ROAD LIFTING FROM BIGAR, UAT BERZEASCA, CARAS-SEVERIN COUNTY

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Abstract: *The topographic elevation means a set of field and office works useful for the realization of a topographic plan. Depending on their content, when determined, the plan metric elevations give the position in the plane of the points of the topographic surface, leveling elevations when the position in the plane, as well as the vertical position of the points is terminated. The topographic elevation may be necessary to obtain the building permit, demolition permit, PUG (general urban plan), PUD (detailed urban plan), PUZ (zonal urban plan). The present work was carried out for the elevation of the road from Bigar locality, Berzeasca commune, Caras-Severin county. There were works carried out for improving the asphalting of the streets and the geometrical elements, the arrangement of the sidewalks and access to properties, the realization of horizontal and vertical road signs, the assurance of water leakage by designing systems for taking them and evacuate them outside the carriageway. The main elements present on the topographic plan are: the road axis where measurements were conducted for determining the transverse and longitudinal profiles, the road part is the surface of the road platform, intended for the vehicles` circulation and the road platform where they were made outside the road segment.The situation plans presented in the current document show exactly where the buildings are located. The situation plan is a technical drawing showing the neighborhoods and all the other existing constructions.The topographic elevations were determined using the Leica GS08 GPS. This GPS has a built-in 3.5G high speed modem, which will connect to the RTK reference networks and allows broadband internet connection through the mobile connection for data transfer; hence, once the unit is switched on, you can connect and measure. After carrying out the field measurements, the work was carried out in the office, where the results were downloaded, then processed for the completion of the assignment. For the work accomplishment, it was used the AutoCAD system, which represents a CAD system, used in designing the two-dimensional(2D) designing plans, less in 3 dimensions(3D), invented and commercialized by the Americana Autodesk company. The measurements were processed in the system-specific files ("native"), which are the dwg type, as well as the widely spread dxf (Drawing eXchange Format).*

Keywords: PUG, PUZ, PUD, GPS,RTK, Autodesk, dwg, dwf

INTRODUCTION

In the last years ACREA (Agency of Cadastre and Real Estate Advertising) has realized and included a modernization project specific to the national geodesic network, where it managed to install several equipments, which are constituted in a geodesic network of permanent stations that can be also found under the name of permanent GNSS stations. Once the process of placing this permanent station in another country is completed, there appeared the problem of uniformization specific to the uniformization mode, which is specific to the embodiment, the GNSS measurement files and all other documentation using these methods (ŞMULEAC, A. ET ALL., 2012, 2017). According to the decision number 1 of 2009 regarding GNSS measurements, in September the ROMPOS (Romanian Position Determination System) system was developed and launched, system which includes real-time positioning services and the promotion of the realization of coordinated determinations conducted by GNSS measurements.ROMPOS is a Romanian positioning system that provides precise positioning in the European reference and coordinate system ETRS89.ROMPOS is based on Global Navigation Satellite Systems including GPS, Glonass and Galileo and based on the national network of GNSS permanent stations. ROMPOS system is a project of the National Agency for Cadastre and Real Estate Advertising (ANPCI) and was launched in Romania inSeptember 2008.

ROMPOS develops DGNSS (Differential GNSS) and RTK (Real Time Kinematic) position determination systems. DGNSS / RTK services are based on data transfer over the Internet. These data are transmitted in the standardized format RTCM (Radio Technical Commission for Maritime Services) using NTRIP (Networked Transport of RTCM via Internet Protocol) technology (ŞMULEAC, A. ET ALL., 2017. ROMPOS is used mainly i)n geodesy, cadastre, photogrammetry, topography (ŞMULEAC, A., ET ALL., 2015, 2016; ŞMULEAC, L. ET ALL., 2016), cartography, GIS (HERBEI, M. V. ET ALL., 2010, 2016) having the possibility of also being used in other areas of activity in which the position is determined based on global satellite navigation systems: land, sea and river navigation, disaster management, geodynamics or meteorology (ŞMULEAC, L. ET ALL., 2017).

