

ANALYSIS OF THE POSSIBILITIES ENGINEERING AND GEOPHYSICAL METHODS FOR SEARCHING GEODETIC MARKS

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Keywords: cadastre, geodetic points, geological and geophysical information. **Statement of the problem**

Current monitoring of geodetic points involves structuring, storage and distribution of geodetic data, that is informative. Besides that the usage of geodetic points on purpose, specialists also need to know the complex technical and technological (topographic surveying, engineering, geophysical, Non-Destructive Testing) techniques that are essential for finding and monitoring of the control point, and able to consider the impact of natural and social and man-made processes for conservation of the geodetic points. **Analysis of recent research and publications related to the solution of this problem**

At the current stage of development of topography and geodesy information about the geodetic network points can be obtained in several ways, including:

- 1) software and technological support GEOGRAD, which is designed for systematize data of the State geodetic network [1];
- 2) with "... technical documentation which provides detailed information of the location and condition of each setting of control points"[2] and data that pass after the field work [3];
- 3) geoportal [1].

Setting of the task

Operation of geodesy control points can be divided into four periods:

- 1) preparation period;
- 2) Period of laying and compliance of deadlines entry into operation;
- 3) Topographic and geodetic period during which the geodesy control points receive geodetic information;
- 4) Period of long-term usage.

Developed by specialists software and technological support GEOGRAD used for organizing, cataloging and mathematical processing of geodetic control points for the purpose of operational support information about control points which can be viewed by users.

The analysis showed that for monitoring the status of geodetic control points, in particular to find them on the ground professionals need to collect information about points of different sources of information as to the legal and archival data (training period). Information obtained during the laying and conducted field instrumental control (the second time) in the future, namely in visual and instrumental (non-geodesic) searching this information is not used. To

reuse this geodesic control point this information restored, and that leads to rise in the cost control point, as a carrier of geodetic information. All this leads to amendment of the software and technological support GEOGRAD. Creating a geoportal represent limited information about the control point.

The main problem

In usage of nowadays advanced exploration work [6] a specialist in the field requires comprehensive information of the state of control point, as well as the changes of the physical fields of the Earth, which may affect the results of the search and control engineering and geophysical surveys.

Therefore, two situations:

- 1) the usage of GPS equipment by specialists in topographic and geodetic field without geological and geophysical information about the underground soil surrounding (obtaining coordinated surface information, which is stored);
- 2) the usage of advanced engineering and geophysical systems with GPS [6], receive all available information (coordinated surface and depth) about the underground center that is not stored.

Topographic and geodetic information is used many times and it is more accurate than the geology and geophysics, which, unfortunately, does not save, but are used for inspection and to control.

Information about the control point on the ground can be: geographical, historical, geological, geophysical, optical, geometric, geodetic.

Geographical - a literal description, outline, the steps, that make up for each triangular, polygon and leveling points on special forms – cards, layings inspection and recovery points of city polygonometry, triangulation and leveling mark. Description is a plan of area of an random scale; sketches, photographs of local objects and buildings. This should be drawn up so that it was possible to find the exact location of the center points, or mark, if it is not saved any signs of its appearance.

According to the normative documents linear binding to geodetic points must be performed no less than to three landmarks. Areas of them should form serif with angles between 30-120 °. Distant landmarks required for the application of geodesic control point on the paper of corresponding map scale, the nearby landmarks are needed for quickly find the mark on the ground. Geodesic distance from the center mark to the permanent location of the object is measured with an accuracy of 0.01m in built-up areas. Also offered to

make altitudinal binding of the elements of topography bindings of geodetic control point.

The scale of surveys for drawing up descriptions of the location of geodetic points coarsened with time of 1:100000 or 1:50000 1:25000 and larger to for leveling marks. To polygonometry points recommended scale is 1:1000; 1:750 to polygonometry wall signs - 1:130; 1:50. In geoportals indicated.

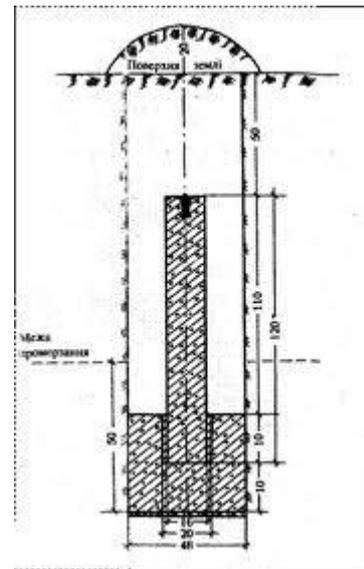


Pic.1. Geographic information

Historical (cartographical) – change of relief between the survey and the update of the surface, change topographic surveying technology, available and affordable cartographic materials of different ages, which shows the changes that are listed not only the area but also administrative structure. Conducted by the authors a field survey and office work (a review of 100 years of cartographic materials) of point Berezovets GN - 1 showed that the change in the situation is not only caused by water erosion, but also non-availability in the last 20 years of intense economic activity in the surrounding towns. All this has led to the displacement or destruction of surrounding roads, housing and commercial buildings. Administrative changes – p.Berezovets geographically located in Tysmenetsia, Zhovtnevy, Lisecky, Ivano-Franivsky areas. In geoportals [1] is not specified.

Optical - availability and low cost of digital photographs can provide the pictures of the pits, pit in which will be laid underground center, rapper. The correctness of the choice of the place of photography pits measuring by tape (rod) on the background of topographic elements binding in future will provide quickly finding a place on the ground and simultaneously control the process of examination and renewal and laying. In geoportals [1] is not specified.

Geometric - types and design of centers that introduced in [2] with specified geometric size, size and material of metal geodetic marks. So for the point Berezovets unspecified of size metal mark that make this difficult to use magnetometers for search. In geoportals [1] partially specified.



