TOPOGRAPHIC STUDY REGARDING THE SPATIAL POSITION DETERMINATION OF THE INTERCEPTION OF SOME MINING WORKS BY VERTICAL DRILLING AT CIUDANOVITA MINE

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***Abstract**: This paper is based on theoretical and practical aspects in the field of Mining Topography works. Through this work we want to present the topographic documentation for the design phase of some works for the execution of two vertical boreholes, boreholes requested by the specialized designer. The paper will present the sequence of work steps that will necessarily consider the rules and technical instructions in force as well as the determinations required by the designer.*

***Keywords:** underground, gallery, topographical network, drilling, digital terrain model*

1. Introduction

The area chosen for the topo study is in the southwestern part of Romania, Caraș-Severin County.

This topo study arose from the need to carry out a design theme regarding the construction of two 265-meter-long pipeline boreholes for the evacuation of mine water from the + 151m flood level.

Fig. 1. Ciudanovița Mine - underground connection areas

These vertical boreholes are intended to intercept two mining works (horizons / galleries) that will be pierced in their path (from the ceiling to the base of the galleries) to reach the objective at elevation + 151m, in the vicinity of the water pump room mine.

To achieve the proposed purpose, measurements were performed using GPS technology to identify the work area on the surface. The verification of the underground access will be done through two points:

- The first access will be made through the coastal gallery of the horizon + 355m;
- The second access will be made through the vertical aeration well equipped with extraction dispositive, which makes the connection between the surface (elevation + 416.85m) and underground in the connection gallery with the underground pump room (horizon + 155m).

2. Materials and Methods

After researching the older plans, the data provided by the mining operation regarding the old points in the geodetic network used in the phase of research, opening and exploitation of the mining works still on site and after conducting the field research it was decided to use two types. of topographic equipment: total station NIKON NPL 332 and GPS SOUTH S82V.

Fig. 2. Presentation of NIKON NPL 332 in the station, next to the aeration shaft equipped with extraction dispositive

The coordinates of the thickening and detail points were determined using a SOUTH S82V GPS receiver and the ROMPOS service.

The detailed and underground measurements as well as the underground measurements were performed with the NIKON NPL 332 total station.

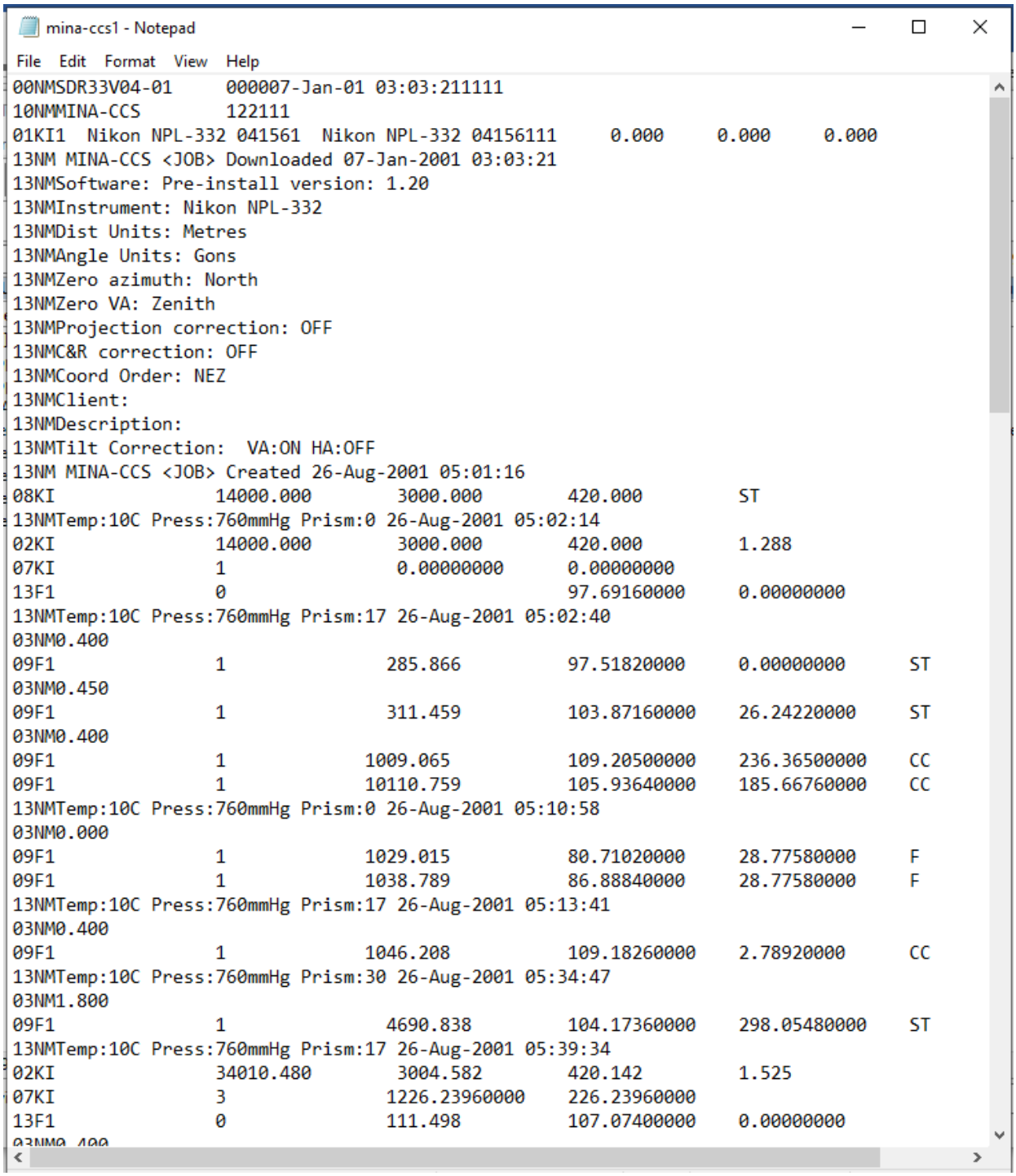
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Fig. 3. Excerpt from the NIKON NPL 332 field notebook

