STUDY REGARDING THE TOPO CADASTRAL SURVEY CARRIED OUT FOR THE REHABILITATION AND MODERNIZATION OF A ROAD IN THE PERIŞOR-GIUBEGA AGRITOURISTC AREA - DOLJ

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ABSTRACT

The paper presents a quick and efficient method of topo-cadastral survey of a road in the Perișor-Giubea-Dolj agrotourism area, in order to rehabilitate and modernize. In order to be able to make the technical documentation required by the beneficiary, a topographic survey was carried out using a modern equipment, adequate to the precision required for such a very complex work. The topographic method used was fully adapted to the existing situation on the ground and to obtain a high yield and efficiencies. On the main axis of the road was made a supported travel on known coordinates and elevations and at the same time the details were raised by the method of polar coordinates. All the data measured in the field were downloaded to the computer, where they were easily and very precisely processed with specialized topography programs, obtaining the coordinates of all surveyed points, based on which the situation plan was drawn up at scale and accuracy required by the beneficiary. The technical documentation thus obtained was used in all stages of construction, design, tracing and execution.

INTRODUCTION

The study area is located between Perişor commune located 36 kilometers from Craiova and Giubega commune at a distance of about 45 km, in the central part of Dolj county. The locality of Perişor is the village where Henri Coandă spent a good part of his childhood years, with his grandparents. He was born in Bucharest, his father was General Constantin Coandă, former Prime Minister of Romania for a short time, in 1918. In his memory in 2006, the authorities set up a museum, where you can see photos that capture fragments from the life of the great scientist and which prove the connections he had with the commune, and in the courtyard of the museum there is also a military plane (Călina A. and Călina J., 2019).

Perișor commune was established by the administrative law of March 31, 1864. The name of the locality comes from a pear plantation on the old hearth of the village. The first documentary attestation of the locality dates from 1570 in the charter of Alexandru Voievod. Under the aspect of developing the local agrotourism and creating a nucleus of accommodation and offer of competitive services, the aim is to attract as many families in the area as possible to the agrotourism circuit. In this way, the accommodation and competitive capacity of the area increases, complex investments can be made and local agro-tourism resources can be better exploited. Among the young people from the locality, or from the neighboring villages, the necessary labor force will be recruited, after a previous qualification in the fields provided in the personnel structure (Călina, J. and Călina, A., 2019).

The studied area being located in the center of Dolj County offers the possibility to easily visit as many tourist attractions as: Nicolae Romanescu Park, Craiova Botanical Garden (Răduțoiu D., et al, 2018), Craiova Zoo, Jean Mihail Palace - Museum of Craiova Art, Vorvoreanu Palace, Craiova Metropolitan Cathedral, Cosuna Monastery, Jitianu Monastery, Plenița Wild Peony Reserve, and nearby you can visit: Fântânele Earth Dam and Lake, Henri Coandă Perișor Museum, Amza Pelea Memorial House – Băilești, Lake

Cilieni, Amza Pelea Holiday Village, Târnăvița Hermitage, etc. You can organize: bike rides, sport fishing, wine tastings, hiking, table tennis, swimming, campfire or an outdoor dinner, walks through the forest, trips to the Danube, etc.

As it is known, the rural area is a socio-cultural entity that includes all rural settlements and in which the basic economic activity is agriculture (Adamov T. et al, 2020). The tourist village is defined as a rural, picturesque settlement, located in an unpolluted natural setting, preserving traditions and a rich historical past that fulfills the function of receiving and hosting tourists for a stay of indefinite duration (Ciolac R. et al, 2019). Through its cultural, historical, ethnographic, natural and socio-economic values, the Romanian village can become a tourist product of great originality and brand for Romanian tourism (Mihai D., 2015; Galluzzo N., 2017, 2021).

