

Design, Construction, and Operation of Buildings and Structures

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Edited by

Alexey Nikolaevich Plotnikov

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SYNOPSIS

The conference "Construction and Development: Life Cycle", as a continuation of the conference "New in architecture, design, construction and renovation" dates back to 1997. The 12th conference was held in 2022. The result of the conference was a collection of articles presented by the results of research by more than a hundred scientists.

The conference is held by the Faculty of Civil Engineering of the Chuvash State University.

The collection is presented by topics devoted to the preservation of the urban historical environment, improving methods for calculating building structures, strengthening them and assessing their suitability for use, improving construction technology, geotechnics, energy efficiency of enclosing structures and energy systems, introducing new structures and materials, and economic evaluation of construction.

The collection contains a number of articles on the development in geotechnical engineering of pile structures obtained by the discharge-pulse technology, as well as their new type - piles with multiple extensions. The results of this work are being tested by researchers from the Faculty of Civil Engineering in collaboration with a geotechnical firm on construction sites in many cities.

Particular attention is paid to monitoring unique buildings and structures. Researchers of the Faculty of Civil Engineering of the Chuvash State University are implementing their developments at many famous sites in Russia.

The conference participants represent several cities in Russia and foreign countries. The publication is popular with researchers, graduate students and undergraduates.

ABOUT THE EDITOR

Alexey N. Plotnikov was born in 1961. In 1983 he graduated from the construction department of the Chuvash State University, and later he began working as a designer of industrial buildings. Since 1986 he has been teaching courses in building structures at the Chuvash State University. Within that time, he has carried out work on the assessment of the technical condition of buildings and structures in operation and under construction. In the 1990s he was active in introducing computer calculations of buildings into the educational process. The results of A.N. Plotnikov's graduation qualification works (projects and research) were repeatedly awarded with awards of All-Russian competitions. Many graduates of the university, who studied under his guidance, hold the positions of heads of design and construction organizations, and are leading specialists and scientists. In 2013 he received a degree from the Moscow State University of Civil Engineering. From 2014 to 2018 was the head of the department of building structures of the Chuvash State University. Currently, he is the dean of the Faculty of Civil Engineering of the named university and an assistant professor in the course of building structures. Plotnikov, being the dean of the faculty, directly supervised the formation and development of the Department of Architecture, from which the first graduation of specialists in "Design of Buildings" took place in 2008. In 2009, with the active leadership and methodological participation of Plotnikov, a master's program was opened in the subject of "Construction", and in 2012 – it was the specialty of "Construction of unique buildings and structures". In 2004, under the leadership of A.N. Plotnikov, a Center for Advanced Studies of Construction Industry Specialists was created, in which several thousand specialists from the Chuvash Republic and other regions were trained. His research interests are automatic monitoring of building structures, buildings and structures, non-linear operation of reinforced concrete, stress state of reinforced masonry. Since 1997 he has been holding All-Russian and International conferences. He is a member of the Public Council of the Ministry of Construction of the Chuvash Republic and has received certificates of honor from the Ministry of Education of the Russian Federation, the Ministry of Construction, the Ministry of Transport of the Chuvash Republic. He is included in the encyclopedia of housing and communal services of the Chuvash Republic.

ARCHITECTURE AND URBANISM

MONUMENTS OF ARCHITECTURE IN THE MODERN LOOK OF THE CITY OF CHEBOKSARY

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Abstract

Within the framework of this article, historical buildings are considered not only as part of the architectural environment of the city of Cheboksary but also as a significant segment of the architectural heritage. The historical buildings that have survived to our time, being part of the modern city, carry the cultural layer of the era. Studying buildings that arose in different periods allows you to touch the architecture of that time, understand the historical connection of different cultures, conduct an analysis, and form a correct understanding of the architecture of modern cities. The authors analyze the aesthetic state of some historical buildings, and architectural monuments, which are objects of cultural significance. Among them are buildings that have retained their original appearance, being operational facilities, completed or rebuilt, or irretrievably lost due to large-scale construction projects. Also, attempts to recreate the destroyed buildings are considered, which led to the fact that the new building does not correspond to the historical prototype. An assessment of cultural heritage objects built in different historical periods, which have become an integral part of the life of the townspeople and have formed the modern architectural appearance of the city, is provided. The authors focus on the formation of national identity,

the need to study architectural heritage, and the preservation of architectural monuments.

