

## HOUSEHOLD BUILDING (LATE 17TH–19TH CENTURY, RYAZAN KREMLIN) RESTORATION AND ADAPTATION TO MODERN USE

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### Abstract

**Introduction:** The issue of preserving historical and cultural heritage is currently highly relevant. The restoration of ancient architectural structures, preservation of their historical appearance, and adaptation to new functions constitute an important step forward towards that goal. Considering the situation with cultural heritage sites in Ryazan, we should note that the city really needs such measures. Many historical, cultural, and architectural monuments have been lost and continue to be destroyed because of incompetent interference with their architectural-and-planning structure (demolition, unauthorized reconstruction, etc.). **Purpose of the study:** We aimed to describe the specifics of the preservation, restoration, and adaptation of cultural and historical heritage sites to modern needs. **Methods:** In the course of the study, we used a systemic approach, analyzed various sources and materials on the restoration and protection of historical and architectural monuments. **Results:** In the paper, we consider a particular example from the architectural practice of adapting a part of an ancient structure to modern use. The paper gives a brief historical background and information on the structures and materials used, discusses methods and technological solutions, analyzes design solutions. Based on the results of the works conducted, we determine issues of adapting a recognized cultural heritage site to modern living conditions and using it in a new capacity in accordance with the applicable regulatory documents. When facing the issue of adapting historical buildings that have lost their original function, it is necessary to perform works without changing their protected features. Within the framework of cultural heritage site preservation, a concept has been developed to serve as the basis for its conversion and operation as a cafe.

### Keywords

Cultural heritage site, architectural monument, preservation, restoration, adaptation to modern use, methods and techniques, Ryazan Kremlin, Ryazan.

### Introduction

Any ancient city, regardless of its size, has rich cultural and historical heritage that has come to us from past eras. The need to preserve historical heritage is essential for the formation of cultural values. It is a memory of prominent figures and important events of a city, which makes it possible to look into the past, evaluate the present, and get a glimpse of the future (Gerasimova and Karasova, 2020).

Besides, buildings connecting the new generation with the old are increasingly perceived as significant historical sites, which will be in demand for tourism development (Aldohdar, 2020) and can become one of the main sources for the replenishment of the regional budget.

When exploring this issue, it is important to turn attention to relevant studies of modern researchers (both Russian and international). For instance, Khakimov and Trebukhin (2019), Novopashina et al. (2012), Sokolov (2016), and Sakharova (2011)

addressed the modern use of cultural heritage objects. Pastukh et al. (2020) discussed the need for the maintenance and repair of historical buildings.

Papers by Solntsev and Petrov (2013) as well as Valegrakhov (2014) are interesting in terms of the economic assessment of cultural heritage sites. Markovich and Luchkova (2011), Romanova (2017), and Zhitlova and Petreneva (2019) explored the adaptability of historical buildings.

In the course of the study, we considered such well-known converted sites of historical-and-cultural, economic, and social significance as the Duisburg-Nord Industrial Landscape Park (Klimova, 2017) and the Zeche Zollverein industrial complex (UNESCO, 2021) in Germany as well as the main house of the Karaul Estate in Tambov Region (Tmbreg.ru, 2015).

Such researchers as Pankratova and Solov'ev (2015), Mokhovikov et al. (2019), Pravdolyubova et al. (2021), and others were engaged in regional studies.

Based on this, it is obvious that the issue of preserving and adapting architectural monuments to

modern use is high on the agenda.

#### Function of the cultural heritage site: historical accounts

The Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century), a recognized cultural heritage site, is located in the south-east of the Kremlin Ensemble (13<sup>th</sup>–15<sup>th</sup> centuries, 16<sup>th</sup>–20<sup>th</sup> centuries) historical monument of federal significance and was built near the side wall of the Consistory Corps at the end of the 17<sup>th</sup> century and consisted of three units with different functions: a cooper's shop, a blacksmith's shop, and "sheds for various goods". Initially, the units were not connected, and each had an individual entrance from the courtyard (Kolesnikova, 2012) (Figure 1).

