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O'zbekiston" bog'i barpo qilish loyahasini tashkil etish uchun ob'yektning jami 38,0 gektar yer maydoni bo'lib, shundan; 32,11 gektar suvli, 4,99 gektar ko'p yillik daraxtzorlar, 0,90 gektar boshqa yerlarni maydoni kelajakda foydalanish maqsadiga ko'ra qishloq xo'jaligiga mo'ljallangan (yoki o'rmon fondi) yerlari toifasidan yer fondining sanoat, transport, aloqa, mudofaa va boshqa maqsadlarga mo'ljallangan yerlar toifasiga o'zgartirish belgilandi.

Tanlangan yer maydonida dam olish va hordiq chiqarish, sport bilan shug'ullanish joylari va yo'laklar, amfiteatr, sun'iy ko'l havzasi, avtoturargohlar hamda mavzuli hududlar, shu jumladan,

kashtan, eman, chinor, lola va nastarin bog'lari, noyob manzarali va qimmatbaho daraxtlar, butalar va gullardan iborat dam olish maskanlari barpo etish rejalashtirilgan (3-rasm).

**Xulosa** qilib aytganda, istirohat bog'larini tashkil etish, aholi punktlarini ko'kalamzorlashtirish va obodonlashtirish tadbirlarini amalga oshirib biz nafaqat atrof muhitni ifloslanishning oldini olamiz, balki biologik xilma-xillikni saqlash, cho'llanishning oldini olishga va kelajak avlodlarning ham salomatligiga zamin yaratamiz. Respublikamizda keyingi yillarda amalga oshirilayotgan islohotlar asosan xalqimiz turmush darajasini yaxshilashga, farovonligini oshirishga qaratilgandir.

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## ON THE NEED FOR INTRODUCING A THREE-DIMENSIONAL CADASTRE OF BUILDINGS AND STRUCTURES IN THE REPUBLIC OF UZBEKISTAN

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**Abstract.** This article highlights the need to maintain a state cadastre of buildings and structures in three dimensions, as well as the shortcomings of traditional cadastre maintenance and the advantages of the proposed three-dimensional cadastre. In particular, the reasons for the emergence of such a need are given and it is indicated that a three-dimensional cadastre not only improves the accounting of objects of the state cadastre of buildings and structures, but also serves the development of regions.

**Keywords:** three-dimensional cadastre, cadastre of buildings and structures, registration, real estate objects, 2D cadastre.

**Annotatsiya.** Ushbu maqolada bino va inshootlar davlat kadastrini uch o'lchamli shaklda yuritish zaruriyati hamda an'anaviy tarzda yuritilayotgan kadastrning kamchiliklari va taklif etilayotgan uch o'lchamli kadastrning afzalliklari yoritilgan. Jumladan, bunday zaruriyat paydo bo'lishi sabablari keltirilgan hamda uch o'lchamli kadastr nafaqat bino va inshootlar davlat kadastrining ob'yektlarini hisobga olishni takomillashtirish, balki hududlarni rivojlantirish uchun ham xizmat qilishi bayon etilgan.

**Kalit so'zlar.** uch o'lchamli kadastr, binolar va inshootlar kadastr, royxatga olish, ko'chmas mulk obyektlari, ikki o'lchamli kadastr.

**Аннотация.** В данной статье освещена необходимость ведения государственного кадастра зданий и сооружений в трехмерном виде, а также недостатки традиционно ведения кадастра и преимущества предлагаемого трехмерного кадастра. В частности, приведены причины возникновения такой необходимости и указано, что трехмерный кадастр не только улучшает учет объектов государственного кадастра зданий и сооружений, но и служит развитию регионов.

**Ключевые слова:** трехмерный кадастр, кадастр зданий и сооружений, регистрация, объекты недвижимости, 2D кадастр.

**Introduction.** Currently, in the Republic of Uzbekistan, the cadastre of buildings and structures is conducted to ensure the effective use and protection of buildings and structures, the rights of owners and other users of these objects, as well as state registration of ownership and other property rights to buildings and structures in two-dimensional form.

As stated in Appendix to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated June 22, 2021, No. 389, "Extent of Rights," point 26 specifies that architectural and construction drawings of buildings and structures are prepared with minimal detail, omitting unnecessary elaboration.

A plan of the building's interior is drawn. If the building consists of several floors, in this case plans of all floors, including the basement, are drawn. Building floor plans are drawn at a scale of 1:100 or 1:200 and given names (for example, "1st floor plan", "2nd floor plan", "Basement plan"). Designs of underground structures (pipes used for various purposes, electrical and communication lines, structures related to mining, etc.) are recorded in the cadastral register using data from project estimates or the state cadastre of these buildings. [4]

**Materials and methods.** The location of land plots is fixed by registering in the cadastre the values of rectangular coordinates X and Y or geodetic coordinates B and L, which denote the rotation of plot boundaries. This ensures precise positioning of the plots on the ground, accounting for their area, configuration, and orientation relative to neighboring plots. In practice, the boundaries of real estate objects are determined by their projection onto a hypothetical level surface (horizontal plane).

However, this method has several drawbacks. It fails to account for multi-level structures such as road interchanges — bridges, tunnels, and metro systems — as well as unconventional architectural forms with cantilevered floors and basement areas (workshops and garages). Consequently, there is a need to develop and implement three-dimensional representation of the land surface and the objects situated upon it. This could significantly enhance the capabilities of more precise and visual

cadastral accounting, mechanisms for ensuring property rights, as well as planning and design processes.

