

SURVEYING WORKS FOR THE RETECHNOLOGIZATION OF LIVESTOCK FARMS WITH EUROPEAN FUNDS

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Abstract: The first known information regarding the existence of this locality is related to the attestation of the church, namely in the tithe record of the Catholic deanery of Timișoara, where it appears under the name of Evsen, and in which it is shown that the priest Nicolae from Evsen paid the sum of 27 banals in 1333. In 1359 the Recaș commune was colonized with Romanian nobles named Stan, Neagu Vlaicu, Nicola and Vlad, who in 1361 were in litigation with the great owner of Izvin Posa Balazs for some lands, which they wanted to occupy. Until the Turkish domination, the great Hungarian owners owned the lands of Izvin: the Zeghary family (1443), Esaky, Bendek and Bennesk, then the Csornay family, the descendants of the Carpathians from Recas. On the maps of the times, until 1937, Izvin appeared under the name of Osyeny. In 1552, Banat fell under Ottoman rule. In 1552, after the fall of the Timișoara citadel, Pasha Casim restored the citadel's fortifications, with inhabitants trapped in Romanian villages and taken away by force, among them excused persons. Under Empress Maria Theresa (1770), the population of Izvin was also engaged in breeding. The hills on the northern side of the village are planted with vines; the picking was done only by supreme order, on Saint Michael's day, which corresponds to the day of Pious Paraschiva. The topographic surveys in this thesis were made with Leica equipment, GPS1200 system and the download of data resulting from measurements was made with Leica Geo Office Combined software. The coordinates were obtained in the WGS84 system, which were converted using TransDat 4.0 software into stereographic coordinates in 1970. In order to carry out the situation plan, the stereographic coordinates obtained 1970 were reported in AutoCAD. The farm for which the topographic surveys were made is located in Izvin, Timiș County and has a zootechnical profile. At the time of topographic measurements this farm was in a state of degradation and was not functional and there were no animals or animal feed deposits.

Keywords: Leica GPS1200, Leica Geo Office Combined, Land Survey, Ortho-photoplane, GPS, Cadastre

INTRODUCTION

After the liberation of Banat by the Austrians, in quieter times, during the government of Count Mercy (1720), it is said that there was the Illyrian and Wallachian Recaș (Vlasnița near the Recaș railway station (1716) from where it seems that the inhabitants were forced (probably due to floods) to look for higher places [Smuleac L. et al., 2016]. On the maps of Count Mercy (1723-1725), Izvin appears again as a populated village, Wallachian Recaș no longer appears, so it is assumed that part of its inhabitants populated again Izvin, abandoned in the Ottoman era, and another part were identified in the commune of Saravale, where there is a street called the Izvinti and where the inhabitants remember that their grandparents told them that they came from Izvin, either in 1657 from the horror of the Turks, or when moving from Vlasnitsa in 1720 due to floods. Some apparently left in 1657, and the exodus followed in 1720.

Under Empress Maria-Theresa (1770), the population of Izvin was also engaged in boar [Pascalau R. et al., 2021]. The hills in the northern part of the village are planted with vines; the harvest was done only by supreme order, on St. Michael's Day, which corresponds to St. Paraskevi's day [Smuleac L. et al., 2017].

According to the Subsidy Regulation [<https://www.roagora.ro>, www.afir.info; RO Agro, 2023], Measure 6: Stimulating investments for the equipment and technological renovation of livestock farms, the general objective is to increase productivity, competitiveness and ensure food safety by stimulating the organization and technological renewal of livestock farms [<https://aiipa.gov.md/>].

The specific objectives are to:

- 1) establishment of livestock farms;
- 2) technological equipment of farms with modern equipment;
- 3) modernization of the technological process within livestock farms;
- 4) diversification of types of agricultural holdings specialized in animal husbandry;
- 5) improvement of livestock;
- 6) improving the quality and increasing the competitiveness of animal production on the internal and European markets;
- 7) ensuring hygiene and safety standards for animal products;
- 8) enhancing added value and economic efficiency;
- 9) diversification of services provided to rural population;
- 10) increasing the incomes of agricultural producers and reducing poverty in rural areas.

The operational objective is to expand the number and increase investments for the establishment and technological renovation [<https://www.legis.md>] of livestock farms and the subsidy is granted for the purchase of technological equipment for the endowment and modernization of livestock farms, including the construction/reconstruction of cattle livestock farms [[Pascalau R. et al., 2021](#)].

According to this Investment Incentive Measure [<https://romania.representation.ec.europa.eu>], it is necessary to obtain additional required documents for obtaining support, including the project sketch of the rooms [Bulat Veaceslav, 2023] and the general plan of spatial planning [[Law no. 350/2001](#); [Veaceslav Bulat, 2011](#)] and the location of farm infrastructure objectives [[Ivanov Tatiana, 2022](#)] as well as topographical elevation [[Barliba Costel, 2023](#)].

The transition to a sustainable and climate-neutral economy by 2050 offers new opportunities for EU businesses and citizens. Many companies and investors have already committed to this, given the increasing volume of sustainable investments. However, companies and investors also face a number of challenges in this transition, notably in complying with new disclosure and reporting requirements [EU Commission, Sustainable Finance, 2023; Daniel Ferrie, 2023].

MATERIALS AND METHODS

The measurements in this paper were made with the Leica TC1205+ total station [<https://leicatotalstation.org>] and with the Leica GPS1200 GNSS [[Leica Infinity and Geo Office, 2016](#)] equipment [<https://www.gefos-leica.cz>], and the download of the data resulting from the measurements was done with the Leica Geo Office Combined software [<https://leica-geosystems.com>], the coordinates obtained in the WGS84 system were transformed using TransDat 4.0 software [<https://transdatro.software.informer.com>] in stereographic coordinates 1970 [<https://www.cfunciara.ro>]. Size compensation was achieved with TopoSys program [<https://www.cadware.ro/magazin/toposys/>] and 1970 compensated stereographic coordinates [[Herbei M. et al., 2013, 2018](#)] were reported in AutoCAD program for project realization (figure 1, table 1).

