 scale was chosen (Figure 4) (Călina, J. et al, 2018).

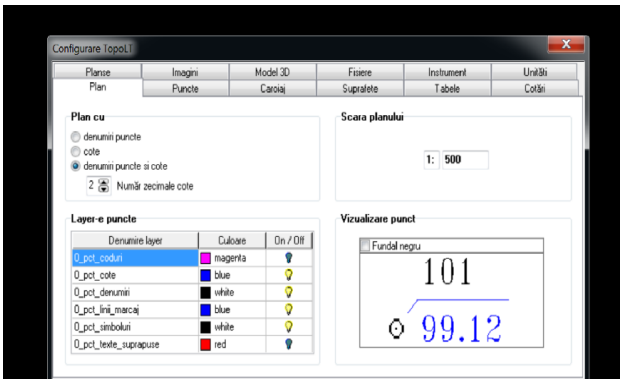

Figure 4. Program configuration

After reporting the coordinates (Figure 5), they were raised to the elevation of the land using the command: TopoLT – Transformation - Raise to the elevation of the points (Figure 6) (Raza, H., et al, 2017).

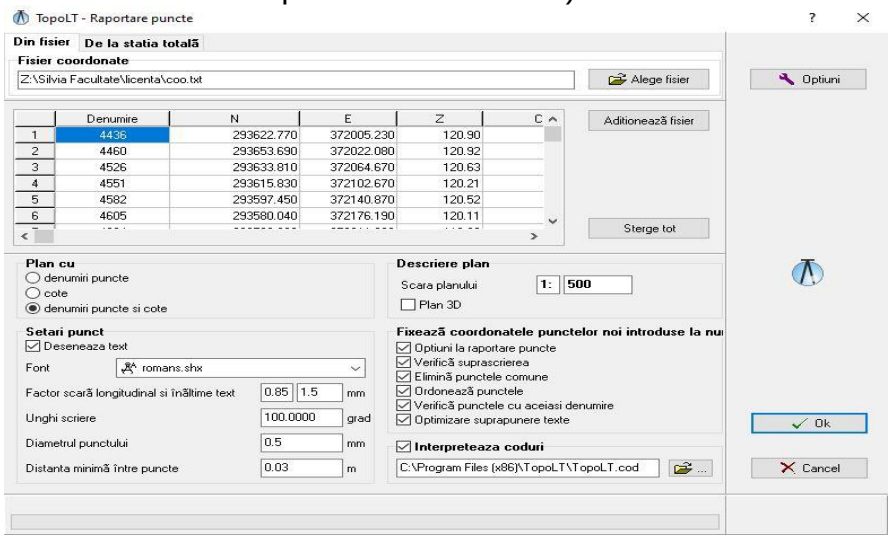

Figure 5. Point representation

Finally, with the help of the TopoLT application, the grid was drawn and all the support points and details were reported, thus finalizing the location and delimitation plan of the road, from Giubega commune, on a scale of 1:500 (Calinovici, I. and Călina, J., 2008; Svestac, C., Herbei, M.V. and Sala, F., 2020). It was printed on an A2 sheet. The names of the neighboring roads, near the road under study, were written on the plan.

