Ways to Solve Problems in the Field of Land Relations at The Present Stage

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Abstract. This study examines the problems of geodetic support of cadastral works in terms of inaccuracies in determining the coordinates of land boundaries. The problems of the geodesic industry as a whole are also considered, in particular, in the section of engineering and geodetic surveys of the Voronezh region there are many flaws, contradictions, and shortcomings. In this paper, all these negative phenomena will be revealed, the causes will be identified, and a solution to these problems will be proposed. The paper reveals the concept of "infrastructure of geodetic works". The analysis of the current state of the infrastructure of geodetic works on the territory of the Voronezh region of the Russian Federation is performed. A regional program for reconstruction and improvement of the quality of coordinate descriptions of points in geodetic networks of the Voronezh region was proposed and developed. Conclusions are drawn and suggestions are given for the success of the reconstruction of the infrastructure of geodetic works in the Voronezh region.

1. Introduction
The economy is the Foundation of any society. With a developed economy, all spheres of public life will develop successfully to one degree or another. Each industry is an essential part of the economy. If there are gaps or contradictions in one of these parts, then the entire economic system will feel uncomfortable. Land resources and the relations arising from their use are the most important link in the economic sector. Throughout the history of Russia's development and formation, land relations have played a key role in the economic and social development of society. Today, land is an object of property and is often a source of disputes and misunderstandings. One of the reasons for problems with land plots is inconsistencies in determining the coordinates of land boundaries. This section of land relations refers to cadastral activities, or rather to geodesy, which currently has a large range of modern measuring tools and technologies that allow you to determine coordinates with high accuracy.

But often the problem is not in the accuracy of the devices, but in the system of errors that exist (densely embedded) in the relevant industry, which are not so easy to solve.

Cadastral activity and geodetic works related to it are also separated into a separate branch. Geodetic works in the implementation of cadastral activities are reduced to obtaining the coordinates of points that characterize the parameters of the property.

The purpose of the study is to identify the causes of inaccurate determination of land boundaries and consider ways to solve problems in this situation.
2. Research material and methods

One of the reasons for the discrepancy in determining the coordinates of land boundaries is the existence of different coordinate systems. For maintaining the Unified state register of real estate, local coordinate systems established for cadastral districts are used with the parameters of transition to the unified state coordinate system defined for them. [1]

On the territory of many regions of the Russian Federation, only the local MSK-N coordinate system is used for cadastral activities, where N is the region number. Until about 2007, the Voronezh city district used the local coordinate system for the city of Voronezh. Topographical tablets were also kept in it. Then the city cadastral database was converted into a common MSK-36 for the region. For engineering and geodetic surveys, MSK-36 is also mainly used. However, in some cases, work is carried out in local coordinate systems and even less often in state ones. In fact, state, local and local coordinate systems operate on the territory of the Voronezh region. Thus, different coordinate systems are used on the territory of the Voronezh region.

According to paragraph 1 of article 6 [2] "the Geodetic basis of the Unified state register of real estate (further - the geodetic framework) are the state geodetic network and geodetic networks of special purpose, created in accordance with the law on geodesy and cartography (further - the reference boundary networks)". To carry out cadastral activities on the territory of the Voronezh region, a reference and boundary network has been developed.

With the development of satellite positioning technologies and the urgent need of the economy for such technologies in the Voronezh region, special – purpose networks-networks of reference base stations-began to be created. "Network of reference stations – a set of permanent satellite (GNSS) reference stations installed on the ground according to a certain scheme, the relative position of which is determined in a single coordinate system, United by communication channels for collecting and processing satellite data in a single center, so that it would ensure the measurement and determination of the spatial location of objects over a vast area with the same accuracy and in a single reference system of time and space." [3]

On the territory of the Voronezh region, there are networks of GEOSTROIZYSKANIYA LLC, hive system, HxGN SmartNet Russia, EFT-CORS, and others. In 2002, land reform began. It was associated with the creation of a register of all real estate objects, their qualitative and quantitative accounting, including a coordinate description. For cadastral registration, it was necessary to develop a survey justification that meets the quality requirements and is adapted to work with all types of geodetic equipment available at that time. For this purpose, the reference and boundary network was developed. At least two localities were established in each locality of the Voronezh region. Today it is the most developed and accessible geodetic network in the Voronezh region. However, some MLA items do not have a third dimension – height. The quality of bookmarks relative to state points also varies from satisfactory to completely unacceptable.