This paper aims to carry out topographic surveys in order to obtain the Urbanism Certificate necessary for the renovation of the Farm in Izvin.

The farm for which the topographic surveys were made is located in Izvin, Timis County and has a zootechnical profile. At the time of topographic measurements this farm was in a state of degradation and was not functional and there were no animals or animal feed deposits.

In order to reach the farm within the built-up area of Izvin locality, you will enter De3703, which is on the right side towards Recaş, you will pass over the railway with cadastral number DF3417, and you will continue on De3713 until the intersection with Hcn3716 where

the entrance to the farm is located. Izvin is situated at the lower limit of the hills, at an altitude of about 98 m, and north of the Bega River [Smuleac L. et al., 2016], at a distance of about 2 km from it; the distance to Timisoara is 18 km.

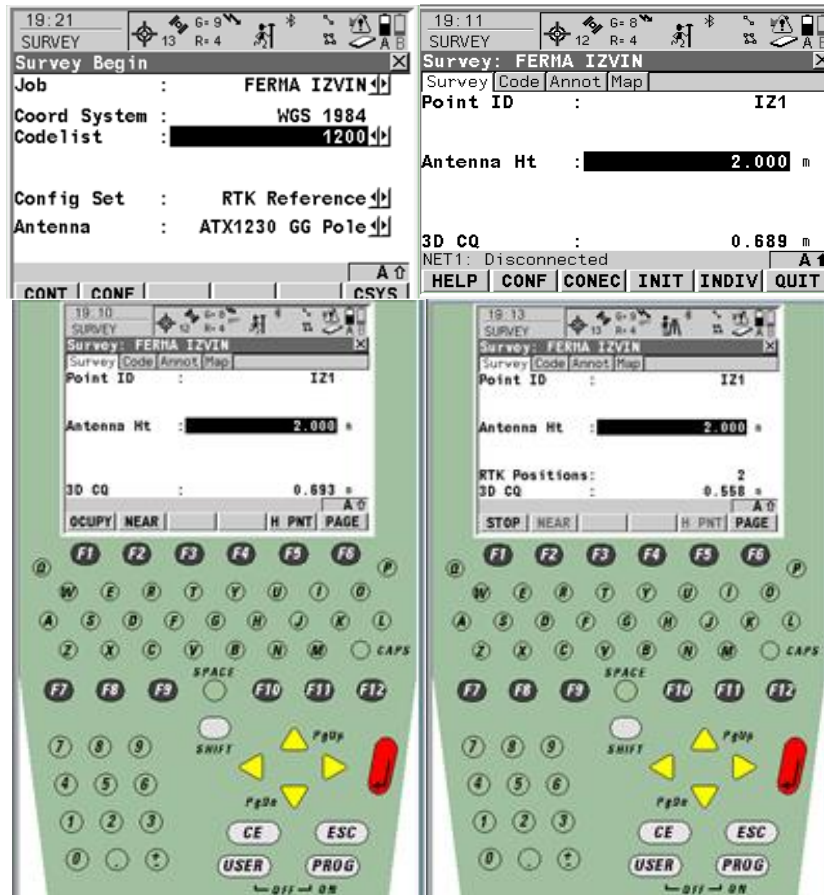


Figure 1. Leica 1200

Table 1

Permanent GNSS station used

GEOCENTRIC CARTESIAN COORDINATES				
Permanent station	Class	Xc	Yc	Zc
TIM1_2.3	A	4153556,883	1613641,291	4548330,869
ELLIPSOIDAL COORDINATES				
Permanent station	Class	B[m]	L[m]	He[m]
TIM1_2.3	A	45°46'47.65271"N	21°13'51.46281"E	154,7278
STEREOGRAPHIC COORDINATES: 1970				
Permanent station	Class	X(m)	Y(m)	Z(m)
TIM1_2.3	A	482495.124	207132.249	111.641

RESULTS AND DISCUSSIONS

Following the exact determination of the buildings to be measured, a recognition of the area was made together with the beneficiary and the limits were established with the help of the zoning plan (figure 2) and the situation plan received from the City Hall (figure 3).

