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Scientific and Methodological Substantiation of the Process of Conservation Work to Strengthen the Construction of Architectural Monuments

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ABSTRACT. In this article case of deviation of the wall in the absence of emergency signs, it can be straightened in a manner known for a long time using steel cables wound around winches or screw jacks. The straightening process is preceded by preparatory work, including the determination of the axis of rotation and the device along this axis on the side opposite to the inclination, the grooves or wedges are wedge-shaped to a depth sufficient to establish the center of gravity of the wall exactly above the center of gravity of the foundation

KEYWORDS: Restoration, cultural monuments, buildings, preventive work, damage, destruction, methodology.

I.INTRODUCTION

The acute relevance of modern problems of restoration, the new level of its formulation, as well as the diverse experience of restoration, urgently require a comprehensive analysis. The historical and practical material, which has concentrated unique examples and long-standing traditions, is the basis for a lot of work to create a theory of restoration. Many provisions of the foundations of the theory and methodology of restoration are of particular interest for modern Russian architecture.

Nowadays, the protection of cultural monuments is turning into an independent branch of the national economy. This is confirmed by the ever-increasing volumes of restoration work, an expanding network of restoration organizations. The sphere of restoration has acquired the character of complex actions, has significantly expanded the boundaries of scientific and methodological foundations, and has revealed the possibility of moving from some objects of unique restorations to setting tasks for the restoration of polysyllabic ensembles ..

At present, a system of certain restoration laws has developed in works with architectural heritage. It provides for the following provisions:

- full preservation of the architectural environment;
- preservation of the historical identity of each historical fragment of the city;
- preservation of facades of historical streets;
- the possibility of staging new buildings in the historical environment up to a complete architectural and aesthetic linking them with the old environment;
- full and mandatory functional involvement of ancient buildings;
- full provision of housing in the historical environment with modern and engineering, communal and well-being conditions;
- preservation of genuine elements (their conservation) during the restoration of individual historical objects;
- the use of new building materials in the restoration and imitation of the old forms of monuments.

Monuments of the history of culture, including works of architecture, deserve attention and care on the part of society due to their special historical, artistic, aesthetic and material merits. Measures of these advantages of a historical or artistic work, both during its creation and throughout the life of many generations, can serve as categories of the quality of the work - its value. Moreover, in different periods, historical qualitative values could change depending on the requirements for them. For example, at the time of the creation of a building, its historical or scientific restoration

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value could be absent. However, under certain conditions, depending on the surrounding buildings or changes in the layout of the city, etc. The urban planning value of individual buildings and a whole fragment of the old urban development may change.

The classification of the types of conservation, repair, restoration and restoration work being carried out is constantly being improved. The need for dynamic development, provided by the scientific and technological achievements of the time, leads the restoration process to a qualitative and quantitative change.

Large restoration or repair and restoration work on outstanding objects, whether it be separate architectural monuments, architectural complexes or historical ensembles, it is recommended to precede the implementation of the theoretical model of restoration - the general restoration project.

The theoretical model of restoration is based on the quality values of the object. Such values for the general restoration project are: historical, urban planning, architectural, artistic and aesthetic, scientific and restoration, functional.

The theoretical model is based on: the full scope of preliminary research; developed research design plans; nature of restoration production and the planned final result of restoration. If necessary, in addition to the drawings of the general restoration project, economic data are presented that characterize the aggregated indicators of the cost of restoration work, the timing and stages of production.

II. METHODS OF RESEARCH

The practice of restoration work and a change in attitude towards the preservation of the architectural heritage have led to the need to reckon with the historical, although at the same time arisen, environment of individual monuments. Accounting for historical development was required in connection with the need for the introduction of modern buildings in the historically developed architectural and spatial environment of cities. Quite naturally, many cities almost simultaneously faced the problem of constructing new buildings within the boundaries of the historical center with the most complete preservation of the historical originality of the city. The engineering and technical capabilities of multi-storey modern houses often create conflict situations, violating the architectural and urban planning organization and the harmony of old cities. This naturally requires a search for ways to overcome obstacles that impede the implementation of a positive approach to preserving the architectural heritage.

Preventive work is important in the protection of architectural monuments and provides an intermediate link in the field of technical measures that are designed to alleviate the threat to the state of the building caused by various reasons and to increase its durability.

