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ADVANCE GIS ANALYSIS ON ZONAL URBAN PLAN PROJECT

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Abstract

According to Law 350/2001, the Zonal Urban Plan is the tool of urban planning area, of specific regulation, which coordinates the integrated urban development of local areas characterized by a high degree of complexity or a pronounced urban dynamics. The Zonal Urban Plan provides correlation of integrated urban development programs of the area with the General Urban Plan. The zonal urban plan is based on terrestrial measurements. The measurements were performed using total station and the GNSS technology. The plan was accomplised in ARCGIS software, which allowed obtaining quality cartographic elements and development of complex analysis. The studied territory is the Zizin area, situated in the East of Brașov City, which has an area of 298 hectares.

Key words*: modern tools, zonal urban plan, urban planning ,surveying methods, interpolation.*

INTRODUCTION

The Zonal Urban Plan for the Zizin area respects the regulations of the law 350/2001 and the Urbanism Certificate no. 879 from 22. 04. 2013. According to the Urbanism Certificate the land use in the Zizin area consists of subarea for constructions and communal facilities, subarea for cemeteries, subarea for green spaces, for public green spaces, mixed subarea, subarea for units of small and medium manufacturing and services, mixed subarea located outside the protected area, subarea of green spaces for recreation.
The zonal urban plan is based on the topographic plan, which is a graphical conventional representation, accurate, scale reduced, of a small area of land. (Nastase and Osaci-Costache, 2005)

MATERIALS AND METHODS

To accomplish the zonal urban plan, were used ,as methods of surveying, the traversing survey supported at the ends points and the vectoring of the areas that couldn't be surveyed due to the lack of visibility. The surveying equipment used consist in two GNSS equipment Leica GPS1200 (Figure 1) and a Total Station Leica TC405 (Figure 2).

Figure 1. GPS1200

Figure 2. TC405

The surveying points taken with the GNSS equipment used at increasing frequncy of geodetic network were post-processed with Leica Geo-Office software using ROMPOS corrections. The compensation of the traverse was made in Toposys software. With compensated coordinates and other data as orthophotos, cadastral plans and parcelling plans, followed achieving the database and the zonal urban plan in ArcGIS software. (Tereșneu and Tamaș, 2010).

RESULTS AND DISCUSSIONS

We can begin achieving the zonal urban plan once is approved the Opportunity Study by the

Local Board. The opportunity study and the zonal urban plan are made complying the Law 350/2001, Law 50/1991 and the Government Decision 525/1996.

In ArcGIS software you can't just lunch the application and start drawing like in the computer-aided design software, you need to follow some footsteps before.

The stages to achieve a cartographic element are:

- Creating a File Geodatabase in ArcCatalog;
- Creating a Feature Dataset in the geodatabase that holds the information about the coordinates systems;
- Creating in the feature dataset New Feature Classes for every type of feature that will exists in the future map: polylines, points, polygons, annotations etc.
- Import in ArcMap the created feature classes and the other data like ortophotos, cadastral plans and the parceling plans;
- Starting to unite the points and create symbols for every feature class according to the details from the terrain;
- Edit and display the labels and the annotation so as to be represented the hole toponymy of the site;
- Make the final configuration in the Layout view and prepare to print the map.

Following these steps you have a map that is ready to be used for the purpose which it was created for.

After it was created the database in ArcGIS, the achievement of the Z. U. P was only a matter of time. The data is structured on layers, making it easy to acces them (Figure 3).