Introduction

The modern city's architecture is determined by buildings and structures characterized by various shapes and designs. Technological transformations contribute to the development of architecture. Historical eras have a significant impact on the appearance of modern cities. Ancient historical monuments that have survived to our time, being part of the modern city, carry the cultural layer of the era (Pevnaya, and Larionova, 2017, 126-134).

Studying buildings that arose in different periods allows you to touch the architecture of that time, preserve the historical connection of different cultures, and form a correct understanding of historical styles and trends (Andreeva, Mikhailova, Akhmetova, and Grigorieva, 2020, 14-21). The study of the architecture of Cheboksary made it possible to identify the earliest buildings located on the city territory for further study. The choice of objects was determined, from the point of view of the preservation of architectural monuments, by their aesthetic state and inclusion in the urban planning component of the city.

A theoretical analysis of the 17th - 20th century's buildings in Cheboksary was carried out, and archive documents, photographs, and graphic materials were studied. For the study, existing and irretrievably lost mansions and buildings located in the historical part of the city were identified. Much research has been devoted to studying the architecture of the 17th - 20th centuries.

Materials and methods

Analysis of the architecture of the XVIII-XX centuries was carried out in the study of E. I. Kirichenko. The author reveals the problem of the historical path of architecture and analyzes the architectural trends and its most significant representatives (Kirichenko, 1978, 325-326). The author of works on Chuvashia's architecture history, R. K. Rakhimov, characterizes in detail the monuments of civil architecture of the 19th century (Rakhimov, 2006, 140-141). In the scientific reference publication "Objects of the cultural heritage of the Chuvash Republic," N. I. Muratov presented a brief description of Chuvashia's monuments of culture and history (Muratov, 2011).

Monuments of the national and regional significance of the city of Cheboksary are described in the first book. Graphic works in the album "Old

Cheboksary," by the artist E.I. Ivanov, reflect the monuments of wooden and stone architecture of the 16th-20th centuries (Suslov, 1895, 19-20).

Results and Discussion

The architecture of the city of Cheboksary has a long history (Trifonova, 2007). The first urban settlement on the territory of Cheboksary arose at the turn of the 13th-14th centuries. However, no architectural monuments of that time have been preserved since the buildings were wooden and numerous fires destroyed everything. Starting from the 1660s, the construction of stone buildings in Cheboksary mainly consisted of churches and merchant houses (Chuvash encyclopedia). Today, these architectural monuments have valuable historical significance. The technical condition of these buildings depends on their location and operation. Today in Cheboksary, several buildings and architectural monuments have retained their original appearance and are operational facilities (Goryunov, and Tubli, 1995). Among them, the only Art Nouveau building is the stone two-story mansion of Fyodor Efremov, which adorns and organically fits into the historical part of the city (Fig. 1) (Ivanov, 2015).

Today it is an art gallery of the Cheboksary Art Museum at 4 K. Ivanov Street (Fig. 2).



Fig. 1. Fyodor Efremov's mansion
Art Foreign



Fig. 2. Department of Russian
in Cheboksary

In 1914, a two-story red-brick building was built, standing on oak piles. It is the only example of traditional Russian architecture located on the central street of Cheboksary and differs from urban development. Despite its impressive age, it has retained its original appearance. This building was built as an elementary school for 150 people; in 1915, a hospital was located here, and in 1930 it was occupied by the first pedagogical institute of

Chuvashia (Fig. 3) (Muratov, 2011). Today, it is a museum of Chuvash embroidery (Fig. 4).