In the course of its operation, the building changed its function and appearance several times.

In the 19<sup>th</sup> and 20<sup>th</sup> centuries, it was rebuilt to become a residential building. Following the restoration of 1970, the exterior of the architectural monument underwent some changes. The large arched gates were converted into windows. Three new window openings were made in the south blind wall. The building was converted into an office of a historical-and-architectural museum-reserve and then — a boiler room (its latest function) (Figure 2).

#### Materials and methods

Prior to the development of architecture-and-design solutions to adapt a part of the historical Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century) to modern use, as a cafe, a scientific research was performed. First and foremost, bibliographical and archival sources were studied. Then the



Figure 1. Buildings of the Ryazan Kremlin

1 — the Assumption Cathedral; 2 — the bell tower; 3 — the Bishop's House; 4 — the Cathedral of the Archangel; 5 — the Church of the Holy Spirit; 6 — the Nativity of Christ Cathedral; 7 — the Consistory Corps; 8 — the Singing Corps; 9 — Glebovsky Bridge; 10 — the Cathedral of the Transfiguration of the Savior; 11 — the Church of the Epiphany; 12 — the hotel for monks; 13 — the walls and towers of the Monastery of Our Savior (Spassky Monastery); 14 — the hotel for the nobility; 15 — the household building; 16 — the stables; 17 — the rampart; 18 — the clergy house



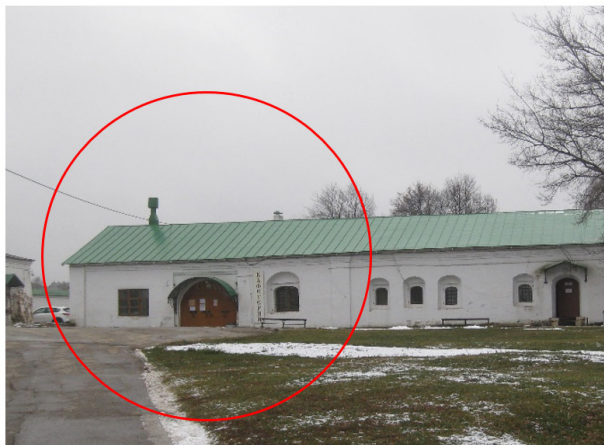


Figure 2. Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century), current state. Photo, 2021

visual inspection of the building was performed and its photos and measurements were taken (Figures 3, 4, 5).

#### Justification of design solutions

It is obvious that since the social structure of society and living conditions changed, the original functions of the historical site turned out to be lost. They do not longer meet the current practical needs. Therefore, to further preserve and use the architectural monument, it is necessary to adapt it to the new reality.

The key in the adaptation of such structures is the right choice of a new function that would take into account the values of the site as well as the present-day social needs and conditions.

Currently, legislative documents define the restoration of cultural heritage sites as a