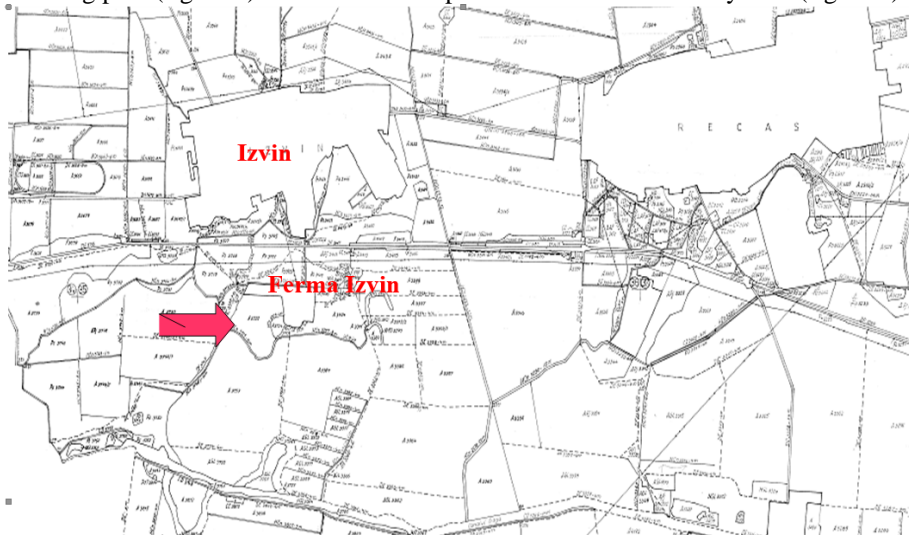


Figure 2. Area framing plan

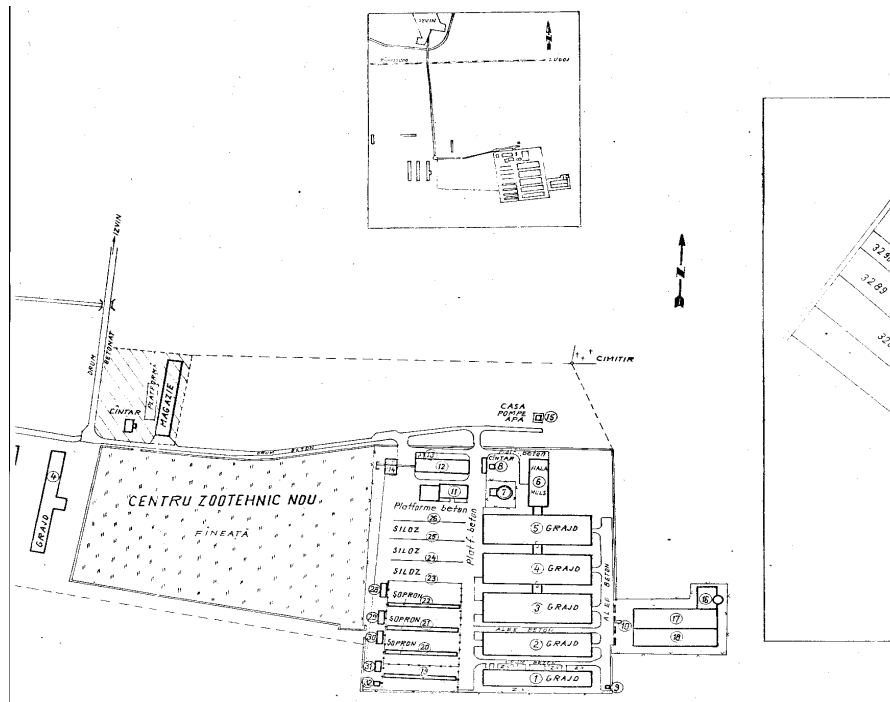


Figure 3. Cadastral plan

After identifying the boundaries in the field, topographical details were raised. For this, after configuring the GPS, we proceeded to choose the reference station to be able to perform the measurements. In this paper, the reference station used is shown in Table 3.1.

1. OFFICE WORK

1.1. Downloading the GPS device LEICA1200 and processing data

The resulting information is stored on the Compact Flash card. The download of recorded data to the card from the device, which is a Compact Flash, is done using the specialized Leica program "Leica Survey Office Combined" [SMULEAC A. et al, 2012, 2015] (figure 4).

A NEW PROJECT is created by pressing the icon with the Project symbol (figure 5) where a box with New project will appear, in our case the project is called IZVIN FARM (figure 6) using WGS84 coordinates [Herbel, M. et al, 2013] (figure 7).

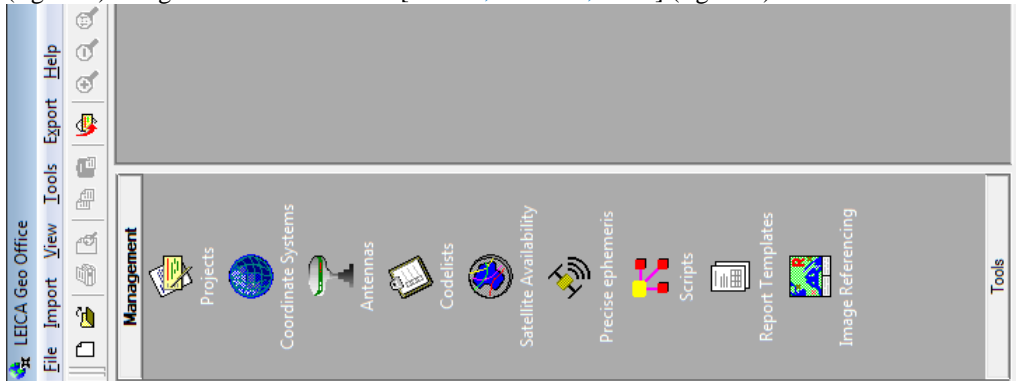


Figure 4. LEICA GEO OFFICE COMBINED program interface

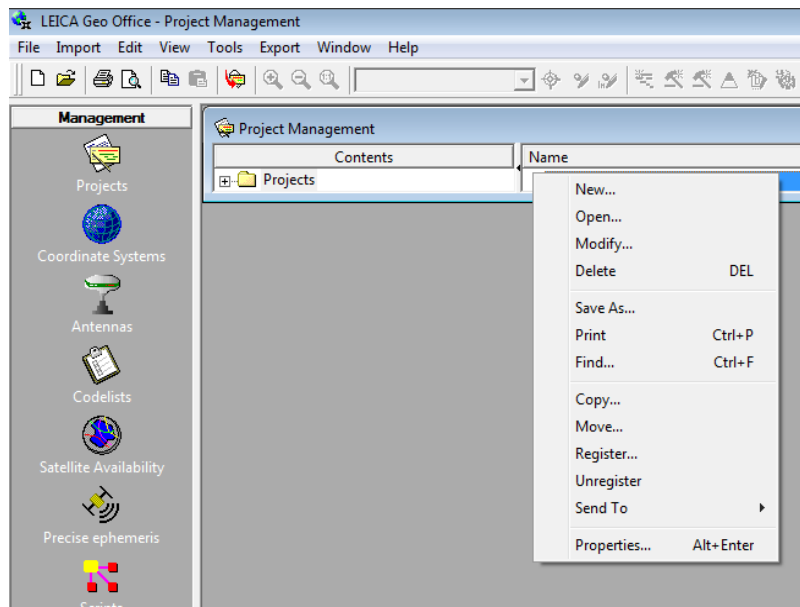


Figure 5. Create a new project (Project management)