Fig. 3. Pedagogical Institute



Fig. 4. Museum of Chuvash embroidery

Due to historical events, the appearance of buildings with regional conservation status has changed. Sometimes these were external changes, but often the buildings were completely or rebuilt. One of the first stone buildings - a monument of constructivism built after 1917, was the Peasant's House (Fig. 5) (Muratov, 2011).

In different periods it housed a cinema and a hotel. Minor changes on the facades of the building mostly allowed the house to retain its original appearance (Bhaskaran, 2006). Today, this building houses the Cheboksary Diocesan Orthodox Theological School (Fig. 6).



Fig. 5. Peasant's house



Fig. 6. Diocesan Theological School

The building of the first pharmacy, which has retained its purpose for more than 150 years, was originally a one-story (Fig. 7) (Muratov, 2011). Then in 1928, the second floor was completed, and the existing buildings were combined (Fig. 8).



Fig. 7. The building of the first pharmacy **Fig. 8.** The building of the first pharmacy today

Although the state protected many historical buildings, the large-scale construction project of the Cheboksary hydroelectric power station in the late 1970s destroyed most of the historical sights and cultural heritage buildings of the Chuvash Republic, Chuvashia, in the city center. Buildings XVII - XVIII, located in the flood zone, were destroyed. The merchant houses of Reshetnikov, Dryablov, erontiev, Igumnov, and many others on Red Square were demolished (Fig. 9-12).



Fig. 9. House of Reshetnikov



Fig. 10. House of Dryablov



Fig. 11. House of Gerontiev



Fig. 12. Igumnov's house

However, there were attempts to preserve some of the monuments that were in the flood zone. It was decided to dismantle the buildings and move them to a new location. However, such an event is a rather complicated process; it is necessary not only to dismantle the building properly but also to take measures to preserve the original fragments of the building and decor. And if this is not done on time, then time will irrevocably take away the historical objects that have become unusable (Cheboksary, 2021).

Attempts to recreate the Kadomtsev House led to the new building not corresponding to the historical prototype. Today, the Kadomtsev House stands on the bay, which was built in the 1990s (Fig. 13) (Cultural heritage of Russia, Chuvashia). During the construction of this building, authentic fragments of the historical house of Kozma Kadomtsev were not used, which did not exist at that time.

The house was built according to the image and measurements of the House of Zelenshchikov, lost at the end of the 19th century, from the book «Monuments of Ancient Russian Architecture» (Fig. 14). And so a new object with a spectacular appearance appeared, which has nothing to do with a historical building (Rakhimov, 2006, 140-141).



Fig. 13. House of Kadomtsev

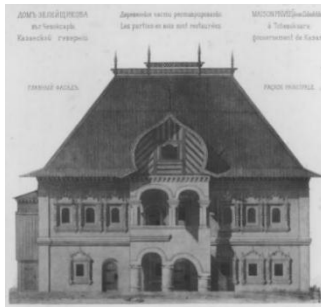


Fig. 14. Houses of Zelenshchikov

Conclusion

The architecture of the city of Cheboksary has been formed over more than five centuries, based on the history of the development of stone architecture, terrain features, historical events, building traditions, and materials. Today, about 70 cultural heritage sites, which have become an integral part of the life of citizens, have shaped the modern architectural appearance of the city (SamoverN.: Posthumous Adventures of Architectural Monuments in Cheboksary). Historical buildings attract researchers and

tourists and help them learn about their people's cultural traditions. They form a national identity (About the Republican target program "Culture of Chuvashia: 2010-2020"). The realities of modern urban planning are such that the rapid pace of urban development leads to the destruction of old areas. Insufficient attention to the preservation of historical sites leads to the fact that existing buildings are dilapidated. The new requirements for the construction of modern buildings are reflected in their appearance. Old buildings are rebuilt, facades are changed, and decorative elements are removed, which leads to the depersonalization and sometimes the destruction of the historical value of the building. Therefore, one of the essential tasks at the present stage of urban development is the preservation of architectural monuments.