After making and checking the surface support network we proceeded to the analysis of underground transmission methods through the two access roads, the coastal gallery - the horizon + 355m and the vertical aeration well equipped with a cable that ensures the connection from the surface with the horizon + 155m.

To perform topographic measurements on the coastal gallery - horizon + 355m, the junction method was used by simple measurements, making a topographical network with a complete measurement going- returned to the end of the gallery, which ended abruptly due to the execution of mining works to close the connections of underground works with the

surface of the land, thus transforming it into a coastal gallery "bottom of the bag" with aeration by mechanical ventilation. The measured length of the road is 423.84 m. In this stage we were able to use as a form of materialization of the station points the nails of the transport rail existing in the gallery marking them by applying paint both on the nail itself and on the wall of the gallery.

Fig. 4. Total station NIKON NPL 332 - centered and set in the coastal gallery

Regarding the underground access through the vertical aeration well equipped with extraction dispositive, for the topographic measurements the method of the quadrilateral junction was used, this method being applied to make the connection between the coordinates of design and orientation in the underground on a vertical well and the topographic network. surface support when the working space in the mouth area of the well is limited.

3. Results and Discussion

After performing the fieldwork, we proceeded to the office phase, downloading, and processing the data obtained using the topographic equipment used. The resulting coordinates will be important in the AutoCAD program for the digital terrain model.

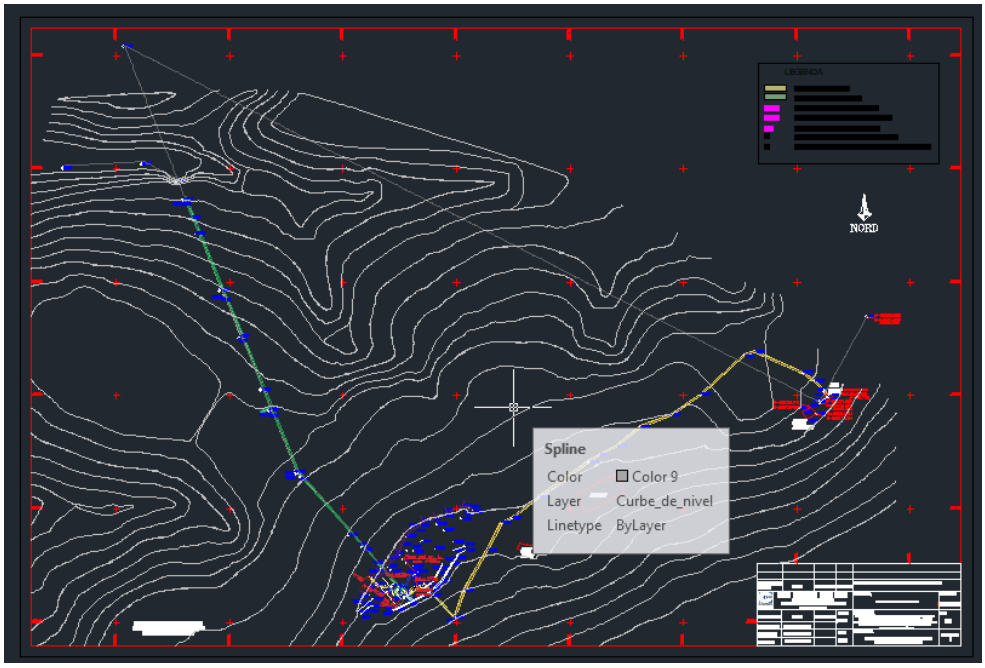

Fig. 5. Digital terrain model

The processed data has been uploaded to AutoCAD and in order to switch to 3D working mode, the 2D polylines will be transformed into 3D polylines through the TOPOGRAPH program.