The village in this central part of the country, through the social-historical conditions in which it developed, is an area where Romanian spirituality has often interfered with that of other nationalities, achieving a symbiosis full of originality and a very rich peasant culture. Each village in the area has a unique personality and character, it imprints specific features and conditions the existing infrastructure. It signifies the human dimension, local intimacy, evokes the town hall, the school, the pub, the church, the traditions and customs, these things that marked the life of the people in this area (Burghilă C. et al, 2016). The farm, the village, the natural environment and the population have complementarity and interdependence relations, they are essential elements of agrotourism, which give it its attractive, economic and cultural character (Iagăru R. et al, 2016).

Viewed from the point of view of the effects it has on peasant households, agrotourism appears as a variant of rural development, especially in areas with difficult living conditions and disadvantaged areas, which can hardly provide the means of subsistence only from the practice of agriculture. and animal husbandry (Sescu AM, et al, 2018). In the area there are villages that are interesting for their ethno-folk values, crafts, products of artistic and artisanal creation, for having recognized values, historical or cultural (museums, monuments, memorial houses, archaeological remains), viticultural tourist villages, villages that offers opportunities to practice sports, villages that are adjacent to nature reserves or other special geomorphological phenomena. The cuisine will be based on the traditional Oltenian offer specific to the area, based on the supply of fresh products from one's own household and from nearby households. For the customers who request, specific dishes will be prepared for the restaurants in the hotel tourist circuit and in the leisure areas, for which the supply of products will be made from the suppliers in the area. Breakfast will be included in the price of accommodation, with the possibility to opt for full board, with lunch and dinner (Iacob, D., Toma, E., 2021).

In collaboration with folk groups (established by participating in folklore competitions in the country and abroad) in Craiova and the area, you can organize evenings with artistic programs with local specifics (folk music, folk dances, literary folklore). The clientele specific to the agrotourism in the area will consist of the following categories of tourists: amateur and professional fishermen who usually fish on Lake Fantanele, who request accommodation and meals, holiday tourists, who request complete agrotourism services for periods between 7-12 days , tourists looking for leisure, people requesting a stay of 3 days, maximum 5 days, usually with request for full services. In addition to the categories listed above, which represent the target groups in terms of source of income for the financial dynamics of pensions, there is also a target group category, namely the families of farmers in the area, who will be suppliers of food and handicrafts for pensions (Sima E., 2019).

In order to ensure easy access to the area and to the existing pensions, it was concluded that the roads and the various technical-municipal networks must be rehabilitated and modernized. From the studies carried out in the area, it was discovered

that the road under study is in a more advanced state of degradation, urgently requiring rehabilitation and modernization works. In order to be able to design, draw and execute the proposed construction works, it is necessary that first, the road route be raised from a topographical point of view, in order to form a clear and realistic image of the existing situation on the ground.

MATERIAL AND METHOD

The topographic-geodetic studies consist in the detailed study of the land that will be surveyed, in the execution of the topographic surveys and of the tracing works, in the development of the geodetic base, in the location on the map of the geological surveys and alignments. The following main topographic materials are required for the preparation of the survey projects: topographic plans of the territories scale 1: 25,000 or 1: 50,000 to identify the location; large-scale topographic plans necessary for the elaboration of the project, resulting from topographic surveys; topographic elements of the land in the area of road constructions; longitudinal and transverse land profiles (Barazzetti L. et al, 2010; Calina A. et al, 2015).

The documentation prepared must meet the following conditions: the accuracy of the topographic works must correspond to the requirements imposed by the differences in design and the purpose pursued; the scale of the topographic documents must correspond to the accuracy of determining the position of the topographic points and the relief; the area of land to be surveyed must be established according to the requirements imposed for each phase of the design, being also related to the length of the paths of different works (Calinovici I. and Călina J., 2008). The peculiarity of the topographic-geodetic works carried out in order to carry out road constructions, is that they precede and accompany all stages of construction (Călina J. et al, 2018).