Figure 3. Facades of the building. Photos, 2010



Figure 4. Condition of the interior walls. Photos, 2010

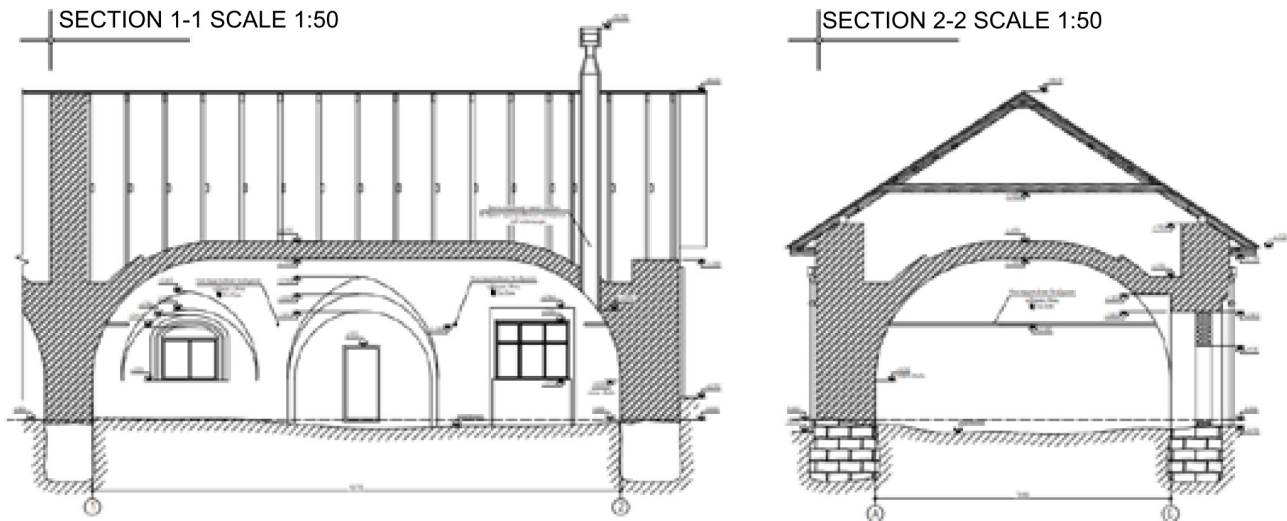


Figure 5. Measurements of the building

comprehensive scientific approach that includes many aspects and tasks pertaining to research, survey, design, and production that shall be considered when conducting operations on their preservation.

In this connection, a specialized organization performed a research and developed a project for the preservation of the cultural heritage site. The project includes activities on restoration and adaptation, i.e., the process of selecting a function that would preserve the appearance, dimensions, and individual characteristics to be protected to the maximum extent, while taking into account the significance of the site as an architectural monument.

The project for the restoration and adaptation of a part of the Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century), a recognized cultural heritage site, to modern use was prepared by OOO Regional Engineering Center (designer, Moscow). The restoration and adaptation of the monument were carried out by OOO Proyektrestavratsiya (contractor, Ryazan).

### 1. Architectural solutions

The Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century) is a one-story structure, rectangular in plan, with a gable roof, stretching from north-west to south-east. The exterior walls are made of oversize solid clay bricks. The foundations are strip, made of rubble masonry. The window and door openings are wooden.

The ceiling is made of brick, with trough vaults in the outermost rooms, and basket-handle arches in the rooms in the middle (Kolesnikova, 2012).

At the time of design documentation compilation, the walls and ceilings had no interior decoration. The floors are lost. The technical condition of the building was determined as satisfactory.

To increase interest in the architectural monument both among tourists and locals, it was decided to include it in the Monastic Meal tour around

the Kremlin. To ensure maximum access to the monument, the project proposed the restoration and adaptation of the outermost room (boiler room) in the building of the architectural monument of the 17<sup>th</sup> century (Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century)) to a cafe. In today's reality, this function is the best option for the preservation of a historical monument.

Since we are talking about a listed property, the repair and adaptation of cultural and historical heritage structures to modern use shall follow the applicable laws and regulations. These works include the preservation of the original historical appearance as well as structural-and-planning solutions. However, the adaptation of a historical structure to modern standards of safety and essential services inevitably leads to its partial reconstruction and brings particular challenges. In most cases, architectural and planning issues are related to the sanitary-and-hygienic as well as fire safety requirements that have been tightened recently. Since the volume of an architectural monument shall remain the same, they prohibit production in such areas.

The adaptation of the site was carried out with account for the existing planning structure.

The total area of the cafe is only 99.3 sq. m. According to the sanitary-and-hygienic standards, it is impossible to ensure the full-fledged operation of the cafe in such a small area. That is why the project proposed to create a typical diner using semi-finished products almost brought to readiness.

To solve the task, the rectangular room is divided into two functional areas: public and service ones. The public area includes a dining hall for 16 people and a bathroom for visitors. The service area includes a kitchen, a wash room, a storage room, and a staff room with a changing room and a bathroom.

