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SURVEY (RECONNAISSANCE) OF GEODESIC CONDITION OF ZARBAND MARBLE MINING AREA

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Abstract

This article presents the topogeodetic survey results of geodetic network points around the quarry "Zarbant". The plan and elevation points of the triangulation network are selected on a 1:100000 scale map. For GNSS (in English “Global Navigation Satellite System”, GNSS) measurements, the search and reconnaissance of SGN (state geodetic network) points and reference mine survey plug described on the topographic map was performed. The enterprise of the Republic of Uzbekistan "SAMGEODEZIST" reconnaissance of geodetic signals and centers installed in accordance with the requirements for new GPS points installation. A scheme of a combined geodetic network was developed in which measurements were to be made using angle measurements and navigation instruments. The right-angled coordinates of these points are obtained in the conventional coordinate system with subsequent abbreviations to the global geodetic network, and the elevations were calculated in the Baltic Altitude System (BAS-77).

Keywords: map, scale, geodetic point, coordinate system, SK42, BAS-77.

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Geodetic network design is the selection of the geodetic point location on the ground in accordance with certain rules. The point density should be appropriate to the network purpose and the network shape should allow the network elements identification with approximate accuracy. Geodetic reference network, geocentric coordinate system, area measurements related to the shape and gravitational field of the Earth should be reduced to a certain period taking into account the Earth rotation speed, the tectonic plate movement on the surface and other influences. If industrial facilities are located or built near this network, then geodetic points role will have a special status due to changes in spatial dimensions resulting from the minerals extraction. Therefore, one of the important directions during mining facilities construction is a planned and elevated base creation of the geodetic network [1].

During the buildings and structures construction in 1960-1990, angular and linear measurements were made using optical theodolites and levels. With the advent of high-precision satellite navigation receivers, the accuracy of geodetic points has increased by several notches [1,2]. The advantage of using these receivers is the ability to receive data in any format and quickly process the measurement results. The existing classical methods of alignment differ from the satellite methods in the coordinate's accuracy of the geodetic point. The classical and satellite measurements combination reveals an accurate and precise, efficient system for determining the coordinates of geodetic points around the marble quarry "Zarband" [1].

In order to intensify the geodetic network, geodetic points reconnaissance around the AGMK plant and near Karshi city was carried out in the study [3,4]. Similar work was carried out at the "Zarband" quarry, where geodetic points are located at different distances from the prospecting area.

The quarry with 28 hectares area is located in Samarkand region (coordinates λ = 66°31'7.98"B, φ = 40°12'4.07"C, height N = 847 м (BAS-77)). Figure 1 (a and b) shows the geodetic points location around the quarry. Recent geodetic measurements in this area were carried out in 1967-1970 by section 12 of the "General directorate of geodesy and cartography (GDGK)" (currently the Central aerogeodesic enterprise-CAGE). In 1990-1995, the re-leveling of geodetic networks has not yet been completed due to limited resources and changes in the resources of topographic and geodetic organizations [1].

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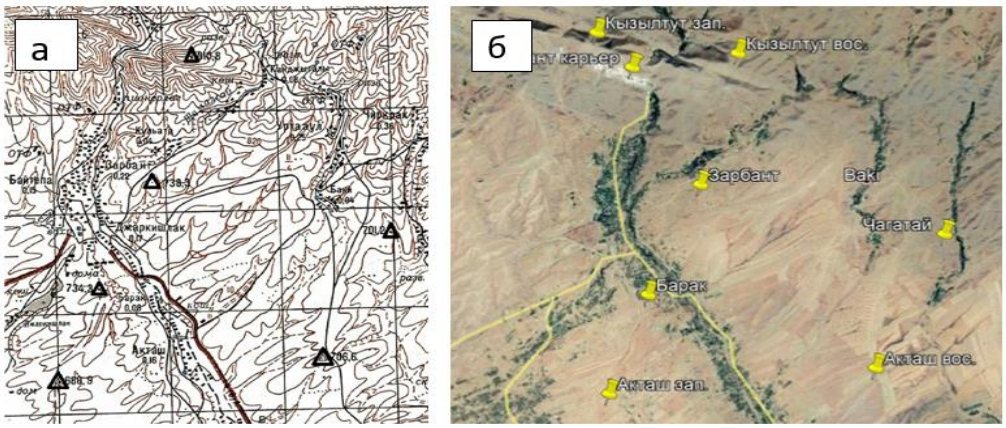