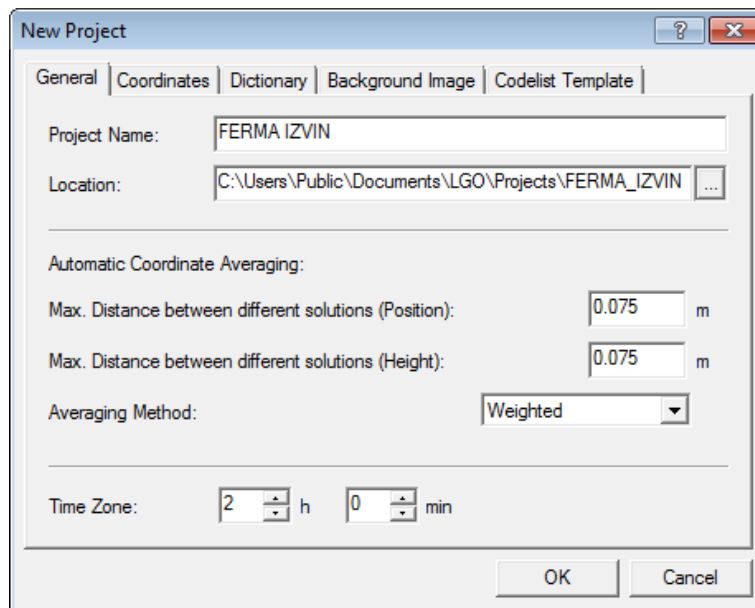


Figure 6. Name of new project

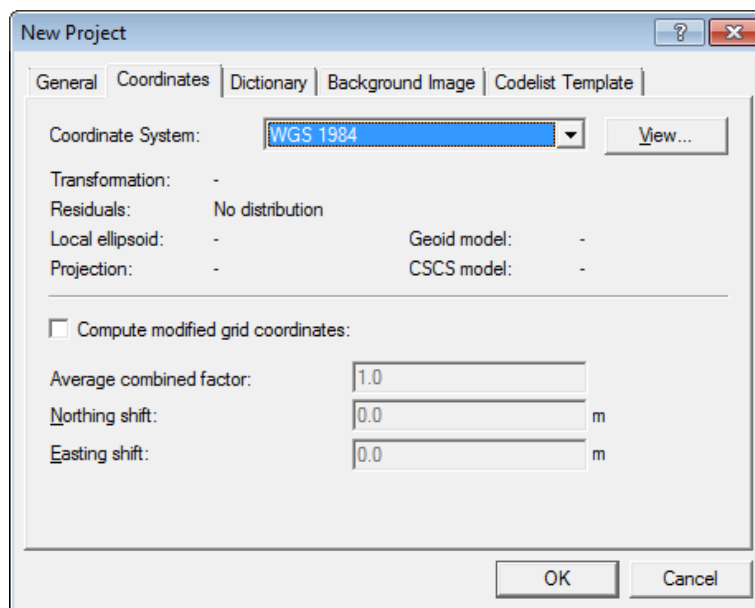


Figure 7. Coordinates used in this paper

The next step is to import data from the machine card using the *Import Raw Data command* (figure 8).

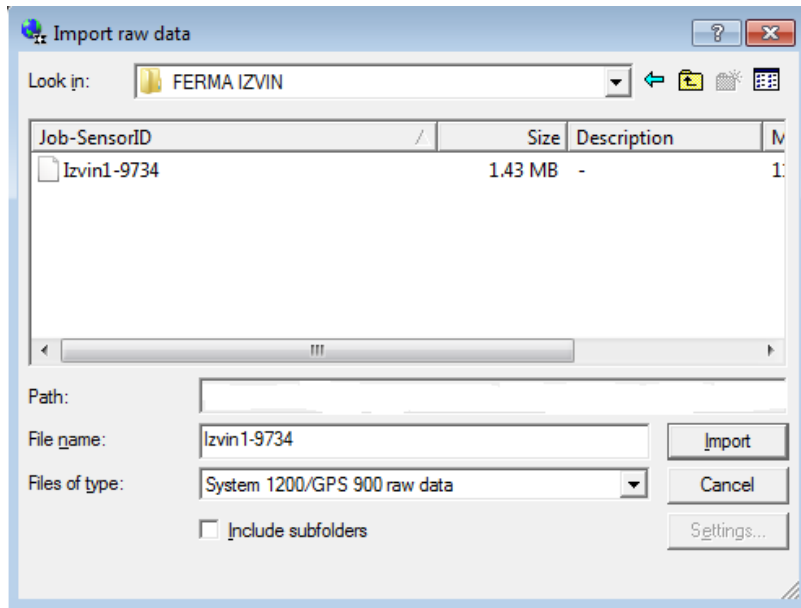


Figure 8. Data import IZVIN FARM

After performing the data import, we will obtain the WGS84 measurement file (partially presented points) from Leica1200 GPS.