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REVIVAL OF AN ANCIENT CHURCH IN THE POKROVSKOE VILLAGE, MARI EL REPUBLIC

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Abstract

This paper discusses areas of religious construction, specifically the temple in the Pokrovskoye village, Mari El Republic. The key idea is to analyze the territory and develop a general plan and a scheme of landscaping the territory. The material presented in the article may show new perspectives for further research. This material will be interesting for those who work in the field of architecture, reconstruction and restoration of buildings and structures.

Introduction

Creation is an important mission of man on Earth. This path is determined by the development and improvement of the human soul and its moral aspects. Through creation, a person not only develops, but society as a whole does, too. New discoveries appear, important global issues are resolved, the world is improved all around.

If we consider different professions, an architect and a builder perfectly meets this challenge. Even in ancient times people tried to use the most advanced technologies of their time in the construction of the architectural faces of temples, palaces, castles, and would pass their knowledge and skills to new generations so as to make the world more beautiful and interesting.

Material and methods of research

Temple architecture was very important in royal Russia. Churches and temples were built in all cities, beautiful monasteries amazed with their grandeur and impregnability. The spiritual life of the nation played an important role in the development of society. Faith gave people strength and direction. But many things have changed since the 1917 revolution. It was “the dark time” which affected religious life also. Temples were closed, monasteries were being destroyed. Many religious and historical buildings were converted into objects of inappropriate functions. This continued until the 90s of the 20th century. During this long time, many unique temples and churches were totally destroyed. Some of the buildings have been saved, but they remain in a very poor condition.

At the end of the 20th century, communities started to feel the urgency need of spiritual support. Difficult days and events in the country demanded the revival of spiritual values. There was a necessity to construct new temples and monasteries as well as to reconstruct existing ones.

For thirty years spiritual revival process in Russia has allowed people to return to the path of creation, improvement and development. Mari El Republic isn't an exception. The church in the village of Pokrovskoye, in the Gornomariysky district, Mari El Republic, is one such striking instance of revival.

The history of its creation begins in the end of the 16th century, when the Pokrovskoye village was founded. At first a wooden monastery was built. In 1813-1814 a stone Church of the Intercession was built instead of a wooden church in honor of the victory in the Patriotic War of 1812. Thanks to the monastery the village was also developing. It was becoming prosperous. Commerce, cattle-breeding and ship-building were well developed. At the beginning of October, people from all over the district and even from other regions came here for the Intercession Fairs. The parochial school and the country college which worked on base of local church also helped to promote village development. But, in 1939, the temple was closed, forgotten and abandoned (Fig. 1). Time did not spare the old village either.



Fig.1. Ruins of temple in Pokrovskoye village

Pokrovskoye, being on the outskirts of the district, which was cut off from the center by a lack of infrastructure, has been slowly fading away for decades. However, for the Russian hinterlands this is quite an ordinary phenomenon: in any region or republic, there are many abandoned or even completely disappeared villages.

But, unlike them, Pokrovskoe has been given a second chance. In the spring of 2015 with the blessing of John, archbishop of Yoshkar-Ola and Mari, the renaissance of the Intercession Church has begun. The plan for the reconstruction of the temple, fraternal building and outbuildings was created by architect V.V. Mamutkin and handed to the parish of the Intercession Church (Fig.2, Fig.3).

The temple was revived thanks to donations from parishioners and caring people, just as in the old days. People painstakingly restored not only a church, but a temple complex with a church-tower and refectory, a priest's house and a hotel for pilgrims.



Fig. 2. Restoration of the temple



Fig. 3. Church-tower's design

Today, construction is almost finished (Fig. 4, Fig. 5). Now the main task is landscaping the area around the temple. The unified face will be complete after flowers surround it and bloom again, trees and shrubs turn green, the freshness and murmur of water fill the air with their energy, and paved paths allow people to walk around the beautiful area and admire the architecture of temple complex.

