

Characteristics and problems of the standardization of urban design in the development of urban underground space

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Abstract. The current situation and national features of technical regulation (standardization) of preparation of planning solutions for the development of urban underground space are considered. The article describes the history of the issue and examines the wording of the draft Code of rules "buildings, structures and complexes underground. Rules of town-planning design". The purpose of the analysis was to assess the effectiveness of the draft Code of rules, identifying the problems of standardization at the planning level. The analysis was carried out in conjunction with the directions of improving legal regulation. It is concluded that before the removal of legal barriers, the approval of the draft Code of rules is premature. The results of the analytical stage showed the presence of system defects of standardization for this urban level and identified their causes. On this basis, General proposals for the elimination of such defects are given and the specifics of finalizing the draft Code of rules are proposed. These recommendations can be useful for the developer, the state customer, the executor of the draft Code of rules, as well as for representatives of the expert community.

1 Introduction

The growth of urbanization and its increasing importance required the inclusion of the theme of urban development in the global target agenda with a focus on ensuring the security, resilience and sustainability of cities, including by ensuring the spatial compactness of their development [1]. To achieve this goal, the vector of development of the urban underground subsurface space (hereinafter also – US) fully corresponds. This is proved by the practice of large cities in a number of countries (Canada, China, USA, Finland, Singapore, etc.), which demonstrates an adequate system of spatial development management.

Moscow and other major Russian cities have some groundwork in the field of urban use of US, accumulated, including in the Soviet period. However, in recent years, they have significantly lagged behind in the scale, intensity, technological level and complexity of the development of US, continuing the practice of "loosening" the space of their territory. This

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is largely due to the imperfection of the system of public administration in the field of activity, including subsystems of its legal and regulatory technical support.

At the same time, it is known that the block of technical regulation (standardization), ensuring, first of all, the safety and quality of products or the corresponding processes of its production, in market conditions is one of the most important components of the effectiveness of the functioning of the public administration system. In the sphere of implementation of urban development activities, this block is characterized by such features as internal complexity and uniqueness, piece-by-piece nature of capital construction objects (hereinafter also – CCO) as such, an increased level of their responsibility (risk). The processes of creation (engineering surveys, design, construction) and operation of CCO are also characterized by specificity. The scale of these features increases when it comes to the creation of underground buildings and structures (hereinafter also - the UBS), through which the development of US is carried out. Such underground objects and especially their complexes are often referred to as particularly dangerous, technically complex and unique objects [2, 3], their service life is usually higher than that of other UBS.

Even more specific is the system of standardization in relation to the planning ("town-planning") level of spatial development of the city, when the object of "normalization" is not just the UBS, but the model of urban development, and the aspect of standardization can not be limited to purely technical standards, requiring at least a reflection of the social context.

The universal requirement for the preparation of documents on standardization is their subordination to normative legal acts (hereinafter also - NLA). Despite the evidence, this requirement is not always met in Russian practice. A good example of this is the development of a Code of rules "Buildings, structures and complexes underground. Rules of town-planning design", the project of which is studied in detail in this article (hereinafter also - the draft Code of rules). In addition, some documents on standardization in one way or another affecting the development of US are considered. The relevance of this study is associated with the above-mentioned features of standardization in relation to the development of urban US, and especially to the planning aspects of such development considered in the article.

2 Materials and methods

The assessment of the state of affairs in the sphere of technical regulation (standardization) of urban US development with the analysis of negative trends is considered on the example of the preparation of the above-mentioned draft Code of rules. The history of the issue is considered. Assessment of compliance of the project with CR requirements of Federal law and state technical task of the customer, evaluation of the effectiveness of the project CR (terminology, completeness, consistency and adequacy of the parameterization requirements, lack of duplication and conflicts with other CR "adjacent" character, the degree of orientation to innovations and best world practices). According to the results of analytical estimates and also with the practice of expert activities of the author of this article, the Subcommittee 9 "urban development" Technical Committee 465 "Construction" of the Federal Agency for technical regulation and Metrology of relevant proposals for the improvement of standardization in the field of urban planning. In the context of the analysis of the CR project, the subject NLA and national documents on standardization are considered, as well as the review of individual methodological documents and results of research works is performed.

3 Results and discussion

To the period of formation of domestic underground urbanism should be attributed to the 70s of the last century. Rationing in the system of urban planning in the era of planned socialist development of the economy was carried out not only as part of the construction rules and regulations (hereinafter also - CRR), adopted by the branch state Executive authority and having a mandatory nature. It was also implemented as part of the territorial building codes. Relevant methodological documents were also significant and could also be adopted at the regional level.