One of the most important methods used in this paper is the method of planimetric traverses. The route of the traverses is usually projected along the traffic arteries, watercourses, etc., as the sides and points of the traverse must be easily accessible (Doneus M., Neubauer W., 2005). The traverse points are located in places away from destruction, where the installation of topographic tools is easy and visible (Herbei M. V., and Sala F., 2020). The distance between the traverse points is determined by the concrete conditions in the field, the degree of coverage with vegetation or constructions, the purpose of the topographic survey and the topographic equipment provided (Kolbe T. et al, 2011). The route of the traverses is established on 1: 5000 scale plans or higher, on which the triangulation points in the area are reported. The finalization of the route, so of the station points, is done on the ground, for this purpose it is necessary to recognize the terrain. When the traverse are made in localities, the marking will be done with metal poles or topographic milestones (Rosca A., et al, 2020; Calina, A. et al, 2014.).

Picking up the details, refers to determining the positions of the characteristic points of the details in the field. The characteristic points are points of change of direction, which in number and position are conditioned by the required accuracy and the scale of representation. The actual methods of picking up the details used were: the polar coordinate method; the method of rectangular coordinates or the method of abscissas and ordinates; the method of perpendiculars (Călina J. et al, 2020).

RESULTS AND DISCUSSIONS

The purpose of the planimetric survey was to determine exactly the points on the contour of the communal road Aleea Craiovei, in order to execute the rehabilitation and modernization works. According to the topographic surveys, the road route takes place in a plain area, without ramps or steep slopes and ensures the connection between the county road DN56 and the communal road Strada Nouă. The need to modernize the

communal road Aleea Craiovei, appeared due to the poor technical condition of the road platform, the presence of unevenness in the road, the lack of water collection ditches on certain parts, which leads to puddles or difficult drainage of water from the road.

In order to carry out the first stage - design, it is necessary to carry out the topographic-geodetic works necessary for the elaboration of topographic plans and profiles, which constitute the technical documentation on the basis of which the design of rehabilitation and modernization works will be elaborated. Preliminary design studies began on maps, in field studies, topographic works occupying an important part, ensuring the "bringing" the land on the designer's drawing, by representing on a material support the reduced images and similar figures on the ground (Li, D. et al, 2009). Thus knowing the real situation on the ground, the designer can study the variants regarding the location of the constructions and taking into account a series of technical and economic factors can choose the optimal solution (Miluț M. et al, 2020).

The next stage, the execution of the constructions, is preceded by the application of the project in the field and the tracing of the constructions in detail. Also, during the execution of the road construction, the topographic works have a significant role and become indispensable on the construction site. These consist in determining the topographic elements necessary for tracing construction projects on the ground, an operation called "topographic preparation of execution projects". As a result of the topographic training, the X, Y, Z coordinates are obtained for the characteristic points of the designed construction to be drawn on the ground (Paunescu R. D. et al, 2020).

The documentation for the execution of works starts at ANCPI / OCPI on the topo-geodetic works previously executed in the area of interest, geodetic networks, raster images (orthophotoplanes, scanned plans). For the measurements, support points materialized and previously used for the modernization works of the national road DN56, obtained from ANCPI / OCPI, were used.

Figure 1. Orthophotoplan with the location of the road in the area

Topographic descriptions of the station points used: Metallic bolts located at the intersection of the communal road Aleea Craiovei with the communal road Strada Noua, having the coordinates: X = 293125.608 m; Y = 373274.052 m and X = 293068.920 m; Y = 373386.963 m.