Fieldbook Report

Job Information

Job name: IZVIN FARM
 Time zone: 2h 00'
 Coordinate system name: PARAMETERS ON TIM
 Application software: LEICA Geo Office 6.0
 Firmware version: 5.60
 Codelist name: SYSTEM1200
 Average limit (Position): 0.0500 m
 Average limit (Height): 0.0750 m

Coordinate System Information

Coordinate system name: WGS 1984

GPS Coordinates

Baseline	Reference: RTCM-Ref 0000	Rover: IZ1
WGS 84 Coordinates:		
Latitude:	45° 46' 47.65271" N	45° 47' 29.19249" N
Longitude:	21° 13' 51.46281" E	21° 27' 26.14836" E
Ellip. Hgt:	154.7278 m	138.9443 m

Quality: Sd. Lat: 0.0162 m Sd. Lon: 0.0134 m Sd. Hgt: 0.0413 m
 Posn. Qlty: 0.0210 m Sd. Slope: 0.0134 m

Baseline Reference: RTCM-Ref 0000 Rover: IZ2

WGS 84 Coordinates:

Latitude: 45° 46' 47.65271" N 45° 47' 30.40590" N
 Longitude: 21° 13' 51.46281" E 21° 27' 26.41071" E
 Ellip. Hgt: 154.7278 m 139.2142 m

Quality: Sd. Lat: 0.0283 m Sd. Lon: 0.0235 m Sd. Hgt: 0.0719 m
 Posn. Qlty: 0.0368 m Sd. Slope: 0.0235 m

Baseline Reference: RTCM-Ref 0000 Rover: IZ3

WGS 84 Coordinates:

Latitude: 45° 46' 47.65271" N 45° 47' 31.09014" N
 Longitude: 21° 13' 51.46281" E 21° 27' 26.03685" E
 Ellip. Hgt: 154.7278 m 139.4098 m

Quality: Sd. Lat: 0.0249 m Sd. Lon: 0.0206 m Sd. Hgt: 0.0629 m
 Posn. Qlty: 0.0323 m Sd. Slope: 0.0206 m

Baseline Reference: RTCM-Ref 0000 Rover: IZ4

WGS 84 Coordinates:

Latitude: 45° 46' 47.65271" N 45° 47' 31.16454" N
 Longitude: 21° 13' 51.46281" E 21° 27' 25.98084" E
 Ellip. Hgt: 154.7278 m 139.3318 m

Quality: Sd. Lat: 0.0170 m Sd. Lon: 0.0140 m Sd. Hgt: 0.0428 m
 Posn. Qlty: 0.0220 m Sd. Slope: 0.0140 m

Baseline Reference: RTCM-Ref 0000 Rover: IZ5

WGS 84 Coordinates:

Latitude: 45° 46' 47.65271" N 45° 47' 31.16171" N
 Longitude: 21° 13' 51.46281" E 21° 27' 25.52048" E
 Ellip. Hgt: 154.7278 m 139.1315 m

Quality: Sd. Lat: 0.0160 m Sd. Lon: 0.0132 m Sd. Hgt: 0.0401 m
 Posn. Qlty: 0.0207 m Sd. Slope: 0.0132 m

Baseline Reference: RTCM-Ref 0000 Rover: IZ6

WGS 84 Coordinates:

Latitude: 45° 46' 47.65271" N 45° 47' 31.44558" N

Longitude:	21° 13' 51.46281" E	21° 27' 25.51063" E	
Ellip. Hgt:	154.7278 m	138.6495 m	
Quality:	Sd. Lat: 0.0214 m Posn. Qlty: 0.0277 m	Sd. Lon: 0.0176 m Sd. Slope: 0.0176 m	Sd. Hgt: 0.0535 m

Baseline	Reference: RTCM-Ref 0000	Rover: IZ7
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WGS 84 Coordinates:			
Latitude:	45° 46' 47.65271" N	45° 47' 31.61949" N	
Longitude:	21° 13' 51.46281" E	21° 27' 25.52641" E	
Ellip. Hgt:	154.7278 m	138.9129 m	
Quality:	Sd. Lat: 0.0219 m Posn. Qlty: 0.0283 m	Sd. Lon: 0.0180 m Sd. Slope: 0.0180 m	Sd. Hgt: 0.0545 m

Baseline	Reference: RTCM-Ref 0000	Rover: IZ8
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WGS 84 Coordinates:			
Latitude:	45° 46' 47.65271" N	45° 47' 31.42246" N	
Longitude:	21° 13' 51.46281" E	21° 27' 26.31274" E	
Ellip. Hgt:	154.7278 m	138.9862 m	
Quality:	Sd. Lat: 0.0158 m Posn. Qlty: 0.0204 m	Sd. Lon: 0.0129 m Sd. Slope: 0.0129 m	Sd. Hgt: 0.0390 m

Baseline	Reference: RTCM-Ref 0000	Rover: IZ9
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WGS 84 Coordinates:			
Latitude:	45° 46' 47.65271" N	45° 47' 31.40854" N	
Longitude:	21° 13' 51.46281" E	21° 27' 30.36736" E	
Ellip. Hgt:	154.7278 m	138.9959 m	
Quality:	Sd. Lat: 0.0226 m Posn. Qlty: 0.0291 m	Sd. Lon: 0.0184 m Sd. Slope: 0.0184 m	Sd. Hgt: 0.0571 m

Baseline	Reference: RTCM-Ref 0000	Rover: IZ10
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WGS 84 Coordinates:			
Latitude:	45° 46' 47.65271" N	45° 47' 31.20544" N	
Longitude:	21° 13' 51.46281" E	21° 27' 30.36833" E	
Ellip. Hgt:	154.7278 m	138.6178 m	
Quality:	Sd. Lat: 0.0174 m Posn. Qlty: 0.0225 m	Sd. Lon: 0.0142 m Sd. Slope: 0.0142 m	Sd. Hgt: 0.0425 m

Note: As the measured data volume is large, partial presentation of the measurement file will be made.