In particular, the Executive authority of the city of Moscow in 1978 approved Recommendations for the use of underground space in Moscow. They were based on the decisions of the Scheme of organization and use of the underground space of the city of Moscow, approved on 07.04.1975 (The document was marked "for official use" and was not published). The scheme in turn developed the corresponding decisions of the approved General plan of the city. It is crucial that the Recommendations of a systemic nature, was preceded by a special supporting scientific research (leader: Misharin, S. D., Becker, A., Kammerer, Y. Y.) and the experimental design. It is also important that the main provisions of the Recommendations were supported by the requirements of a number of Moscow city building standards (MBS), which had the nature of mandatory application.

Almost simultaneously and with the participation of the authors of the Moscow Recommendations under the leadership Of G. E. Golubev, the preparation of the Manual [4] was conducted, as a similar document in content, but also related to other cities of the country. The guide developed some of the subject provisions of the CRR, in particular the head of CRR II-60-75 "Planning and development of cities, towns and rural settlements". It was intended to "at least partially fill the lack of normative and methodological documents in the field of integrated use of underground space" (Later, the Manual was reworked into a "Guide to the complex development of underground space in large cities" [5]. It formed the basis of the studied draft Code of rules).

In the following years of political and economic perestroika, the deficit of normative and technical regulation in terms of urban development of the US was observed in [4]. Moreover, during the reform of the system of technical regulation, the regions lost the right to adopt their own territorial building standards [3]. In particular, the MBS was de jure abolished.

At the same time, there was no adequate substantive replacement of regional normative technical documents (hereinafter also - NTD) at the Federal level. This fact was confirmed in the course of our monitoring of the relevant NTDs (the main national standards and Codes of rules for both mandatory and voluntary application). The emphasis was on the position analysis of the complexity (integrity) of the US development and research unit "urban development" with the highest managerial (regulatory) potential (Paradoxically, the Ministry of construction of the Russian Federation (hereinafter also referred to as the Ministry of construction) does not pay much attention to this planning ("urban planning") level of standardization, which has the above features. In this regard, sub-Committee 9 "urban development" in the summer of 2019 sent its proposals to the leadership of the Ministry of construction. In particular, they suggest using the format of not only Codes of rules for this level, but also state standards, which expands the range of regulatory possibilities and is more in line with world practice. A radical organizational solution, in our opinion, is to form a special Technical Committee "town planning", similar in status to the Technical Committee 465 "Construction"). The monitoring was carried out in 2017 as part of a research project commissioned by the Federal center for standardization, standardization and technical conformity assessment in construction subordinate to the Ministry of construction (hereinafter also-the Federal center for standardization).

The analysis made it possible to draw the following conclusions:

1. In Russia, there is no single NTD that normalizes the complex urban development of US.
2. Existing NTD basically normalizes the design and construction of separately located objects without their mutual linkage when they are placed in a single space of space and planning.
3. Gaps and conflicts in the NTD cause the need to develop special technical conditions for the implementation of the design of the CCD, which requires additional financial resources and time.
4. The existing regulatory technical base in Russia in the field of development and use of US is largely conceptually outdated and does not meet modern needs in the use of US.

As a way out of the situation, we proposed a purposeful and systematic development of the regulatory technical base by developing a basic NTD that regulates the integrated urban development of US, and developing a Code of interconnected special NTDS or additional sections of existing NTDs. The corresponding lists of new documents were justified. The structure of the basic NTD – Code of rules "Complex urban development of underground space" was proposed. The main provisions", as well as a list of research projects, the implementation of which is necessary to justify the development of specific requirements of the proposed NTD.

Unfortunately, the topics of the proposed works were not included by the Federal center for standardization in the relevant plans of the Ministry of construction in 2018 or 2019. At the same time, in the plan for 2019 there was a development of another document - the CR project considered below with the original name "Urban planning. Planning and development of underground space". At the same time, the required approval of the draft plan in this part of the Subcommittee 9 "urban planning" was not carried out.