This step will be used later in the three-dimensional representation of the measured objective.

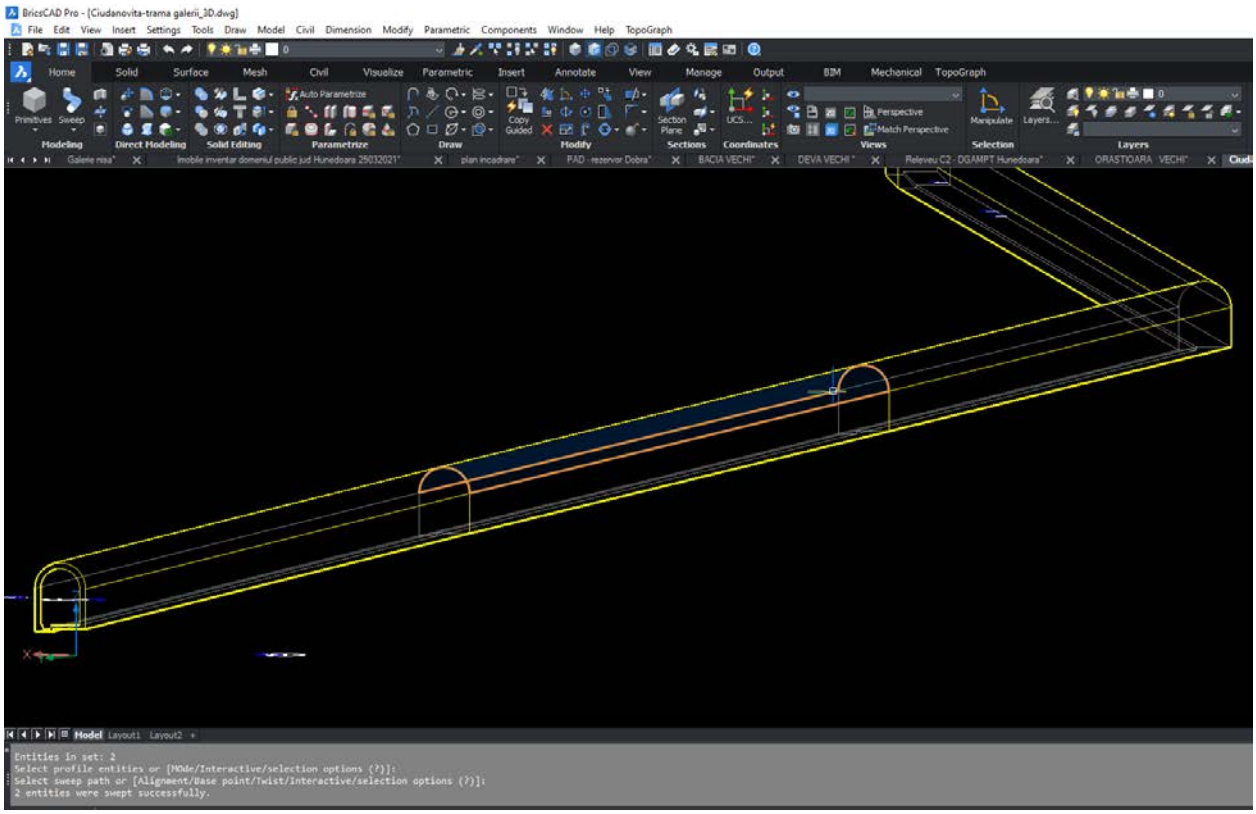

Fig. 6. Three-dimensional gallery

To obtain the representation of the terrain in 3D mode, the TopoLT utility will be used, where the measured points and the lines of forced change of slopes will be used in order to result a representation as close as possible to reality.

After obtaining the digital terrain model (MDT), the level curves with an equidistance of 2m will be made.

