

## Aspects of Organization and Implementation of the having Historical-Cultural Monument's Status Buildings Reconstruction

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**Abstract:** In this article are considered main aspects of the organization and implementation of the having historical-cultural monument's status buildings reconstruction. The reconstruction of a monument refers to a number of measures to restore and strengthen the

which it has completely or partially lost due to the influence of time or other negative force and ecological factors. The article analyzes the stages of the reconstruction of buildings with the status of a historical-cultural monument, taking into account general construction norms and legislative requirements when implementing such projects.

**Keywords:** reconstruction, buildings, cultural heritage, historical and cultural monuments, reconstruction experience.

### 1. Introduction

Historical and cultural monuments are recognized as the property of the nation, the world cultural heritage, as well as a means of immortalizing the cultural and engineering activities of that time people in which they were created. As a result of observing many historical buildings, the age of cities, their changes and development at different stages of history can be determined. Most of the architectural monuments created in the past are still used today, although often not at all for their original purpose. Basically, they serve the development of science, artistic and social culture, public education. However, over the long period of their existence, under the influence of various environmental factors, architectural monuments undergo significant changes and are significantly worn out. Often they not only lose their original appearance, but also have significant structural damage, or complete or partial collapse and experience complete decay. Therefore, reconstruction

structure that are carried out using various architectural-structural solutions and technologies in order to adapt the building to modern socio-cultural conditions and make it as close as possible to its original appearance,

works of buildings and structures recognized as architectural monuments and cultural heritage objects are in great demand in modern city conditions [1, 2,3,4,5].

### 2. Basic part

In the international practice of reconstruction of historical centers, there is experience of chaotic mass demolition of historical buildings and construction of modern ones in their place. For example, in Brussels in the 1960s-1970s, under the pretext of building a "city of the future", entire quarters were built with futuristic-looking office buildings with glass facades. The lack of a unified plan and aesthetics in new construction led to the massive relocation of historical buildings, which was followed by their destruction over the decades. This practice was even called "Brusselization".

In modern Europe, the problem of preserving architectural monuments is taken very seriously and they try to preserve the appearance of the masterpiece as much as possible, while adapting it to modern needs.

In Georgia, historical and cultural monuments, that are buildings-monuments, old blocks, historical centers, represent the cultural heritage of the Georgian people that reflects the history of the country, architecture, painting, and cultural history.

Monuments would be defined as the most valuable category of real estate. Its peculiarity is, on the one hand, the increase in its value depending on the antiquity of the creation or historical event, and, on the other hand, the

possibility of increasing this value as a result of constantly conducted historical-cultural research. In addition, the assessment should be carried out not only in terms of cultural significance, but also from the material value, which takes into account its financial representation (similar to the assessment conducted for museum and private collections), which allows to correctly determine its value, organize insurance of monuments, and determine penalties for caused damages.

Thus, the preservation of buildings-monuments is a technically difficult and complex task, which must be solved at a time when the volume of repair and restoration works has significantly increased, in a shortened timeframe, and in the absence of clear regulation of the composition, volume, and nature of the complex of engineering studies to be conducted on the building-monument, which is not provided for in the existing regulatory documentation for restoration and research works.

The development of a methodology for a complex approach to the assessment of historical and cultural monuments, leading to a set of specific methods, defines the goal of the work.

The theoretical and methodological basis of the research are the following methods: system analysis; hierarchy method; structural linguistics; expert assessment method; multifactor analysis; regression analysis. The reconstruction of architectural monuments is a very laborious process. It depends on many factors, laws, regulations and rules. Before starting work on the site, it is necessary to conduct a number of studies, including works on the architectural study of the monument and a cycle of engineering and technical studies. This is necessary so that the reconstructed object maximally repeats the appearance that was conceived by the architect when creating it. The materials are also very carefully selected so that after all the work is completed, the object does not resemble a "new building" [2,6].

The main stage in identifying problems in the

reconstruction is an expert assessment of the condition of the object. At this stage, a comprehensive examination and technical examination of building structures are being carried out for the most accurate assessment of the condition. Work is also underway with archival materials and the city plan to reveal the historical appearance of the building, its significance and relevance in the life of the city. In parallel, a study of the cartogram of the quarter's development is being carried out to obtain information about the number of floors of the building, the construction materials used, the degree of moral and technical wear and tear.