The first edition of the draft Code of rules, in fact, was largely a copy of the Manual [5] without the necessary consideration of the other status of the document and significant changes in the field of legal regulation. This caused numerous comments from participants in the public discussion of the draft Code of rules. The principal comments of the author of this article concerned many problematic issues. Among them: disordered structure of the document and terminology, contradictions to the legislation, non-compliance with the requirements of the technical specification of the state customer (hereinafter also - TS) and the provisions of the explanatory note, the absence (weak validity) of the relevant requirements and normalized indicators (criteria, parameters, indices), insufficient accounting of world practice, etc.

Unfortunately, many of these issues have remained to the second edition of the draft Code of rules, despite a number of workshops held by the state customer and the contractor. In addition, they were recorded in the expert opinion (review) of the author of this article (hereinafter also-Review) and the need to take them into account was reflected in the agreed Protocol decision of the meeting of the Subcommittee 9 "urban development" from 28.11.2019. The degree of consideration of these problematic groups of issues in relation to the final version of the draft code of rules (hereinafter also CR), sent to the Ministry of construction as the developer for approval, is analyzed below.

Name of the CR project ("Buildings, structures and complexes underground. Rules of urban design") corresponds to one of the three compromise options proposed in the above Review (The need to find a compromise was determined by the fact that the customer and the developer, recognizing the problematic nature of the CR project, insisted on its adoption, assuming its early processing after changes in legislation (see below)). It is important that at least in the name in the end it is fixed that the composition of underground facilities includes buildings, which is more in line with the legislation on technical regulation [3]. At the same time, the second part of the name proposed in the Review ("Rules of placement and design") was replaced by the sentence "Rules of urban design",

which includes a term that is not present in [2]. This also already Codes a conflict with the structure and composition of the CR project. They are much wider than the scope of the concept of "urban planning", which usually includes only the preparation of documents of territorial planning, urban zoning and documentation on the planning of the territory (This interpretation is given, for example, in the Law of the city of Moscow from 25.06.2008 N 28 "Urban planning code of the city of Moscow").

It is desirable to specify the scope of the joint venture, to limit it to the level of a large and largest city (city district), for which the issues under consideration are most relevant. Requirements concerning the level of the region and the municipal district should be excluded, including to reduce the risk of difficulties in interdepartmental coordination with the Federal Ministry of economic development, which is responsible for territorial planning (such coordination according to the legislation in this case is mandatory) (The level of such risks is even higher with the same agreement with the Federal Ministry of natural resources, which is responsible for the rational use and protection of the subsoil, including the underground space of the subsoil (see below)).

The structure of the CR project does not fully comply with the TS. In turn, it is fair to note that the inclusion in the TS of questions on the construction, operation and liquidation of underground facilities in the context of the name of the CR project and its application does not seem logical (The term "planning and development (cities)" since Soviet times actually meant "urban planning". Currently, this is confirmed, for example, by the content of the standard of professional activity "urban Planner» (http://www.consultant.ru/document/cons_doc_LAW_196498/)). In the Review, the author proposed a "compromise" version of the structure, which in particular provided for:

- delineation of requirements for zoning of US, formation of US and development of multifunctional US;
- transfer (after differentiation) of the corresponding requirements to the new section "conditions of placement of gas stations and complexes".

In the part concerning terms and definitions, a number of inconsistencies with the legislation (urban Planning, Land and Civil Code of the Russian Federation and other Federal laws) were revealed. So in the definition of the term "underground space" does not take into account that according to the law on subsoil US is an integral part of the subsoil [6] and that it can also include the soil. For example, according to the law of the city of Moscow on urban soils, the power of their layer is 1m (<http://www.consultant.ru/cons/cgi/online.cgi?from=83676-0&rnd=254571672FB9A266863C5F846244113E&req=doc&base=MLAW&n=191486&REFDOC=83676&REFBASE=MLAW#2q95ke6wieg>), this makes it possible to use them in order to create such ACS as main gas pipelines and linear-cable structures. It should also be taken into account that according to [7] you can use not the "underground space" itself, but only an individually defined immovable thing that has been put on the state cadastral register and has passed the state registration of rights (land plot, subsoil plot, building, construction) (In this case, when forming an open-source ACS, there is a question about the formation of a land plot [2,8], and when forming a closed - source ACS, there is a question about the formation of a subsoil plot [6]).

In addition, in the definition of US, the range of its possible use is narrowed. Taking into account the declarations stated in the explanatory note to the CR project, it is necessary to take into account that the US in the world practice (for example, the "Deep city" model) is a resource and other services (geo-energy, geo-materials, underground water, etc.), and these services are implemented in the framework of urban development [9].