Next, with the help of *TrasDatRO 4.01* (figure 9), the coordinates from ETRS89 will be transformed into Stereographic 1970, interactive (figure 10) and or from the file (figure 11).

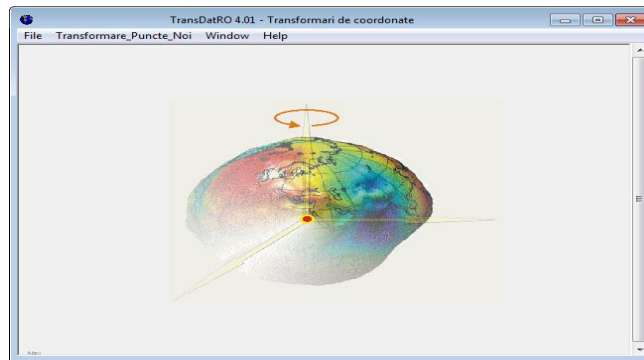


Figure 9. TransDatRO 4.01 Program

The method of transforming the points will be chosen, within the project the transformation will be made from ETRS89 to Stereographic 1970 (figure 3.9).

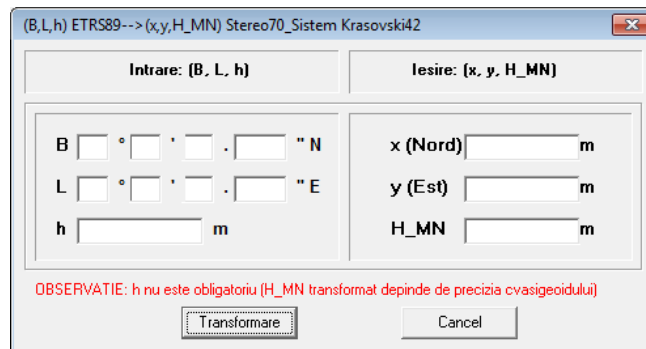


Figure 10. Interactive coordinate transformation

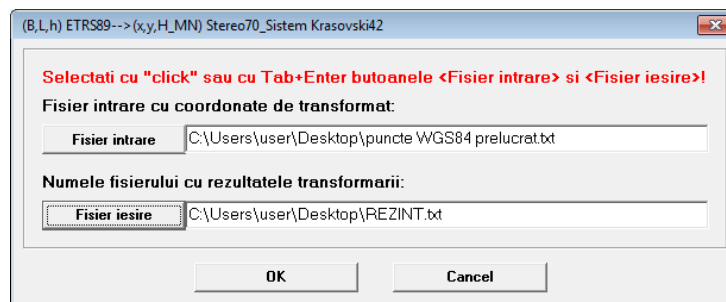


Figure 11. Transform coordinates in the file

Thus, we obtain the coordinates in the 1970 stereographic projection system for all points presented as a text file (figure 12).

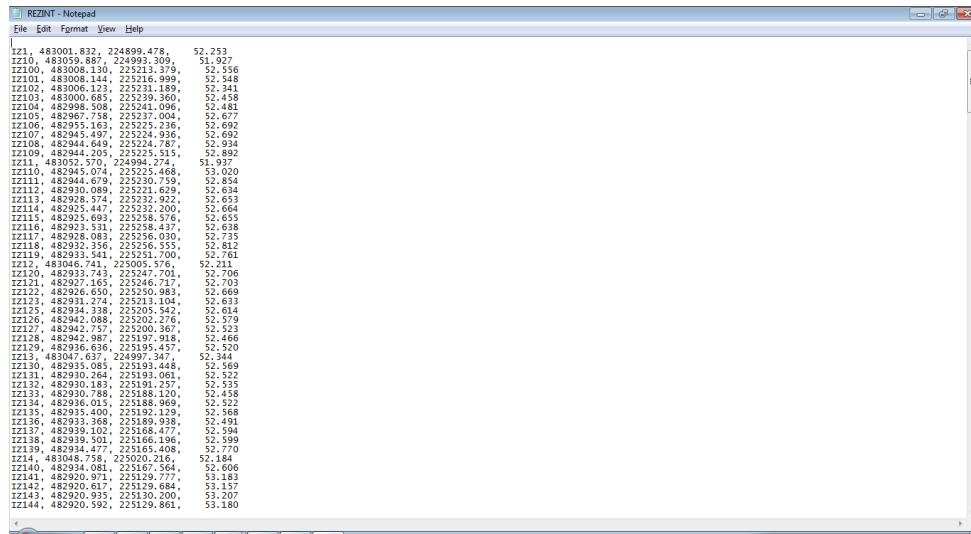


Figure 12. REZINT file with stereographic points 1970, in .txt format

Next we will enter the coordinates in AutoCAD and proceed to the realization of the necessary plan for drawing up the documentation.

1.2. Joining downloaded points and drawing up the plan

After loading the points in AutoCAD [Paunescu, Roxana-Denisa, et al, 2020] (figure 13) proceed to their union. This is done with the polyline command, and after closing the polyline I will calculate the area of the polygon. The scale chosen for representation on the plan when drawing up the technical documentation is 1:2000 (figure 14), by which all the details raised can be highlighted.