Based on the information received, a detailed project for the reconstruction of the facility has been drawn up for its phased implementation in the future.

The main structural elements of any building are the foundation, walls and roofs.

Buildings and structures inevitably deteriorate over time from precipitation, temperature changes and solar radiation. Also, the development of housing and road infrastructure leads to an increase in the load on buildings. If a subway line or highway is being laid near an old house, the structural elements experience increased vibration and, when cracked, lose their bearing capacity. Such loads were not taken into account at the design stage of the construction, so now they need to be strengthened.

If the walls of the house are in satisfactory condition, it is advisable to replace the wooden floor with reinforced concrete. If the roof walls and foundation are severely damaged, it is necessary to strengthen and restore the old wooden structures or partially replace them with new ones.

When carrying out such work, the use of modern technologies along with the use of the latest composite materials is very relevant.

To compensate for the effects of natural wear and tear and to protect buildings from emerging negative factors, reinforcing mesh, shotcrete and waterproofing are used as reinforcement methods.

Steel and composite reinforcement are used for

reinforcement, various rolled metal products - angles, channels, welded mesh. For reinforcement, additional elements are installed outside, creating an external reinforced belt, and are laid inside load-bearing structures - in walls, beams, ceilings.

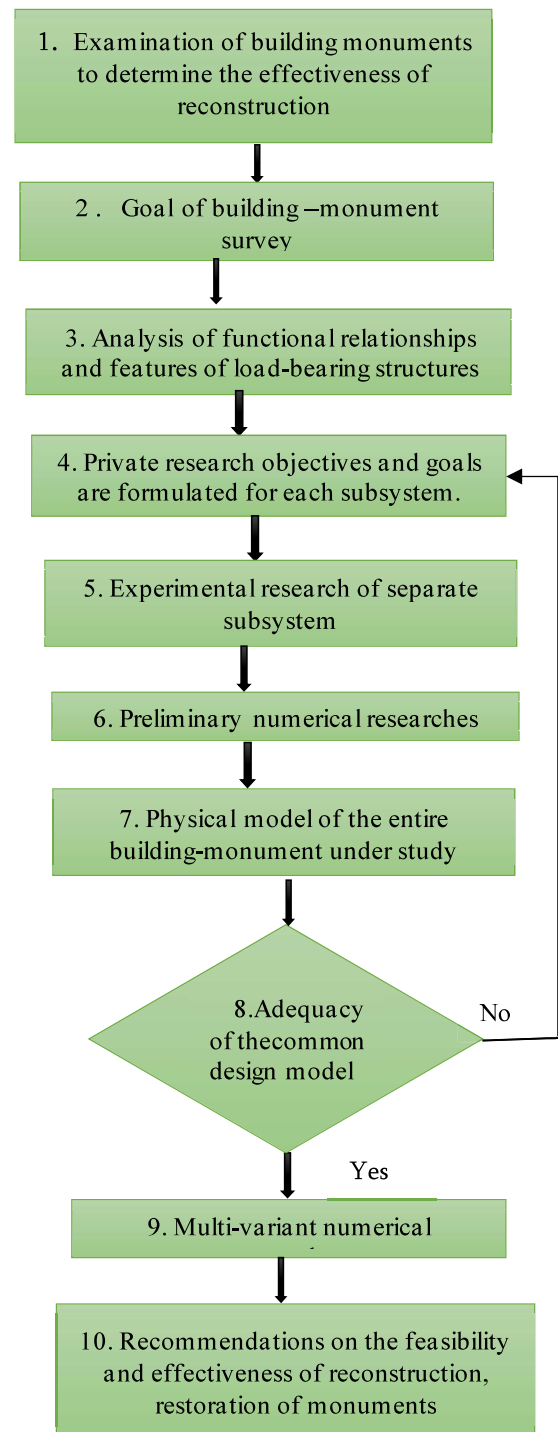
The shotcrete method is a relatively recent invention compared to other construction technologies and today is one of the most effective and economical ways to strengthen brick, stone and concrete structures.