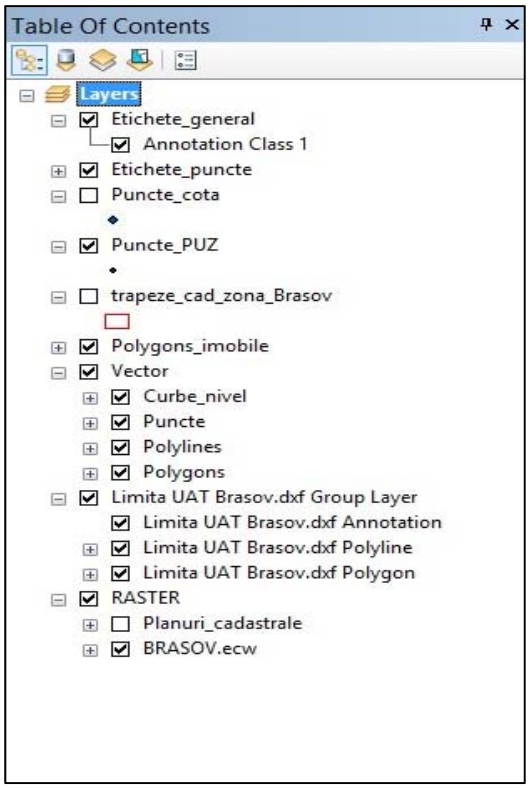

Figure 3. ArcGIS layers

The Symbology submenu (Figure 4) from the Layer properties help us to recreate with high fidelity the details that has been observed on the studied area. In this submenu, we can create unique symbols for points, polylines and polygons.

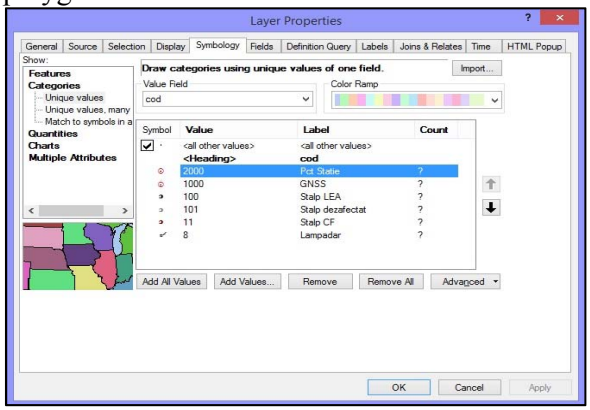

Figure 4. Layer properties page

The Labels submenu (Figure 5) from the Layer properties let us build special label using an expression to derive the label string from each feature. The expression need to be coded using the rules of the scripting language selected. The scripting languages that exists in the ArcGIS internal database are JScript and VBScript.

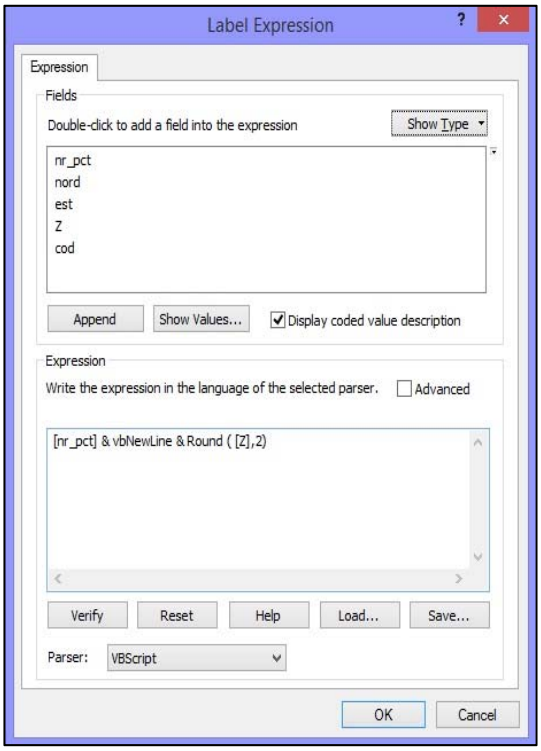

Figure 5. Label expression window

For exemple, the expression " [nr_pct] & vbNewLine & Round ([Z],2) " displays, in the VBScript language, a label which has the text structured on two lines and the second line text, the "Z" field, is rounded to two decimal places.

The accomplised topographic plan respects with fidelity the studied area and show all the technical and juridical elements that are present there (Figure 6).

Figure 6. Sector of the topographic plan overlapped above the orthophoto map

The contours presented in the topographic plan (Figure 7) were obtained using a function from ArcToolbox, the Contour function from Spatial Analyst submenu. This function creates a line feature class of contours (isolines) from a raster surface. (ArcGIS Help Window)

Initially I did contours with three types of equidistance: 0.5 m, 1 m, 1.5 m. After an analysis I consider that the most suitable are those with equidistance of 1 m.

Figure 7. Contours with 1 meter equidistance

The raster surface that the contours are based on, was generated using the elevation points measured on the field. To obtain the raster surface I used the Interpolation function from the same Spatial Analyst submenu. There are eight types of interpolation and I used three of them: IDW, Spline and Topo To Raster.