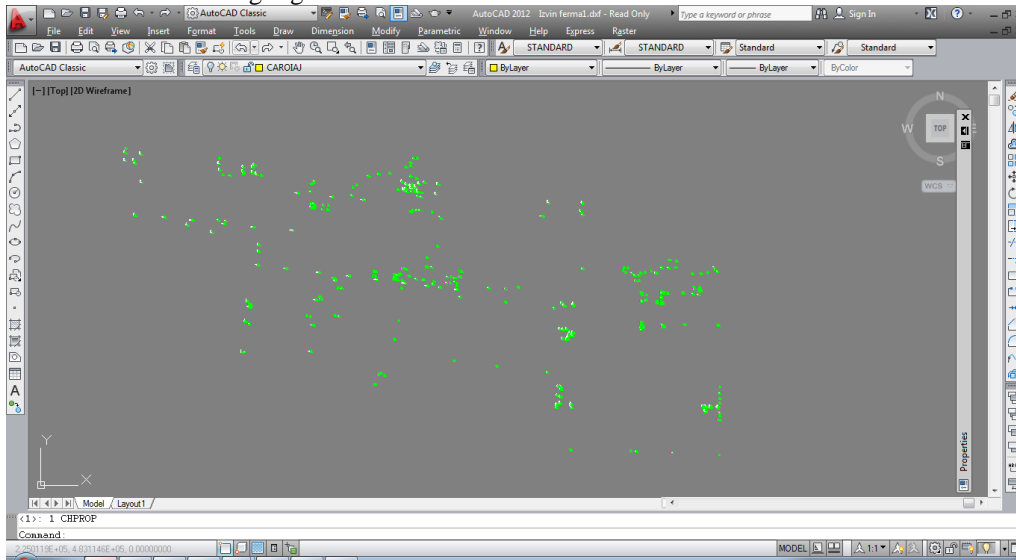


Figure 13. Loading points in AutoCAD

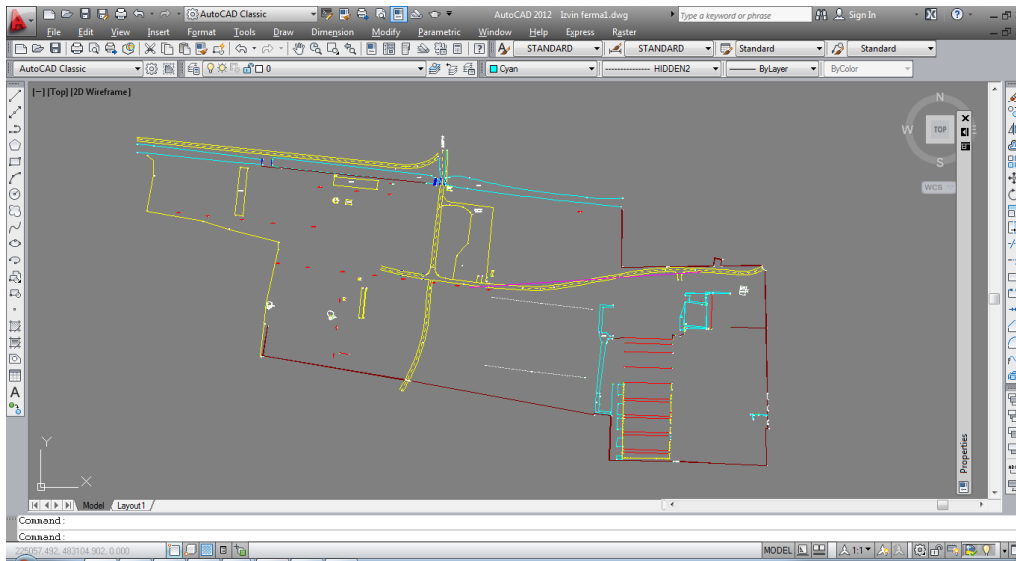


Figure 14. Joining the points obtained after unloading the machine and processing them

After joining the unloaded and processed points [Miță, R. et al., 20202; Casian, A. et al., 2019; L ȘMULEAC et al., 2014], the data will be verified by superimposing the information obtained over the orthophotoplan TM_Timișoara_image.sid.xml shown [Popescu C. et al., 2014] in figure 15.

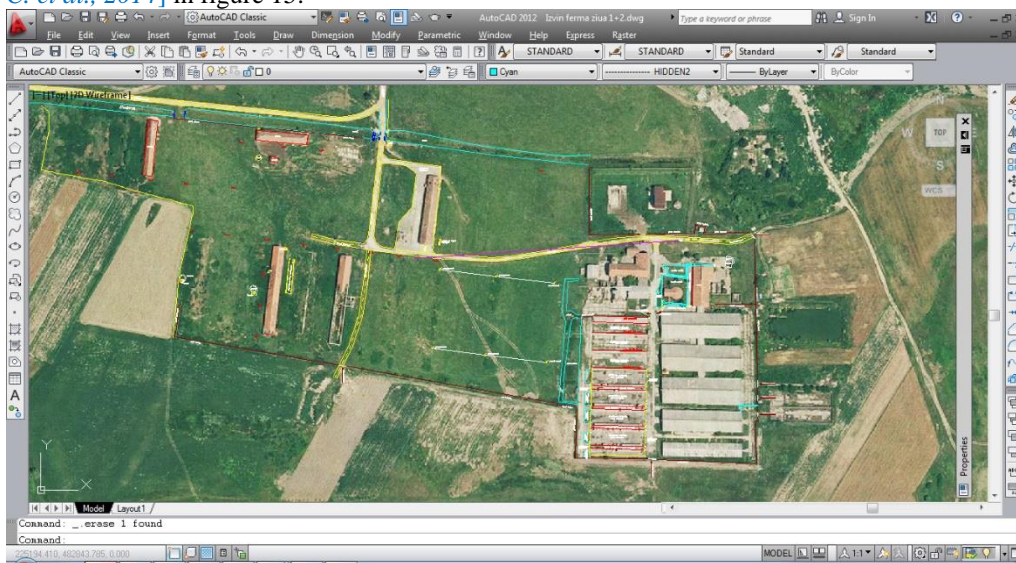


Figure 15. Checking the correctness of the obtained data by overlaying the orthophotoplan TM_Timișoara_image.sid.xml

Following the preparation of data processing, [Popescu G. et al., 2019] drawing up the situation plan, the area on which topographic elevations were carried out, namely

12.1282ha and the area in the land book is 11.9741ha (figure 16). The contour points for which the area has been calculated shall be shown in Table 2.