With the help of shotcrete, it is possible to quickly process large surfaces and concreting structures of any complexity, including in conditions of limited space. This is especially important when working with old buildings, the dimensions of which are not calculated for the dimensions of modern construction equipment.

The waterproofing method is relevant primarily for protecting the foundation, basement and low ground floor floors from contact with water. In such cases, anti-filtration waterproofing is used. Anti-corrosion waterproofing can also be used, which protects structures from moisture and other chemically aggressive substances that can provoke corrosion of concrete and reinforcement [3,7,8].

The long service life of cultural heritage monuments is partly due to the fact that, although the technologies and materials used were imperfect compared to modern ones, their foundations are usually very strong. However, the foundations of almost all historical buildings are significantly overloaded due to the ongoing construction or reconstruction of the building.

The beginning of the reconstruction of the foundation begins with a thorough analysis of the causes of its damage, because. The choice of the method of its restoration and strengthening depends on this. To eliminate the cracks in the foundation and strengthen the pile, cement mortar is injected into the existing cracks. Metal or reinforced concrete casings are also built to improve the bearing capacity of the foundation.



**Fig. 1. Flowchart of the process for determining the effectiveness of reconstruction of building-monuments**

To relieve excessive load on the foundation, metal belts are used to distribute it. Also, by installing supports or new slabs, you can change the structural scheme of the foundation if it is severely worn out.

Often, a reconstruction project involves the complete demolition of a dilapidated building or

monument.

A study of the construction of many monuments was carried out using the developed methodology. After compiling and calculating the calculation models of the study objects, the analysis of the calculation results was carried out, after which the calculation of the enhanced model and comparative analysis were carried out.

### 3. Conclusions

1. The structural solutions of existing historical and cultural monuments are analyzed, their classification is made (on the example of a cylindrical vault, a cross vault, a closed vault and closed arches), the architectural monument is presented as an element of a complex natural-technical system "monument-environment", which contains interconnected structural and architectural elements;
2. A block diagram of the hardware-computer diagnostics of the stressed-deformed state of a historical-cultural monument has been developed, which takes into account the methodology for studying the state of the monument, combining experimental and numerical methods;

### References

1. M. Tsikarishvili, N. Tabatadze, M. Vardiashvili, A. Katamidze. Ecological and technical monitoring of Georgian historical-cultural monuments, Scientific-technical Journal "Mshenebloba", N3(34), 2014, pp. 18-24;
2. M. Tsikarishvili, N. Tabatadze, M. Vardiashvili, I. Garibashvili. Analysis of structural solutions of existing on territory of Georgia historical-cultural monuments, Scientific-technical Journal "Mshenebloba" N3(38), 2015, pp. 44-53;
3. M. Tsikarishvili, U. Dzodzuashvili, N. Tabatadze, M. Vardiashvili. Analysis of buildings monitoring systems, Scientific-technical Journal "Mshenebloba", N3(38), 2015, pp. 117-128;
4. N. Tabatadze. Study of deformability of historical-cultural monuments structure, Scientific-technical Journal "Mshenebloba", N4(43), 2016, pp. 81-84;
5. M. Tsikarishvili, N. Tabatadze. Development of organizational structure of control and diagnostics of mode of deformation of historical-cultural monuments, Scientific-technical Journal "Mshenebloba", N1(44), 2017;
6. N. Tabatadze. Perfection of experiments and numerical methods unity for diagnostics of technical state of historical-cultural monuments, Collection of Scientific Works of GTU, N3(505)-2017.
7. N. Tabatadze. Analysis of historical-cultural monuments structural solutions, 83 Open International Scientific Conference of Students of GTU, pp.7.
8. J. HOŁA, K. SCHABOWICZ, State-of-the-art non-destructive methods for diagnostic testing of building structures – anticipated development trends, Wrocław University of Technology, Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland, 2010, p. 6-7;
- [9] Paulo B. Lourenço, Rob van Hees, Francisco Fernandes, Barbara Lubelli, Characterization and damage of brick masonry; ISISE, Department of Civil
1. (Shota Rustaveli National Science Foundation of Georgia PHDF-24-3778)