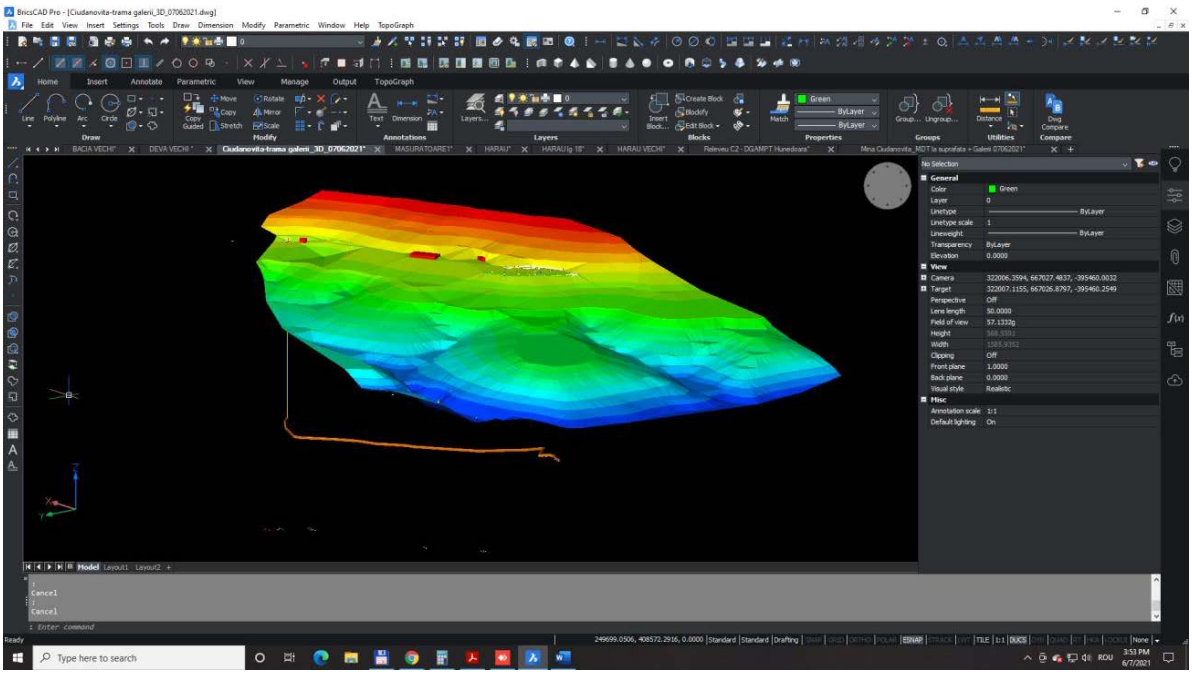

Fig. 7. 3D representation of surface land by MDT and underground mining works (aeration shaft and horizon gallery + 155m)

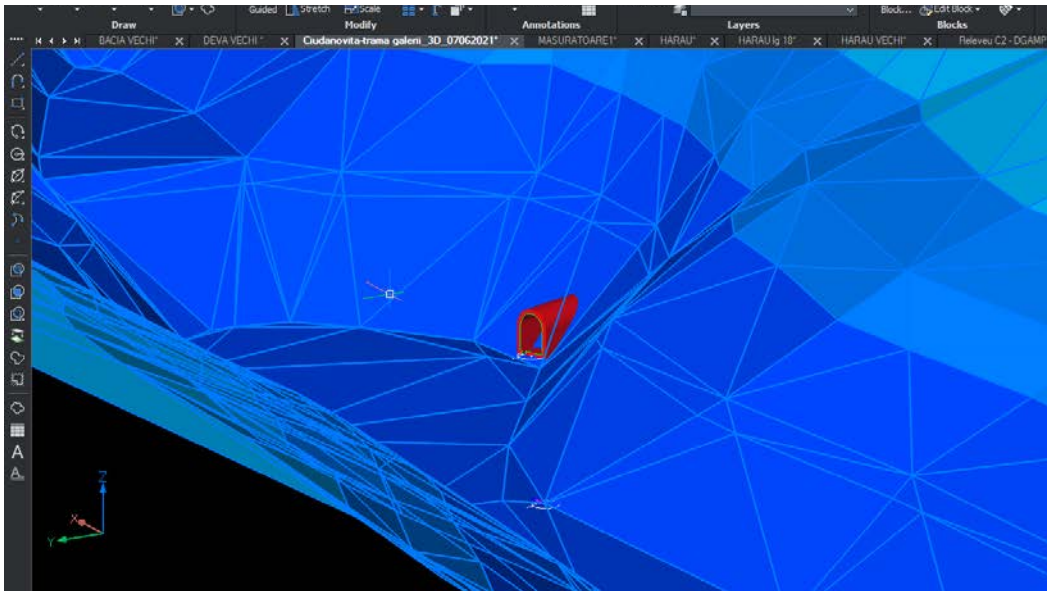

Fig. 8. 3D representation of the coastal gallery portal - horizon + 355m

The topographic documentation that will be prepared is necessary to achieve the design theme regarding the construction of two pipe drillings, in length of 265 linear meters, for the evacuation of mine waters from the flood level of + 151m.