IDW interpolates a raster surface from points using an Inverse Distance Weighted technique. The output value for a cell is limited to the range of the values used to interpolate. This interpolation cannot create ridges or valleys if these extremes have not already been sampled. (Watson and Philip, 1986)

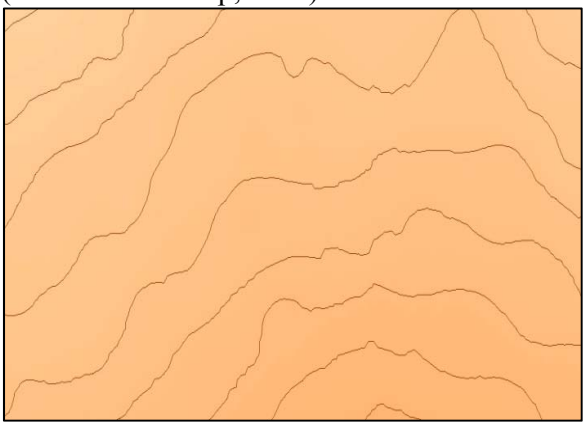

Figure 8. Contours based on IDW interpolation

This contours were not used on the topographic plan because are too irregular (Figure 8).
Spline interpolates a raster surface from points using a two-dimensional minimum curvature spline tehnique. The resulting smooth surface passes exactly through the input points. The greater the value of elevation points, the smoother the surface of the output raster will be (ArcGIS 10 Help Window).

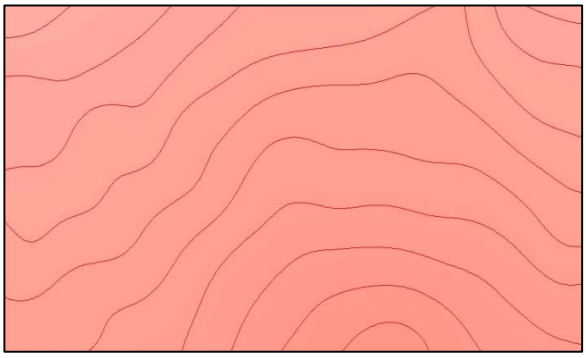

Figure 9. Contours based on SPLINE interpolation

The contours based on Spline interpolation fits perfectly over our needs and therefore I used it on the topographic plan (Figure 9).
Topo To Raster interpolates a hydrologically correct raster surface from point, line and polygon data. The best results will be obtained if all input data is stored in the same planar coordinate system and has the same ZUNITS. (ArcGIS 10 Help Window)
The input data in our case, is framed in the Stereographic 1970 Projection System and in the Normal Altitudes System Black Sea 1975.
Topo to Raster use only four input data points for the interpolation of each output cell. All additional points are ignored.

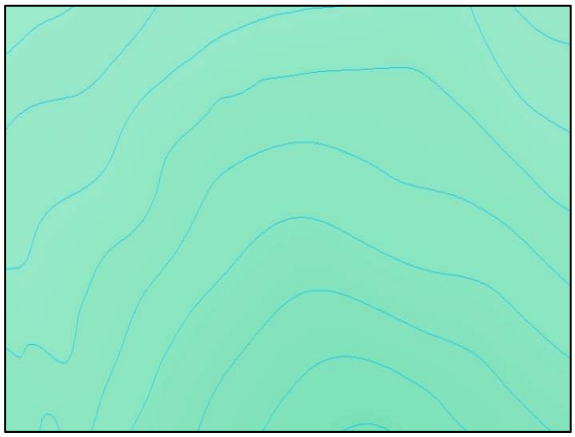

Figure 10. Contours based on Topo To Raster interpolation

The contours obtained with Topo To Raster interpolation are smooth but I don't used them on the plan because it's not using all the input data points and so it can lose a certain amount of output cell information (Figure 10).
After printing the topographic plan and filing the documentation, the file it's ready to be taken at O. C. P. I. for approval (Figure 11).

CONCLUSIONS

All the modern instruments and software allows us to gain high quality and accuracy in the achievement of the cartographic plans.
In the new softwares we can easy to experiment different methods of mapping and choose the best to get a finished product comply with regulations in force, but also the needs of beneficiaries.
ArcGIS is an attractive computer application, combining the visual and the numeric, the cartographic items are considered to be part art and part science. The database for each project can be updated continually and can offer information about all the elements that exists in the plan. Using the tools that exists in the software database allows us to analyze a variety of data. It has tools for 3D analyzes, geostatistics, spatial analyzes, spatial statistics and many others.
It will be a great improvment if A. N. C. P. I. will receive the entire GIS projects with all the information that are contained in them. They developed on a GIS platform eTerra Geoportal, but the information offered is poor and can be improved.
The GIS softwares may be the next stept in the evolution of the mapping.