Fig. 1. "Zarband" quarry (a - part of the topographic map, b - Google information)

Reconnaissance of SGN points around the Zarband quarry in 2020 the preliminary calculations of the geodetic points coordinates were performed using Stonex S900A (developed by the Italian company Stonex) GNSS satellite navigation receiver devices [1] by employees of Samarkand aerogeodesic expedition and researchers of Samarkand state architecture and civil engineering institute (SSACEI).

During the reconnaissance, the pyramids absence in the main part of the geodetic points for deformations and classical angular measurements was found (Fig. 2 a, b). Therefore, this work purpose is to assess the geodetic points condition described on the topographic map obtained by triangulation and leveling methods.

Fig. 2. Reconnaissance of geodetic points around the quarry: a - geodetic point, b - GNSS measurements

It is known that geodetic networks are actively used not only in construction, but also in the search for minerals, conducting topographic surveys of a certain scale, connecting them with a starting points system in the signal points or pyramids form [5]. These points, whose coordinates are known, reflect the rectangular or

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triangular pyramids structure that make up the geodetic reference network or class SGN 1-4. In dense urban conditions, they are mounted on the walls of the building, in open areas - they penetrate deep into the soil (Fig. 3 a, b). Places are marked to make it easier to find them. Laying of the reference geodetic network points for various purposes is carried out by calculating their subsequent use in the deformations observation.

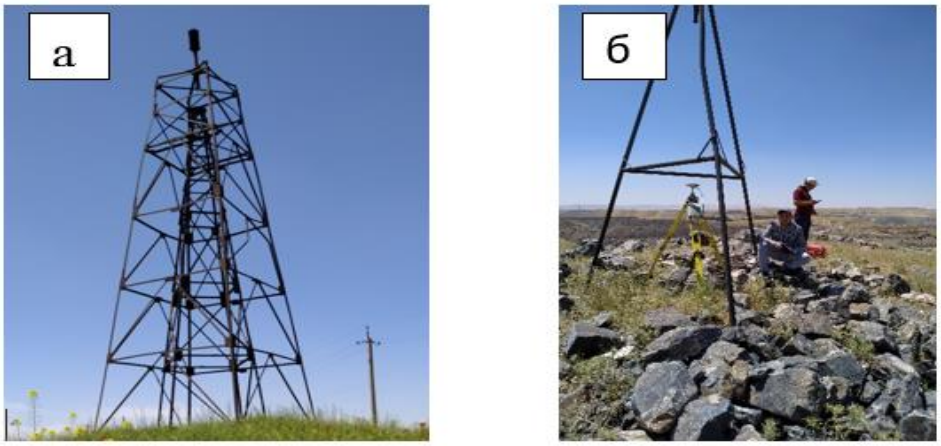

Fig. 3. Geodetic signal (a- complex, b - pyramid)

A number of additional works will be carried out to ensure the safety of geodetic network points, for example, creation of constructive schemes, installation of mine survey plug (Fig. 4), orientation, preparation of various documents, coordination of geodetic works with relevant structural organizations (agreement, approval). Typically, the creation of a geodetic network foundation represents the geodetic networks condensation to high-precision points by the method of triangulation or the theodolite development and leveling paths [6].