In addition, it is necessary to provide definitions of the main terms used in the text of the CR project ("objects of underground space", "development of underground space", "structure of underground space", "planning structure of underground space", "complex

development of underground space", "reuse of underground space", etc.), ensuring their uniformity. The term "underground space" in the text of the joint venture should be used in the singular.

Based on the legislative requirements [3,7] it is expedient to disclose such concepts as "underground building", "part of an underground building", "buried building", "buried structure", and also in the text to give the corresponding requirements for them. At the same time, it is necessary to exclude terms that are not used further in the text of the draft CR, as well as to exclude conflicts in the further application of terms in the text.

The performer committed a number of violations of the General rules of division of concepts and other requirements of formal logic. So often there are signs that are not disclosed in the standard, that is, need additional fixing. It is a mistake that the concept of the term "underground space" in the text is replaced by a different content (the US is not understood as "space", but "underground structures", for example, when it comes to "formation of the US").

The requirements of the section "General provisions" should be differentiated in accordance with the structure of the joint venture proposed in the Review. At the same time, it is extremely important to understand that according to the legislation [3], as well as the standard [10] and the TS, any joint venture should establish not legal, but technical standards. They, in turn, can not contradict the law. In other words, this and other sections should exclude numerous requirements relating to relations that are not regulated by law and contradict it. These include, for example, requirements aimed at ensuring the "comfort of the urban environment", including through the application of standards of urban design (Until the above-mentioned proposals are taken into account and implemented in the report of sub-Committee 9, standardization of the sphere of "urban planning" is subject to strict universal requirements of the legislation on technical regulation, when conformity assessment is carried out to ensure a purely "construction", "technical" safety [3]), as well as provisions that are not subject to technical and legal regulation.

This fact is reflected in particular in the agreed Protocol decision of the meeting of the Subcommittee 9 "Urban development" from 28.11.2019. Moreover, it was recorded from the words of responsible representatives of the Ministry of construction, who were present at the meeting. This provision in this case is of a key and problematic nature due to the presence of systemic defects in the sphere of legal regulation of the development of US cities, discussed in detail by the author of this article, for example in [11].

The essence of the issue is that urban development activities for the creation of UBS, which are CCO is associated with the formation and development of not only land plots, but formally, according to [6] and with the formation of subsurface areas, at least for the design of UBS, buried at 5 meters or more.

However, the legal distinction and technological link between "urban planning", "subsoil use" and "land use" is currently absent in Russian legislation, which is facilitated in particular by the weak coordination of actions in this area at the Federal level. We are talking about the Ministry of construction and the Ministry of economic development, responsible for regulating the areas of urban development, as well as the Ministry of natural resources, responsible for subsoil use.

The legislation on town-planning activity today does not establish any features in regulation of development of US. Due to the imperative nature of such legislation, this means that there is a legal gap. According to [2] town-planning relations in this case can be regulated by "related" legislation, but this gap is not compensated by it. Moreover, the legislation on subsoil has a clear mining context with the ideology of not development, but protection of subsoil for the purposes of mining.

At the same time, the whole cumbersome administrative procedure (model of preliminary approval of the construction object, licensing, etc.), in fact, is mechanically

transferred to the case of "construction subsoil use". This, in turn, creates conflicts with more modern and "market" urban planning legislation, including in terms of underground urban planning (leveling institutions of urban design, engineering surveys, construction expertise, etc.).

On our initiative, the issue was submitted to the Federal level (discussed at a number of events in the State Duma, an appeal was sent to the Government of the Russian Federation). According to the relevant instructions, the issues of harmonization of Federal legislation for the development of urban US were considered in the framework of a special working group that was created under the government of Moscow and carries out the necessary conceptual study with the participation of representatives of Federal agencies. It is encouraging that these agencies have finally recognized the problem and generally agree on how to address it.

Currently, the state procurement of research work on the preparation of a bill aimed at removing barriers to the expansion of urban development of US and making changes to the legislation on urban development, land legislation, legislation on subsoil, on state cadastral registration and state registration of real estate (work should be completed in 2020).

Taking into account these circumstances, many key requirements of the CR project concerning territorial planning (preparation of a special section of the "city master plan" or the scheme of development of US) and territory planning should be excluded on formal grounds. Firstly, because they themselves according to [2] belong to the subject of legal regulation. Secondly, because the features of the legal regulation of underground urban planning as already indicated, have not yet been established.