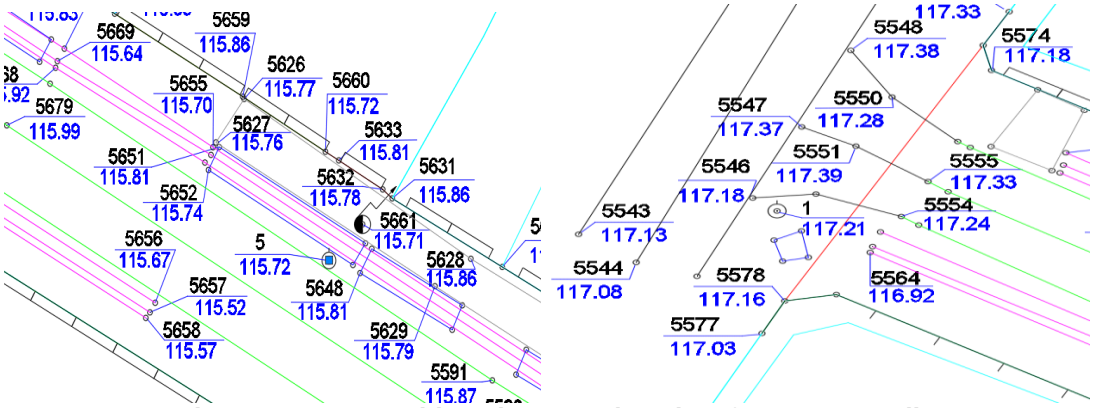


Figure 2. Topographic points 1 and 5 taken from OCPI-Dolj

For the elaboration of the technical documentation necessary for the modernization and rehabilitation of the communal road Aleea Craiovei, a topographic survey was performed in the Stereographic Projection System 1970 and the Black Sea Altitude System 1975. The topographic survey was made with the total station Leica TS 06 (Pop N. et al, 2019) . A reconnaissance of the land was made to identify the respective work area in order to verify the existence of the old support points, their condition, including the need to thicken it. Following the reconnaissance of the land, it was found that due to the complexity of the works, the points that make up the support network are insufficient, it was necessary to thicken the network through terminals and metal bolts located outside the work area.

All the points in the main network materialized in the field through FENO type terminals which were later concreted with cement (Sala F. et al, 2020). Points 1 and 6 were obtained from OCPI. Based on these known coordinate points, the rest of the points were determined by the traverse method: 2, 3, 4 and 5. Following the measurements performed with the total Leica TS06 station, the coordinates and elevations of the points were obtained.

The Leica Geo OFFICE program was used to transfer data between the Leica TS06 total station and the computer.

Thus, for importing the observations in TopoSys format, the following steps are followed:

1. Connect the station using your own software (Leica Survey Office) by loading the TopoSys mask (topoSys.frt) in the total station at Profile 2. This operation is done only once;

2. When downloading, select the TopoSys format in the Leica software. Thus the resulting ASCII file will have the format supported by TopoSys;

3. Edit the downloaded file in a text editor (eg Notepad), and if necessary correct the missing or extra characters;

4. Save the file and import it into TopoSys with the IMPORT-ASCII - Measurements function.

Table1

Coordinates of support points

Point no.	X(m)	Y(m)	Z(m)
1	293125.608	373274.052	117.21
2	293103.262	373327.978	116.39
3	293103.262	373327.978	116.31
4	293080.652	373355.092	115.91
5	293068.920	373386.963	115.70
6	293057.037	373393.695	115.99

The existing details on the ground were measured by the method of polar coordinates with which the points that actually define the perimeter, objects, or natural and artificial details on the earth's surface were surveyed. The control of the radiated points is generally ensured by drawing up a field sketch as accurate as possible, performing the measurements in the horizon tour and by aiming at the same point in two stations and measuring the horizon tour in both positions.

By this method, the coordinates of all the points of detail that interest us were determined from the support points and were entered in table 2, in facsimile.

Table 2

Coordinates of detail points

Nr. Pct.	X [m]	Y [m]	Z [m]
1947	293041.940	373395.900	116.01
1948	293039.967	373404.378	115.74
1949	293044.470	373402.320	116.03
1950	293047.850	373409.910	116.13
1951	293043.040	373411.900	115.78
1953	293039.880	373404.410	115.73
1963	293045.690	373417.876	115.76
1964	293046.987	373421.062	115.74
1965	293046.210	373411.040	115.95
1966	293046.390	373410.930	115.13
1967	293046.580	373410.850	115.18
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
5760	293082.300	373349.840	115.64
5761	293082.040	373349.560	115.89
7903	293035.535	373392.933	115.42
7908	293127.493	373293.537	117.06
7909	293097.098	373345.967	116.30
7910	293061.373	373408.660	115.98
7911	293051.229	373383.746	116.09
1945	293037.660	373394.000	115.44
5661	293070.620	373388.750	115.71
5700	293104.030	373333.380	116.41
5742	293109.280	373299.030	116.75

