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ASSESSMENT OF QUALITY OF PLANNING OF GEODESIC NETWORKS ON CONSTRUCTION SITES

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Annotation
This article describes the main stages of geodetic support of modern construction, the creation of planned geodetic networks at the construction site, as well as the design of planned geodetic networks, taking into account the construction costs.

Keywords: Triangulation, trilateration, polygonometry, linear-angular and construction networks, State geodetic networks, compaction networks.

Main Part

In the geodetic support of modern construction, the main stage is the work on the creation of planned geodetic networks at the construction site. Planned geodetic networks are designed taking into account the construction costs. Planned geodetic networks are constructed in the following ways: triangulation, trilateration, polygonometry, linear-angular and construction networks. The basis for their construction are the points of the state geodetic network. Many factors must be taken into account when building planned networks, such as the accuracy of the foundation, the speed of construction of the network, the maximum maintenance of points, low labor costs.

Each of the above methods has its own advantages and disadvantages. Prior to the construction of the construction master plan, it will be necessary to assess the quality of the nets.

A distinctive feature of modern industrial construction is the high degree of mechanization of construction and installation work, the use of advanced technologies, the use of accurate and efficient methods of planning and design. Carrying out construction work in a short time. These require the design and construction of alternative geodetic elevation networks to ensure the reliability of the methods. In modern construction, geodetic networks are divided into 2 types: geodetic foundation and geodetic planning networks.

he geodetic basis is created at the expense of the customer, search - design organizations. These networks serve for the implementation of topographic surveys in the construction areas, if there is a topographic plan, then they are used in the initial planning work for the relocation of buildings or structures. When accepting such networks from customers, geodetic specialists of construction organizations check the compliance of this network with the requirements of regulatory documents, ie the provision of construction. During construction, these networks can be rehabilitated and supplemented by surveyors from construction organizations.

heir accuracy is regulated by the requirements of QMQ 1.03.26 - 2004 "Geodetic works in construction". [3]

The second type of network is a separate building or group of them, which is similar in general design, will be needed to carry out the work of planning the main axes.

To carry out planning work, triangulation, trilatation, compaction of linear-angular networks is constructed in the form of polygonometry and theodalite path, among which the geodetic rectangle is the most convenient. Because this method saves time in the measurement work because the two opposites - aging angle and all sides are measured. In this method, it is also recommended to measure the obtuse angles of the rectangles close to the rhombus. In this case, the accuracy of detecting the other two acute angles is the same as the measurement obtained from the measurement. However, it is advisable to use a light meter when constructing planning nets from rectangles, but this is not always possible in construction conditions. With this in mind, it is convenient to build a geodetic network in the form of triangles, because it requires only a compressed roulette and a theodolite with an accuracy of 2``- 5`` to measure the base length.

Public geodetic networks, compaction networks from urban, rural and industrial construction networks are also used in planning works at the construction site as a planned and elevation geodetic basis.

At a scale of 1: 500, one point of class II-IV state networks corresponds to the norm of 20-30 km2. At the same time, in the construction of geodetic foundations of the planned height, the instructions of QMQ 1.02.17 - 09 should be taken into account, because modern large-scale industrial constructions are carried out in the sequence established in QMQ. Point centers are attached to the construction site. In the construction of large industrial facilities, base geodetic networks are built in several stages. The points of the upper level networks serve as the basis for the construction of the lower level networks. [3] [4]

The number of stages for non-standard constructions is determined by the ratio of the average quadratic error m_n/m_1 in the final and initial stages.

The accuracy reduction coefficient is determined in such a way that high discharge errors when balancing the networks should not adversely affect the measurement results in small discharge construction. The selected value level q is represented by the following inequality

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$P_F \geq (1-q)^2 P_{F_1}$, (1)

where P_{F_1}- depending on the effect of measurement errors of networks belonging to one discharge; P_F –is the weight of the function under consideration, based on the combined effect of the initial data and measurement errors; To determine P_{F_1} and P_F it is necessary to solve 2 systems of equations. The first system of equations was salted only to measure a network of a given discharge. The second is used to determine corrections to measurements for networks of both levels.

In the parametric equation method, the correction equation of the first and second systems has the following form

$V_1 = A_1 x + L_1;$

$V_1 = A_1 x + Ax + L_1;$ (2)

$V_1 = x;$

where V1, A1, V, A are the matrix of the vectors of the corrections in the measurement and the coefficients of the correction equations.

In the correlot method, a general conditional equation is formed to determine the inverse weights $^1/_{P_{F_1}}$ and $^1/_{P_F}$

$B_1 V_1 + BV + W = 0,$ (3)

where B_1 and B - are the matrices of the conditional equation of corrections for low and high discharge networks; W - unconnected.

Geodetic networks at construction sites can be free and non-free.

Sometimes, networks that are not connected to public networks are considered free networks, and networks that have such connections are considered non-free networks. Such a tariff is not always appropriate for planning networks. In such cases, a network with the coordinates of one of the points directly related to one directly measured side and the directional angle of one of the sides is considered a free network, and the coordinates of two arbitrary adjacent points may be given instead.

Networks with excess primary data are preferably referred to as non-free networks. The description of the proposed types of geodetic planning networks has a clear geometric meaning and equalizing computational properties.

Thus, networks with one group of starting points are called free networks, and networks with two or more groups of starting points are called non-free networks. Simple networks can include adjacent triangular and rectangular networks. Complex networks can include triangular and rectangular networks with intersecting sides.

It is known that in the alignment of free networks there can be only three basic types of conditional equations: figure, horizon and side, in non-free networks, in addition to the above, bases, steering angle - azimuths and coordinate conditional equations can be added.

Geodetic planning networks are often free because the relative position of the axes is more accurately determined when planning a building than when determining the position of the axes of two adjacent buildings, because they are not structurally and technologically related to each other.

Carcass height grids will be built on II and III class leveling. The carcass network is aligned by the node method using the sequential approach method. The weight for each path is assumed to be $P_i = 1/L_i$, and the weight values are determined by the following formula

$$P_l^0 = {P_i}/{\sum_1^n P_i}, \qquad (4)$$

Height planning networks are constructed by means of separate level roads, based on the points of carcass networks. Planning networks were built near the facilities under construction, resulting in the formation of construction network rappers. The robustness of the planning network markers is controlled by the frame network rappers. Height planning networks are constructed by class IV geometric leveling.

The leveling path should not exceed the allowable binding value of $20\sqrt{L}$ mm. The permissible deviations are based on δ_1 and δ_2 to assess the accuracy of the sign being detected. They describe the point transmission errors in height construction. Assuming that the reliability probability is equal to the value of P, we find the standard deviation of the measurement at one station with the following inequalities:

$$\mu \le \delta_1\sqrt{\rho_1}/t\ ;\ \mu \le \delta_1\sqrt{\rho_2}/t \qquad (5)$$

Local planning networks require taking into account the specifics of the structures under construction, the topographic, hydrogeological conditions of the construction site.

The local planning network will be built with high accuracy relative to the geodetic base points. Such network points, as a rule, fix the auxiliary planning lines of the structure, the storks of the main and main axes. Local planning networks are characterized by non-standard construction in the form of a free network.

Geodetic construction nets are constructed on construction sites in different geometric shapes and with different accuracy depending on the construction conditions. It is advisable to create construction networks only in areas where important structures are being built. In industrial construction, the relative positioning errors of adjacent points can be as accurate as 1: 10,000 [3].

Construction nets allow to plan the axes without spending extra material and time, to carry out geodetic works during the construction of structures and surveys at any time of construction.

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