At the same time, in accordance with [10], it is also necessary to exclude unjustified duplication of not only legal norms, but also documents on standardization. In particular, this applies to the requirement that the largest cities should provide for the integrated use of US. It duplicates a similar requirement of CR 42 [12], which, being "mandatory for application", does not find practical use. This is explained in a similar way - this requirement is a legal norm that is not in the legal field. The subject reference to [12] is also not correct, since CR 42, in fact, does not contain modern and reasonable normalized parameters for the development of US.

It is advisable in this and in other sections to highlight specific requirements specific only to the development of US, which, however, is not always possible to do the executor of the CR project. The paradox is that these requirements are not provided by legal regulation.

It is also advisable to change the requirements of the section "Typology and General organization of underground space" structurally (see above). "Typology" (selection of object types) as such is not reflected in the section except for certain proposals that require justification. It is advisable to conduct it in accordance with the TS and reflect it in the draft CR, and in relation not to the US, but to the CCD, including underground off-street crossings and other CCD. We need to ensure that the proposed typology "worked", that is, with its account of the text of CR is differentiated formulated the relevant requirements.

It is necessary to clarify the essence (nature, method) of the proposed "zoning", its role and place, taking into account [2]. Proposals for "zoning" should be brought into line with the normative classification of functional zones (http://www.consultant.ru/document/cons_doc_LAW_289833/). At the same time, it is necessary to take into account the above-mentioned deficit of legal norms in terms of regulation of "functional zoning of underground space". The main thing is that zoning in this case is very specific (for example, due to the fact that the CCD when placed deeper than 5 m can freely cross the boundaries of any functional zones established on the earth's surface) (This "cross-border" character of underground development corresponds to the

maximum extent to the modern ideology of multi-functional spatial development [1]). In this regard, the question certainly requires further research.

All this fully applies to attempts to indicate the formation of a special "planning structure of the US", as well as to the boundaries of territorial zones established by urban zoning. The technology of such "legal" zoning "has not found any reflection in the CR project, although in the world it is used for the considered purposes quite effectively [11].

In general, the requirements for "zoning" should be differentiated and detailed. That is, it is necessary to give instructions on where and in what way or method they are used at different levels of urban development (to perform "binding" to the relevant documents and documentation, and above all in the context of the placement of the relevant CCD and their complexes).

However, there are separate proposals for the placement of CCD in the text of the draft CR, but they also require clarification (for example, whether the placement of CCD under the streets allows legislation on road activities).

A similar clarification is needed:

- proposals for "adaptation" of cultural heritage objects using US;
- recommendations for the device of a single US in the "renovation of areas".

The need for clarification is due to the fact that the proposed options are neither urban planning nor the relevant special legislation (security, renovation) is not yet provided, as they are not provided in the relevant special CR (In this case, the contractor according to [10] and the TS was obliged to provide the state customer with reasonable proposals for making changes and additions to such SP in order to ensure their consistency).

In our opinion, the recommendation that the use of US in industrial zones is allowed only with "appropriate justification" is erroneous. This contradicts modern principles of compact urban development and rational use of land and contributes to the preservation of extensive land use in industrial zones of Moscow and other major cities. As possible the following wording: "With the development of industrial area in large and largest cities, it is recommended to consider the maximum utilization potential of urban underground space" the concept and importance of such capacity should be disclosed in addition to the applied in the world integrated model "Deep city". In the same context (based on the maximum use of the entire potential of the US), it is necessary to give the requirements for the implementation of a comprehensive reconstruction (reorganization) of production areas.

The vast majority of this and other sections of the CR project also require their justification (including the functional distribution of US by depth levels), disclosure and clarification of terminology. It is necessary to exclude the presentation in the format of "essay" by concretization, to eliminate internal contradictions, as well as contradictions with the requirements of formal logic, to clarify the meaning and practical significance of the requirements.

The section "Basic requirements for the formation of underground space" has many of the shortcomings already noted, starting with the need to disclose the term "formation of US", detailing its essence and "binding" to the appropriate levels of urban design.