Due to the fact that engineering and geodetic surveys in the vast majority of cases are carried out in msk36, which maintains cadastral records, other local and local coordinate systems, their reference points and materials have lost their relevance. However, it should be noted that topographic plans created in these coordinate systems are still used, since they display up-to-date information on underground communications. Moreover, these engineering and topographic plans in some cases are the only source of information about the passage and characteristics of underground engineering structures. For this reason, there is a need for inventory, linking in the coordinate system in which engineering surveys are currently conducted, points created in local and local coordinate systems.

Conclusion: it is necessary to make an inventory of existing polygonometry networks. After that, it is necessary to link these networks with the state coordinate system and with the system in which engineering and geodetic surveys are conducted.

What to do with the GGS items required for production? Currently, information about such points has been transferred from the Federal register To the Federal state budgetary institution "center for geodesy, cartography and IPD" as the holder of the Federal spatial data Fund. There they are issued for a fee. Cadastral registration on the territory of the Voronezh region is conducted in the coordinate
system MSK 36. Cadastral activities will not be carried out in the state coordinate system of GSK 2011 until a special decision is made at the Federal level. According to paragraph 2 of article 6 [2], "for maintaining the Unified state register of real estate, local coordinate systems established for cadastral districts are used with the parameters of transition to the unified state coordinate system defined for them....» [2].

Engineering surveys are linked to the coordinate system in which cadastral records are kept. This is an immutable rule, since the survey customer—the designer uses the topographic plan and cadastral data as the source data created in a single coordinate space. Therefore, the prospector needs information about GSK points in MSK36. And this will be relevant as long as the inventory is maintained in Moscow time. 36 At the same time, there is a known problem with the quality of the coordinate description of GGS points in MSK36. This description needs to be corrected. However, the cadastral database was created on the basis of the GGS network and "absorbed" all the errors of the geodetic basis. And if you re-level the GGS network in msk36, this will not have a positive effect, since cadastral data will not be re-aligned. Therefore, "work on errors" must be carried out in a comprehensive manner. It does not make sense to expect the organization of work on correcting cadastral data and the GGS network at the Federal level. Such work should be launched at the regional level at the expense of the regional budget. There are several ways to solve the problem of cadastral data quality. A lot of research can be devoted to this.

The normative concept of "infrastructure of geodetic works" currently does not exist. However, it is necessary to introduce such a concept, since in fact this economic and legal entity exists. Moreover, the components of this phenomenon are inextricably linked with each other and cannot be considered separately if we are talking about solving a global problem. This paper deals with the solution of the global problem within the region.

So, what is "infrastructure"? In the explanatory dictionary this concept is interpreted as follows: "capital equipment used to provide publicly accessible services, including transport and telecommunications, gas, electricity and water supply. They provide the necessary basis for other economic activities in modern countries; their absence or unreliability .... they are a hindrance to their development. Infrastructure services are usually either provided or regulated by the state" [4]. Or: "Infrastructure - a complex of interconnected service structures that make up and / or provide the basis for solving a problem (task)." [5].

In order to analyze the components of the "geodetic infrastructure", it is necessary to give its definition, which formulates its main purpose.

"Infrastructure of geodetic works" is a set of industries, enterprises, regulatory and scientific bases, equipment and technologies, special objects, engineering structures designed to provide high-quality geodetic services. For most people, the term "geodetic services" is incomprehensible. Even in more specialized institutions that are related to construction, land management, environmental management, planning, not everyone understands what "geodetic works" are and why they are needed. In the monograph "Economics of geodetic production "[6], the authors formulated the classification of geodetic works:

- Basic geodetic works.
- Urban geodetic works.
- Geodetic works in land management design.
- Geodetic works during the Assembly and installation of space modules.
- Geodetic works for forest management.
- Geodetic works in the production of engineering and geodetic surveys.
- Geodetic works for geological exploration.
- Geodetic works in residential and industrial construction.
- Geodetic works for the needs of the country's defense.
As can be seen from this list, geodetic works permeate a large number of branches of economic activity. But we will return to the correlation of geodetic works with other branches of the economy a little later. And now we will formulate the components of the "geodetic infrastructure".