The calculation of the areas is made from the coordinates of the contour points of the administrative-territorial unit, of the property bodies and of the plots, resulting from the processing of the field and office operations. This was done with the help of the TopoLT program, which works over the AutoCAD platform. The TopoLT program is an indispensable tool in the field of topography and cadastre, fulfilling all the necessary requirements for field-office work. It is a specialized program that provides tools for 2D or 3D applications with which you can create topographic or cadastral plans, make 3D models of terrain and contours, also calculate volumes or insert georeferenced images (Figure 3).

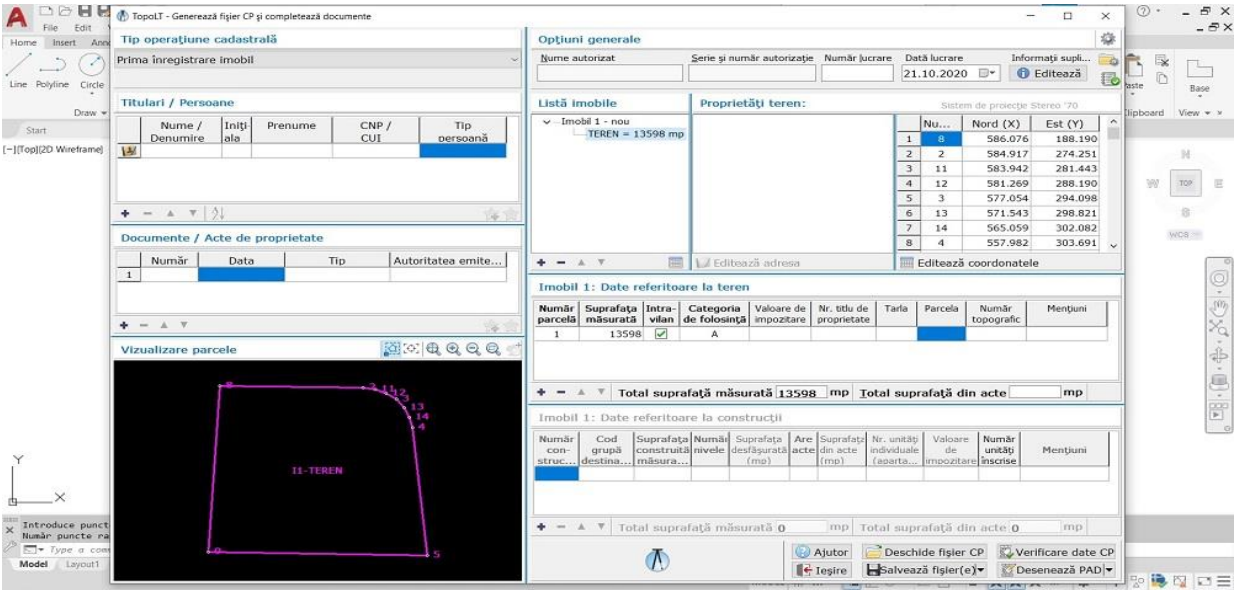


Figure 3. Screenshot, with the interface of the tools of the TopoLT program, which works over the AutoCAD platform.