It (as well as other sections) instead of the technical requirements, which according to [10] and TS should be justified, tested and conform to the best models, recommendations of a General nature, the implementation of which is not provided by law, no other CR as standardization documents. This, for example design guidelines use US in future schemes ("development areas" and "underground development", the formation of urban ensembles and complexes "a unified system of underground spaces", to create a multifunctional US, programme of development of US in the project "line, or a network of underground", according to claims of the "historical zones", etc.). At the same time, the required proposals for harmonization with other CRs are not given, but simply given references to them (without taking into account the fact that these CRs do not have special requirements for the

development of US). Another incorrect option - if there are such special requirements in the joint venture, they are duplicated, and without reference to the source. For example, there is a reference to CR 395 on the design of transport transfer points (TTP), in which the specific character of US development is not disclosed at all (During the examination of the SP 395 project in sub-Committee 9 "urban planning", the author of this article provided relevant comments and suggestions, but neither the contractor nor the state customer and the developer did not take them into account. At the same time, in world practice (Japan, Great Britain, China, USA), TTP projects demonstrate a developed CCD network).

The section "Design of underground space in urban planning documentation" (The term "urban planning documentation" itself is not legitimate as absent in [2]) also suffers from similar disadvantages. According to the logic of its name, as well as in compliance with [10] and TS, it is here that specific requirements for each level of "urban planning documentation" should be disclosed. That is, we should first describe the features of territorial planning, urban zoning and territory planning in the context of the location of the CCD, taking into account, in particular, the cross-border nature of the CCD noted above. Only then, on this basis, will it be possible to formulate specific "technical" requirements for the preparation of documents or documentation (including relevant justification materials).

However, this did not happen, because attempts to formulate such requirements were "scattered" in other sections, and without a specific "binding" to a particular type of document or documentation. Therefore, the volume of the section was only one page (This circumstance largely dictates the proposal to change the structure of the document in the Review).

In this case, the section duplicates the illegitimate requirements of the previous sections in terms of planning the US as part of the city master plan (see above), additionally offering for large cities (It is not logical that cities with a population of more than 1 million people, which according to SP 42 [12] are the largest, are not marked) to include the section "Complex development of US", and in its structure to provide the General scheme of the organization and use of US, sections and the schemes connected with its development. At the same time included provisions, subject not related to the composition of "urban design", for the determination of the economic feasibility of underground construction, solving property issues, establishing easements, etc., which definitely should be deleted.

The requirements for determining the "dimensions" of the CCD when planning the territory and for "mutually agreed placement of ground and underground construction objects" also do not correspond [2]. At the same time, there are no requirements related to the preparation of the land surveying project that are significant for the design of open-source CCD systems.

Incomplete and not quite correct (for example, in relation to technical zones) Code out the requirements for restrictions that must be taken into account in urban planning in the relevant areas with special conditions of use of the territory (hereinafter also-ASCUT). It is advisable to specify specific "technical" requirements about the nature and scope of restrictions (Under the ground, the volume of such restrictions is much smaller than on its surface, which significantly increases the degree of "planning freedom" in making design decisions), guided by the novelties of the Laws [2, 8] and the resolutions of the government of the Russian Federation on the procedure for establishing the relevant ASCUT, which are now adopted in pursuance of legal innovations.

It should also be taken into account that the issues of establishing and correcting red lines are not relevant to the legislation for the creation of CCD when they are buried more than 5 m and that they are solved in the documentation on the planning of the territory, and not in the "planning".

It is also advisable to focus on infrastructure objects, primarily on linear UBS and complexes (to formulate additional requirements for the placement and urban design of such UBS as metro tunnels, TTP, communication city collectors and give suggestions for their integration with other CCD). In addition, it is necessary to provide requirements for possible accounting for the use of innovative "underground construction technologies" in urban planning (Appendix K).

There are also a number of comments to the section "Special requirements for engineering surveys", which contains almost no declared features in relation to the development of US, which should be justified and formulated in the context of a refined type of CCD (see above).

Therefore, in accordance with [10] and the TS, it is necessary to identify and describe the features of performing engineering surveys (hereinafter - ES) in relation to the development of US, taking into account the "typology" of objects (thereby closing the deficit of standardization in this area). On this basis, it is further necessary to give the formulation of specific requirements for the implementation of the relevant types of ES, and not limited to engineering and geological surveys. This should reflect the differentiation of the specifics of the implementation of ES, conducted for the purpose of placement and creation of CCD for various purposes and their complexes, and separately for the conditions of built-up and undeveloped territory and separately for open and closed construction method.