GLONASS space segment comprises 24 satellites arranged on 3 orbital planes inclined at 64.8 ° at an altitude of 19100 km. The revolution period of the satellites is 11 hours and 16 minutes. Out of the 24 satellites projected moments that can use a number of 16 satellites. Each satellite is implemented atomic care that is not generating or frequent care are formed twice that do not carry. The transmitted signals are similar to the GPS, including the C / A code on the L2 carrier. The accuracy level of the Russian GLONASS system is comparable to the NAVSTAR-GPS system. In Romania you can use GLONASS, which can be completed constantly. The reference system is used PZ90.

By this, an uniformization of the way of drawing up the cadastral documentation is carried out in case the measurements are made on the basis of the GNSS technology-the kinematic working method. This decision takes into account the drawing up of Annex 15a, for static measurements and Annex 15b for kinematic measurements, both using GNSS technology.This decision clearly specifies that "in the case of the geodetic networks of bending and lifting by GNSS (GPS) determinations, the static measurement method will be used”.

MATERIAL AND METHODS

The measurements were made in the Bigar village of Berzeasca, Caras-Severin county, with GPS equipment from Leica GS 08.The Leica Viva GS08 GNSS receiver was designed to make the RTK network the ideal roverun while working together with Leica Vivia CS (figure 1).

In this paper we have determined the position of a point with the help of the GPS technology. The basis for determining a position with the help of GPS is the "trilateration" from the satellites.

Every second a satellite emits a radio signal which includes a PRN (Pseudo Random Number), which refers to its identification. By "Trilateration" the position will be determined by measuring the distance (from the receiver), from the point to be determined, to the group of satellites that are visible. When we receive a signal from a single satellite our position can be anywhere on the surface of this sphere (the radio signal propagates in all directions at the same theoretical speed). The moment we receive the signal from 2 satellites the position determination area is restricted to the intersection of 2 spheres on a circle, we could in theory be on its perimeter.

The distance between the GPS receiver and the satellites is calculated by measuring the time the radio signal requires to travel from the moment it is emitted by the GPS until it is received by the receiver. As we measure a radio signal, the propagation speed of the signal will be the speed of light (light and all other forms of electromagnetic radiation travel in vacuum at a speed of about 299792,458km / s, and in the air a little slower). The biggest problem that arises is the measurement of the propagation time of the signal with maximum accuracy.We will need some very precise clocks. If so, all we need to know is the time when the signature was issued by the satellite. Both the GPS receivers and the satellites are synchronized in order to generatethe same codes at the same time, a so-called "Pseudo Random Code" (PRC).

Figure. 1 Leica Vivia CS

The "Pseudo Random Code" (PRC) is a fundamental part of GPS. From a physical point of view it is a very complicated digital code; in other words, it is a sequence of 1 and 0 pulses.The complex construction of the signal ensures that the receiver does not accidentally synchronize with other signals. The print is so complex that it is almost impossible form a missed signal to have the same shape. Because each satellite has its own unique "Pseudo-Random Code" this guarantees that the receiver will not accidentally capture the signal of another satellite. To conclude, all satellites can use the same frequency without bumping into each other, which makes it even more difficult for a hostile force to roam the system. This "Pseudo Random Code" gives the US Department of Defense a way to control access to the system.

RESULTS AND DISCUSSIONS

The following steps were taken to complete the measurements:

The first step is to represent the preparation of GPS measurements. I tried to use time intervals where the GPS value is low. It is recommended that you choose sessions that do not exceed 6. Another important element to consider during measurements is the satellite lifting (figure 2).

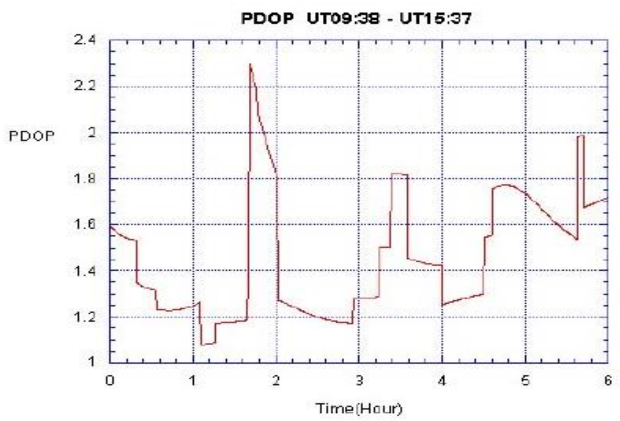

Figure. 2 GDOP values chart

In the preparatory stage we aim to achieve as much data as possible, similar to the stages in the field. Thus we recall the data collection and the establishment of both working methods and the necessary equipment. After establishing the working method and after analyzing all the data related to this project, the topographic network was created. (figure 3 and 4).