Timely and correctly implemented preventive measures lead to an improvement in the building's condition, hinder the development of destruction processes and create more favorable conditions for a complex of conservation and restoration work, decisively affecting the scope of work and finances, social costs for restoration in the future.

In the process of protecting monuments, various questions may arise. From a technical point of view, they can be divided into three main areas:

preventive work associated with the use of various means to prevent the destruction of the object from exposure to atmospheric precipitation, discharges, etc. (moisture, fire, fungi, parasites), preventing mechanical and chemical damage to those elements of the building, which are associated with its exterior or interior decoration and operational comfort;

works related to maintaining strength and encompassing measures to temporarily strengthen the building structure and its individual elements. In this case, the volume and nature of the work is determined by the technical condition of the structures and the degree of possible threat;

protection of the territory on which the object is located. Its violation or neglect is fraught with dangerous consequences in the future. Here, the main task is to prevent the effects of shifts and fluctuations in the base, disturbances in the equilibrium of soil masses, the turbulent action of water, the growth of vegetation, etc.

The effectiveness of the conservation of monuments is closely linked with the systematic monitoring of the condition of the building and the timely identification of dangerous foci of destruction.

From a technological point of view, protection measures may be temporary or permanent. In both cases, the means used are closely related to the work program for the protection of the monument.

Restoration practice has a variety of ways and methods of temporary and permanent protection, and these problems become more complicated the more the object is in a more ruined state.

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Vol. 6, Issue 10 , October 2019

The restoration and strengthening of damaged or dilapidated supporting structures of a building is part of the overall restoration program, closely related to the issues of stabilization and consolidation of the structural organism. Most often, these works are one of the most significant events in the preservation of the monument.

The purpose of restoration and amplification is to return constructive systems to the ability to perform certain operational functions, increase their strength, stability and resistance to various destructive processes.

These works are usually preceded by a study of the structural features of the building, including the features of the implementation of damaged elements, the technical condition of the building, the nature and extent of damage and destruction, as well as their causes. Reconstruction and amplification measures should be carried out in such a sequence as to first of all eliminate the causes of deformation and destruction of the main carrier system; then parts of the building buried in the ground and those elements on which its strength and stability depend. Even the most thorough performance of work in the ground parts of the building will not be able to prevent their further destruction unless the deformations of the base are stabilized first and the possibility of developing foci of damage for the future is eliminated.

From a technical point of view, the methods of restoration and amplification are characterized by great diversity. Reconstruction work usually begins with foundations and other related supporting structures. As a rule, they cover small fragments of walls and individual elements of stone structures, and the restoration criteria presented to them can be divided into two groups: restoration and strengthening of the underground parts of the building and restoration and strengthening of the ground parts.

In the first case, decisions regarding the choice of means and methods of amplification can be made with sufficient freedom; this applies both to the types of materials used, and the technology of production work. At the same time, one should not forget that old constructions and their elements must be protected in such a way that they are always accessible and the necessary conditions are created for future research.

The restoration and strengthening of the elements and structures of the ground parts of buildings play a huge role in the technical sphere of the protection of monuments. This type of restoration work is most consistent with the principles of preserving and preserving monuments, since the prevention of the destruction of masonry and other elements, their restoration and strengthening are the most necessary measures aimed at maintaining and maintaining the state of the monument. It is quite clear that the higher the quality of work, the longer the monument will be preserved. Other requirements follow from this - when performing reinforcing and restoration work, materials that are easily damaged or that can cause destruction should not be used.

Quite often, the need arises to strengthen parts of the building buried in the ground, especially foundations and underground masonry. The fate of the monument largely depends on these works.

The need to strengthen the underground parts of the building can be dictated by the following considerations:

a) the structure of the masonry elements is characterized by serious weakening in the form of cracks, voids, leaching of the solution, violation of the dressing, etc .;

b) a change in the purpose of the building, new working conditions, including increased loads, requiring an increase in the bearing capacity of the structural elements under consideration;

c) defects in the construction of foundations and the actual conditions of their operation, requiring reinforcement, expansion, deepening or superstructure of foundations.

The method of reinforcing stone structures and elements buried in the ground depends on their functional and structural purpose, as well as signs of damage. Therefore, in the first place, attention should be paid to foundations and foundation walls, and depending on the nature of the technological operations, three main issues can be distinguished here — strengthening the base, strengthening the masonry structure and strengthening the entire structural system.