On the northern facade, it is assumed to make an entrance space with two doors and a vestibule. One



of the doorways (to be used as the entrance to the cafe by visitors and staff) is formed by the expansion of the existing archway, and the other (to be used to unload products) is made in the late masonry. Such a combination of the entrance for staff and the entrance for visitors is determined by the fact that it is impossible to make an additional opening in the walls of the architectural monument.

Modern fire safety requirements regulating the size and number of escape routes and emergency exits contradict the requirements of regulatory documents applicable to the preservation of cultural heritage sites, in particular in terms of the arrangement of emergency exits. Since, due to the above circumstances, it is impossible to make a second emergency exit, the number of people in the building cannot exceed 20 people: 16 seats for visitors and 4 workplaces.

To ensure equal access to cultural heritage sites and in accordance with the requirements of regulations and state standards (Federal Agency for Technical Regulation and Metrology, 2018; Ministry of Construction, Housing and Utilities of the Russian Federation, 2017), the project provided for some measures for persons with reduced mobility — a paved sidewalk with stairs and a ramp at the approach to the building. Besides, in accordance with the requirements, a semicircular canopy with well-developed forged brackets is proposed above the entrance.

The project also proposed to cover the flooring of the ramp, landing, and vestibule with anti-slip ceramic granite tiles. The one-way ramp has a clear width of 1 m and a slope of 10%.

To ensure the mobility of disabled persons of various categories and account for their number and location in the building, the transport passages and pedestrian routes around the building are separated and just partially combined. Disabled people in wheelchairs can move along the pedestrian sidewalk with a width of more than 1.8 m, the longitudinal slope not exceeding 5%, and the transverse slope not exceeding 1–2%. At the intersections of these pedestrian routes with the roadway, it is planned to reduce the height of the curb by 2–4 cm and make a curb ramp with the slope not exceeding 1:10. One parking space at the parking lot by the Ryazan Kremlin is reserved for persons with reduced mobility. It is marked by signs used internationally. The width of the parking space is 3.5 m.

## 2. Structural solutions

The high-priority measures aimed at preserving the historical structure included the following successive operations: site clearing, base and foundation strengthening, masonry and brick vault strengthening, restoration of the lost and destroyed sections.

During restoration, the following works were performed:

- preparatory works;
- foundations and foundation/soil contact cementation;
- base soil injection (stabilization);
- masonry injection, brick vault crack injection;
- measures aimed at preventing water from entering the building: foundation damp-proofing, arrangement of a vapor-proof blind area made of discrete materials;
- new walls and partitions laying;
- floor and porch restoration.

To minimize structural deformations, which may occur during the restoration and further use of the architectural monument, the foundation masonry was cemented. Cementation makes it possible to fill the exposed cavities in the foundation body and, thus, improves the bonds between structural elements. In that way, the problem areas are strengthened, the stiffness and load-bearing capacity of the foundation increase. Foundation/soil contact cementation restores the lost bond between masonry and soil and balances pressure along the bottom of the foundation.

To restore the lost bond and ensure masonry grouting, increase the structural strength and load-bearing capacity of the external walls and brick vault, masonry injection was used (Figure 6).

Foundation/soil contact damp-proofing was carried out along the external load-bearing elements of the foundations of the Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century), a recognized cultural heritage site. Boreholes were drilled to the foundation depth, through the joints of the exterior masonry tier, in the direction from the bottom up (wherever possible). Damp-proofing was carried out using a polymer composition to create a damp-proof membrane between the foundation and the soil.

Such measures guarantee the restoration of the exterior walls as load-bearing structures.

As for the internal structure, to adapt the ancient structure to modern standards of safety and essential



Figure 6. Masonry injection

services, it was proposed to install utility (water supply, sewerage, ventilation, electricity, heating) equipment, fire safety and other systems. To create a modern interior, it was proposed to use modern flooring materials characterized by high strength, hardness, and wear resistance.

Therefore, the floors in the cafe were supposed to be tiled as follows, depending on the purpose of the premises: ceramic granite stylized as natural stone (Figure 7a) in the dining room, and standard ceramic granite in the service areas.