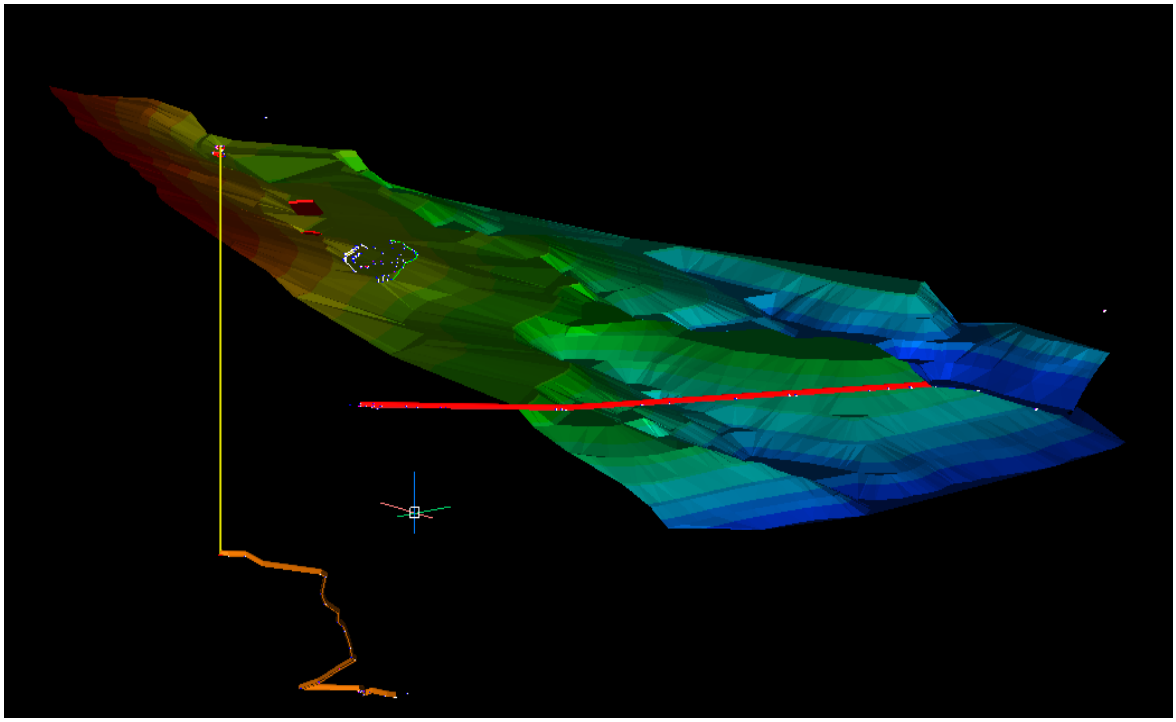

Fig. 9. 3D representation of surface land by MDT and underground mining works (aeration well, horizontal gallery + 355m and horizontal gallery + 155m)

The preparation of the technical documentation for obtaining the building permit will require technical reception from the Office of Cadastre and Real Estate Advertising Caras-Severin, this being prepared according to the Regulation of approval, reception and registration in cadastral records and land book (Order of the Director General of National Agency for Cadastre and Real Estate Advertising no. 700 of 2014) with subsequent amendments and completions.

4. Conclusions

The final product of the case study required the preparation of a technical documentation that is the subject of the technical reception of the Office of Cadastre and Real Estate Advertising Caraș-Severin and which has only the surface component. However, to be able to carry out the design part, the mining designer needs an in-depth view of all the works, both on the surface and underground, in order to be able to make a decision regarding the positioning and realization of the vertical pipe drilling required by to the beneficiary, in order to operate the mine drainage system.

Under these conditions, the topographic documentation submitted to the designer will be completed with digital data regarding the survey of the gallery and the plot of underground works, for this purpose, the mining designer can manipulate and process the measured data and plan with the plot of underground works in digital format CAD to form a clear picture of the placement in space of all underground mining works that will be encountered by drilling.

This topographic study will serve the design activity so that the geographical position on the surface of the designed boreholes can be identified and methods can be used to control the verticality during the drilling period until the goal is reached - pump room on the horizon + 151m, with an execution depth of 265 linear meters.

5. References

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