At the same time, it is necessary to exclude the admitted contradictions of the section to chapters 1, 5, 6, 7 of the Code [2], as well as the corresponding by-laws and Codes of rules for the implementation of ES (CR 47 (<http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=STR&n=21071#09718614198836166>), CR 438 (<http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=STR&n=23838#01595740993274396>) etc.). In particular, it should be taken into account that ES for the purposes of urban zoning is not carried out, and as part of CR 438 does not provide for the implementation of control drilling as the main types of work when performing ES.

It is advisable in particular to disclose the features of the implementation and necessary for the purpose of placing the CCD and their complexes, to provide additional requirements indicating specific types of work. At the same time, it is desirable to note that ES should ensure the creation and updating of an engineering digital model of the territory's terrain (The issues of information modeling in this area need to be reflected in other sections of the CR project, especially since the relevant developments are actively developing in foreign best practices), including the geological environment with a focus on the format of 3D study of natural conditions and factors of man-made impact for the purpose of rational and safe use of territories, land plots and subsurface areas within them, preparation of data on the justification of materials necessary for making design and planning decisions.

It is also necessary to point out the requirements for the implementation of ES in relation to the problem of establishing the parameters of functional zones. It is also important to take into account, specify a way to determine the category of complexity of engineering and geological conditions for the development of US (zoning or other method), taking into account the logic and requirements contained in CR 47 (this CR is the main common for the implementation of ES of all types).

It is necessary to detail the case of the lack of sufficient and reliable initial survey data, specify the criteria for assessing their sufficiency, specify the requirement for "minimum volumes" of ES. It should also be noted that in CR 446 (<http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=STR&n=24229#025542155702307345>) there are no requirements for the implementation of the AI for the territorial planning stage, and in CR 438-requirements for the implementation of the ES for the preparation of the land surveying project.

The monitoring requirement should be clarified, taking into account the norms of the RF Government resolution No. 87 of 16.02.2008 [13]. It is also advisable according to CR 305

(<http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=STR&n=21749#08108409426536151>) introduce appropriate requirements for geotechnical monitoring and take into account that according to CR 47 ES can be performed at the construction stage.

It is important to note that the collection and processing of research materials from previous years is carried out at all stages of ES with the mandatory use of information from the state funds of spatial data and other state information resources, including those providing urban development. It is advisable to take into account the analysis of the results of subsoil exploration performed for purposes not related to the extraction of minerals. It is also proposed to provide that in the conditions of the surrounding development, the results of the ES should contain data on the stress-strain state of the ground layer. In addition, it should be noted that engineering-geological zoning as a result of ES is performed on the factors that determine the features of complex (mutually linked) design and construction of ground and underground facilities with the preparation of assessment maps, as well as maps (schemes) distribution and risk assessment of hazardous processes and phenomena.

Among other things, it is necessary to take into account that according to the legislation, geological and engineering-geological conditions are legally conditions and not restrictions (restrictions are formed based on the presence and nature of ASCUT), as well as the fact that the implementation of ES during operation is not provided by law [2]. In turn, local monitoring is provided by the legislation, but only if the ES is performed for the purpose of preparing project documentation, while the requirements of CR 305 for monitoring relate only to the construction stage.

As in other sections of the CR project, numerous references to special CRs concerning the implementation of ES do not make practical sense, since these CRs, in fact, do not disclose the features of the implementation of ES for the development of the US.

The inclusion in the project structure section "specific requirements for architectural design" as the subsequent sections of the draft CR as already noted above does not match the name and scope of the project CR (their subject is not relevant to urban design). The section also as well as other sections does not contain disclosure of features of design of CCD and complexes in reference to their typology and also contains similar numerous incorrect references to special CR (see above). In addition, some requirements (for example, to include additional materials and sections of the project documentation in the project documentation) do not comply with legal norms [2.13].

If you keep this section in the structure of the CR project, based on the "compromise considerations" of the state developer, then along with the proposals outlined above, it is advisable to focus on the preparation of projects for the creation of "public" CCD and complexes. This refers to Federal, regional and local facilities [2] (TTP, metro facilities, engineering infrastructure, etc.), the location and creation of which is necessarily justified by the layout of the territory, as well as other particularly dangerous, technically complex and unique underground facilities. In this case, before adjusting the Federal laws, you will have to take into account the requirements of the legislation on subsoil (see above).

The sections "Requirements for the choice of technologies for integrated development of underground space" and "Basic requirements for the construction, operation and liquidation of underground facilities and structures" are also mostly referential (contain numerous references to other CR and standards). The first of them concerns not "complex development of US" as it is declared, and traditional underground construction. Sections are not related to urban planning, although already at the stage of making planning decisions, it would be advisable, for example, as already mentioned above, to take into account (on the

principle of feedback) the possibility of using a particular construction or mining technology.