Strengthening the masonry structure. The foundation walls, as well as the strip and pillar foundations laid out of brick or stone on the mortar, characterized by weakening of the structure due to the action of the above factors, can be effectively strengthened by injection.

Sometimes the type of materials used in the construction of the building and the production technique exclude the possibility of reinforcement by injection, for example, in the case of stone foundations loosely connected with clay, gypsum or lime mortar with impurities that enter into chemical reactions with the cement mortar. In this case, reinforcement can be used reinforced concrete clip.

The shape of the reinforced concrete cage depends on the shape and size of the foundation. This method of amplification is expediently applied for a pillar foundation for various columns and racks. In this case, the cage counteracts the transverse deformations of the masonry located inside it, increases the overall rigidity and load-bearing capacity of the structure, and also provides a more uniform transfer of the load on the ground.

Strengthening the structural system. Strengthening the structural system of foundations depends on the conditions of their work and, to a large extent, on the quality of the foundation. Among the main methods, one can

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single out reinforcement by broadening the base, by adding new foundations (with greater deepening), as well as by superstructing the foundations, which, however, is connected not with bearing capacity, but with functional considerations. In special cases, reinforcement is performed using piles, lowering wells and other structures.

Broadening the foundation walls. If under the foundation there is high-quality soil and the structure of the foundation masonry does not cause concern, then the foundation can be strengthened by expanding it on both sides. Such reinforcement is made when it is necessary to reduce the pressure on the ground, and laying the foundation foundation provides access to it from both sides. quality of the foundation. Among the main techniques, one can single out reinforcement by broadening the base, by adding new foundations (with greater deepening), and also by adding foundation, which, however, is connected not with bearing capacity, but with functional considerations. In special cases, reinforcement is performed using piles, lowering wells and other structures.

The broadening of the foundation can also be done by bringing under the old foundation a reinforced concrete slab or prefabricated reinforced concrete elements. In this case, the reinforcement work is carried out on sections 1 to 1.5 m long, that is, in the same way as when installing horizontal waterproofing. Undermining the foundation in the adjacent section can only be done after the finished section has acquired the ability to absorb the load. And in this case, it is necessary that the new parts are firmly connected to the old. To do this, the open parts of the base should be cleaned of the earth and washed with water so that the new parts of the foundation fit snugly on the sole of the old one.

Deepening the foundations. The need to increase the depth of laying of foundations may arise when, due to soil erosion or its partial cut, it is less than the depth of freezing of the soil or if the soil under the foundation is too weak for safe perception of the corresponding loads. In this case, there is a need for a device to support the foundation on more durable soil layers, if they, of course, do not lie too deeply. A similar need may arise when washing out the soil from under the base or in the case when wooden piles rotted under it, and hydrological conditions make it possible to deepen the foundation to the underlying bearing layers.

Deepening the foundations may also be necessary if a new building is proposed to be erected next to the monument, the foundation depth of which exceeds the depth of the foundation of the old building, or if there is a need to deepen the underground premises existing in the building to a mark below the existing foundations.

An increase in the depth of laying can be carried out under the entire building or under its individual parts. The foundation should be started with the most weakened parts and lead in sections of 1 - 1.5 m in length with the following principles.

If the foundation masonry cracked and weakened, then its structure should be preliminarily strengthened. Especially ¬ destroyed and unsuitable for technical reasons to reinforce the old foundations, it is recommended to disassemble and reposition again, or even remove and replace with a new foundation with the necessary depth.

To strengthen the old foundation or the installation of a new monolithic or prefabricated reinforced concrete foundation on this foundation pit, depth to the bearing layer. Undermining the old foundation should be done with great caution, using appropriate protective equipment. The new foundation should be located on the ground with an undisturbed structure. Usually, soil under a new foundation is compacted, clogging gravel or stone rubble with a grain size of up to 5 cm into it.

After bringing a new foundation under the sole of the existing one, both structures should be reliably interconnected. If the new foundation is made of monolithic concrete or reinforced concrete, then such a connection is made after it has hardened, and in the case of a new foundation made of brick, stone or concrete blocks, when the wall reaches the corresponding strength. When connecting the sole of the existing foundation with a new one, steel wedges are hammered into the gap between them and cement mortar (1: 3) is supplied, which is carefully compacted. Upon completion of work in the next section, you can proceed to the next in accordance with the work plan.