The field stage is composed of the first and the second part.

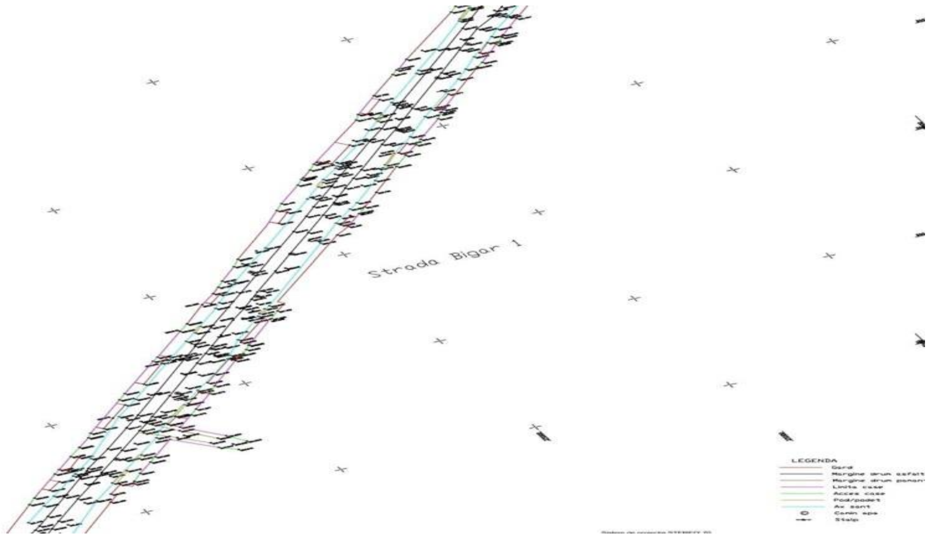

Figure. 3 Topographic study

Figure. 4 Framing plan in Bigar road area

In the first part, the land is recognized, then the following steps are taken: announcing the necessary authorities and recognizing areas for the location of new points.

In the second part the land sheets are completed with great attention. Another important aspect at this stage is the good organization of all the operations for starting and stopping the measurement sessions, which is easy to do thanks to GPS technology.

At this stage of the office we download the raw data from the GPS. It is indicated the re-qualification of the process of care of a land. It is the most important stage of the work. Even real software processes automatic data, or special attention to be paid post-processing, and the result is very good when the score is determined is millimeter.

After processing the data, we proceeded to adjust the network with the Leica Geo Office program. We will presents you a part of Leica reports (figure 5 and 6).

- when it has to be right Leica Geosystems

Fieldbook Report
10/18/2019 11:32:07

Job Information

Job name:	BIGAR1
Created:	03/02/2017 19:59:48
Time zone:	2h 30'
Coordinate system name:	E-TransDatRO
Application software:	LEICA Geo Office 6.0
Firmware version:	9.01
Codelist name:	SYSTEM1200
Average limit (Position):	0.0500 m
Average limit (Height):	0.0750 m

Coordinate System Information

Coordinate system name:	E-TransDatRO
Created:	03/02/2017 16:25:41
Transformation name:	-
Transformation type:	-
Height mode:	-
Residuals:	-
Local Ellipsoid:	Krassowski
Projection:	Romania Stereo 70
Geoid model:	Not found
CSCS model:	Not found

GPS Coordinates

Baseline	**Reference: RTCM-Ref 0020**		**Rover: mp_0302_17301800**
WGS 84 Coordinates:			
Latitude:	45° 17' 34.45921" N		44° 39' 44.95915" N
Longitude:	21° 53' 54.54481" E		22° 05' 59.76595" E
Ellip. Hgt:	300.2379 m		545.8379 m
Quality:	Sd. Lat: 0.0064 m	Sd. Lon: 0.0056 m	Sd. Hgt: 0.0164 m
	Posn. Qlty: 0.0085 m	Sd. Slope: 0.0063 m	