The program uses a series of files necessary both for data entry and for configuring and customizing the program as follows: coordinate files, code interpretation file, used layers file, lines file, shapes file, program language change file. With its help the area was calculated and passed to table 3

Table 3

Area calculated from coordinates

Point no.	X [m]	Y [m]	Point no.	X [m]	Y [m]	Point no.	X [m]	Y [m]
5623	293064.048	373404.439	5741	293109.484	373296.663	5699	293104.160	373334.390
5622	293063.326	373405.487	5579	293120.912	373276.472	5698	293101.620	373338.550
7910	293061.373	373408.660	5578	293120.555	373274.368	5697	293097.377	373345.482
7911	293051.229	373383.746	5575	293134.919	373282.456	7909	293097.098	373345.967
5663	293053.657	373386.466	5574	293133.511	373282.797	5696	293088.845	373360.334
5664	293057.464	373389.219	5738	293128.052	373292.462	5671	293080.536	373375.588
5667	293073.814	373360.063	7908	293127.493	373293.537	5659	293076.630	373382.390
5758	293078.677	373351.390	5739	293125.534	373296.872	5660	293074.040	373386.780
5757	293091.991	373327.649	5716	293116.004	373313.823	5633	293073.630	373387.488
5753	293097.284	373318.210	5715	293115.370	373314.400	5632	293072.266	373389.819
5751	293101.690	373310.620	5714	293112.890	373318.500	5631	293071.841	373390.325
5752	293103.940	373306.290	5713	293108.400	373326.430	5634	293068.616	373396.166
Area = 1939 m^2								

Also from the coordinates of the points was drawn up with the help of the TopoLT program, which works over the AutoCAD platform, all the drawings needed for the design, tracing and execution of rehabilitation and modernization of the road studied (Figures 4 and 5). It provides tools for 2D or 3D applications with which topographic plans can be created, 3D models of terrain and contours can be made, and volumes and longitudinal and transverse profiles can be calculated (Figures 6 and 7).