Lots of measurements were carried out to obtain a total understanding of existing circumstances and elaborate territory research was carried out before the designing stage. Many photos and sketches of the temple were also made.



Fig. 4. Construction of the refectory Fig. 5. Church-towers building.

Results and issues

Based on the results of the research, a master plan for the development of the area was made (Fig. 6). The central axis of the composition was identified. There is a temple and an entrance group on it. Functional zones of various significance are formed around the central axis: a zone with a hedge, flower beds and a fountain; an economic zone with a garage; a spring and a church shop; an administrative and residential building. The distinguishing feature of the territory is the terrain. The main axis with the temple and the listed functional zones are located on a flat plane, along the Volga River. The terrain has a sharp elevation difference on the left side of the temple. It was decided that this part of the area would be used as a picturesque view point of the complex. An observation deck, priest's house, refectory and various walking paths are placed on the elevation of the relief. On the border of the relief drop there is a small decorative cave which will be interesting for children and adults.

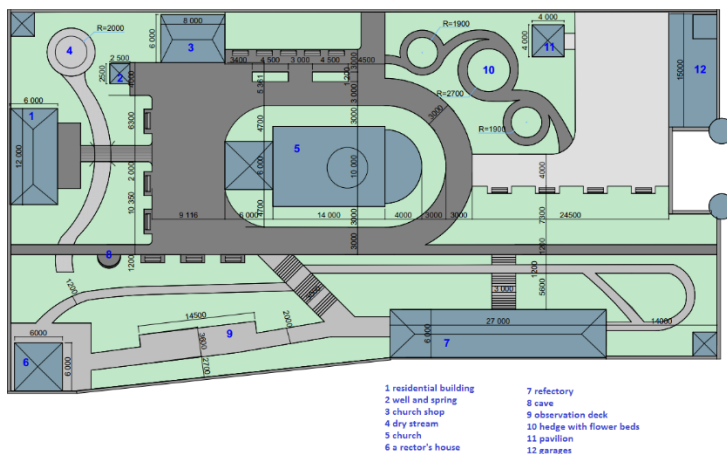


Fig. 6 Temple complex area master plan

Different types of plants, trees and shrubs are proposed to be used in the landscaping of the territory. The roads are supposed to be covered with paving slabs and stones (Fig. 7). A scheme for the placement of lighting fixtures has been developed for accessibility to the temple's area in the evening. The intention is to use both ordinary lampposts and decorative illumination of flower beds. Volunteer students from the Volga State University of Technology, “Volgatech”, are involved in the effort of realizing the landscaping project.

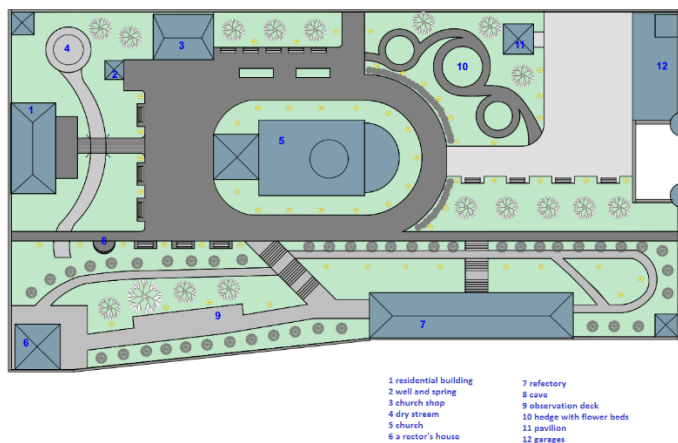


Fig. 7. Landscaping scheme

Conclusion

Since the temple complex is located in a beautiful picturesque place on the Volga River bank, there are plans to design an architectural illumination project. This would be an interesting addition for the progress of the region. Tourists passing along the river could be interested in visiting this place, so it could contribute to the establishment of tourist and pilgrimage routes. It would be a unique attraction for visitors from the Mari El Republic and also from other regions of the country, thus developing domestic tourism.