Pic.2. Geographic information

Physical – materials for production centers, rappers, their physical properties, which can be used in searching operations. In geoportals [1] is not specified.

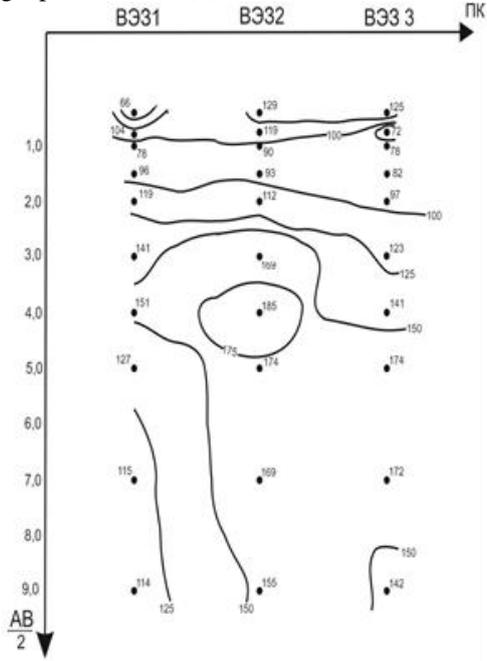
Geological - geological section, which is obtained through optical information can be represented in graphically (verbal) and digital form. In geoportals [1] is not specified.



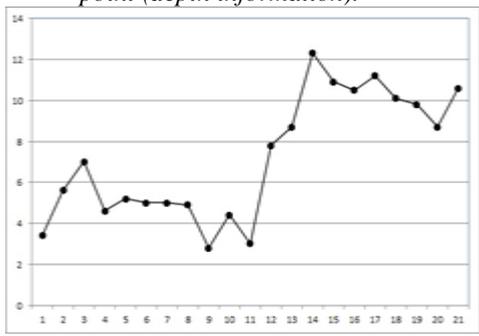
Pic.3. Geographic information

Geophysical information could be presented in the field (instrumental) and office form. For this we need to know which physical values of natural or man-made physical fields (density ρ of soil and the material from which center is manufacturing, alleged electric resistance ρ , magnetic susceptibility χ , the velocity of longitudinal v_r , cross v_s , v_R surface waves, natural radioactivity, thermal conductivity λ , specific heat c and specific thermal resistance ξ) can detect an anomaly created by geodetic point on the ground. Therefore it is necessary to specify which geophysical instruments, software used to find control point in the soil, and represent the resulting geophysical information as radiogram, geoelectrical section, schedule the apparent electrical resistivity, magnetic field maps as isodynam, vertical electrical sounding curves, coordinated by GPS using 2-D or 3-D magnetic cards, laying abnormalities places points GHS. In

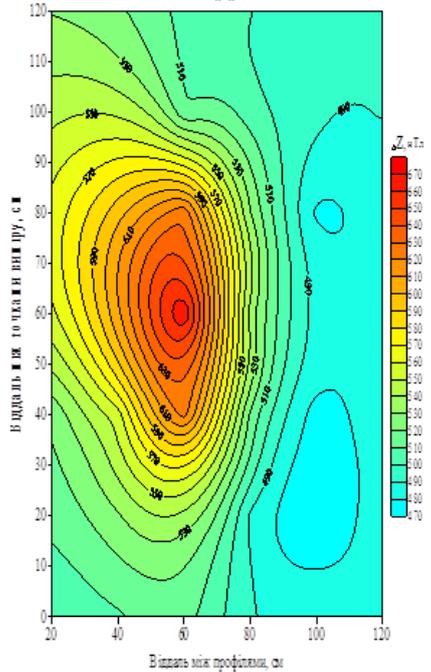
geoportals [1] is not specified.



Pic.4. Geoelectrical section laying of geodetic point (depth information).



Pic.5. Graph of specific electrical resistance of the soil rapper



Pic.6. Map of the magnetic field in the form of isodynam point of polygonometry

The authors propose to introduce a new numbering of new geodetic points. The ideology of the previous was that at minimal cost to cover a large area with insufficient mapping. Therefore, triangulation points have their own names, which corresponded to geographical names used by the local population.

The proposed numbering geodetic points takes into account current administrative division of Ukraine and current trends of geodetic networks in the context of allocation of local government finance to support the operational geodetic networks, the adoption of regional development programs topographic, geodetic and mapping activities. [8]

New numbering of the points corresponds to the the Law of Ukraine [9], where the responsibility for the destruction of the control point bear local governments, as well as to automatically calculate the density of geodetic points in the territory. It consists of 17 numbers and 3 letter designations:

- 00 - refer geodetic framework (network) for a scheduled basis - 00, it is UPN,
- 10 - geodetic network 1 class
- I0 - leveling networks of class I
- 00 - the number of regions, cities of Kyiv and Sevastopol;
- 000 - number of cities, towns,
- 0000 - number areas.

In the case of determining the height of a geometric leveling points instead of 0 used number corresponding class leveling, a similar situation with the definition of the coordinate rappers leveling.

Thus, the control point (leveling rapper) will be denoted by 17 numbers, so points for GN - 1 Berezovets number is:

- IIV.042. 30868.S.09.13.15.GF
- 09 - Ivano-Frankivsk region;
- 13 - Tysmenytsya area;
- 15 - Kolodiyivska village council;
- C - satellite surveillance;
- GF - available geological and geophysical information about soil environment of the center.

In the absence of information put 00

Conclusions

The current geodetic data bank should include comprehensive information about the geodetic control point. To make better use of geodetic points proposed new numbering. The introduction of this system strongly depends on the allocation of funds for the development of local topographic and geodetic activities.

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