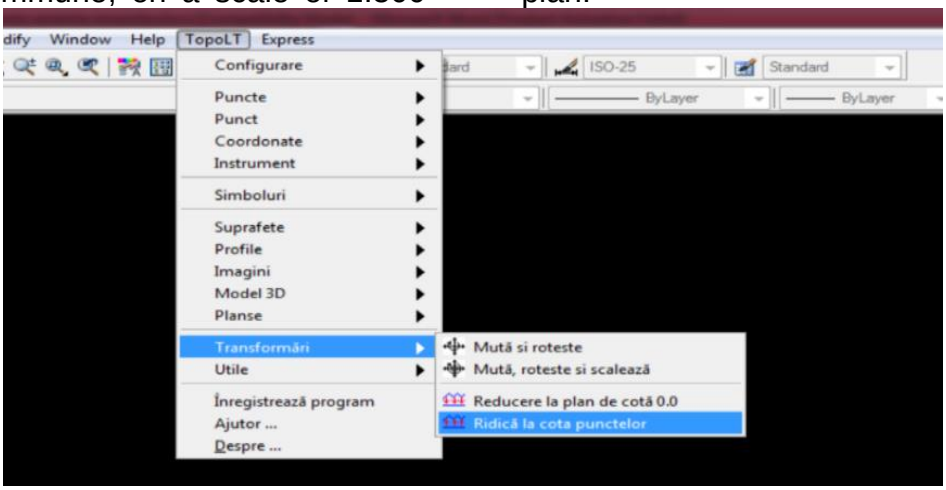

Figure 6. Levelling up points

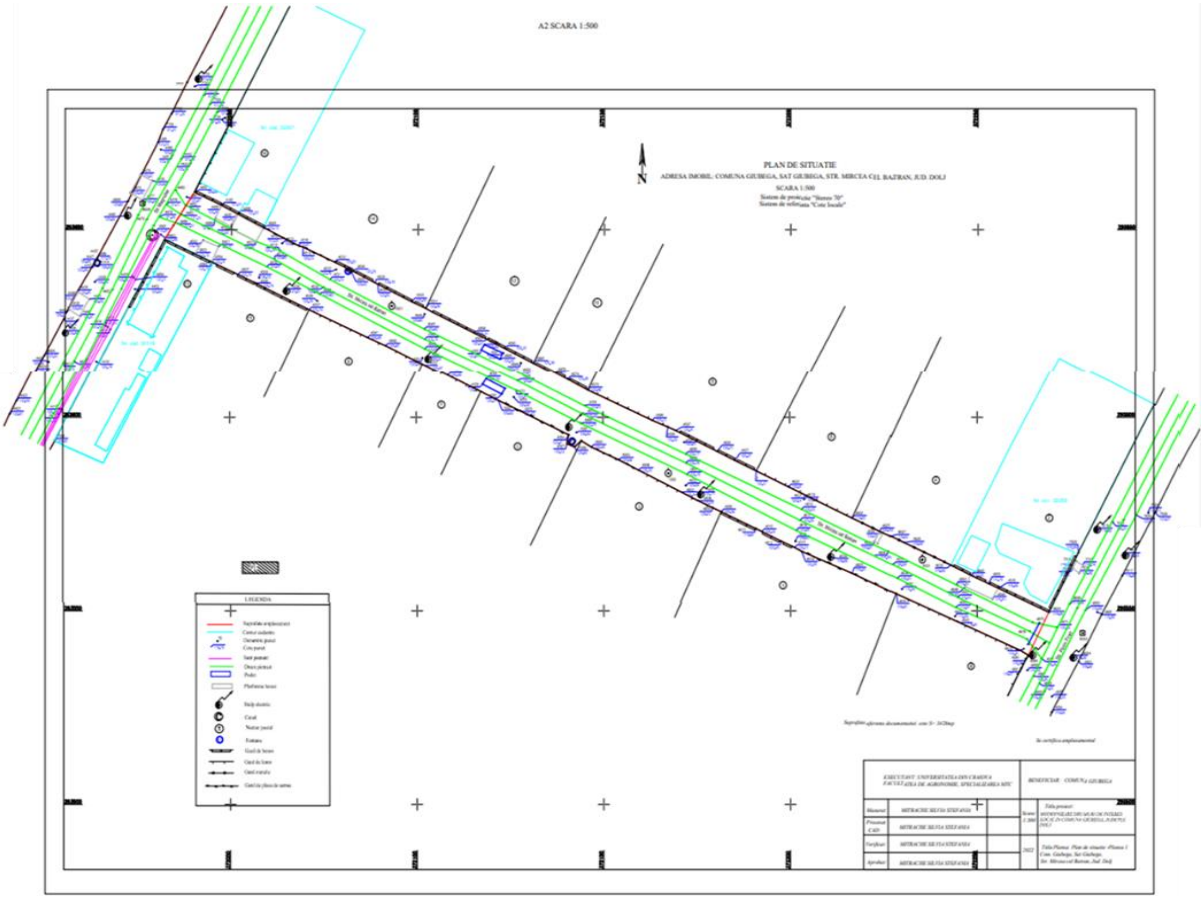

Figure 6. Location and delimitation plan sections assembled by overlapping

The total surface determined from the coordinates of the points delimiting the road is 3428.21 m^2 (Table 5), (Croitoru, A. et al, 2016; Rosca, A., et al, 2020).