The dense urban development, particularly in business districts, has led to the interweaving and overlap of structures. Establishing property rights amidst these complexities, describing and depicting them in the cadastral registration of buildings and facilities, introduces uncertainties. The challenge lies in how to register duplications and building blockages in the cadastral registration system, which currently records information in 2D.

**Results and discussion.** Since the two-dimensional cadastre inadequately reflects the actual condition of property on the ground, real estate objects may be situated above, below, or directly on the surface of a single land plot. In practice, this circumstance leads to uncertainty and ambiguity in the traditional (two-dimensional) registration of objects based on their 2D projection onto the land plot.

For example, this (Fig. 1), residential complexes; (Fig. 2), various underground structures, for example metro, underground communications; (Fig. 3), unique structures (Fig. 4), etc.

This issue has recently arisen as to whether cadastral registration should be conducted in the third dimension. The reasons for posing this question include:

- Not only the aforementioned shortcomings but also the large-scale redevelopment of the capital, regional and district centers, and other major cities, along with residential construction.

- Significant increase in real estate objects and private ownership.

- Consequently, active construction of tunnels, pipelines (water, electricity, sewage, telephone, TV cables), underground parking lots, shopping centers, buildings above roadways, and railways.

- Anticipated transition to 3D in other fields of activity.

- Attics in buildings often accommodate attic floors—spaces equipped with walls and ceilings within the attic, with an area of not less than half the floor area, and wall heights to the bottom of the sloped ceiling part, maintaining a proportional area ratio of at least 1.6 meters.



Fig. 1. Residential complexes

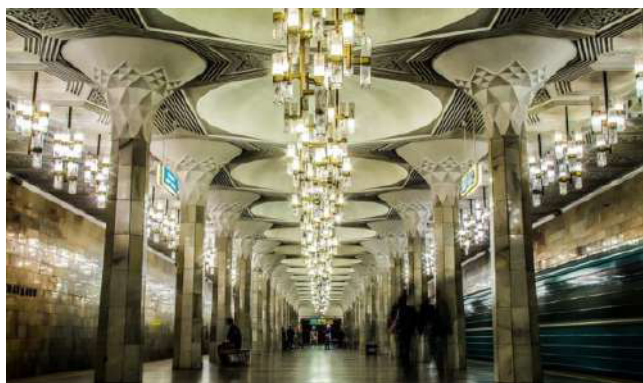


Fig. 2. Underground structures



Fig. 3. Unique constructions

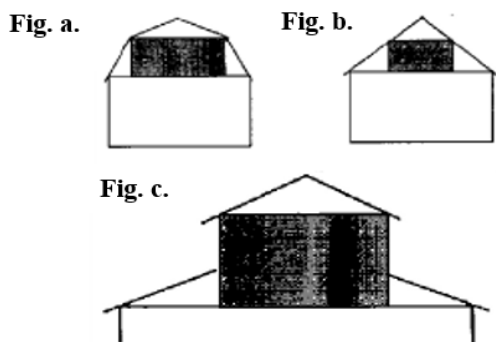


Fig. 4. Attic space

It is known that if a room on such a floor is integrated within the dimensions of an attic formed by a broken roofline (Figure, a), it is referred to as a mansard. When the roof pitch direction remains unchanged (Figure, b), the space is called a skylight. Sometimes, a structure with its own roof is built above the house roof, known as a mezzanine (Figure, c). Often, an extension is appended to the main structure—a part of the building auxiliary to the main structure and sharing one (or more) common load-bearing walls with it.

The solution to the cadastral registration issues of such objects and structures could involve the implementation of a three-dimensional real estate cadastre in Uzbekistan. Three-dimensional mapping of the land surface and the objects situated on it could facilitate informed decision-making in urban planning and design, create favorable conditions for investment, introduce new working formats for developers, and enhance rights guarantees of the property owners.

**Conclusions.** The effective solution to the aforementioned shortcomings involves the use of modern technology such as laser scanning of capital construction objects, which results in highly precise and detailed three-dimensional visual models of real estate objects [1, 2]. Furthermore, considering the experience of establishing three-dimensional cadastral systems in European countries, in the design of buildings or structures

(future cadastre objects) where automated three-dimensional design systems are widely utilized, it can be anticipated that geographic information systems (GIS) will form the foundation for the three-dimensional cadastre.

Establishing the instrumental foundation for maintaining a three-dimensional cadastre will enable the search and retrieval of reliable information about real estate objects, ensuring high-quality, comprehensive visualization and spatial (geographical) analysis. Moreover, it will help address a broad spectrum of tasks associated with urban development planning [3].

The significance of this problem lies in the inadequacy of the two-dimensional cadastre to meet modern requirements. Considering international experience and the available human resources in the Republic, it is evident that there is not only a necessity but also an opportunity to transition to a more effective three-dimensional cadastre of buildings and structures.

In this regard, we fully agree with the views of scholars in this field that transitioning to a three-dimensional cadastre of real estate objects will contribute not only to the improvement of cadastral accounting and registration of objects but also to solving issues related to urban planning, urban area beautification, promoting investment construction, ensuring environmental and sanitary-epidemiological safety, and other challenges associated with the development of modern urban areas [5].

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