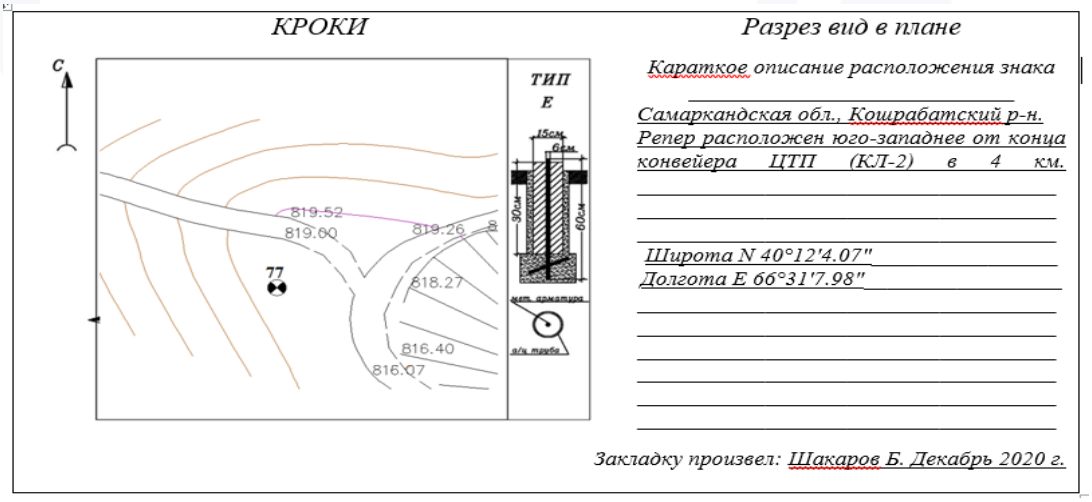

Fig. 4. Mine survey plug installation scheme

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Work on the primary geodetic networks development will also be carried out during the surveying work related to the minerals prospecting. All necessary measurements are made from the geodetic network points using tachometers, levels or GPS receivers, using polygonometric methods, in which the angle and distance between the points are measured.

All work on the geodetic networks construction will be carried out step by step as follows:

1. Project development. At this stage, the necessary materials are collected and studied, surveys are conducted, the required accuracy is set, and the network construction method is selected;
2. Preliminary research. They include area reconnaissance, determination types and numbers of required geodetic points, taking into account the area characteristics;
3. Installation of mine survey plugs. Location of geodetic network points, location, registration of relevant documents;
4. Carrying out geodetic survey. Geodetic vertical and horizontal surveys (topographic surveys, etc.);
5. In-camera processing of results. Determining the marked geodetic points coordinates, estimating the network accuracy and its alignment.

Alignment of geodetic networks is a very important step in the camera processing of measurement results. The data obtained in the field measurements must be corrected taking into account the errors in order to obtain more accurate coordinates of each point in the network, in which case the errors do not exceed the allowable limit and the measurement accuracy does not decrease, but, conversely, increases. The smallest squares method is used to equalize measurements made using a taximeter [7]. This allows the selection of measurement parameters. As a result, their mean square error is minimal. For small networks, the correlation method of equalization is also used, based on the mathematical relationships interdependence of the measurement values to each other.

Surveillance using satellite technology and a stationary station involves redundant measurements. Alignment of the satellite geodetic network is carried out in the following ways:

- using special software from the equipment manufacturer;
- use of third side software;
- the smallest squares method and other classical methods.

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SGN points since its installation in 1950-1970, we have determined the approximate coordinates of these points using navigation devices (Table 1).

Table 1 Coordinates of geodetic points located around the quarry

	Geographical coordinates		Coordinates (Gauss-Kruger) CK42		Height, H (BAS-77)
	φ	λ	X	Y	
Aktash зап.	40°08'39"C	66°30'47"B	48655.45	88000.00	680,9
Aktash вос.	40°08'54"C	66°34'03"B	48992.44	92683.25	706,6
Barak	40°09'41"C	66°31'17"B	50489.58	88760.74	734,3
Chagatay	40°10'18"C	66°34'53"B	51508.73	93955.41	701,2
Zarbant	40°10'50"C	66°31'56"B	52599.19	89756.39	738,3
Kyzyltut вос.	40°12'11"C	66°32'25"B	55085.93	90516.26	1010,8
Kyzyltut зап.	40°12'24"C	66°30'44"B	55587.74	88087.42	1060,6
Baytepa	40°10'59"C	66°30'04"B	52977. 69	87199.68	734,6

During the points reconnaissance, it was found that many geodetic pyramids had not been preserved, but the centers had been preserved in their original form. This provides the basis for the ability to determine the centers coordinates by satellite navigation methods. Although the processing technology of GNSS measurements differs from the classical methods, the basic principles of measurements and calculations remain the same. Such measurements were made by SAMGEODEZIST using the Stonex S900A GNSS receiver (Developed at Stonex, Italy) in 2019 to intensify the satellite geodetic network. Special concrete signs are installed around the quarry. The geometric center of the quarry was used as the starting point.