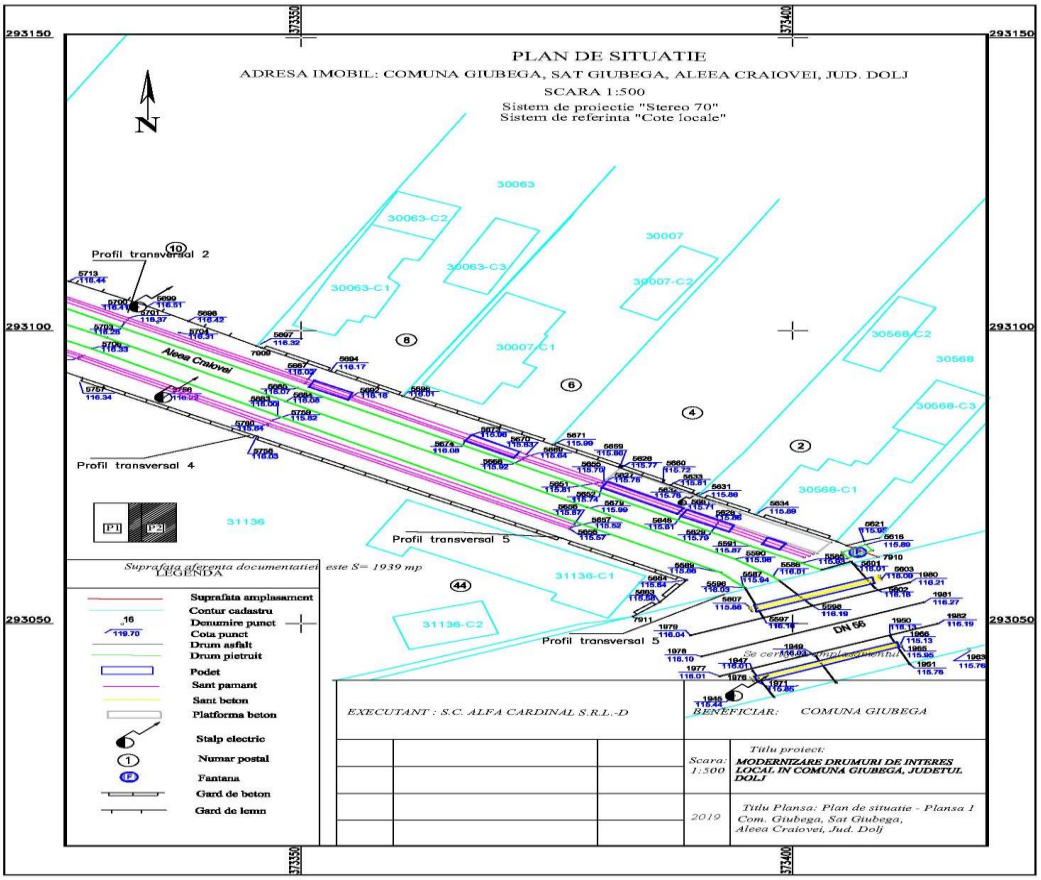


Figure 4. Situation plan for section 1 of the road to be modernized

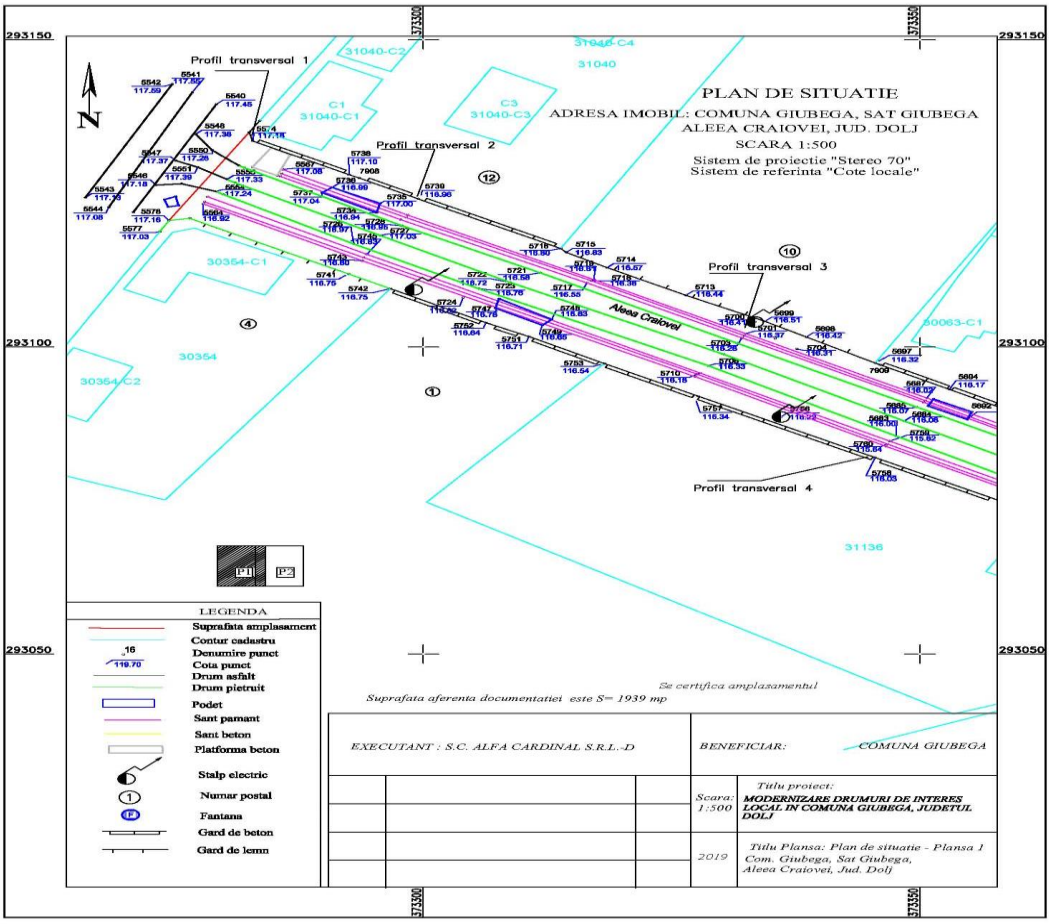
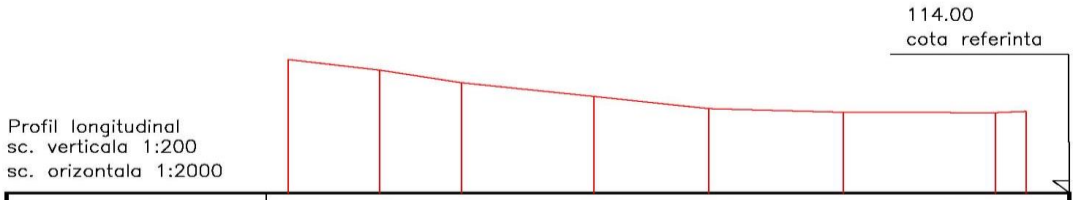
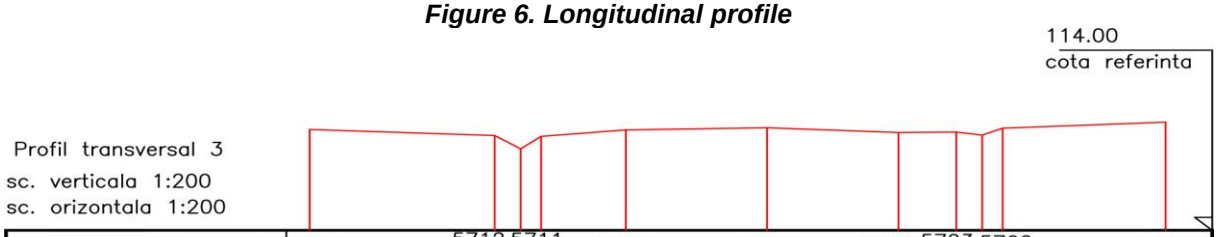