The current state should be studied in the context of the components of the infrastructure of geodetic works. These include:

1. Scientific and technological basis of geodetic works;
2. Legal framework for geodetic works [1, 2, 7-21];
3. Regulators of geodetic works on the territory of the Voronezh region;
4. The coordinate system used in the Voronezh region;
5. Geodetic network on the territory of the Voronezh region;
6. Geodesic professional production community of the Voronezh region.

3. Research result
To solve the above-mentioned problems, at the first stage, it is necessary to develop a regional program for the reconstruction and improvement of the quality of coordinate descriptions of points of geodetic networks in the Voronezh region. The General structure is shown below.

The goals of such programs are:
1. Improving the quality of the coordinate describing points of geodetic networks for engineering surveys on the territory of the Voronezh region
2. Evenly distribute quality coordinate describing points of geodesic network on the territory of Voronezh region;
3. The establishment of a unified geodetic network, including SGN, CBOs, polygonometrii, reference base stations;
4. Development and registration of networks of reference base stations.

Tasks of regional programs for the development of geodetic networks in the Voronezh region:
1. Identify the quality parameters of the coordinate description of each component of the geodetic network on the territory of the Voronezh region;
2. Determine the necessary density of points in the geodetic network;
3. Work on re-equalizing points of the GGS in the coordinate system in which cadastral records are kept;
4. Work on equalizing polygonometry and MHI networks based on equalized points of the GGS;
5. Develop rules and conditions for interaction with owners or managers of reference base station networks;
6. Create catalogs of points of the unified geodetic network on the territory of the Voronezh region;
7. Develop rules and conditions for the use of such networks by applicants.

Reconstruction of geodetic networks in order to obtain a monolithic system on the territory of the Voronezh region is an important task. Without solving the problems of the geodetic basis, it does not make sense to deal with the infrastructure of geodetic works.

4. Conclusions
As a result of studying the process of engineering and geodetic surveys on the territory of the Voronezh region, a number of problems were identified:
1. Increasing Complexity of legal requirements in terms of staffing specialists, which leads to the withdrawal of small businesses from the market;
2. A Deep contradiction between the requirements of modern legislation and the existing system of receiving, storing and issuing engineering survey materials in the Voronezh region;
3. The Absence of a single coordinate space for placing objects taken in the course of engineering and geodetic surveys on the ground in it;
4. There is an Urgent need for an open, informational resource containing up-to-date information about points that are the basis for geodetic works;
5. The need to conduct an inventory of existing polygonometry networks created during engineering and geodetic surveys in the Voronezh region. After that, it is necessary to link these networks with the state coordinate system and with the system in which engineering and geodetic surveys are conducted;
6. Unstable quality of coordinate and altitude descriptions of points of geodetic networks used for engineering and geodetic surveys;
7. The need to transition to new technologies related to GIS systems;
8. The Secrecy of the problems of engineering and geodetic surveys and the related non-obvious problems for government agencies.

Reconstruction of the infrastructure of geodetic works on the territory of the Voronezh region is extremely necessary. Delaying the solution of problems related to contradictions in the organizational, regulatory and technical components of the infrastructure will lead to a further increase in errors. Currently, the set of problems and errors created is so complex and multi-layered that it is already a very difficult task to sort it out. After all, to solve these problems, it is necessary to involve power structures, allocate a considerable budget, redistribute the Fund's materials, negotiate with disparate Fund holders, and work with the professional community.

At the moment, there are no visible problems that cannot be solved without violating the current legislation. Creating a centralized system for providing and monitoring geodetic works in the Voronezh region is the only way to systematically and effectively solve the problems that have accumulated over several decades.

The most important key to the success of the reconstruction of the infrastructure of geodetic works in the Voronezh region are:
1. The Body or organization that actively promotes this idea;
2. Understanding and supporting the authorities.

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