Baseline	**Reference: RTCM-Ref 0020**		**Rover: 457**
WGS 84 Coordinates:			
Latitude:	45° 17' 34.45921" N		44° 39' 44.65386" N
Longitude:	21° 53' 54.54481" E		22° 05' 59.45245" E
Ellip. Hgt:	300.2379 m		545.4690 m
Quality:	Sd. Lat: 0.0071 m	Sd. Lon: 0.0062 m	Sd. Hgt: 0.0190 m
	Posn. Qlty: 0.0094 m	Sd. Slope: 0.0070 m	

Job Information

Job name:	BIGAR1
Created:	03/02/2017 16:25:55
Application software:	LEICA Geo Office 6.0

file:///C:/Users/Scanner/AppData/Local/Temp/~Rpt/0.html 10/18/2019

Figure. 5 Leica Viva Feeldook report (I)

Coordinates:			
Easting:	270286.1511 m		
Northing:	355934.7222 m		
Height:	532.0402 m		
Quality:	Sd. E: 0.0019 m	Sd. N: 0.0023 m	Sd. Hgt: 0.0005 m
Observations in Face I:	Hz: 320° 44' 02.8" Az: 334° 28' 13.4"	V: 99° 19' 45.5" H. Dist: 8.2980 m	S. Dist: 8.4082 m Ht. Diff: 0.1130 m
Observations:	**5**		
Reflector height / type:	0.0000 m / Reflectorless		
Coordinates:			
Easting:	270286.1510 m		
Northing:	355934.7223 m		
Height:	532.0403 m		
Quality:	Sd. E: 0.0019 m	Sd. N: 0.0023 m	Sd. Hgt: 0.0005 m
Observations in Face I:	Hz: 320° 44' 01.9" Az: 334° 28' 12.6"	V: 99° 19' 42.9" H. Dist: 8.2981 m	S. Dist: 8.4083 m Ht. Diff: 0.1131 m
Observations:	**6**		
Reflector height / type:	0.0000 m / Reflectorless		
Coordinates:			
Easting:	270304.6586 m		
Northing:	355944.4623 m		
Height:	531.0850 m		
Quality:	Sd. E: 0.0014 m	Sd. N: 0.0027 m	Sd. Hgt: 0.0003 m
Observations in Face I:	Hz: 27° 10' 44.9" Az: 40° 54' 55.5"	V: 95° 48' 25.6" H. Dist: 22.7979 m	S. Dist: 22.9128 m Ht. Diff: -0.8423 m
Observations:	**7**		
Reflector height / type:	0.0000 m / Reflectorless		
Coordinates:			
Easting:	270297.1127 m		
Northing:	355937.6498 m		
Height:	531.4688 m		
Quality:	Sd. E: 0.0011 m	Sd. N: 0.0028 m	Sd. Hgt: 0.0005 m
Observations in Face I:	Hz: 21° 36' 13.2" Az: 35° 20' 23.8"	V: 98° 36' 59.3" H. Dist: 12.7681 m	S. Dist: 12.9123 m Ht. Diff: -0.4585 m
Observations:	**8**		
Reflector height / type:	0.0000 m / Reflectorless		
Coordinates:			
Easting:	270292.8457 m		
Northing:	355938.8932 m		
Height:	531.5747 m		
Quality:	Sd. E: 0.0001 m	Sd. N: 0.0030 m	Sd. Hgt: 0.0005 m
Observations in Face I:	Hz: 1° 14' 17.1" Az: 14° 58' 27.8"	V: 98° 36' 59.9" H. Dist: 12.0687 m	S. Dist: 12.2050 m Ht. Diff: -0.3526 m
Observations:	**9**		
Reflector height / type:	0.0000 m / Reflectorless		
Coordinates:			
Easting:	270294.2042 m		
Northing:	355949.5735 m		

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Figure. 6 Leica Viva Feeldook report (II)

CONCLUSION

In conclusion, considering the accuracy of the measurements obtained on each point following the network compensation, and comparing the data we can specify the following:

a) The values obtained from the GPS measurements by the RTK (Real Time Kinematic) method.

b) The method is practical but requires compliance with the conditions regarding the correct and efficient planning of a GPS company.

c) The results obtained from the measurements highlight the good quality of the GPS determinations.

The information recorded in the field is easy to process and can be transmitted directly to a GIS (Geographic Information System), a system that will find wide use in road management by entering all data in computerized databases, which will facilitate access to information.

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