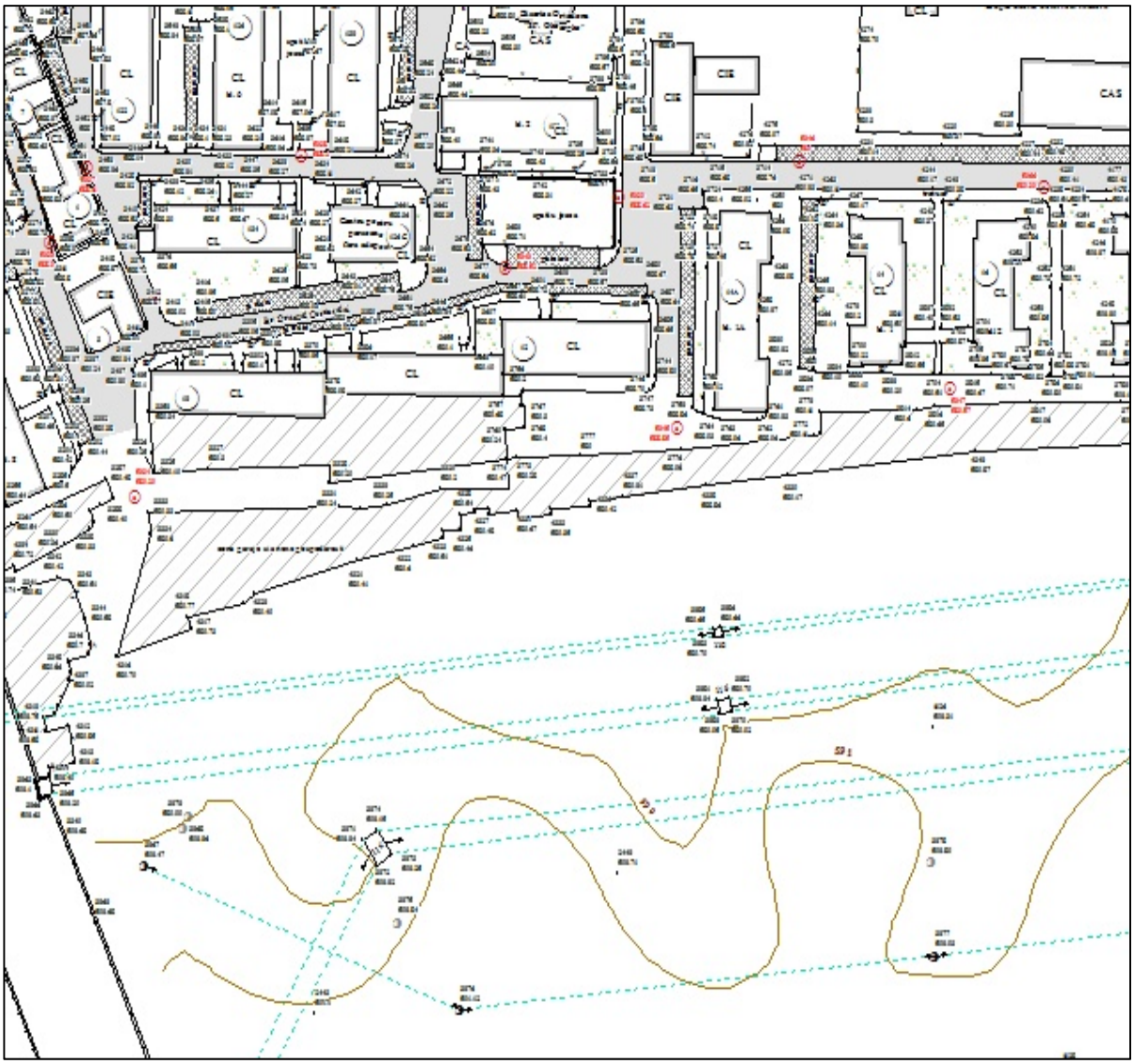

Figure 11. Sector of the topographic plan

ACKNOWLEDGEMENTS

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