The basis of the primary geodetic network survey was a horizontal survey by measuring the area contours where the objects are located and measuring the control points connections between them using the polar method [8]. The distance from the geodetic instrument to the main contour does not exceed 750 m, vertical and horizontal surveys were carried out together. When leveling, the pickets height was determined at all characteristic points of the ground (the distance between the pickets was at least 50 meters). When surveying the relief, the maximum distance from the tool to the column (pole) did not exceed 150 meters. The working points coordinates are calculated in the conditional coordinate system. This poses certain difficulties when falling into the global coordinate system (Figure 5).

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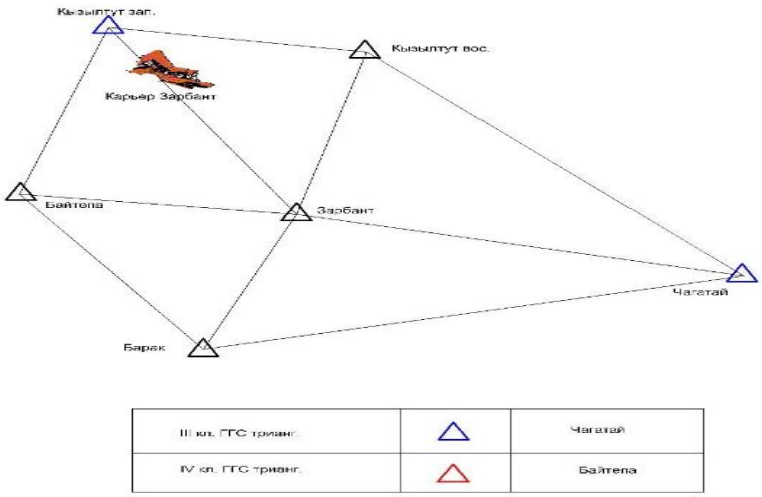

Fig. 5. Schematic diagram of the geodetic network around the quarry "Zarbant"

From the above, it can be concluded that the points Reconnaissance near mining sites is an integral part of geodetic work, which allows to reduce the amount of earthworks associated with the restoration and reconstruction of starting points. As well as the correct design of the new geodetic network. The SGS points configuration is related to the initial calculation of the coordinate accuracy, where the mean squared errors and viewing zones must be taken into account.

REFERENCES:

1. Mirmahmudov E.R., Niyazov V.R. “Muruntov” cleaning of the quarry atrophidagi geodesicist punctlarnie reconnaissance қilish. // Materials of the International scientific and methodological journal «GLOBAL SCIENCE AND INNOVATIONS 2021: CENTRAL ASIA» NUR-SULTAN, KAZAKHSTAN, FEBRUARY 2021. 134 бет, 127-132-бетлар.

2. Antonovich K.M. Use of satellite radio navigation systems in geodesy/ K.M. Antonovich. - M: Kartgeocenter, 2005.T.1. – 334p.

3. Mirmakhmudov E.R. Preliminary analysis of the geodetic network of the Almalyk industrial zone / E.R. Mirmakhmudov, O. G. Yusupzhonov, B. Sh. Toshonov, D. O. Khasanbaeva // Scientific and technical journal. Science and education today. Moscow, 2020. №5(52). p.106-109.

4. Mirmakhmudov E.R. Reconnaissance of points of a geodetic network in the vicinity of Karshi / E.R.Mirmakhmudov, A.Egamberdiev, M.M. Aralov / Bulletin of Science. Collection of articles based on the materials of the II - International Scientific and Practical Conference. Ufa, January 5, 2021.p. 261-267.

5. Temporary instructions for the survey and restoration of points and signs of the state geodetic and leveling networks. M .: RIO VTS, 1970. – 23p.
6. Leveling instruction I, II, III, IV class. Moscow: Nedra, 1974.-160 p
7. Bolshakov V.D. The theory of mathematical processing of geodetic measurements / V.D.Bol'shakov, P.A. Gaidaev. – M.: Nedra,1977. – 368 p.
8. Girshberg M.A. Geodesy / M.A. Girshberg - M.: Science, 1967. T.1. – 384p.

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