Figure 5. Situation plan for section 2 of the road to be modernized



Nr. punct	5559	5727	5722	5707	5684	5679	5590	5586
Dist. cumulate [m]	0.00	16.94	32.05	56.53	77.76	102.65	130.73	136.37
Cote [m]	117.29	117.03	116.72	116.38	116.08	115.99	115.98	116.01
Dist. partiale [m]		16.94	15.12	24.47	21.23	24.89	28.09	5.64
Pante [%]		1.54	2.05	1.39	1.41	0.36	0.04	0.53

Figure 6. Longitudinal profile



Nr. punct	5757	5712	5711	5708	5707	5706	5703	5702	5699
Dist. cumulate [m]	0.00	3.17	3.61	5.41	7.83	10.08	11.07	11.52	14.65
Cote [m]	116.34	116.20	115.89	116.33	116.38	116.27	116.28	116.21	116.51
Dist. partiale [m]		3.17		1.45	2.42	2.25	0.99		2.79
Pante [%]		4.42		10.33	2.07	4.89	1.01		5.02

Figure 7. Transverse profile no.3

CONCLUSIONS

Based on the study of the area and the importance of roads, it was concluded that the Aleea Craiovei road section must be rehabilitated and modernized, because its technical condition is very precarious, from all points of view. In order to achieve this, the designer of the modernization works must have a technical documentation, which must include all the drawn and written parts he needs. In order to draw up the location and delimitation plans at the scale requested by the designer, a road supported on known coordinates and elevations was carried out on the main axis, this being also the support network for the topographic survey. Subsequently, in order to measure all the existing details and the characteristic elements of the cross-section, the polar coordinates method was used, taking rays from the support points previously determined by the traverse method. The data collected from the field were processed with the help of special topography programs, TopoSys, TopoLt and AutoCad, obtaining the absolute coordinates of all points surveied, and based on them, the location and delimitation plan was prepared quickly and with great fidelity. The plans had to be executed on a large scale of 1: 500, which gives them great accuracy and proper detailing for all phases: design, tracing and execution.

Finally, it was found that the study is very important and well prepared because based on it it was possible to design with great precision all the constructive elements, according to the details in the longitudinal and transverse profiles, included in the documentation. By rehabilitating this section of road, the modernization of the roads in the studied agrotourism area was started, which will lead to the improvement of the tourists'

access in the area and to the invigoration of the specific tourism and leisure activities that can take place.

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