Strengthening the foundations by deepening or supporting them on piles or lowering wells is a difficult and expensive undertaking. Particularly significant difficulties arise when work is associated with a fragment of deep pits and the combination of existing foundations with a new reinforcing system. Any work associated with the installation of additional and auxiliary structures is always fraught with dangers. Therefore, before deciding to strengthen the foundations by increasing the depth of their foundations, it is necessary to consider the possibility of strengthening the ground part of the building to absorb tensile stresses caused by abnormal behavior of the base. This applies mainly to reinforcing walls and ceilings and providing the minimum necessary spatial stiffness of a building so that it itself can absorb increased stresses.

The traditional methods of strengthening should also include all the works related to the reconstruction and relocation of destroyed structural elements. In this case, depending on the nature of the deformations and the extent of the destruction, it is possible to provide either partial filling of the missing parts with new masonry, or disassembling and removing the destroyed structures or their parts with replacing them with similar structural forms when using

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modern masonry systems (for example, the use of masonry with longitudinal or transverse reinforcement of old-format bricks or appropriately hewn stone on external surfaces).

The use of traditional stone work technologies for restoration work in many cases seems to be the only way.

Great opportunities in eliminating cracks, strengthening and stabilizing the separated parts of the building create a prestress. The idea of prestressing has been known for a long time. It boils down to creating in a brittle material an artificial state such a tense state that would effectively resist the action of external forces and increase the bearing capacity or general rigidity of the structure. Nowadays, prestressing has been successfully applied in concrete structures and can also be used to strengthen stone structures. In this case, the task is reduced to laying prestressing reinforcement in the crack development zone, fixing it in the corners of the building and stressing it to such a value that causes the appearance of compressive forces in the masonry corresponding to its strength capabilities.

Among the various deformations of ancient buildings, their deviation from the vertical axis is especially alarming. Most often, such deviations are noticeable in the end walls, fortress walls, towers, minarets. The reasons for these deformations can be various, in particular, they can develop due to uneven settlement of foundations, structural defects, etc. deviations from the vertical are usually accompanied by vertical cracks and violation of spatial connections. As a result of the deviation, the center of gravity of the building is shifted in the direction of inclination, which causes an increase in stress under the sole of the foundation or in the horizontal plane of rotation. Even in well-connected walls on the side opposite the slope, horizontal cracks occur due to bending moment. An increase in this moment may cause the building to collapse.

The initial measure for stopping the turn should be an auxiliary construction device that prevents further deviation and ensures stabilization of the element or building before starting work directly on its straightening.

III. CONCLUSION

Consequently, case of deviation of the wall in the absence of emergency signs, it can be straightened in a manner known for a long time using steel cables wound around winches or screw jacks. The straightening process is preceded by preparatory work, including the determination of the axis of rotation and the device along this axis on the side opposite to the inclination, the grooves or wedges are wedge-shaped to a depth sufficient to establish the center of gravity of the wall exactly above the center of gravity of the foundation. Before straightening, it is necessary to check the bending moment from the dead weight of the wall and provide protective measures so that during straightening there will be no damage (cracks, bulging) in the upstream parts. After the wall returns to its vertical position, further construction and restoration work is carried out.

In the process of straightening the towers and other buildings, you can also use methods based on the principle of uneven lowering from the side opposite the slope, or on the principle of uneven inclination from the slope side. The restoration of architectural objects also includes the preservation of the elements of the functional and artistic decoration of facades and interiors.

REFERENCES

1. Prutsin O. I. Romashevsky B., Borusevich I.N. “Architectural and historical environment”. Ph., Stroyizdat, 1990
2. Samigov N.A., Arslonov I. "Modern methods of research of technical condition of buildings and structures". Textbook. Teacher 2006 - 127 p.
3.M. Mirakhmedov., N. Bozorboev, F.N. Bozorboev “Technology for the repair and reconstruction of buildings and structures” Training Manual, part 2, 2008. – 117 p.
4.Rimshin V.I. "Inspection and testing of buildings and structures" Textbook, Ph: Higher school 2007
5.H. Rakhimov, S.T. Qosimova Shodjalilov Sh. Bader “Reconstruction of buildings and structures” Economy - Finance, Ph. 2008