Table 5. Area calculation from absolute point coordinates

Point no.	X [m]	Y [m]	Point no.	X [m]	Y [m]
4486	293659.881	372039.987	4650	293556.985	372253.251
4466	293647.453	372032.004	4651	293559.012	372248.726
4505	293641.294	372044.992	4639	293561.811	372242.993
4507	293638.200	372051.650	4628	293567.660	372230.400
4508	293635.980	372056.220	4627	293569.330	372226.870
4527	293628.920	372070.720	4626	293570.150	372224.960
4541	293621.560	372086.420	4625	293570.530	372224.110
4542	293619.430	372091.250	4622	293573.970	372216.720
4552	293614.540	372101.080	4621	293579.830	372204.370
4553	293610.980	372108.410	4620	293582.050	372199.700
4554	293606.690	372117.270	1	293586.158	372191.064
4555	293604.400	372121.950	4607	293588.880	372185.340
4573	293601.670	372127.830	4606	293591.200	372180.600
4584	293595.480	372140.820	4597	293596.600	372169.480
4587	293593.770	372140.420	4596	293597.490	372167.390
4588	293593.150	372140.330	4595	293599.240	372163.210
4586	293592.340	372142.390	4576	293607.120	372145.940
4585	293593.950	372144.200	4574	293609.900	372140.580
4583	293592.310	372146.930	4575	293611.930	372136.600
4593	293588.980	372154.260	4567	293614.790	372130.920
4594	293586.350	372159.570	4566	293618.740	372123.180
4603	293580.610	372171.110	4565	293621.130	372118.570
4604	293578.510	372175.390	4564	293622.720	372115.140
4608	293576.650	372179.360	4545	293628.320	372103.750
4609	293575.610	372181.670	4544	293629.290	372102.040
4611	293571.250	372190.940	4543	293631.020	372098.280
4610	293570.490	372192.570	4540	293635.620	372089.230
4612	293568.000	372197.720	4539	293636.060	372088.360
4613	293566.390	372201.340	4534	293639.000	372082.700
4614	293565.370	372203.190	4533	293641.440	372077.620
4623	293559.740	372216.700	4516	293645.380	372069.180
4638	293554.430	372228.280	4515	293645.680	372068.040
4645	293547.250	372244.650	4514	293647.800	372063.890
4679	293539.770	372261.570	4525	293650.594	372058.548
4680	293538.560	372263.720	4496	293654.083	372051.755
4654	293549.639	372269.191	4495	293656.438	372047.301
Area = 3428.00 sq m					

CONCLUSIONS

In order to be entered in the Land Register, the work carried out was framed in the Stereo'70 reference system, based on the coordinates of the geodetic points taken from the maps and topographic plans, obtained from A.N.C.P.I. and O.C.P.I. and inventories of coordinates for support network and detail points. When drawing up the network of support and thickening, necessary to survey the road surface, the method of traveling supported at the ends on points of known coordinates and sides with known orientations was used. Thus, the traverse was based on two landmarks known coordinates, with visas on signals from the local church and the nearby hill. A support network was created, this being materialized by iron bolts/wooden stakes. For each of these points, topographical descriptions were made. The station points were materialized in such a way as to ensure the visibility necessary to perform the measurements.

The topographic survey also covered a number of detail points such as: property boundaries; road surface; electricity and

lighting poles; footprint of constructions; other elements of public interest. Based on the topographical measurements in the field and the calculation operations of the coordinates of the points, the situation plan was executed. For this purpose, the Autocad 2014 program was used, and the plan was then printed on A2 format paper, at a scale of 1:500.

The resulting topographical documentation was used in the submission to obtain the technical visa for the road rehabilitation and modernization project located on Mircea cel Bătrân street, in Giubega, Dolj county. On the basis of the prepared cadastral documentation, the road can be registered in the Land Registry, in order to obtain the construction permit, followed later by the realization of the technical project, in order to rehabilitate and modernize it.

The study carried out in this way meets all the technical standards of precision and quality imposed on such work, and based on this documentation, the design and plotting on the ground of all the rehabilitation and modernization works requested by the beneficiary can be carried out, which will lead to increased operational safety. Also, by carrying out these works, all expensive periodic maintenance and repair expenses will be removed and access to nearby cities and to all existing tourist reception structures, or that will be built later, through various local or national development programs, will be facilitated.

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