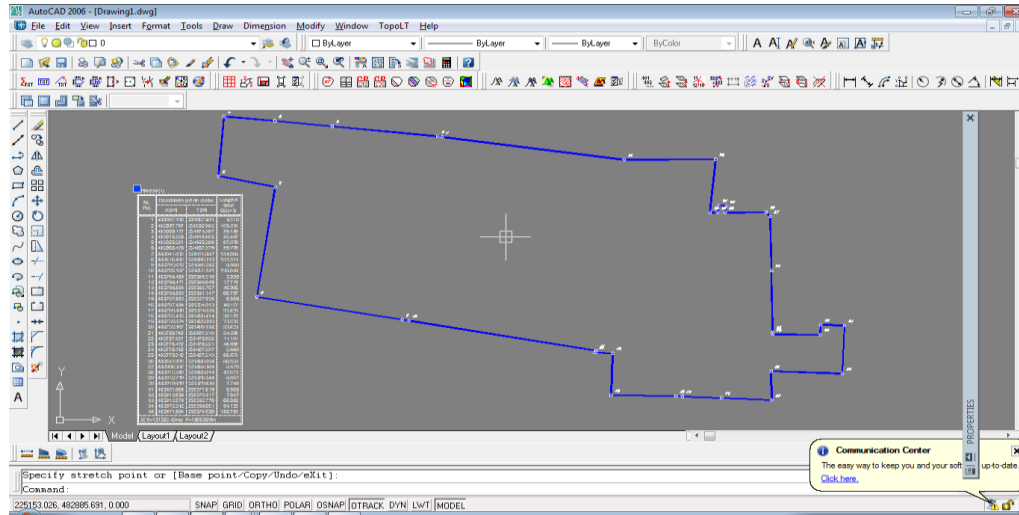


Figure 16. Presentation of contour points

Table 2

Coordinates of contour points

No. Pct.	X [m]	Y [m]	No. Pct.	X [m]	Y [m]
1	482997.190	225087.451	19	482735.574	225425.693
2	482997.797	225082.982	20	482732.967	225499.182
3	483009.177	224974.367	21	482786.762	225501.210
4	483015.333	224915.502	22	482787.551	225476.925
5	483020.251	224863.286	23	482776.472	225476.221
6	482953.436	224857.379	24	482776.752	225427.237
7	482941.093	224915.867	25	482779.312	225427.213
8	482818.483	224896.915	26	482847.875	225426.054
9	482793.072	225046.282	27	482908.397	225424.904
10	482792.107	225053.181	28	482913.240	225420.614
11	482758.489	225245.310	29	482912.719	225378.544
12	482756.471	225245.049	30	482919.619	225379.430
13	482755.854	225262.757	31	482921.068	225371.819
14	482708.890	225261.147	32	482912.626	225370.417
15	482707.800	225327.935	33	482912.579	225362.770
16	482707.484	225334.513	34	482972.342	225368.651
	482705.885	225374.638	35	482971.804	225274.520
18	482703.412	225426.414	S=121282.43sqm P=1859.926m		

CONCLUSIONS

The work aims to carry out topographic surveys for the farm in Izvin, in order to draw up the situation plan with the real situation on the ground in order to obtain the Urbanism Certificate for the renovation of the farm, which is currently degraded.

The farm for which the topographic surveys were made is located in Izvin, Timiș County and has a zootechnical profile. At the time of topographic measurements this farm was in a state of degradation and was not functional, there were no animals or animal feed deposits.

The lifting of this work was possible with the help of GPS equipment from Leica 1200 series, which is a state-of-the-art device and uses SmartWorx v8.10 technology, and the link is Bluetooth. The permanent GNSS station chosen for lifting is the permanent station from ROMPOS, namely TIM1_2.3, which is located in Timisoara.

The lifting method used is Stop and Go, which involves alternately moving and stationing a receiver, on which occasion measurements are made when the receiver is stationary. The recording is not carried out automatically after a certain time interval, but at the command of the operator, by pressing the corresponding receiver key. The antenna, arranged on a hard support, is held in the hand from point to point, where it is fixed in a position as close as possible to the vertical, after which the recording is made. The residence time is from a few seconds to several minutes. The longest recording time per point totals 2 minutes. The most important quality of this method is reflected in accuracy, as a result of accumulating time in several stages, on which occasion their average is performed (an observation step lasts 5 seconds).

The Stop and Go working method can be used to determine points of detail, for the needs of the real estate cadastre, in geodetic engineering, etc. Through the development of technology, GPS receivers will also become accessible to a wider circle of users, so the Stop and Go working method will probably replace the classic terrestrial measurement methods. Because of this, the Stop and Go working method has a great perspective in the future.

After completing the topographical details, the device was unloaded. The information is recorded on a memory card of the type Compact Flash, which is inserted into a card reader. The download and processing of data was done with the Leica program, namely Leica Geo Office Combined, after which the processing of coordinates and obtaining the coordinates in the stereographic projection system 1970 legislated in our country, was done with the TransDat 4.0 program, a program developed by ANCPPI and which is available on the Internet on www.ancpi.ro.

The stereographic coordinates obtained will continue to be reported in AutoCAD, where the points of detail raised by codes will begin to be joined.

After finalizing the situation plan, together with the Land Book, he will submit to the City Hall of Recaș the documentation in order to obtain the Urbanism Certificate for carrying out the renovation of the Izvin Livestock Farm.

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