The grace of this place will allow the Pokrovskoye village to become a center of spiritual enlightenment for residents of the Gornomariysky district, but also for everyone in the Mari El Republic.

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MODERN TRENDS IN INTERIOR DESIGN

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Abstract

This paper discusses current trends and innovations in the world of interior design. The key idea is to describe popular styles in the design of premises for various purposes and to consider ways to improve the comfort of space. This material will be relevant for people specializing in the field of design, architecture and construction.

Introduction

Design has covered almost all spheres of life and art – styles are growing in abundance and, at the same time, the number of new designers, new ideas and trends is also growing. More recently, such pompous styles as modern and classic were at the peak of popularity - luxury, pomp, richness of color and form reigned everywhere, while now minimalism ascends the throne. Fashion trends in modern interiors are a combination of color schemes and laconic forms, and most interiors are built just on color accents, as well as on the contrast of textures. The technique of displaying the interests of the owner in the interior was often used, thanks to which it was possible to learn about a person as if you were reading an open book. But the mistake of most beginners and even experienced designers is the application of an abundance of newfangled trends in space, which leads to imbalance and stereotyping.

New trends in interiors fascinate the eye, and original incarnations defeat the uniformity of "perfect pictures". Comparing designs of the late 20th - early 21st century to those of the present reveals, of course, a huge differences. At present, simplicity in colors, shapes, volumes and content

rules all. Contemporary interior designers are moving away from "congestion" of the premises with an abundance of furniture and accessories and are instead focusing on organizing space with more airiness.

The house, in the perception of designers in 2022, becomes not only a place of recreation, but also a workspace and a place for receiving guests. As such it should be comfortable, convenient and transformabl. It is from here that the desire for minimalism appears, where there are no frills, and each item and element of the interior is located in its clear place. For the design of the premises, materials are selected that give naturalness, such as raw stone, textured tree and so on. Thus, the main trend is environmental friendliness. To maintain this topic and preserve health, specialists recommend abandoning plastic and chemical items that emit harmful fumes - which is why most people are leaving stretch ceilings in favor of environmentally friendly materials.

Material and methods of research

Many people try to follow interior style, dictated by fashion. The most popular at this stage are loft, minimalism, provence, modern, fusion and contemporary, among others.

The standard loft, which features high ceilings, large windows, untreated rough wall surfaces and open communications, has been popular for several years. This is the style of non-standard, free and creative people independent of other people's opinions. Among the main distinguishing materials are brick, concrete, wood and glass. Key colors are brick, a palette of gray and white. Paintings and sculptures are suitable as decor. Among the main recommendations is the use of a large number of lighting fixtures: on the ceiling, hung along walls, floor lamps on tables and shelves, lamps on long cords, diode ribbons, backlighting with spotlights (Fig. 1).



Fig. 1. Loft-style interior

Minimalism is the second most popular style. Simple, beautiful, reliable, comfortable and multifunctional. It does not forbid creative ideas, nor does it limit anything. It allows you to remove everything that is of no use so as not to litter life and one's own consciousness. To create this effect, only natural materials are used: decorative stone, wood, brick, cotton, linen, leather. The ceiling is often covered in paint and plain wallpaper is glued onto the walls. The floor is usually parquet, laminate and porcelain stoneware. The leading shades are: white, light beige, gray and brown. There is practically no textile décor - only the most necessary (Fig. 2).



Fig. 2. Minimalist interior.

Provence - romantic, light, French. Very cozy, soft, light and floral. All materials are natural. Stone floor or tiles, wallpaper - light with the image of flowers or plaster of one shade. The painted ceiling is decorated with wooden beams. It has a lot of light and warmth. Airy textiles, with soft floral patterns. The decor is openwork and intricate. Provence style interiors are filled with sincerity, tenderness and sweet beauty (Fig. 3).