Many of the requirements and the normalized parameters are given in the Appendixes of the project CR, also require clarification on compliance with the law (for example, groups of permitted uses UBS, restrictions and prohibitions on the placement of underground facilities), and justification (e.g., recommended functional composition of US). The main thing is that they must contain specific requirements according to the TS that have passed validation and testing in the design, construction and operation of the CCD, corresponding to the best world and domestic models. In Appendix I, it is also appropriate to define the complexity categories of engineering and geological conditions separately for the open and closed method of creating a CCD and for different levels of ES implementation.

In general, the requirements of sections and appendixes need additional cross-linking (at least by providing coordinating links), elimination of repetitions and internal duplication, many require editorial editing.

4 Conclusions

One of the promising ways to achieve sustainable territorial development of cities is to make better use of the potential of US. The implementation of this path is objectively complicated by the inclusion of an additional component in the object of management - the earth's interior. It implies an adequate system of public administration, which is based on effective legal and regulatory technical regulation (standardization) and, above all, at the planning level.

The results of the study on the example of the analysis of the development of a Code of rules "Buildings, structures and complexes underground. Rules of town-planning design" confirmed the presence of system defects of standardization for this town-planning level and identified their causes.

In general, these include:

1. Weak interagency coordination.
2. Lack of scientific groundwork to justify the development of NTD and the necessary volumes of advanced development of legal regulation.
3. Imperfect procedures for planning the development of NTD and related research work, violation of such procedures.
4. Lack of professional competence and (or) efforts of the State customer, lack of proper coordination with the expert community.
5. Low level of professional competence and (or) lack of experience in the development of NTD contractor.

The elimination of such defects requires the preparation and approval by the Ministry of construction in coordination with the concerned departments of a certain action plan (road map).

The main barriers that specifically prevent the preparation of a full-fledged CR project "Buildings, structures and complexes underground. Rules of urban planning design" is a deficit and conflicts of legal regulation, as well as the lack of verification of the parameters of regulation (insufficient sampling of practical implementation of projects). It seems that until the removal of legal barriers, the approval of the draft joint venture is premature.

In order to reduce the risk (including reputational costs) of adopting the draft joint venture in the current version, it is advisable:

1. To continue the work to eliminate above-mentioned disadvantages in conjunction with the ongoing work on improvement of legal regulation.

2. To carry out interdepartmental coordination of the project with the departments authorized in the areas affecting the scope of the CR project.
3. Re-consider the draft joint venture at the meeting of PC 9 "Urban planning".

As for the system improvement of standardization in "urban planning", the main directions of reform noted in the above Report of the Subcommittee 9 "urban planning", in our opinion, should be reflected in the emerging strategy for the development of the construction industry [14].

References

1. Resolution adopted by the General Assembly 25 September 2015, 70/1. Transforming Our World: the 2030 Agenda for sustainable development, <https://sustainabledevelopment.un.org/index.php?menu=2361>
2. City Building Code of the Russian Federation, N 190-FZ (2014)
3. Federal law of 28.06.2014 N 384-FZ Technical regulations on the safety of buildings and structures
4. Guidelines for drawing up schemes for integrated use of underground space in large and major cities, <https://files.stroyinf.ru/Data2/1/4294851/4294851114.pdf>
5. Guide to the complex development of underground space in large cities, <https://files.stroyinf.ru/Data1/45/45107/>
6. Law of the Russian Federation of 21.02.1992 N 2395-1 «On subsoil»
7. Civil code of the Russian Federation» (part one) from 30.11.1994 N 51-FZ,
8. Land code of the Russian Federation» from 25.10.2001 N 136-FZ
9. H. Li, A. Parriaux, The Joint HKIE-HKIP Conference on Planning and Development of Underground Space, 53–60 (2011)
10. Russian Federation Standard GOST R 1.2-2016, <http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=OTN&n=11617#09966478158386016>
11. V.L. Belyaev, Economics of construction and environmental management **2(67)**, 27-34 (2018)
12. Code of Russian Federation Regulations CR 42
13. Resolution Of the government of the Russian Federation of 16.02.2008 N 87 2
14. Russia's construction industry development strategy until 2030, <http://stroystrategy.ru/#docs>