Prior to flooring works, the soil inside the building was leveled and thoroughly compacted. In places intended for future internal partitions, holes were made that later were reinforced and concreted.

Since the building does not have a vent line, ventilation was maintained through galvanized air ducts with an outlet to the roof through a hole in the ceiling (Figure 7b).

The porch has a canopy with forged brackets (Figure 7c).

All these measures combined are necessary to preserve the architectural monument and prevent changes in its appearance.

### Conclusions

In addition to restoration, the issue of preserving historical-and-architectural heritage shows that it makes sense to search for new approaches and options when it comes to the operation of ancient structures.

Under such an approach, the concept of the

restoration and adaptation of the Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century), an architectural monument of the Ryazan Kremlin, to modern use was developed. The key in the restoration process was to preserve the appearance of the building and adapt its layout to new functions with minimal interference with the structure. Despite the new layout, due to modern technologies of damage repair as well as foundation/structure strengthening, the historical load-bearing walls were preserved. This solution made it possible not only to preserve all the valuable characteristics of the site but also to prevent its destruction in the future.

The adaptation of the architectural monument to new functions will enable its preservation. In most cases, being involved in the life of modern society moving at an intense pace, such an adaptation gives ancient structures a certain status, making them more attractive for commercial use.

Due to the wide variety of options used to adapt cultural heritage sites, cities are turning into tourist attractions with a developed economy and unique architectural environments. Each monument contributes to the historical appearance of the city, encouraging people to get to know their culture and history. The site under consideration, located on the Ryazan land, can become another protected place that will attract those who value cultural heritage.



Figure 7. Household Building (late 17<sup>th</sup> century, 19<sup>th</sup> century). Current state. November 19, 2021  
a — the interior of the dining room, b — the ventilation duct, c — the canopy



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## КОНЦЕПЦИЯ РЕСТАВРАЦИИ И ПРИСПОСОБЛЕНИЯ ПАМЯТНИКА АРХИТЕКТУРЫ РЯЗАНСКОГО КРЕМЛЯ «ХОЗЯЙСТВЕННЫЙ КОРПУС» КОН. XVII В., XIX В.» ПОД СОВРЕМЕННОЕ ИСПОЛЬЗОВАНИЕ

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### Аннотация:

Проблема сохранения историко-культурного наследия очень актуальна в настоящее время. Важный шаг к этому – реставрация старинного архитектурного сооружения с сохранением внешнего исторического облика и его приспособление под новое функциональное назначение. Рассматривая сложившееся положение с объектами культурного наследия Рязани, следует отметить, что город нуждается в подобных приемах (мерах). Множество памятников истории, культуры и архитектуры было утеряно и продолжает разрушаться вследствие неграмотного вмешательства в их архитектурно-планировочную структуру (снос, самовольная перестройка и т.п.). **Цель исследования:** Показать особенности сохранения, реставрации и приспособления объектов историко-культурного наследия к новым современным потребностям. **Методы исследования:** В ходе исследования был использован системный подход, изучены различные источники и материалы по реставрации и охране историко-архитектурных памятников. **Результаты:** Авторами рассматривается конкретный пример из архитектурной практики по приспособлению части древнего сооружения под современное использование. В статье дается краткий исторический обзор, приводится информация о конструкциях и используемых материалах, рассмотрены методы и технологические решения, проанализированы проектные решения. На основании результатов проведенных работ раскрываются проблемы приспособления выявленного объекта культурного наследия к современным условиям жизни и его использование в новом качестве в соответствии с существующими нормативными документами. При этом, сталкиваясь с проблемой приспособления исторических зданий, утративших свою первоначальную функцию, необходимо проводить работы не изменяя особенности, являющиеся предметом охраны таких сооружений. Сделан вывод, что в рамках сохранения объекта культурного наследия разработана концепция, на базе которой будет выполнено перепрофилирование, разместив в нём кафе.

### Ключевые слова

Объект культурного наследия, памятник архитектуры, сохранение, реставрация, приспособление к современным условиям, методы и технология, Рязанский Кремль, Рязань.